SECTION EC
ENGINE CONTROL SYSTEM

CONTENTS

MR16DDT

HR16DE

PRECAUTION

PRECAUTIONS

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

INFOID:0000000006548505

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the “SRS AIR BAG” and “SEAT BELT” of this Service Manual.

The vehicle may be equipped with a passenger air bag deactivation switch. Because no rear seat exists where a rear-facing child restraint can be placed, the switch is designed to turn off the passenger air bag so that a rear-facing child restraint can be used in the front passenger seat. The switch is located in the center of the instrument panel, near the ashtray. When the switch is turned to the ON position, the passenger air bag is enabled and could inflate for certain types of collision. When the switch is turned to the OFF position, the passenger air bag is disabled and will not inflate. A passenger air bag OFF indicator on the instrument panel lights up when the passenger air bag is switched OFF. The driver air bag always remains enabled and is not affected by the passenger air bag deactivation switch.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the “SRS AIR BAG”.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**
- **The vehicle may be equipped with a passenger air bag deactivation switch which can be operated by the customer. When the passenger air bag is switched OFF, the passenger air bag is disabled and will not inflate. When the passenger air bag is switched ON, the passenger air bag is enabled and could inflate for certain types of collision. After SRS maintenance or repair, make sure the passenger air bag deactivation switch is in the same position (ON or OFF) as when the vehicle arrived for service.**

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

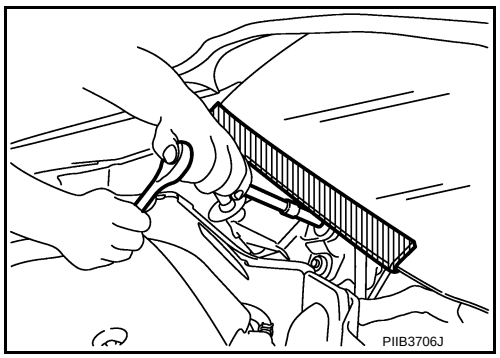
WARNING:

- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.**

Precaution for Procedure without Cowl Top Cover

INFOID:0000000006548517

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



On Board Diagnostic (OBD) System of Engine and CVT

INFOID:0000000006417057

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.

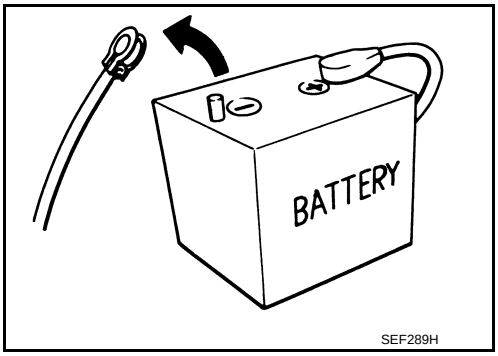
CAUTION:

- **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-4, "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:0000000006417058

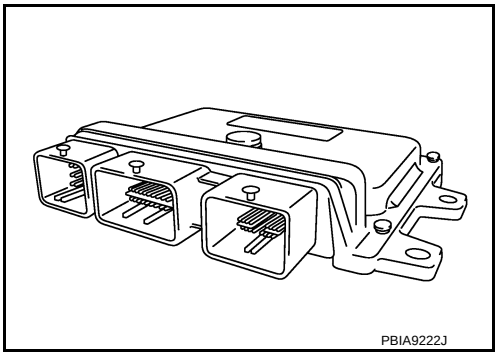
- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because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



SEF289H

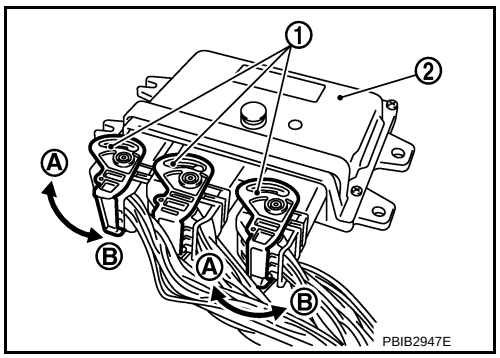
- **Do not disassemble ECM.**
- **If a battery cable is disconnected, the memory will return to the ECM value.**
  The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do 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**

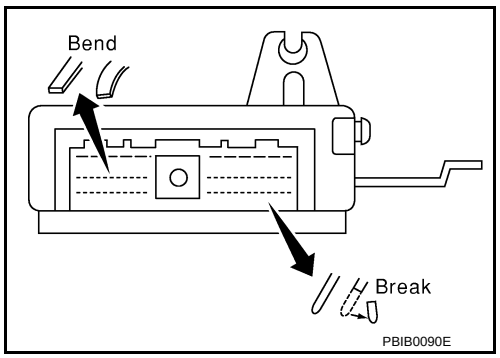

PBIA9222J

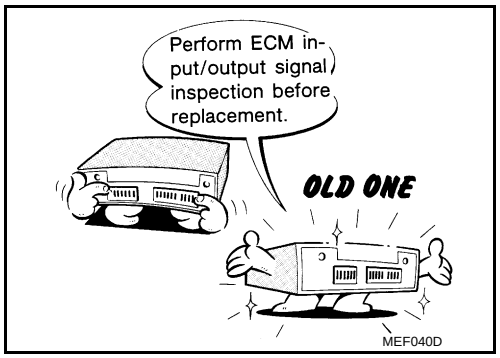
- **When connecting ECM harness connector (1), fasten (B) it securely with a lever as far as it will go as shown in the figure.**

2. ECM
A. Loosen

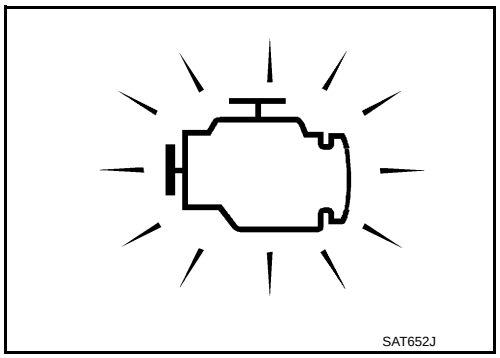


- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- **Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.**
- **Keep engine control system parts and harness dry.**
- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-90, "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).**

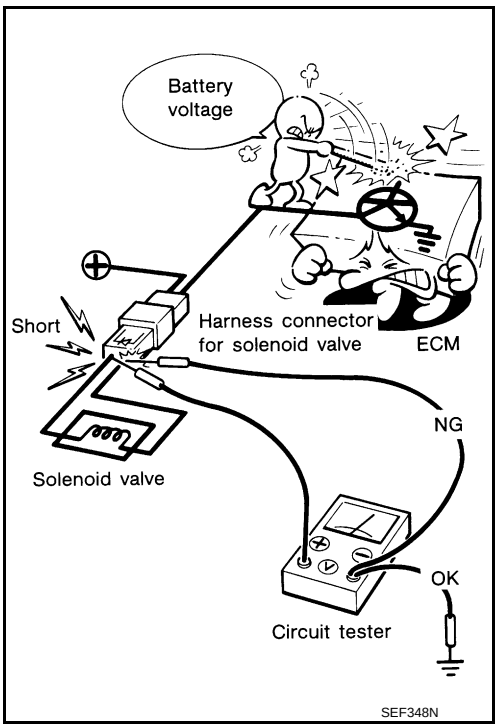




- **After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check.** The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.

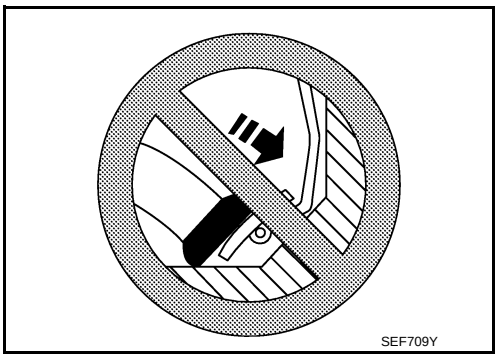


- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.

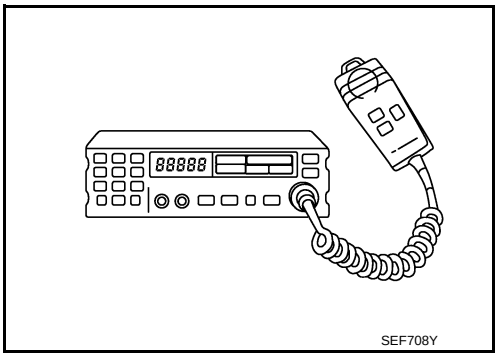


- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**

- **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.**

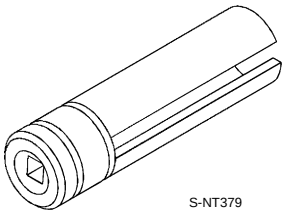
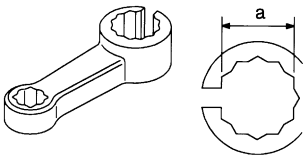
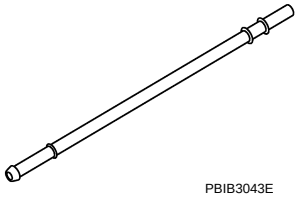


PREPARATION

PREPARATION

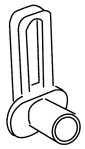
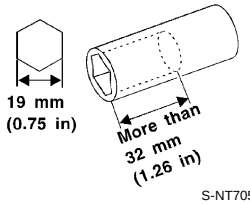
Special Service Tools

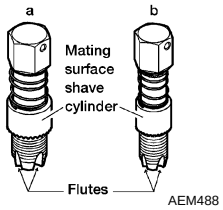
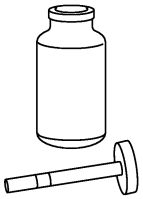
INFOID:0000000006417059

Tool number Tool name	Description
KV10117100 Heated oxygen sensor wrench  S-NT379	Loosening or tightening heated oxygen sensor with 22 mm (0.87 in) hexagon nut
KV10114400 Heated oxygen sensor wrench  S-NT636	Loosening or tightening heated oxygen sensor 2 **a: 22 mm (0.87 in)**
KV10118400 Fuel tube adapter  PBIB3043E	Measuring fuel pressure

Commercial Service Tools

INFOID:0000000006417060

Tool name	Description
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	Description
Oxygen sensor thread cleaner  AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor** **b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor**
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)  S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

SYSTEM DESCRIPTION

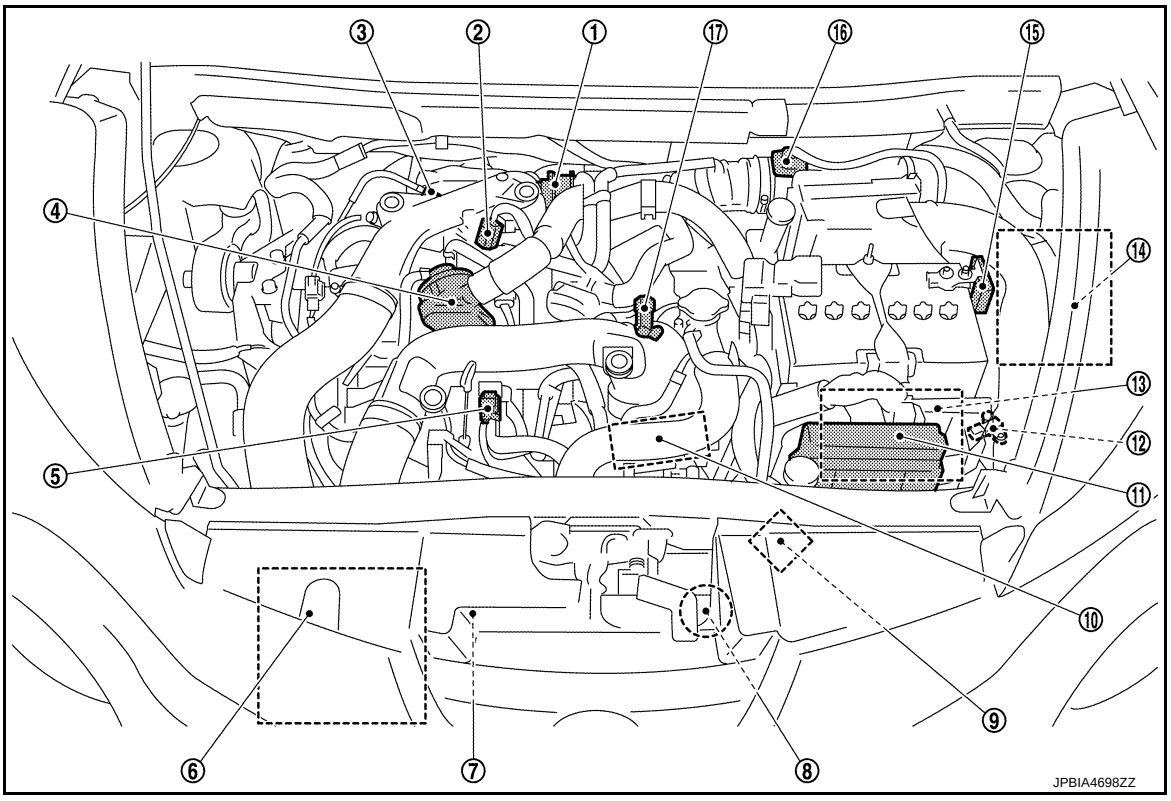
COMPONENT PARTS

ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : Component Parts Location

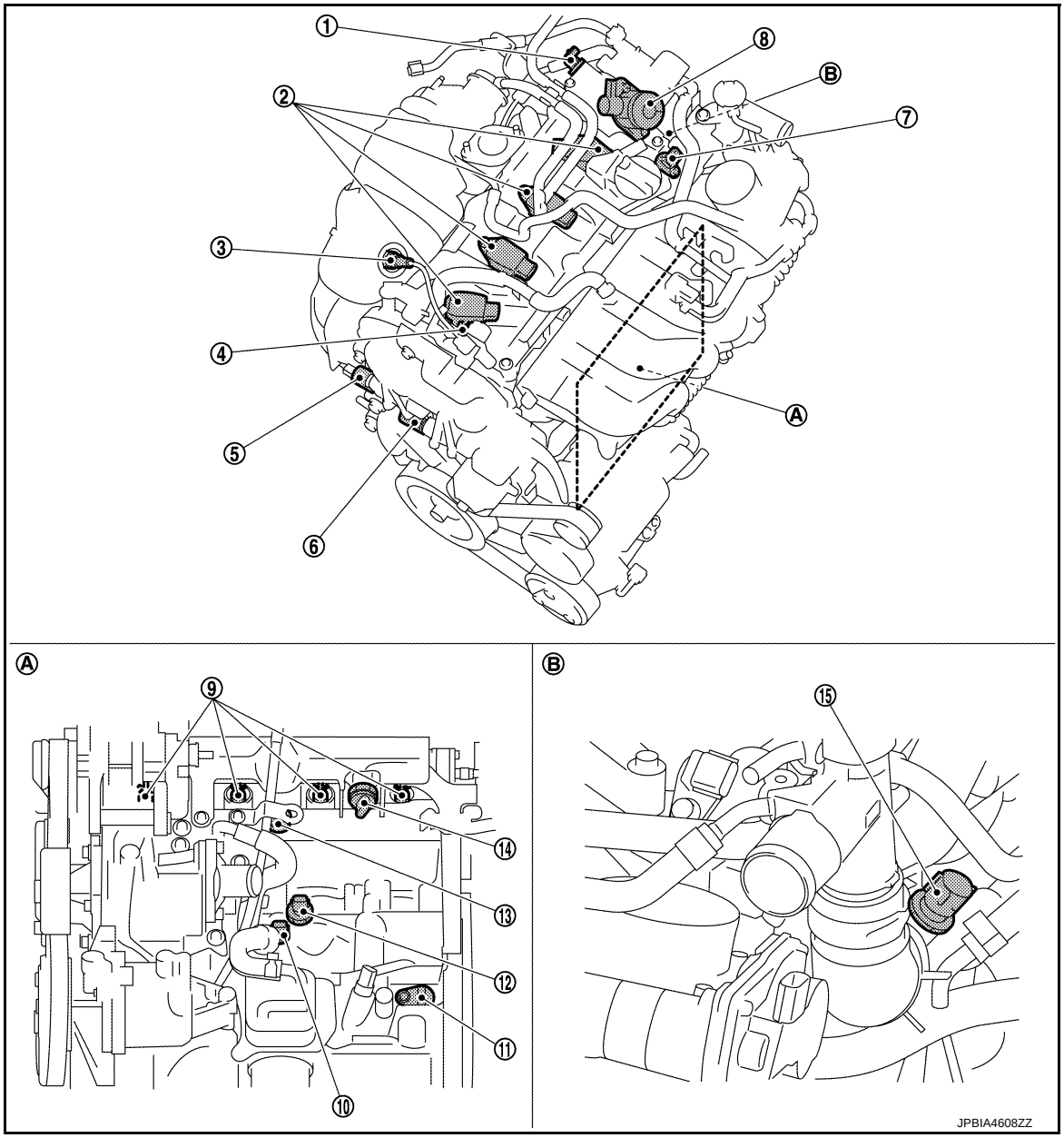
INFOID:0000000006440377

ENGINE ROOM COMPARTMENT



1.	Boost control actuator	2.	Turbocharger boost control solenoid valve	3.	A/F sensor 1
4.	Recirculation valve	5.	EVAP canister purge volume control solenoid valve	6.	Inter cooler
7.	Refrigerant pressure sensor Refer to HAC-12, "Component Parts Location".	8.	Cooling fan motor	9.	Cooling fan control module
10.	Electric throttle control actuator (with built in throttle position sensor and throttle control motor)	11.	Relay box • Cooling fan relay • Fuel injector relay • Fuel pump relay	12.	Atmospheric pressure sensor
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)		

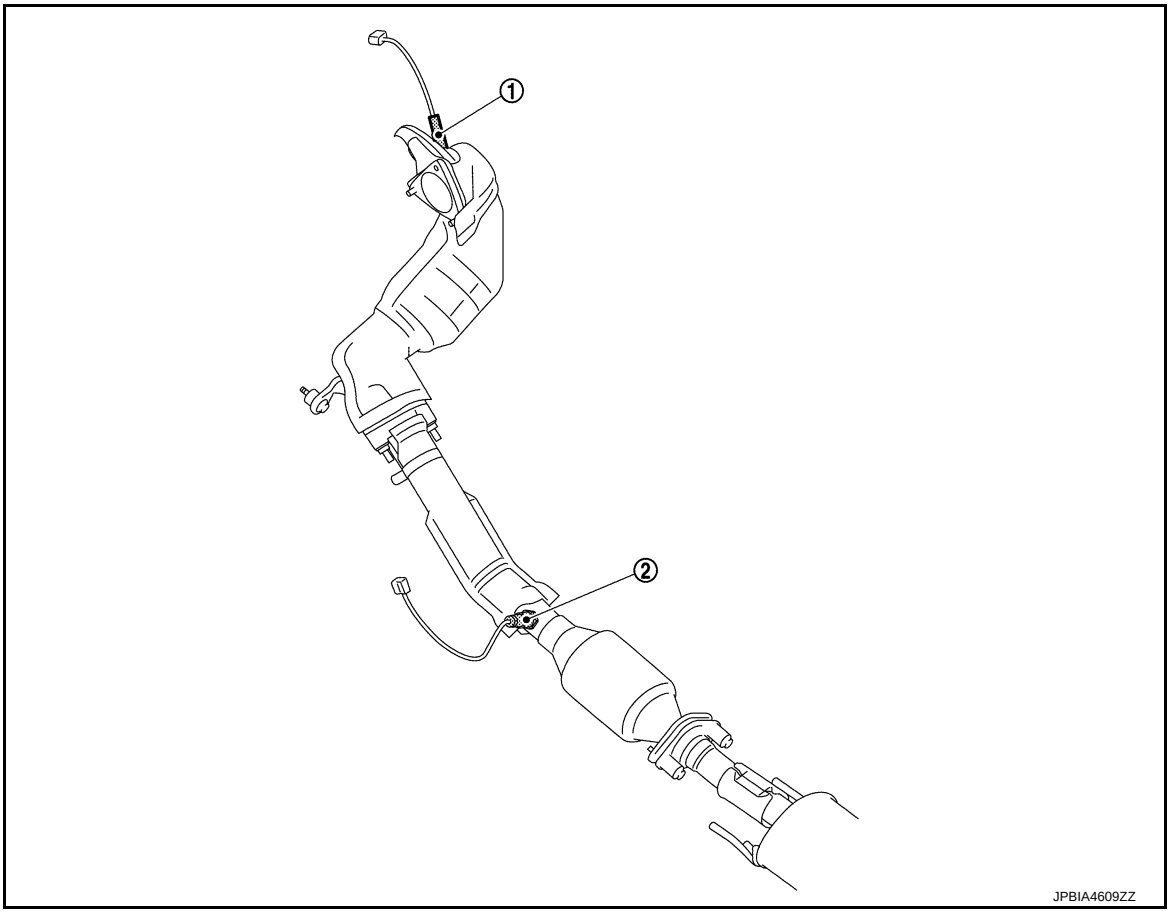
ENGINE COMPARTMENT



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

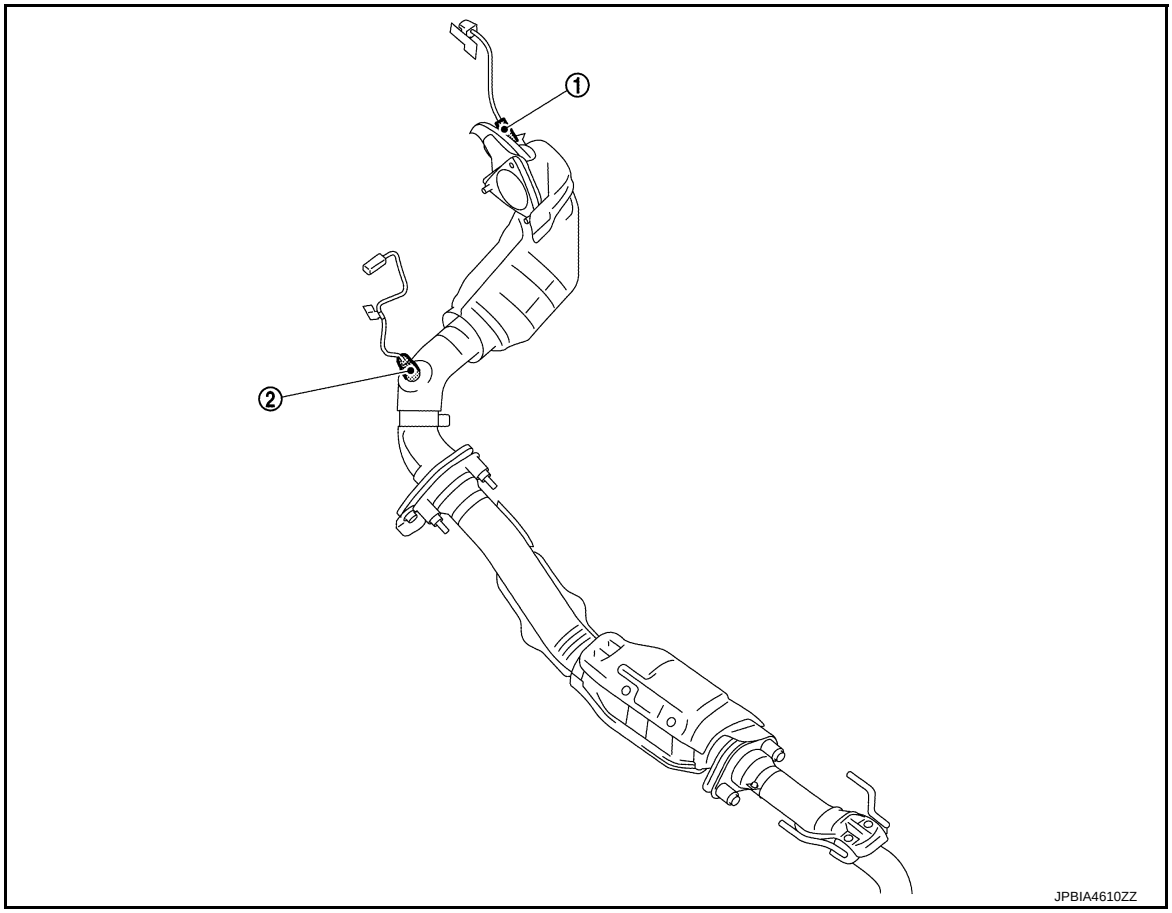
EXHAUST COMPARTMENT

2WD



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

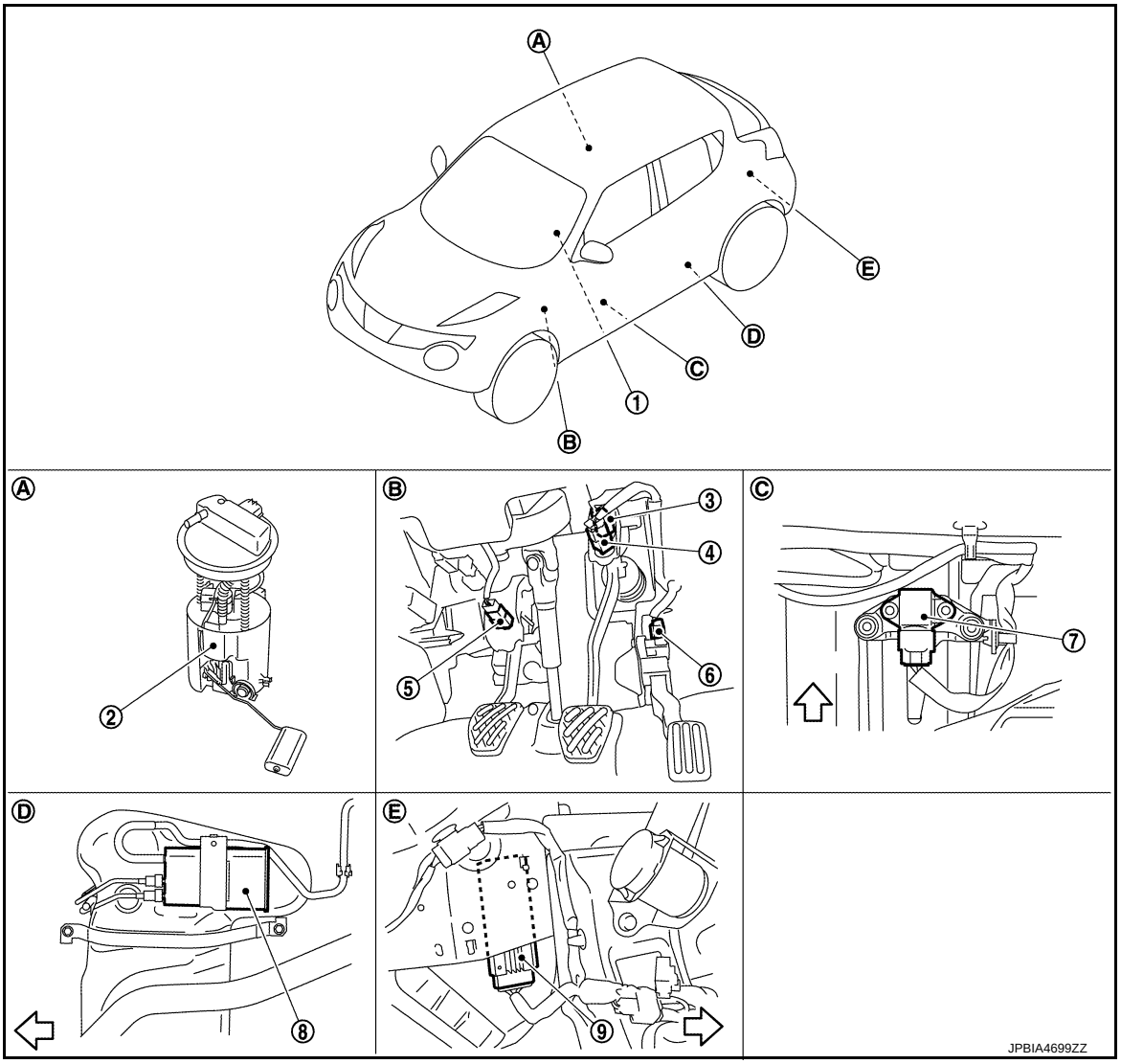
4WD



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

BODY COMPARTMENT

2WD

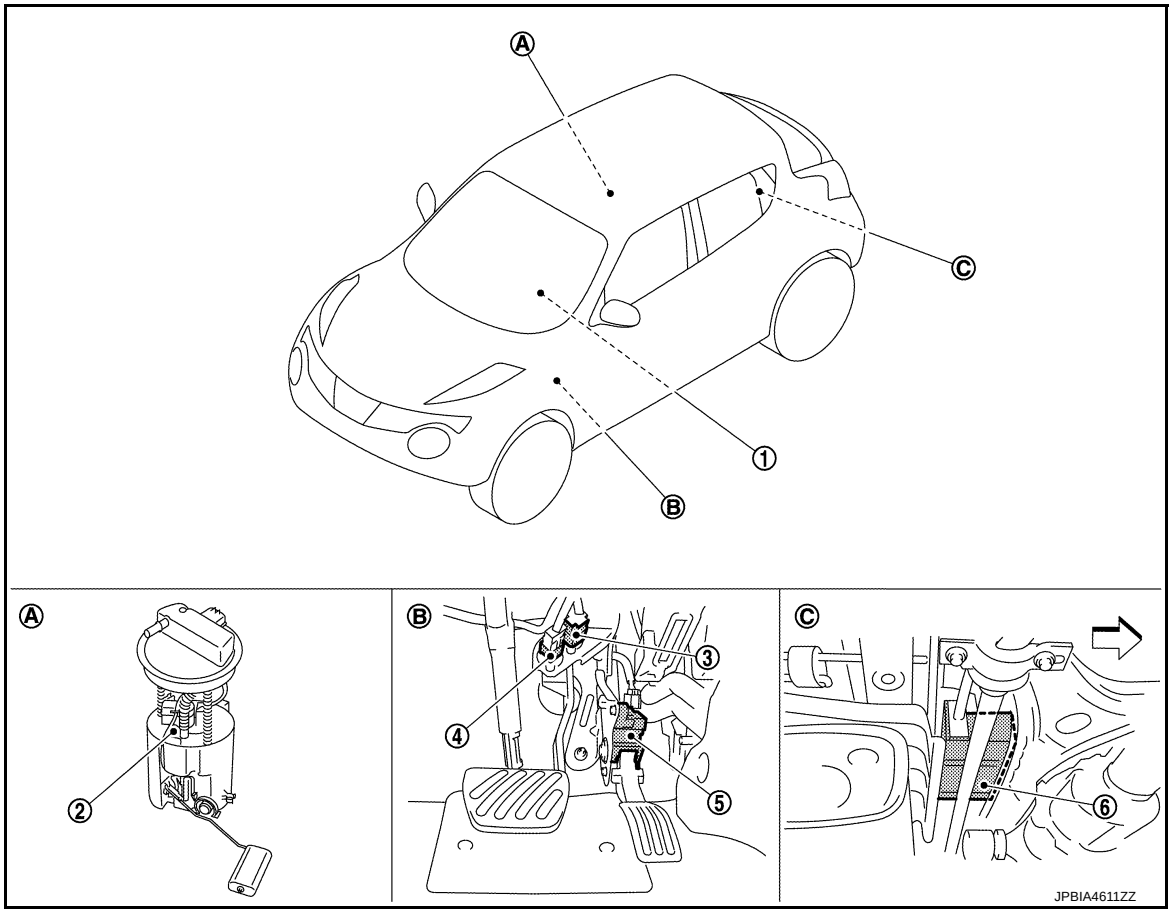


1. ASCD steering switch
2. Fuel level sensor unit, fuel filter and fuel pump assembly
3. Brake pedal position switch
4. Stop lamp switch
5. Clutch pedal position switch
6. Accelerator pedal position sensor
7. G sensor
8. EVAP canister
9. Fuel pump control module (FPCM)

A. Under of right side second seat
B. Periphery of pedals
C. Under of driver's seat
D. Under of left side fuel tank
E. Behind the luggage side lower finisher LH

⇦ : Vehicle front

4WD



1. ASCD steering switch
2. Fuel level sensor unit, fuel filter and fuel pump assembly
3. Stop lamp switch
4. Brake pedal position switch
5. Accelerator pedal position sensor
6. EVAP canister
A. Under of right side second seat
B. Periphery of pedals
C. Over the rear final drive assembly
⇦ : Vehicle front

ENGINE CONTROL SYSTEM : Component Description

INFOID:0000000006416776

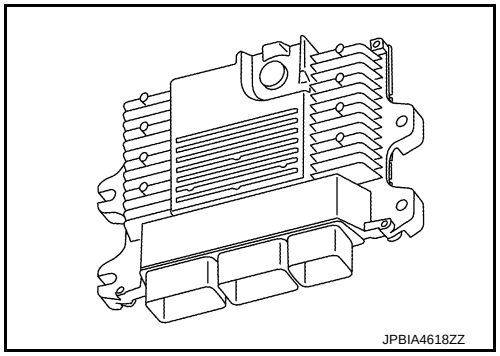
Component	Reference
ECM	EC-31, "ECM"
Accelerator pedal position sensor	EC-32, "Accelerator Pedal Position Sensor"
Electric throttle control actuator	EC-32, "Electric Throttle Control Actuator"
Throttle control motor	
Throttle position sensor	
Ignition coil with power transistor	EC-33, "Ignition Coil With Power Transistor"
Fuel injector	EC-33, "Fuel Injector"
High pressure fuel pump	EC-33, "High Pressure Fuel Pump"
Fuel rail pressure sensor	EC-34, "Fuel Rail Pressure Sensor"
Low pressure fuel pump	EC-35, "Low Pressure Fuel Pump"
Fuel pump control module (FPCM)	EC-35, "Fuel Pump Control Module (FPCM)"
Mass air flow sensor	EC-35, "Mass Air Flow Sensor (With Intake Air Temperature Sensor 1)"
Intake air temperature sensor 1	

Component	Reference
Turbocharger	EC-36, "Turbocharger"
Boost control actuator	
Turbocharger boost control solenoid valve	
Turbocharger boost sensor	EC-36, "Turbocharger Boost Sensor (With Intake Air Temperature Sensor 2)"
Intake air temperature sensor 2	
Engine coolant temperature sensor	EC-37, "Engine Coolant Temperature Sensor"
Crankshaft position sensor	EC-37, "Crankshaft Position Sensor (POS)"
Camshaft position sensor	EC-38, "Camshaft Position Sensor (PHASE)"
Intake valve timing control solenoid valve	EC-38, "Intake Valve Timing Control Solenoid Valve"
Exhaust valve timing control position sensor	EC-39, "Exhaust Valve Timing Control Position Sensor"
Exhaust valve timing control solenoid valve	EC-39, "Exhaust Valve Timing Control Solenoid Valve"
Air fuel ratio (A/F) sensor 1	EC-39, "Air Fuel Ratio (A/F) Sensor 1"
Heated oxygen sensor 2	EC-40, "Heated Oxygen Sensor 2"
Atmospheric pressure sensor	EC-40, "Atmospheric Pressure Sensor"
Knock sensor	EC-40, "Knock Sensor"
Engine oil pressure sensor	EC-41, "Engine Oil Pressure Sensor"
Engine oil temperature sensor	EC-41, "Engine Oil Temperature Sensor"
Cooling fan	EC-41, "Cooling Fan"
EVAP canister purge volume control solenoid valve	EC-42, "EVAP Canister Purge Volume Control Solenoid Valve"
Battery current sensor	EC-42, "Battery Current Sensor (With Battery Temperature Sensor)"
Battery temperature sensor	
Malfunction indicator lamp (MIL)	EC-43, "Malfunction Indicator lamp (MIL)"
Oil pressure warning lamp	EC-43, "Oil Pressure Warning Lamp"
Refrigerant pressure sensor	EC-43, "Refrigerant Pressure Sensor"
Stop lamp switch	EC-43, "Stop Lamp Switch & Brake Pedal Position Switch"
Brake pedal position switch	
Clutch pedal position switch	EC-43, "Clutch Pedal Position Switch"
ASCD steering switch	EC-44, "ASCD Steering Switch"
Information display	EC-44, "Information Display"

ECM

INFOID:0000000006416902

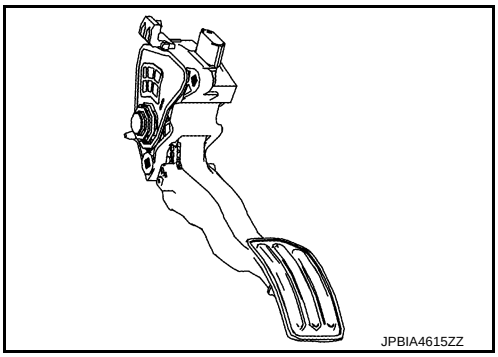
The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



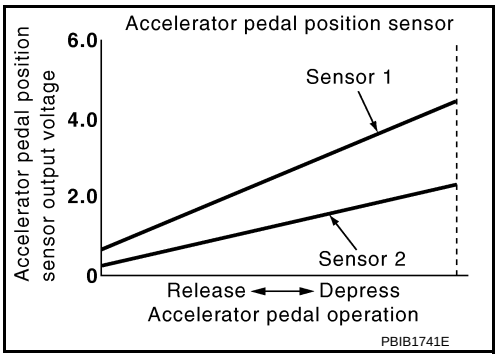
Accelerator Pedal Position Sensor

INFOID:0000000006416987

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.

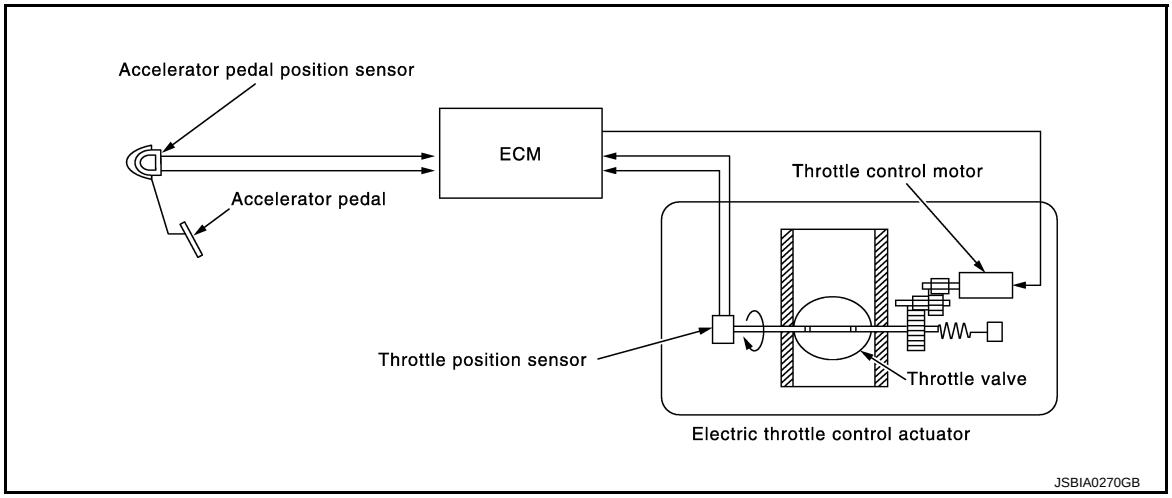


Electric Throttle Control Actuator

INFOID:0000000006416834

OUTLINE

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



THROTTLE CONTROL MOTOR RELAY

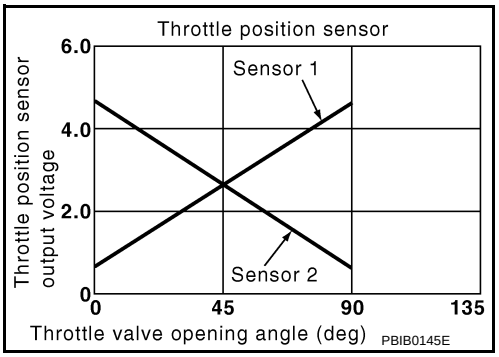
Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the 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

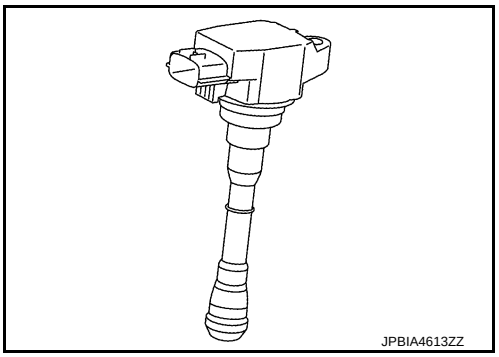
The throttle position sensor responds to the throttle valve movement. The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the 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:0000000006417270

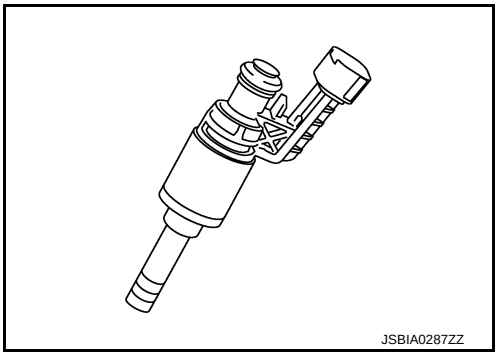
The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.



Fuel Injector

INFOID:0000000006417265

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).

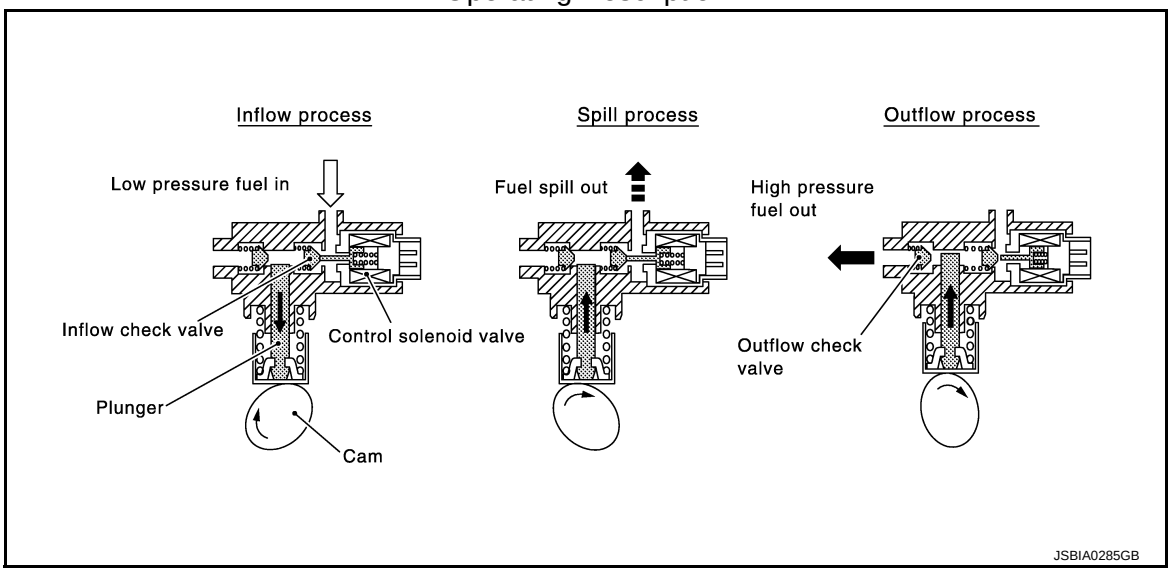


High Pressure Fuel Pump

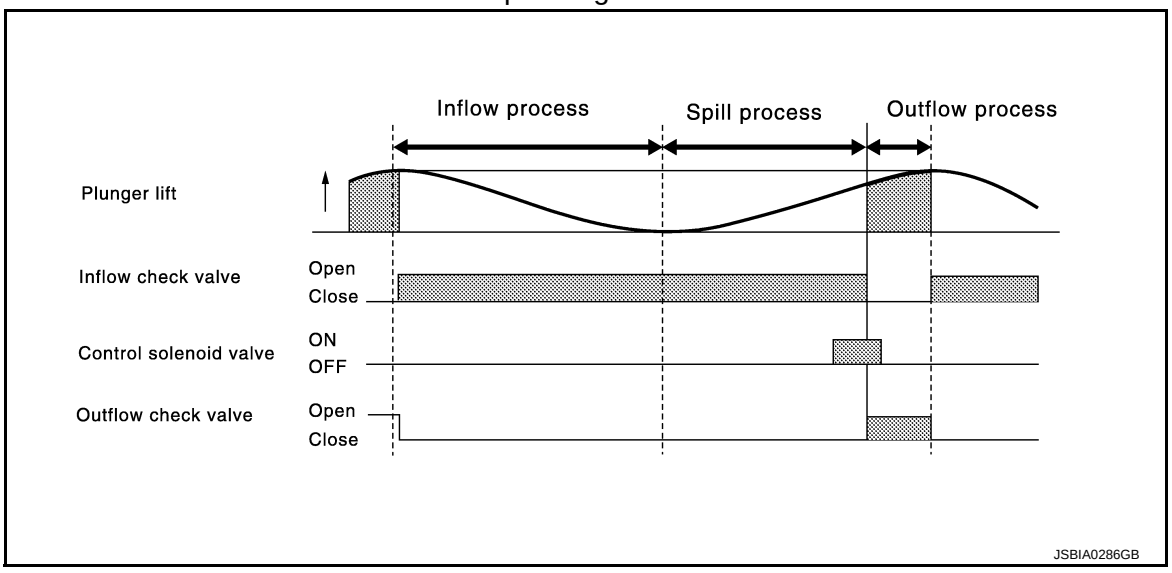
INFOID:0000000006417267

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



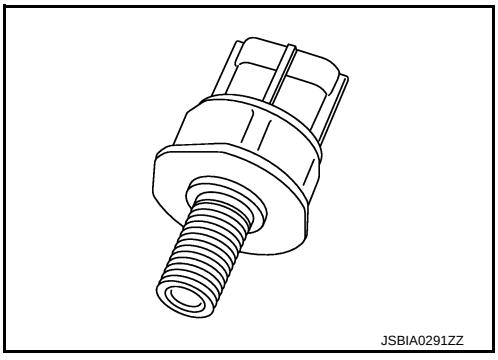
Operating Chart



Fuel Rail Pressure Sensor

INFOID:0000000006417269

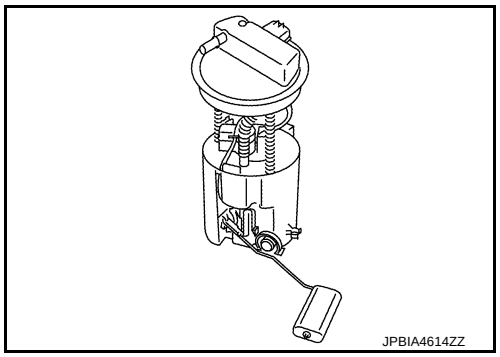
The fuel rail pressure (FRP) sensor is placed to the fuel rail and measures fuel pressure in the fuel rail. The sensor transmits voltage signal to the ECM. As the pressure increases, the voltage rises. The ECM controls the fuel pressure in the fuel rail by operating high pressure fuel pump. The ECM uses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



Low Pressure Fuel Pump

INFOID:0000000006417274

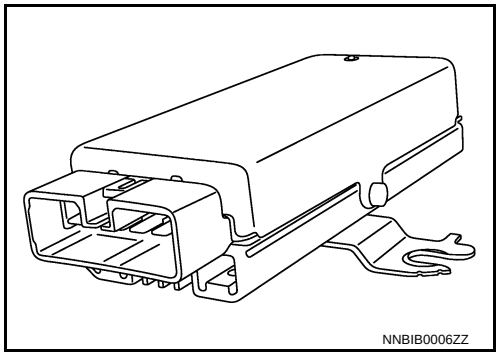
The low pressure fuel pump is integrated with a fuel pressure regulator and a fuel filter. This pump is build into the fuel tank.



Fuel Pump Control Module (FPCM)

INFOID:0000000006417268

The fuel pump control module (FPCM) controls the discharging volume of the fuel pump by transmitting the FPCM control signals (Low/Mid/High) depending on driving conditions.

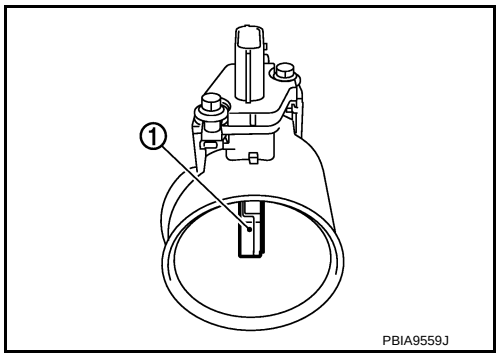


Mass Air Flow Sensor (With Intake Air Temperature Sensor 1)

INFOID:0000000006416822

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.



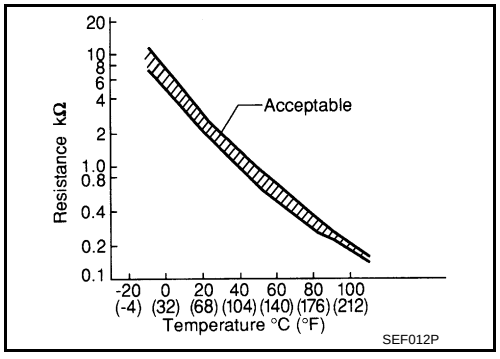
INTAKE AIR TEMPERATURE SENSOR 1

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

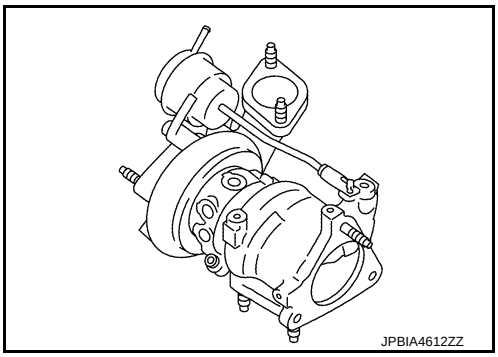
*: These data are reference values and are measured between ECM terminals.



Turbocharger

INFOID:0000000006426476

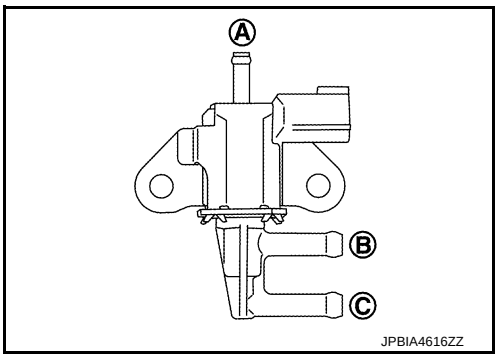
Turbocharger boost is controlled by adjusting the pressure to the diaphragm of the boost control actuator.



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

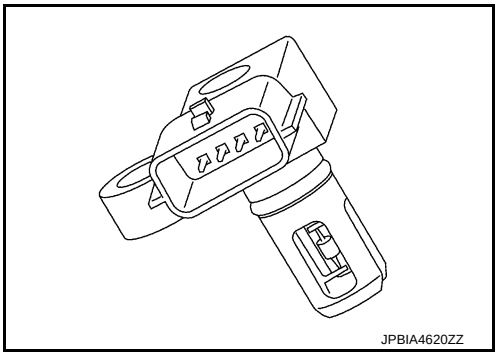


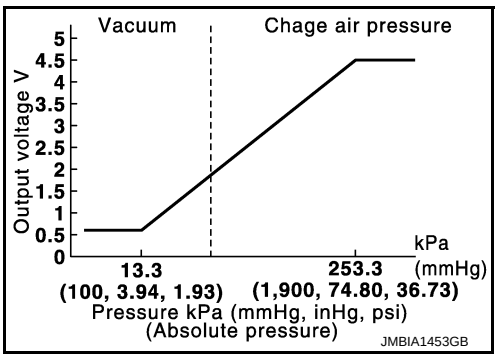
Turbocharger Boost Sensor (With Intake Air Temperature Sensor 2)

INFOID:0000000006440380

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.





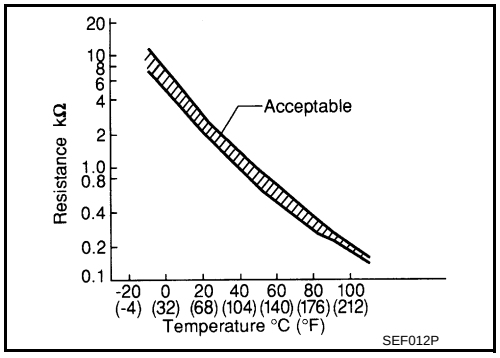
INTAKE AIR TEMPERATURE SENSOR 2

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

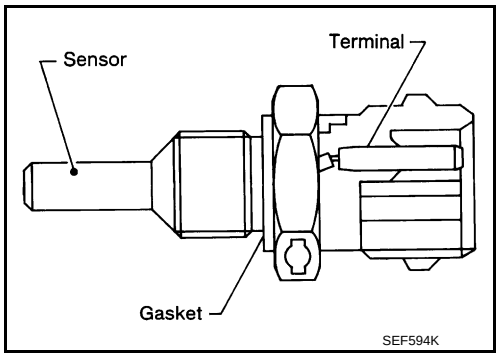
*: These data are reference values and are measured between ECM terminals.



Engine Coolant Temperature Sensor

INFOID:0000000006416830

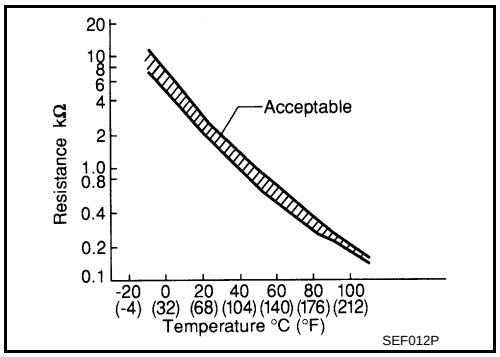
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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

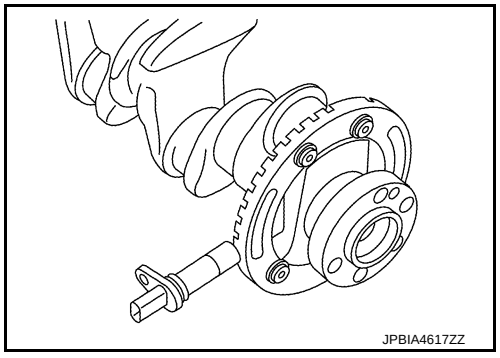
*: These data are reference values and are measured between ECM terminals.



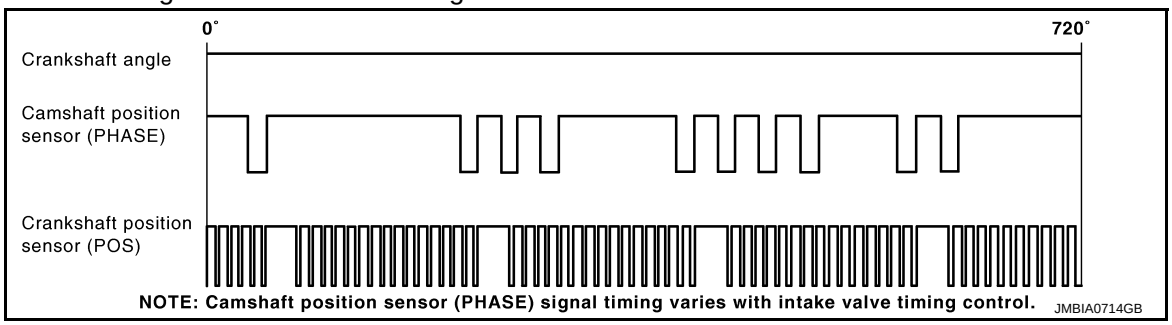
Crankshaft Position Sensor (POS)

INFOID:0000000006416883

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.



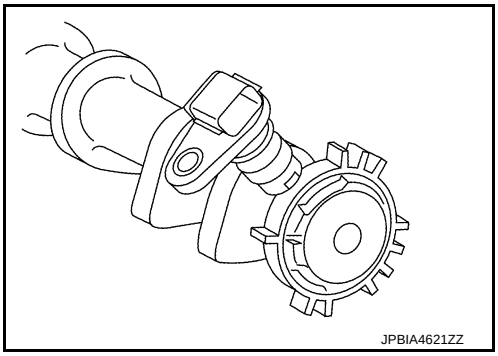
ECM receives the signals as shown in the figure.



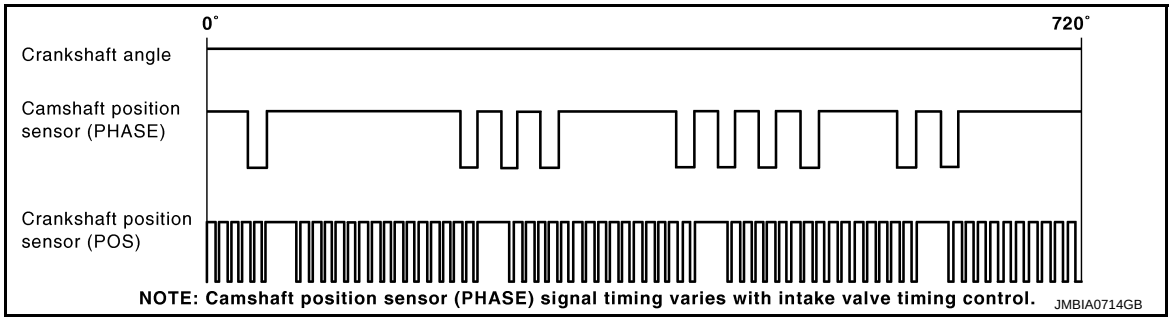
Camshaft Position Sensor (PHASE)

INFOID:0000000006416887

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.



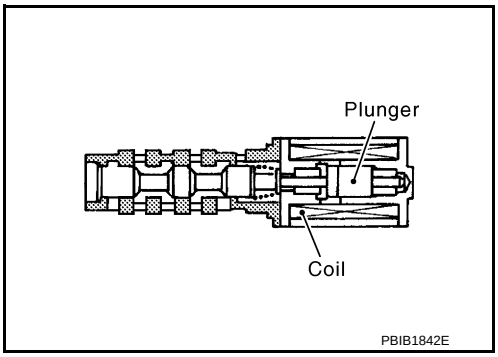
ECM receives the signals as shown in the figure.



Intake Valve Timing Control Solenoid Valve

INFOID:0000000006417283

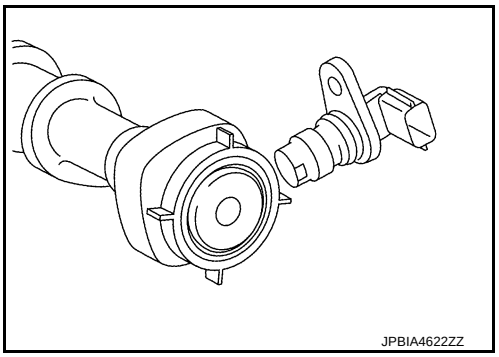
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.
The longer pulse width advances valve angle.
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.



Exhaust Valve Timing Control Position Sensor

INFOID:0000000006417263

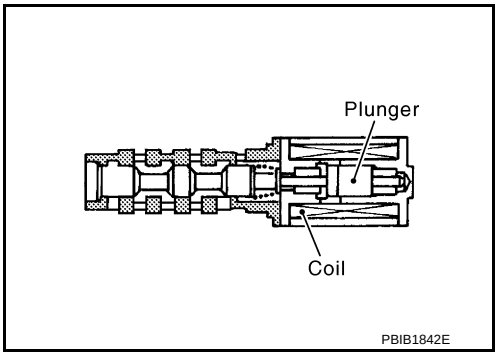
Exhaust valve timing control position sensor detects the protrusion of the signal plate installed to the exhaust camshaft front end.
This sensor signal is used for sensing a position of the exhaust camshaft.
This sensor uses a Hall IC.
Based on the position of the exhaust camshaft, ECM controls exhaust valve timing control solenoid valve to optimize the shut/open timing of exhaust valve for the driving condition.


JPBIA4622ZZ

Exhaust Valve Timing Control Solenoid Valve

INFOID:0000000006417264

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.



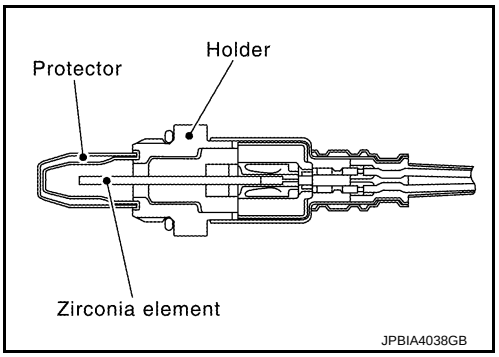
PBIB1842E

Air Fuel Ratio (A/F) Sensor 1

INFOID:0000000006417257

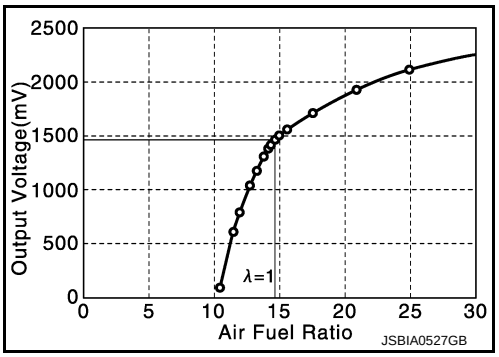
DESCRIPTION

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 $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.
The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



JPBIA4038GB

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).



JSBIA0527GB

A/F SENSOR 1 HEATER

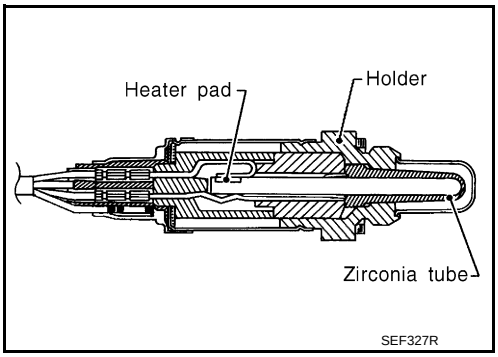
A/F sensor 1 heater is integrated in the sensor.
The ECM performs ON/OFF duty control of the A/F sensor 1 heater corresponding to the engine operating condition to keep the temperature of A/F sensor 1 element within the specified range.

Heated Oxygen Sensor 2

INFOID:0000000006417266

DESCRIPTION

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



HEATED OXYGEN SENSOR 2 HEATER

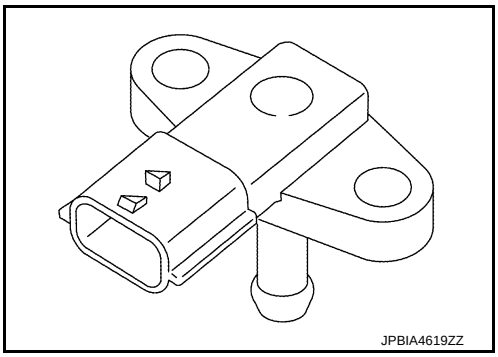
Heated oxygen sensor 2 heater is integrated in the sensor.
The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

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

Atmospheric Pressure Sensor

INFOID:0000000006417433

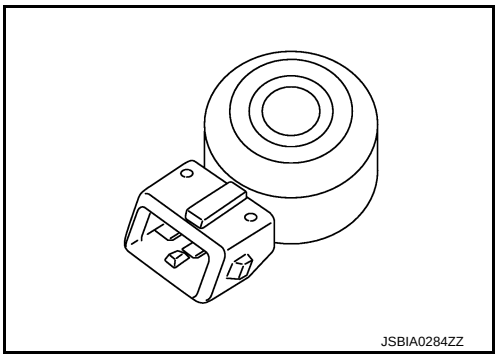
The atmospheric pressure sensor is placed at ECM bracket. It detects atmospheric pressure and sends the voltage signal to the ECM.
The sensor uses a silicon diaphragm which is sensitive to the change in pressure. As the pressure increases, the voltage rises.



Knock Sensor

INFOID:0000000006417272

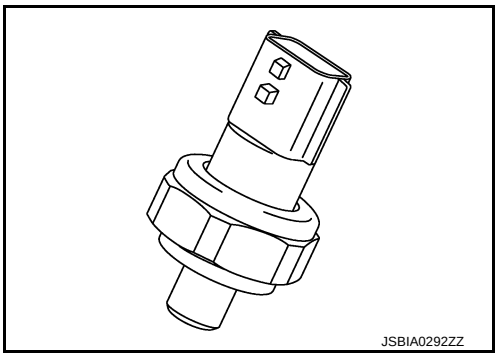
The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.



Engine Oil Pressure Sensor

INFOID:0000000006417261

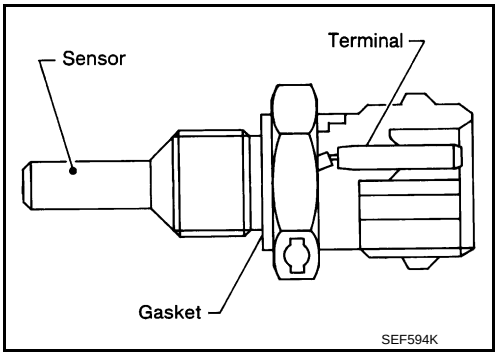
The engine oil pressure (EOP) sensor is detects engine oil pressure and transmits a voltage signal to the ECM.



Engine Oil Temperature Sensor

INFOID:0000000006417262

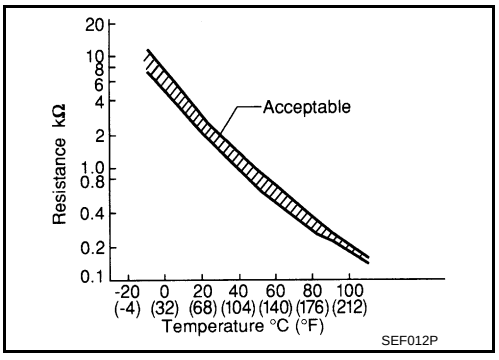
The engine oil temperature sensor is used to detect the engine oil temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine oil temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance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



<Reference data>

Engine oil temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260
110 (230)	0.6	0.143 - 0.153

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



Cooling Fan

INFOID:0000000006578463

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.

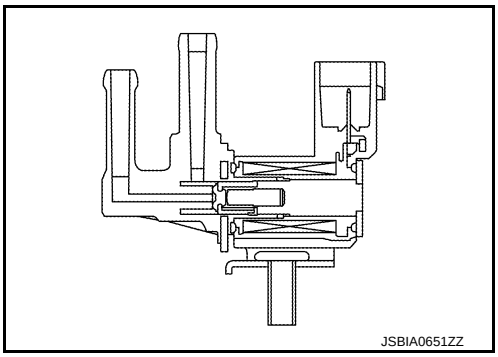
COOLING FAN MOTOR

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:0000000006416894

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.

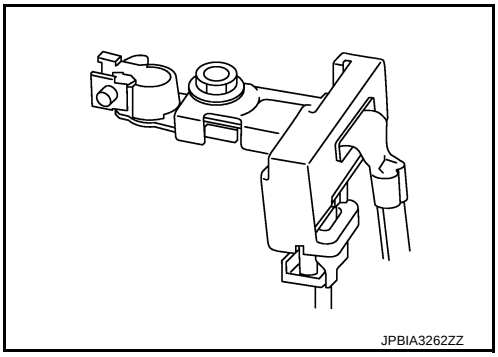


Battery Current Sensor (With Battery Temperature Sensor)

INFOID:0000000006418056

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-9, "POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : System Description (Gasoline Engine Models)".



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.

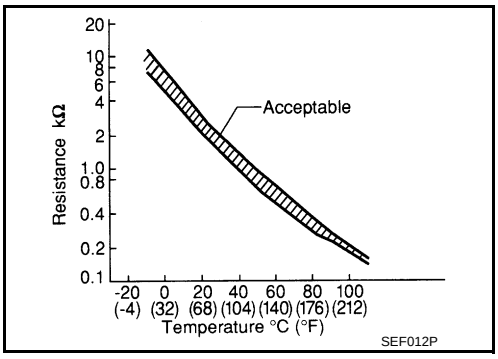
BATTERY TEMPERATURE SENSOR

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

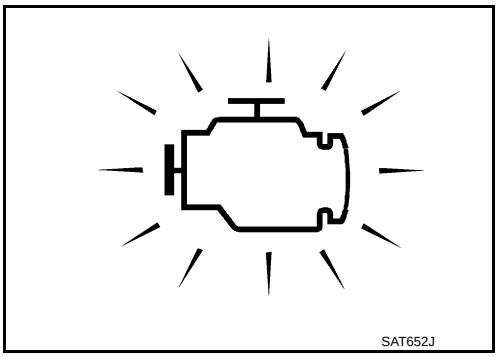
*: These data are reference values and are measured between battery temperature sensor signal terminal and sensor ground.



Malfunction Indicator lamp (MIL)

INFOID:0000000006417275

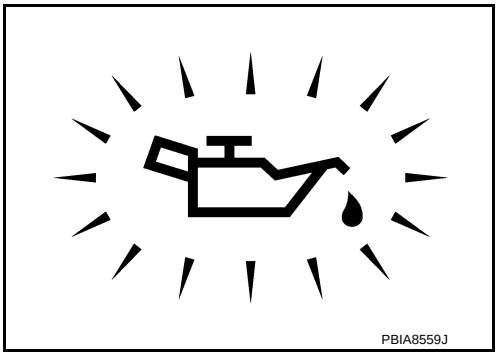
Malfunction Indicator lamp (MIL) is located on the combination meter.
MIL will illuminate when the ignition switch is turned ON without the engine running. This is a bulb check.
When the engine is started, MIL should turn OFF. If the MIL remains illuminated, the on board diagnostic system has detected an engine system malfunction.
For details, refer to EC-79, "DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)".



Oil Pressure Warning Lamp

INFOID:0000000006748137

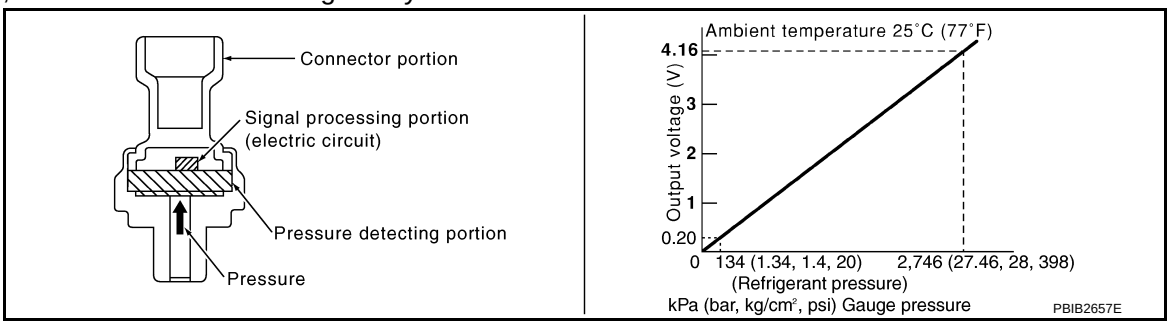
Oil pressure warning lamp is located on the combination meter.
It indicates the low pressure of the engine oil and the malfunction of the engine oil pressure system.
Combination meter turns the oil pressure warning lamp ON/OFF according to the oil pressure warning lamp signal received from ECM via CAN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



Refrigerant Pressure Sensor

INFOID:0000000006417279

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:0000000006440378

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:0000000006417440

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:0000000006440379

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

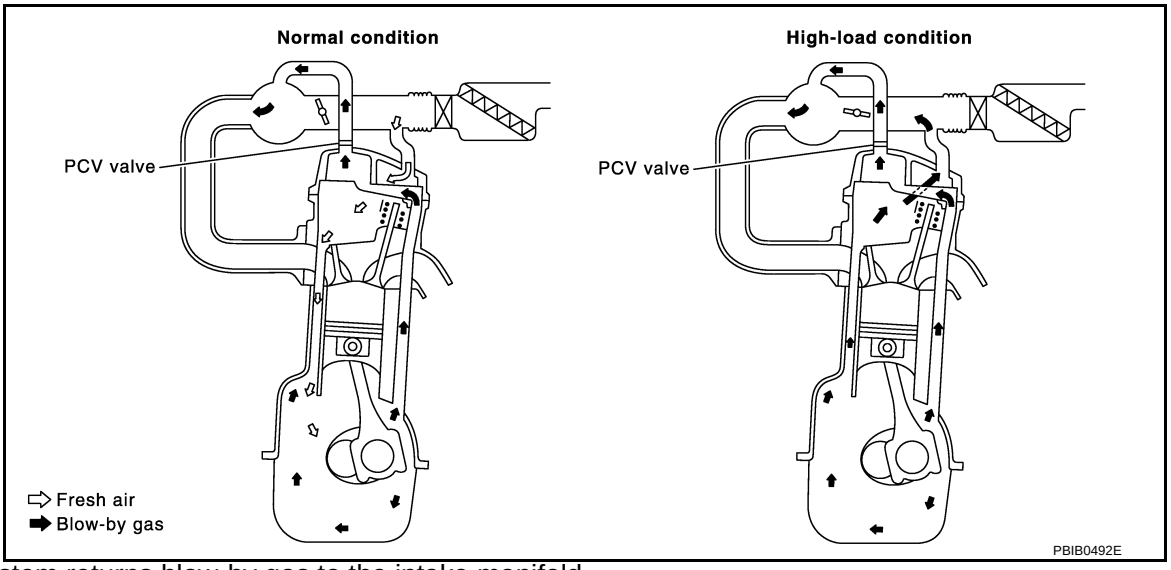
INFOID:0000000006417271

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

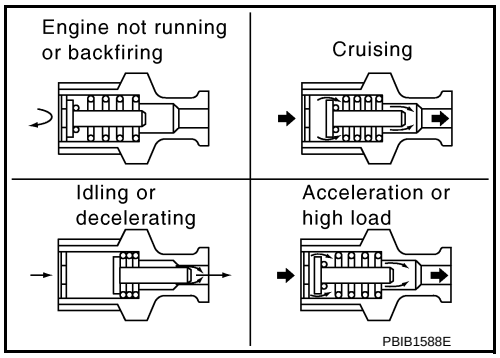
STRUCTURE AND OPERATION

Positive Crankcase Ventilation

INFOID:0000000006417039



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.

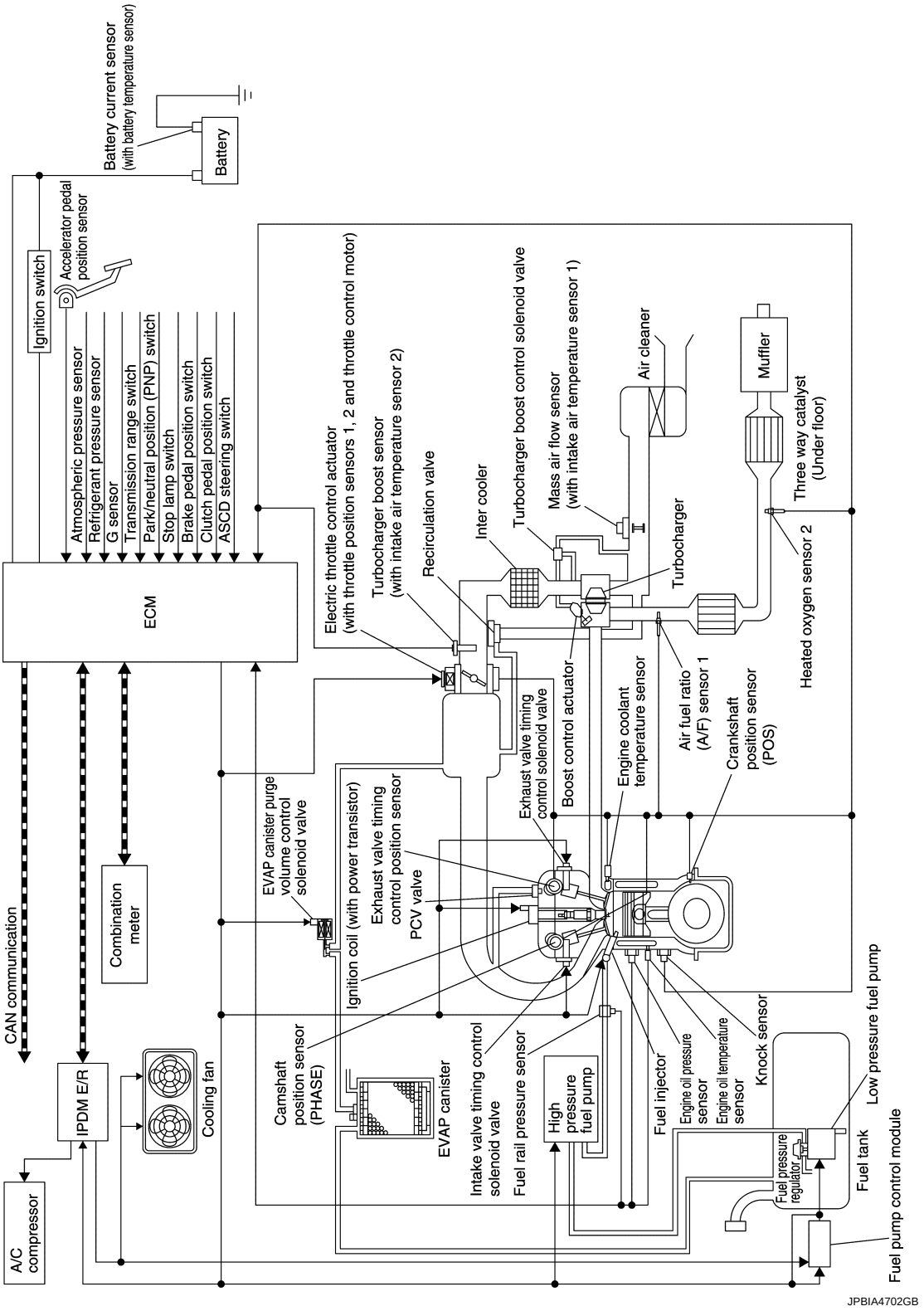


SYSTEM

ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : System Diagram

INFOID:0000000006416773



ENGINE CONTROL SYSTEM : System Description

INFOID:0000000006416774

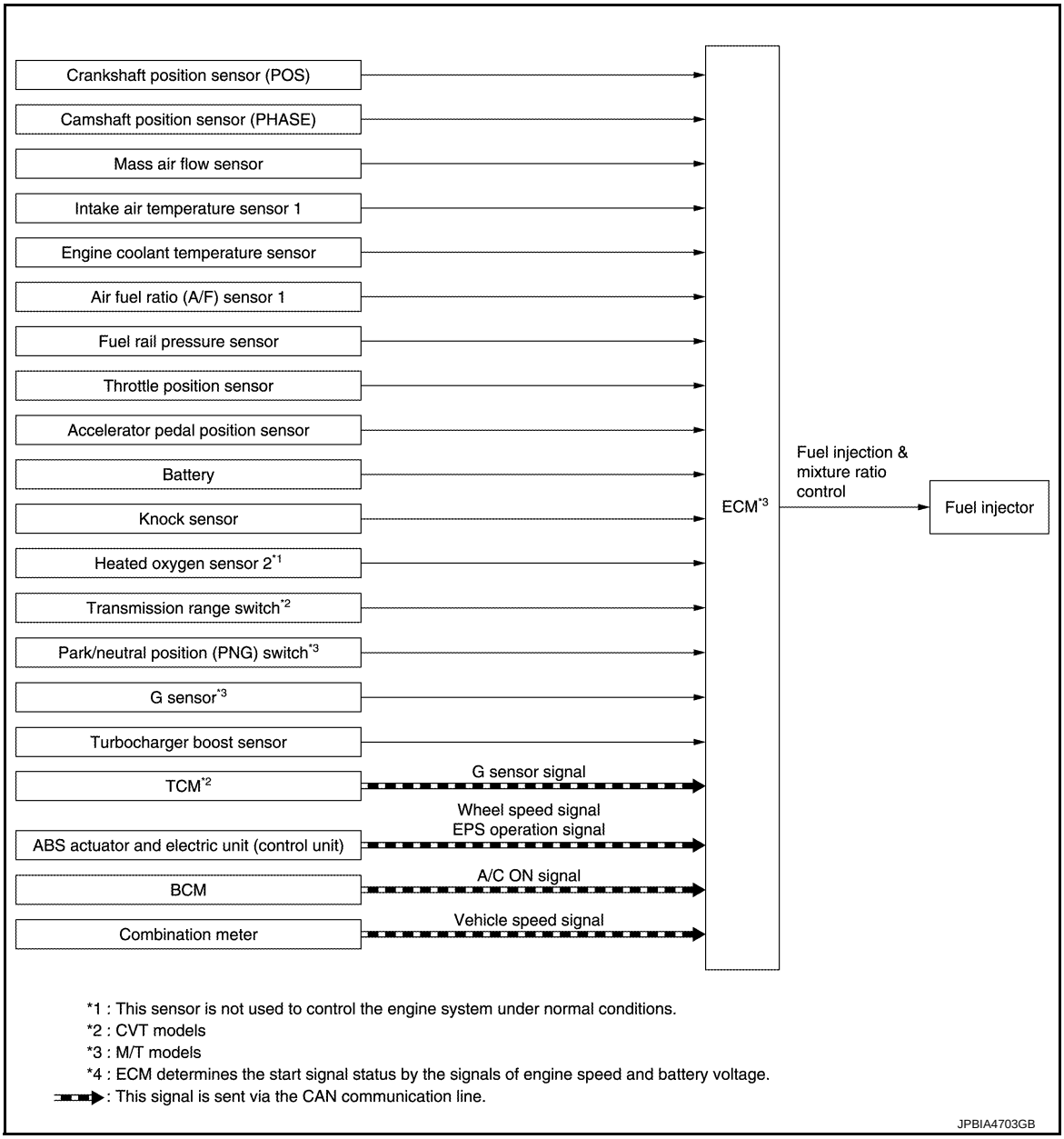
ECM controls the engine by various functions.

Function	Reference
Fuel injection control	EC-48, "DIRECT INJECTION GASOLINE SYSTEM : System Description"
Fuel pressure control	EC-51, "FUEL PRESSURE CONTROL : System Description"
Electric ignition control	EC-54, "ELECTRIC IGNITION SYSTEM : System Description"
Intake valve timing control	EC-55, "INTAKE VALVE TIMING CONTROL : System Description"
Exhaust valve timing control	EC-56, "EXHAUST VALVE TIMING CONTROL : System Description"
Turbocharger boost control	EC-57, "TURBOCHARGER BOOST CONTROL : System Description"
Engine protection control (Low engine oil pressure)	EC-59, "ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description"
Air conditioning cut control	EC-60, "AIR CONDITIONING CUT CONTROL : System Description"
Cooling fan control	EC-61, "COOLING FAN CONTROL : System Description"
Starter motor drive control	EC-62, "STARTER MOTOR DRIVE CONTROL : System Description"
Evaporative emission	EC-63, "EVAPORATIVE EMISSION SYSTEM : System Description"
ASCD (Automatic speed control device)	EC-64, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description"
Speed limiter	EC-65, "SPEED LIMITER : System Description"
Nissan dynamic control	EC-67, "NISSAN DYNAMIC CONTROL SYSTEM : System Description"
CAN communication	EC-67, "CAN COMMUNICATION : System Description"

DIRECT INJECTION GASOLINE SYSTEM

DIRECT INJECTION GASOLINE SYSTEM : System Diagram

INFOID:0000000006417210



DIRECT INJECTION GASOLINE SYSTEM : System Description

INFOID:0000000006417211

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*3	Inclination angle			
Turbocharger boost sensor	Turbocharger boost			
TCM*2	CAN communication	G sensor signal		
ABS actuator and electric unit (control unit)	CAN communication	• Wheel speed signal • EPS/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

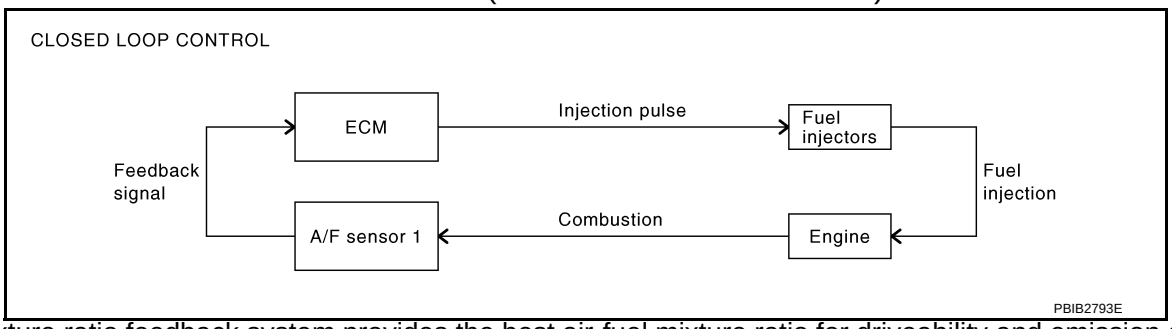
Stratified-charge Combustion

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-39, "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

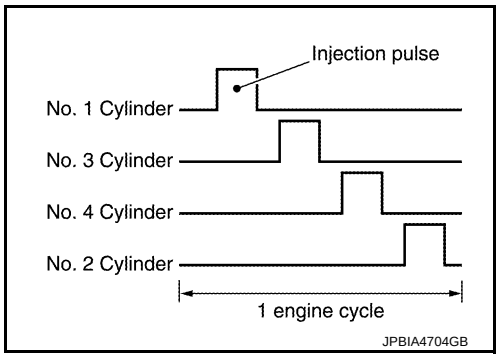
MIXTURE RATIO SELF-LEARNING CONTROL

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 the-

oretical 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).

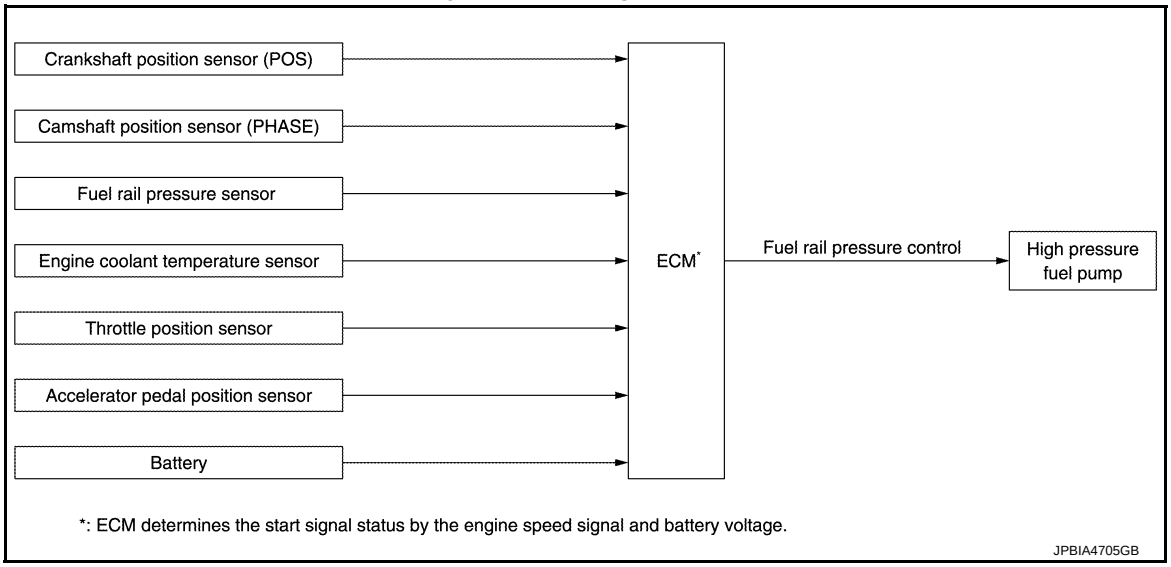
FUEL SHUT-OFF

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:0000000006417212



FUEL PRESSURE CONTROL : System Description

INFOID:0000000006417213

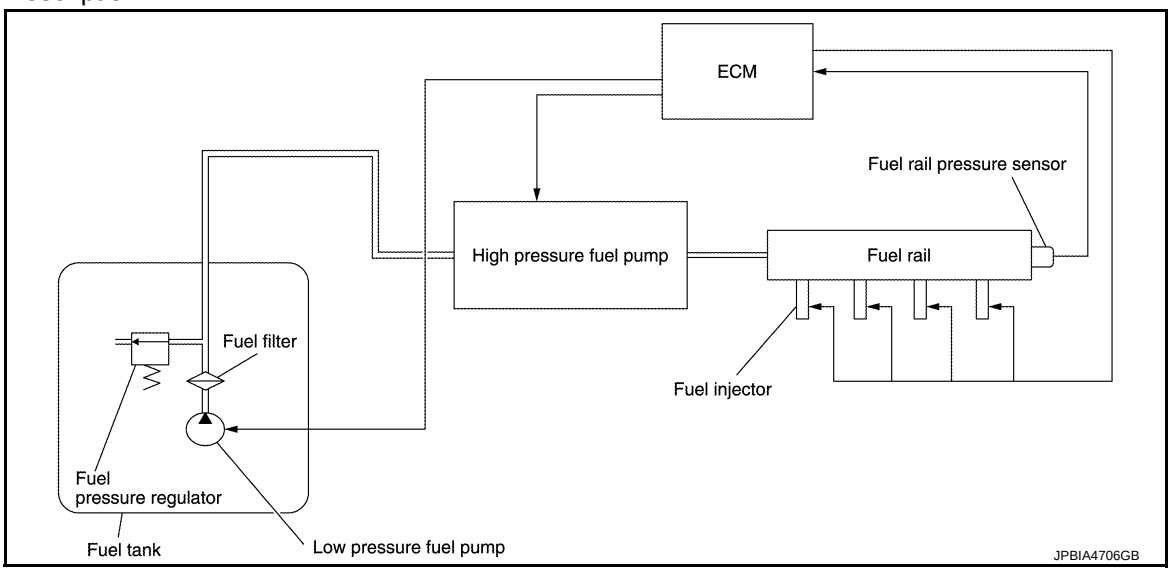
INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*	Fuel injection & mixture ratio control	Fuel injector
Camshaft position sensor (PHASE)	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.

CVT models

System Description



Low fuel pressure control

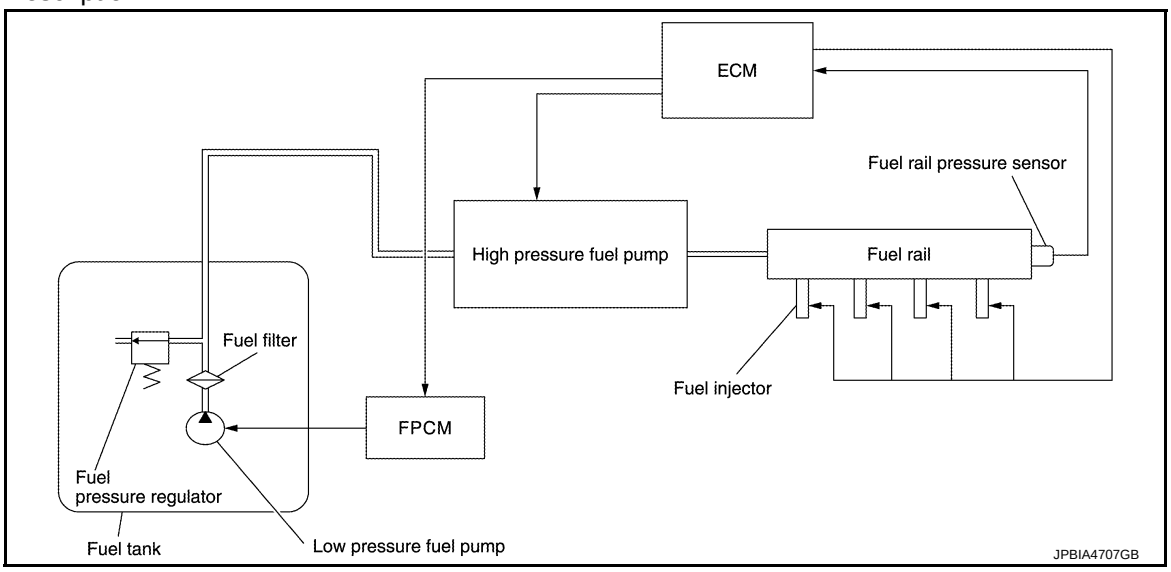
- The low fuel pressure pump is controlled by ECM. The pumped fuel passes through the fuel filter and is sent to the high pressure fuel pump.
- Low fuel pressure is adjusted by the fuel pressure regulator.

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 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.

M/T models

System Description



Low fuel pressure control

- The low fuel pressure pump is controlled by the fuel pump control module (FPCM) and pumps fuel according to a driving condition. The pumped fuel passes through the fuel filter and is sent to the high pressure fuel pump. FPCM controls the low pressure fuel pump, according to a signal from ECM as shown in the table below.

Conditions	Amount of fuel flow	Supplied voltage
After a laps of 1 second after ignition ON	OFF	0 V
• For 1 second after ignition ON (engine coolant temperature is 5°C (41°F) or less, or 40°C (104°F) or more) • For 1 second after turning ignition switch ON	Low	Approximately 8.5 V
• For 1 second after ignition ON (engine coolant temperature is 5°C (41°F) or more, or 40°C (104°F) or less) • Engine cranking • Engine coolant temperature is below 10°C (50°F) • Engine is running under high load and high speed conditions	High	Battery voltage (11 – 14 V)
Except the above	Mid	Approximately 10 V

- Low fuel pressure is adjusted by the fuel pressure regulator.

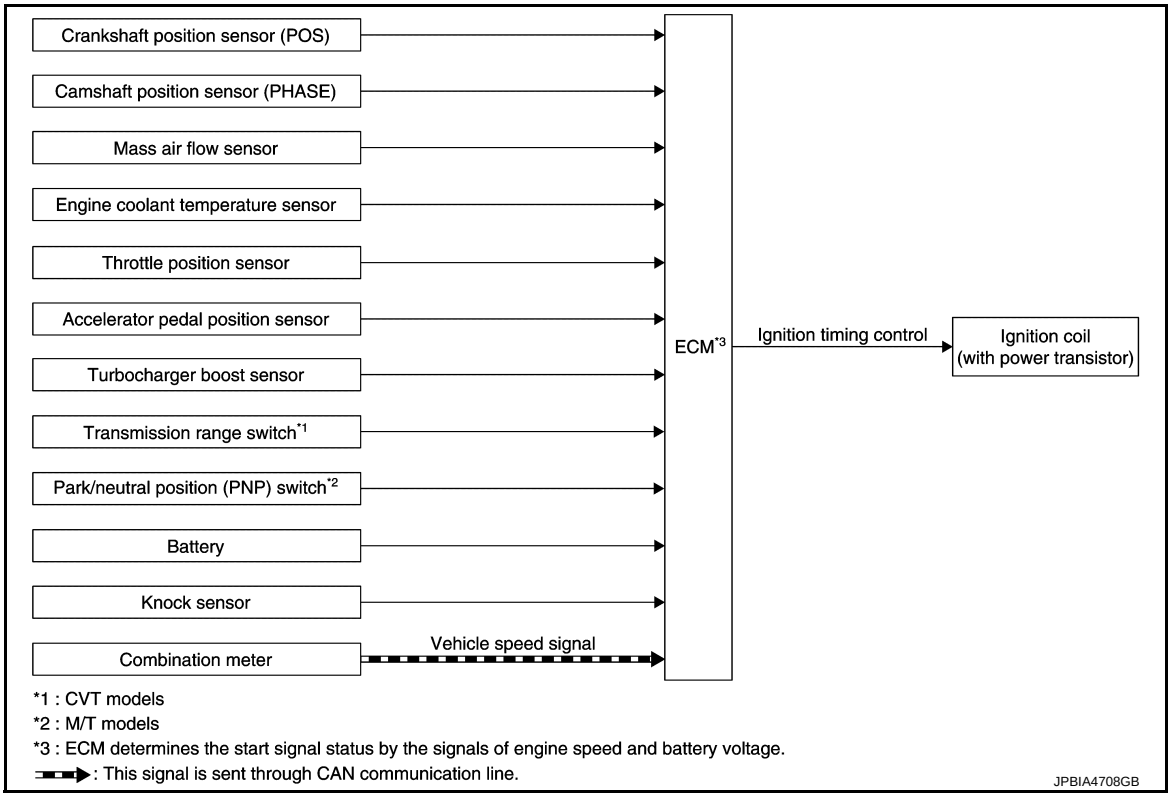
High fuel pressure control

The high pressure fuel pump raises the pressure of the fuel sent from the low pressure fuel pump. Actuated by the 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:0000000006416781



ELECTRIC IGNITION SYSTEM : System Description

INFOID:0000000006416782

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			
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.

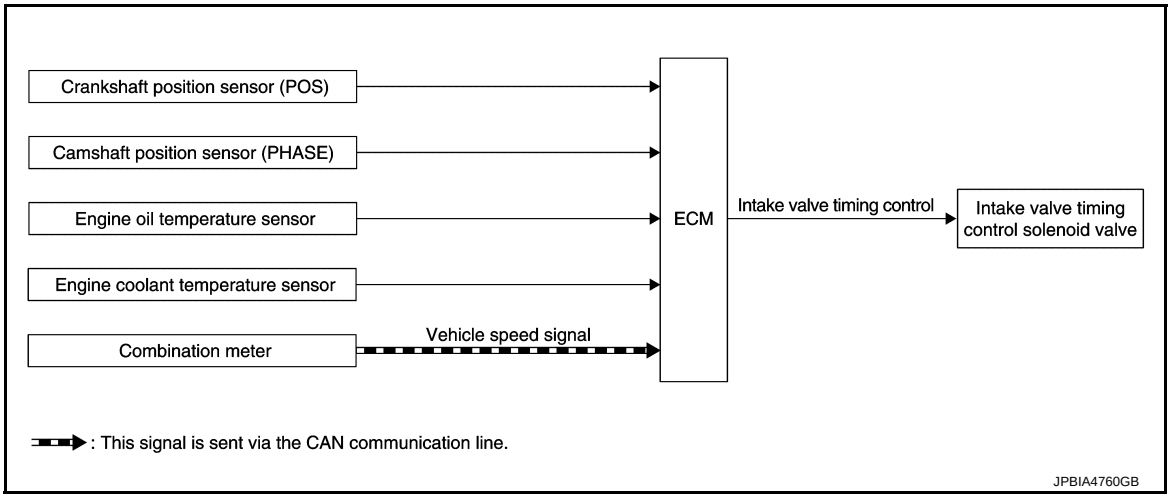
- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

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:0000000006485685



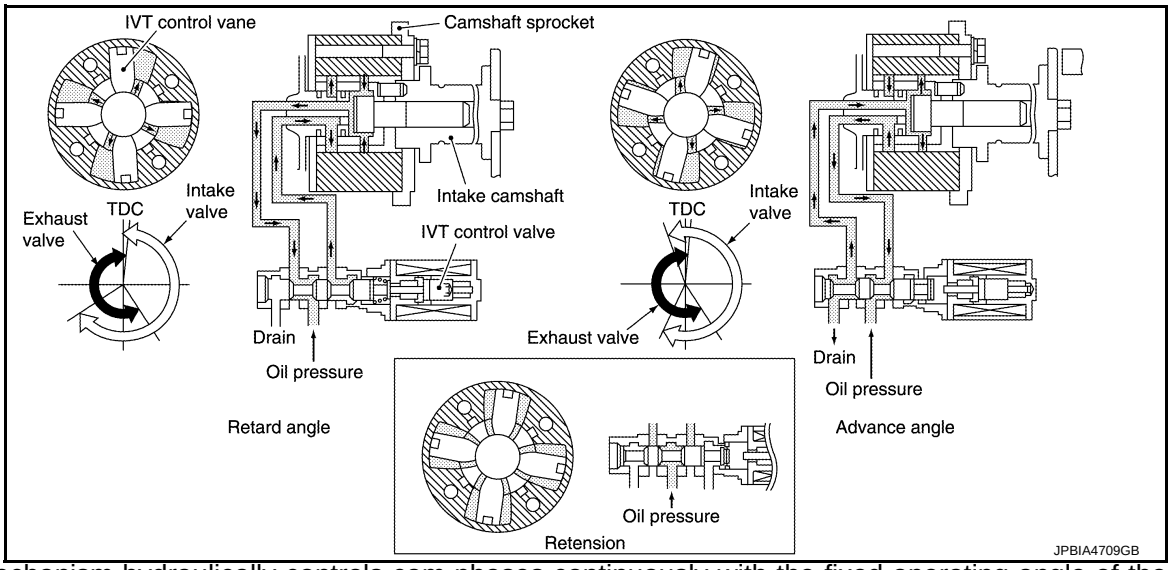
INTAKE VALVE TIMING CONTROL : System Description

INFOID:0000000006485686

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



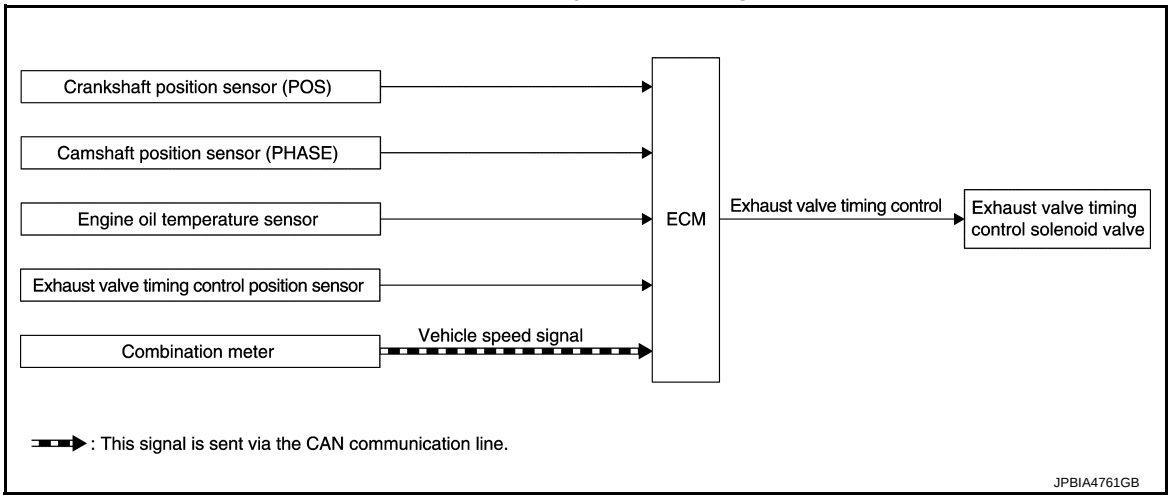
This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake-valve.

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:0000000006485682



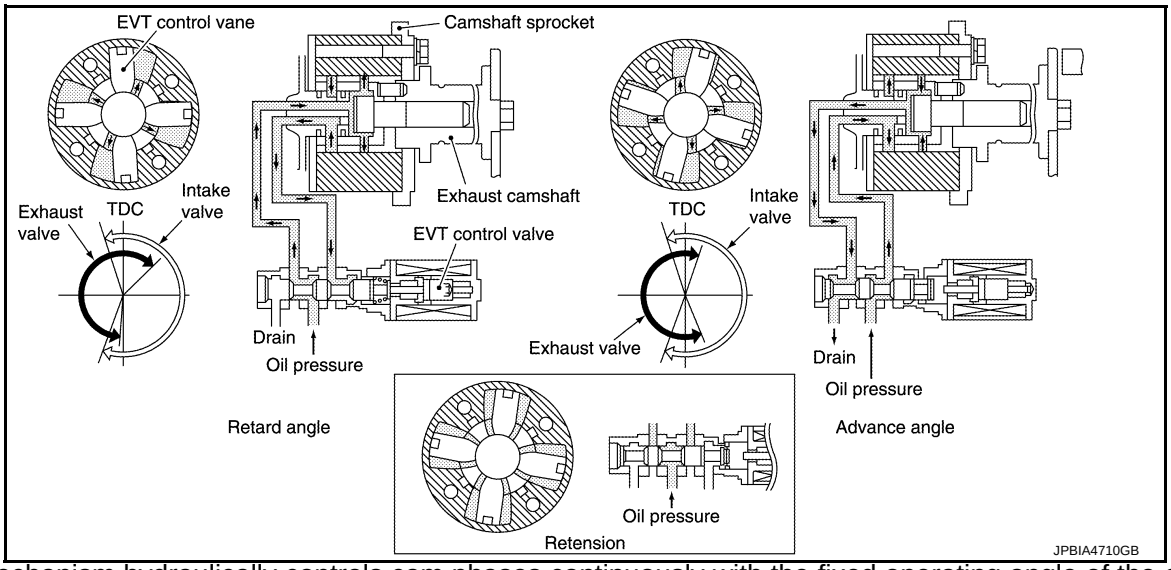
EXHAUST VALVE TIMING CONTROL : System Description

INFOID:0000000006485683

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



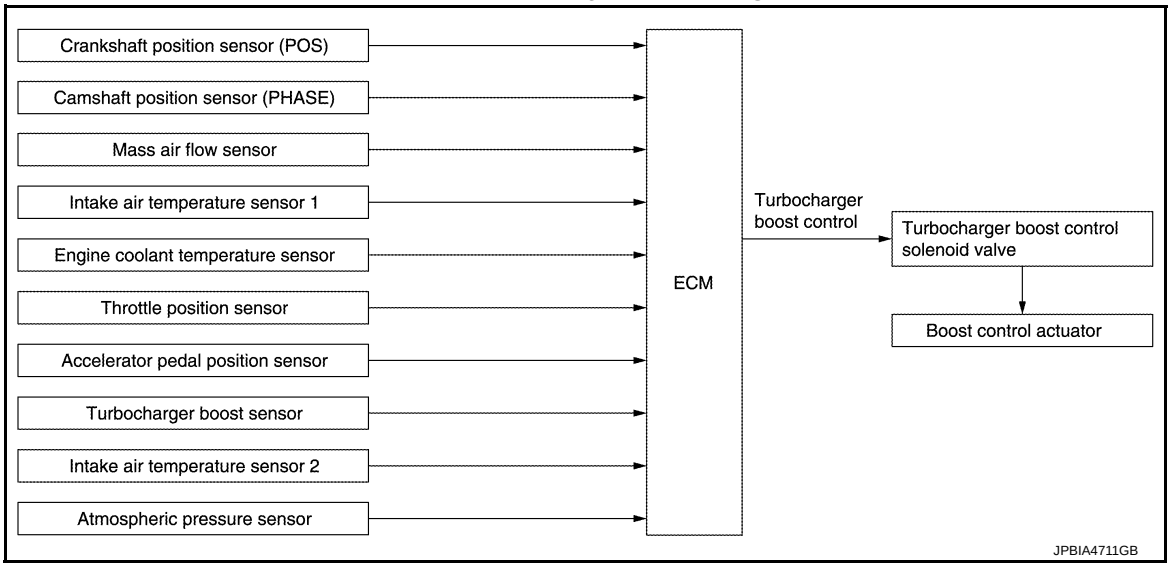
This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the exhaust valve.

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:0000000006417255



TURBOCHARGER BOOST CONTROL : System Description

INFOID:0000000006417256

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		
Atmospheric pressure sensor	Atmospheric pressure		

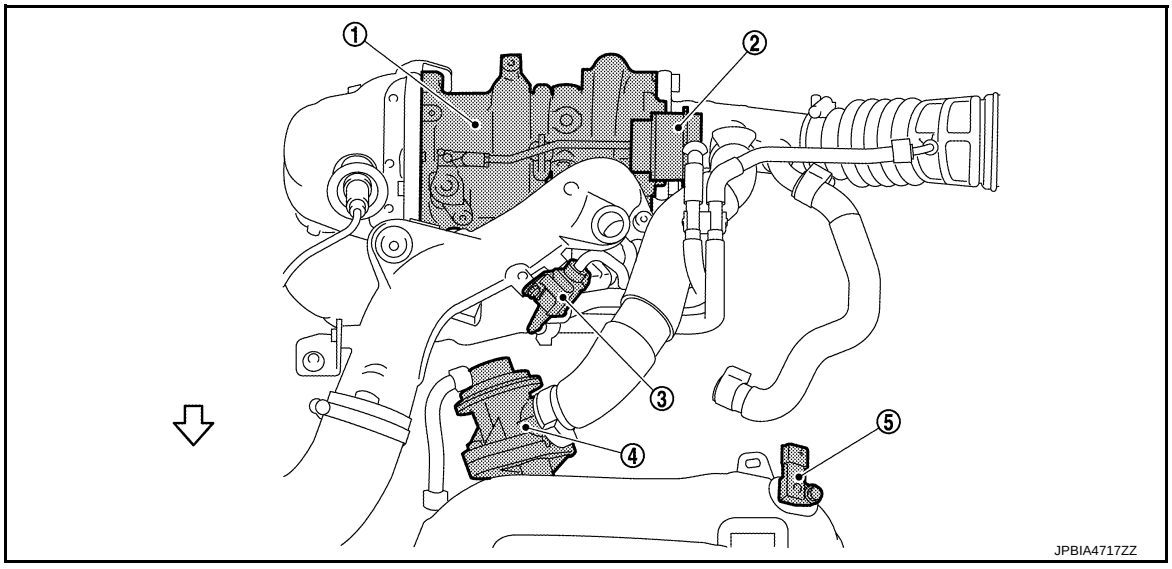
SYSTEM DESCRIPTION

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)

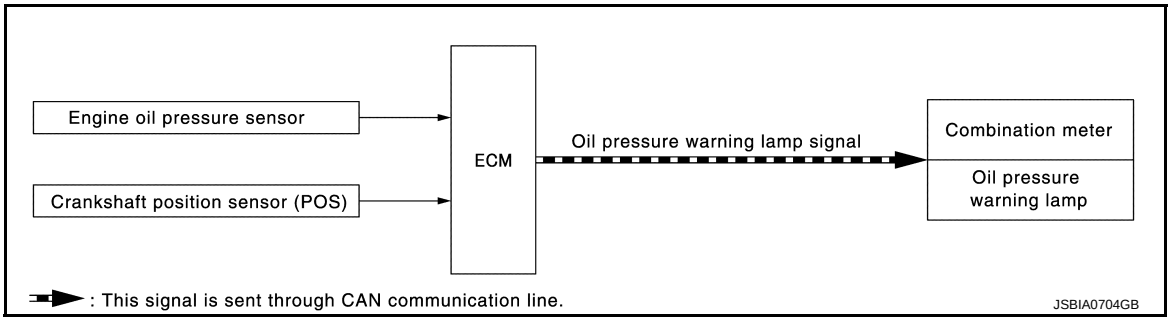
⇦: Vehicle front

ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE

ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Dia-

gram

INFOID:0000000006548542



ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description

INFOID:0000000006548543

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	Combination meter • Oil pressure warning lamp
Crankshaft position sensor (POS)	Engine speed		

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.

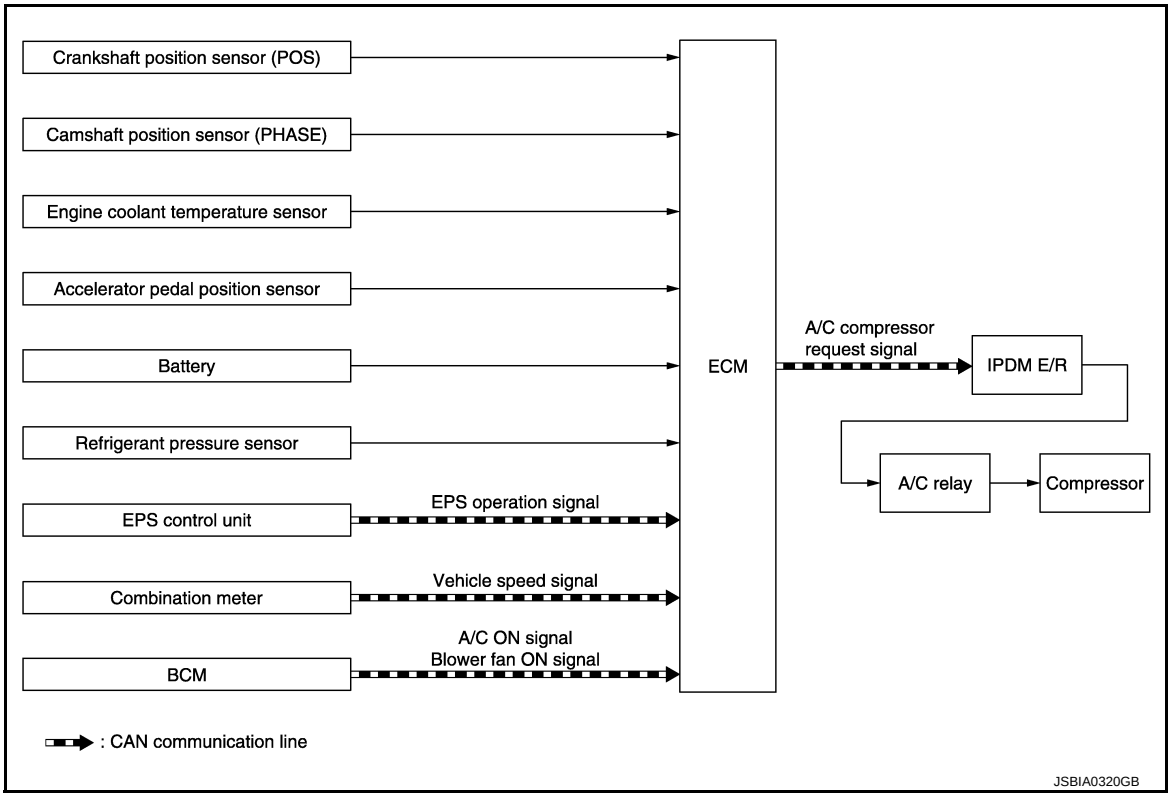
Decrease in engine oil pressure	Engine speed	Combination meter
		Oil pressure warning lamp
Detection	Less than 1,000 rpm	ON*
	1,000 rpm or more	ON

*: 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:0000000006416785



AIR CONDITIONING CUT CONTROL : System Description

INFOID:0000000006416786

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

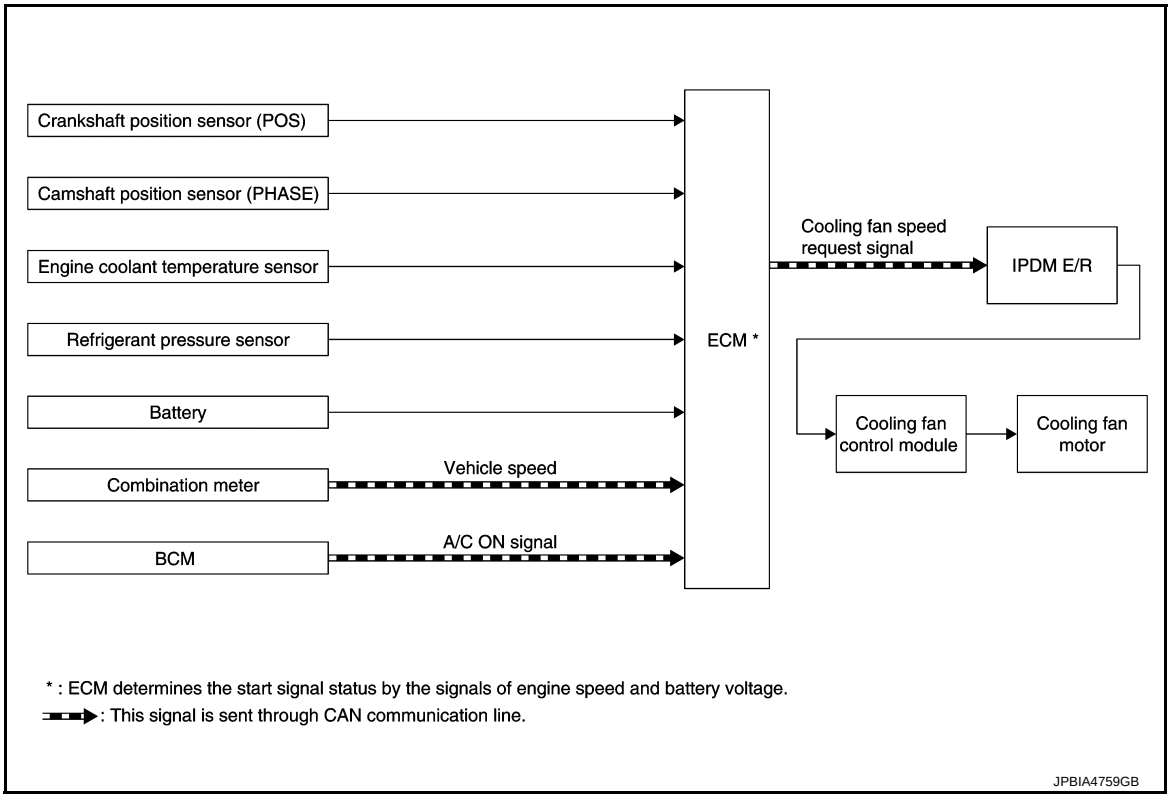
This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.

- 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:0000000006416794



COOLING FAN CONTROL : System Description

INFOID:0000000006575260

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		

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

SYSTEM DESCRIPTION

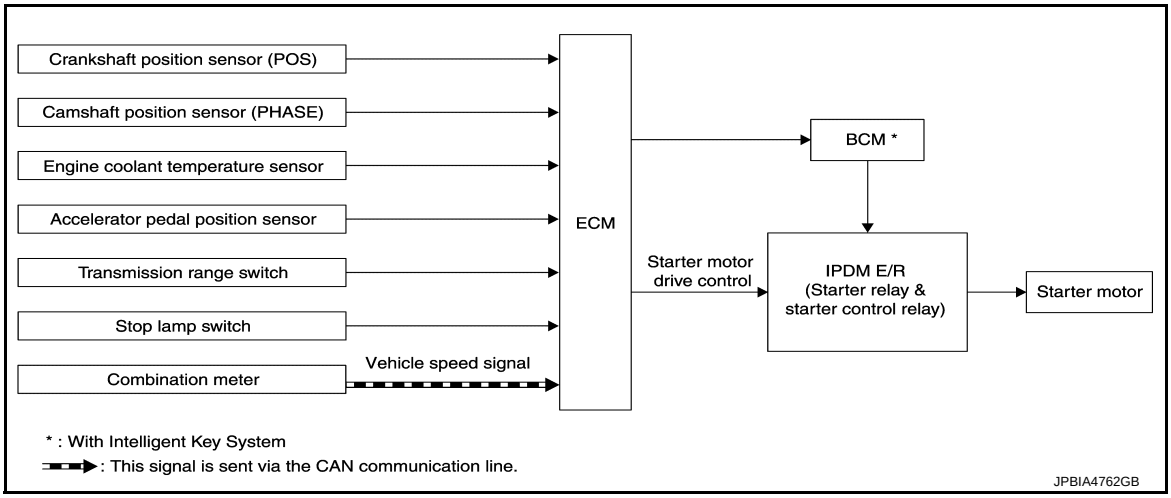
ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, A/C ON signal and refrigerant pressure.

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:0000000006546741



STARTER MOTOR DRIVE CONTROL : System Description

INFOID:0000000006546742

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		

*: With Intelligent Key system

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)

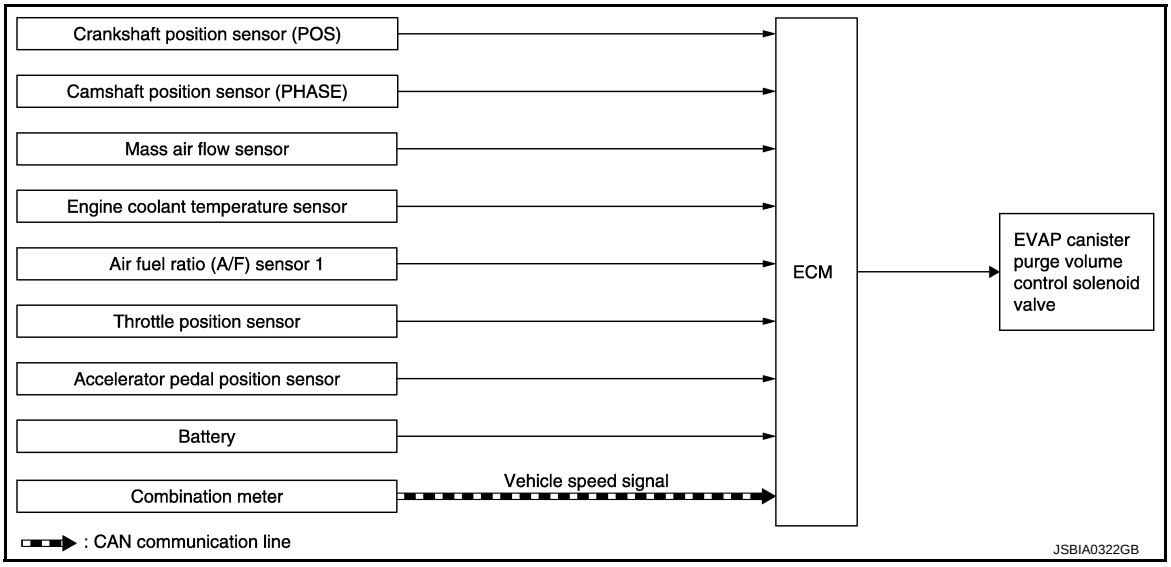
Models with no Intelligent Key System transmit a control signal directly to IPDM E/R. On the other hand, models with the Intelligent Key System transmit a control signal to IPDM E/R by way of BCM via CAN communication.

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:0000000006548619



EVAPORATIVE EMISSION SYSTEM : System Description

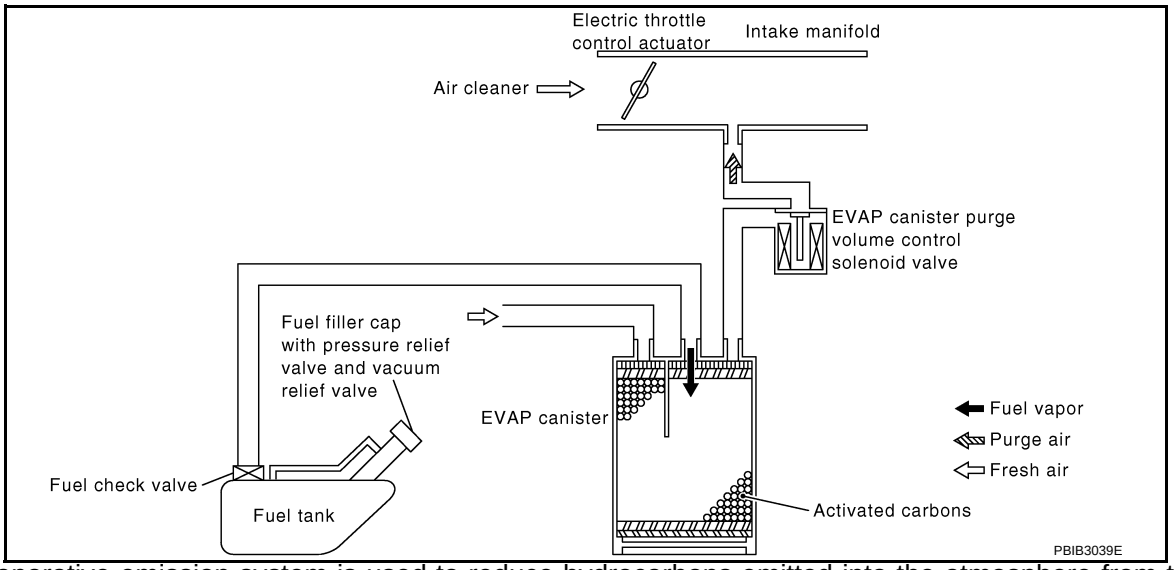
INFOID:0000000006548620

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM		ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*		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*			
Combination meter	CAN communication	Vehicle speed signal		

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

SYSTEM DESCRIPTION

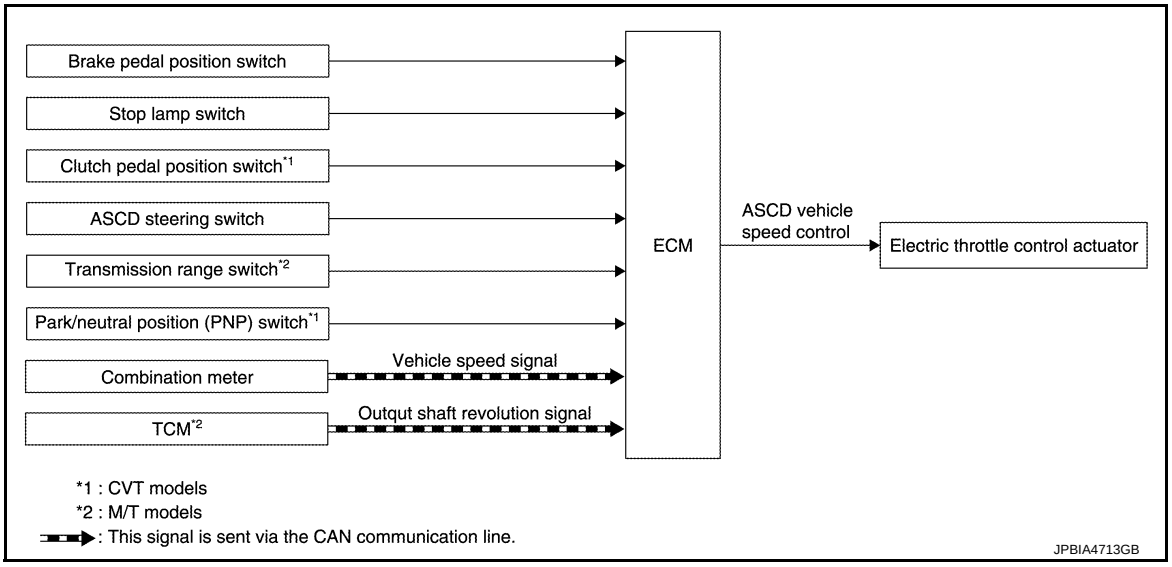


The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon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

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Diagram

INFOID:0000000006416789



AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description

INFOID:0000000006416790

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 194 km/h (120 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-69, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function" for ASCD operating instructions.

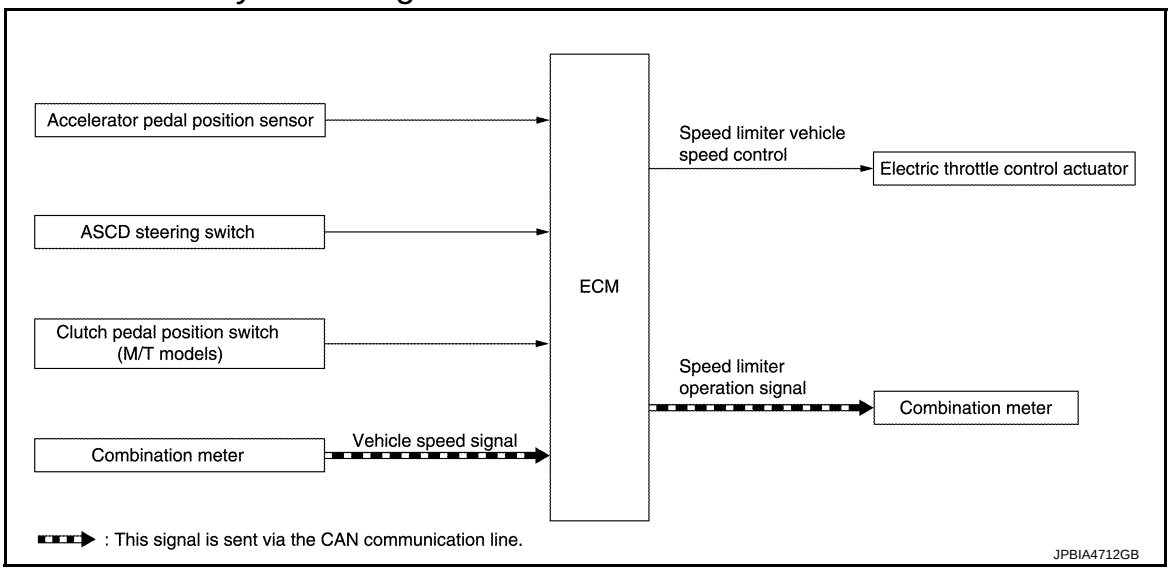
NOTE:

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

SPEED LIMITER

SPEED LIMITER : System Diagram

INFOID:0000000006417216



SPEED LIMITER : System Description

INFOID:0000000006417217

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM		ECM function	Actuator
Accelerator pedal position sensor	Accelerator pedal position		Speed limiter vehicle speed control • Speed limiter operation signal (CAN communication)	• Electric throttle control actuator • Combination meter (Information display)
ASCD steering switch	ASCD/ICC steering switch operation			
Clutch pedal position switch (M/T models)	Clutch pedal position			
Combination meter	CAN communication	Vehicle speed signal		

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

BASIC SPEED LIMITER SYSTEM

- Speed limiter is a system that enables to restrict the vehicle speed within the set speed that is selected by the driver. Driver can be set the vehicle speed in the set speed range.
- ECM controls throttle angle of electric throttle control actuator to regulate vehicle speed.
- Operation status of speed limiter is indicated on the information display in the combination meter.
- If any malfunction occurs in speed limiter system, it automatically deactivates the speed limiter control.

Refer to EC-70, "SPEED LIMITER : Switch Name and Function" for speed limiter operating instructions.

CAUTION:

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

NOTE:

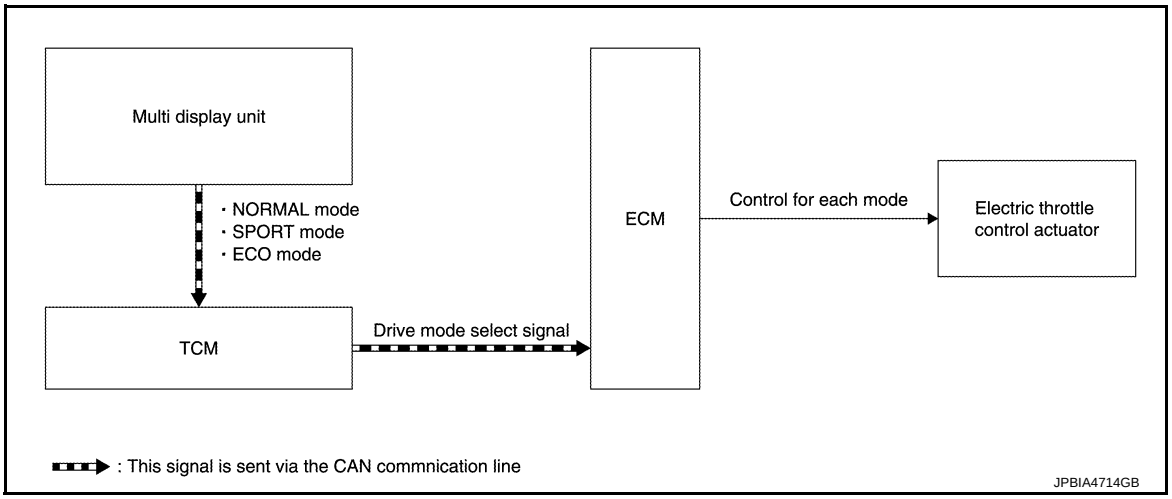
Since the speed limiter is controlled by the electric throttle control actuator, vehicle speed may exceed a set speed during downhill driving.

NISSAN DYNAMIC CONTROL SYSTEM

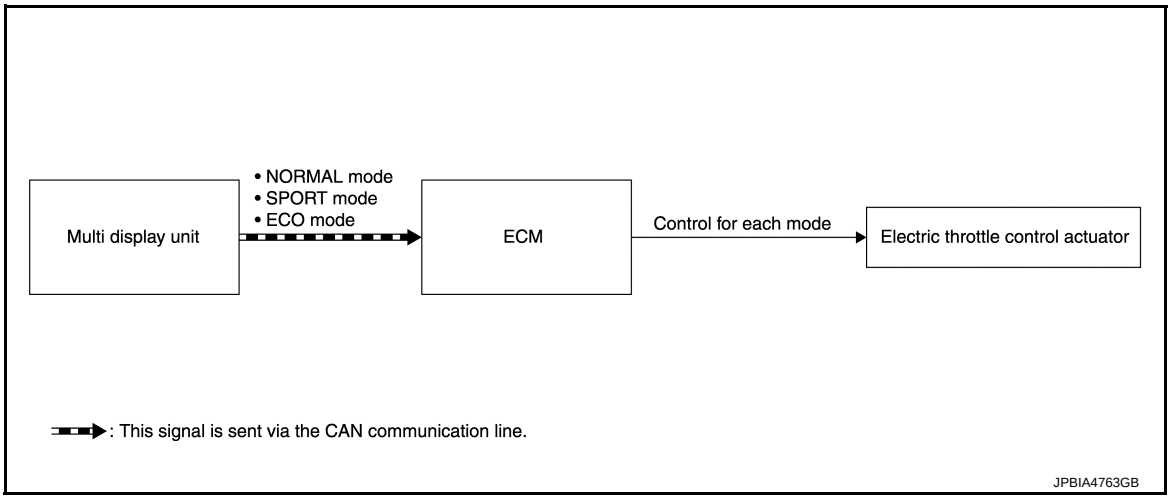
NISSAN DYNAMIC CONTROL SYSTEM : System Diagram

INFOID:0000000006472915

CVT models



M/T models



NISSAN DYNAMIC CONTROL SYSTEM : System Description

INFOID:0000000006472916

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:0000000006417218

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-31, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart", about CAN communication for detail.

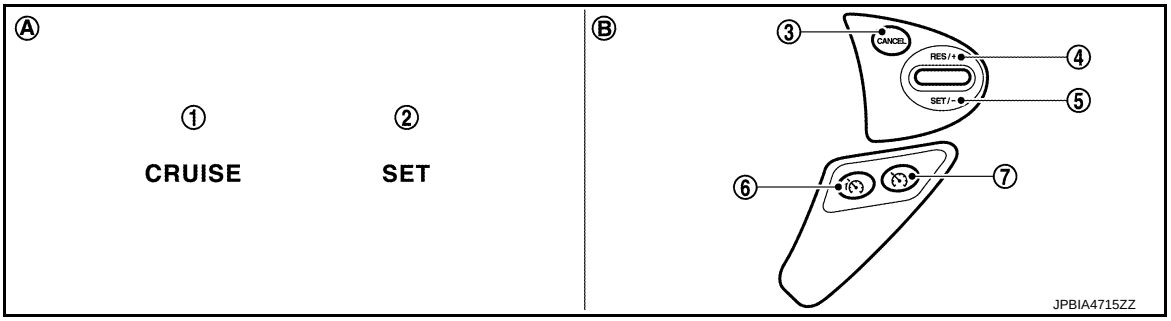
OPERATION

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

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

INFOID:0000000006417208

SWITCHES AND INDICATORS



1. CRUISE indicator
2. SET indicator
3. CANCEL switch
4. RES / + switch
5. SET / – switch
6. Speed limiter MAIN Switch
7. ASCD MAIN switch

A. On the combination meter (Information display)
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)	194 km/h (120 MPH)

SWITCH OPERATION

Item	Function
CANCEL switch	Cancels the cruise control driving.
RES / + switch	• Resumes the set speed. • Increases speed incrementally during cruise control driving.
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 194 km/h (120 MPH), press SET/– switch. (Then SET indicator in combination meter illuminates.)

ACCELERATE OPERATION

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

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.
- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to neutral position. (M/T models)
- Selector lever is changed to N, P 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 will cancel the cruise operation and inform the driver by blinking indicator lamp.

• Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE indicator may blink slowly.
  When the engine coolant temperature decreases to the normal operating temperature, CRUISE indicator will stop blinking and the cruise operation will be able to work by pressing SET/– switch or RES/+ switch.
• Malfunction for some self-diagnoses regarding ASCD control: SET indicator will blink quickly.

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

COAST OPERATION

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

RESUME OPERATION

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

• Brake pedal is released
• Clutch pedal is released (M/T models)
• Selector lever is in other than P and N positions (CVT models)
• Vehicle speed is greater than 40 km/h (25 MPH) and less than 194 km/h (120 MPH)

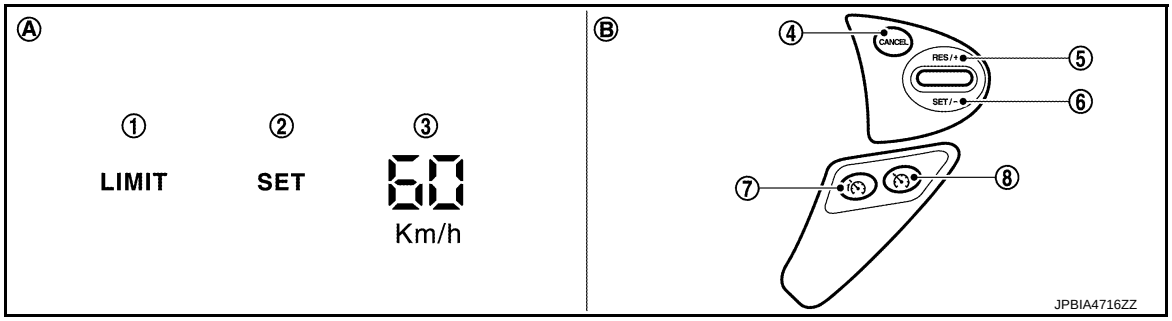
SPEED LIMITER

SPEED LIMITER : Switch Name and Function

INFOID:0000000006417209

SWITCHES AND INDICATORS

NOTE:
Shared with ASCD switch.



1. Speed limiter indicator
2. SET indicator
3. Set speed indicator
4. CANCEL switch
5. RES / + switch
6. SET / – switch
7. Speed limiter MAIN Switch
8. ASCD MAIN switch
A. On the combination meter (Information display)
B. On the steering wheel

SET SPEED RANGE

Speed limiter system can be set the following vehicle speed.

Minimum speed (Approx.)	Maximum speed (Approx.)
30 km/h (20 MPH)	210 km/h (130 MPH)

SWITCH OPERATION

Item	Function
CANCEL switch	Cancels the speed limiter control.
RES / + switch	• Resumes the set speed. • Increases the set speed incrementally.
SET / – switch	• Sets desired speed. • Decreases the set speed incrementally.
Speed limiter MAIN switch	Master switch to activate the speed limiter system.

SET OPERATION

- Press speed limiter MAIN switch. (LIMIT indicated on the information display)
- By pressing the SET/– switch, the vehicle speed can be set within the range between 30 km/h and 210 km/h (in the metric system mode) or 20 MPH and 130 MPH (in the yard/pound system mode). (SET and set speed is indicated on the information display)
- When pressing the RES/+ switch, the set speed can be increased.
- When pressing the SET/– switch, the set speed can be decreased.

CANCEL CONDITION

- When any of following conditions exist, speed limiter control is canceled.
- Speed limiter MAIN switch is pressed. (Set speed is cleared.)
- ASCD MAIN switch is pressed. (Set speed is cleared.)
- CANCEL switch is pressed.
- When accelerator pedal is fully depressed (Kickdown), speed limiter control is temporarily released. And driver can be driven above set speed (Set speed indicator is blinked).
- When the ECM detects any of the following conditions, the ECM cancels the speed limiter operation and informs the driver by blinking speed limiter indicator and SET indicator.
- Malfunction for some self-diagnosis regarding ASCD system.

RESUME OPERATION

After the speed limiter is released by other method than the MAIN switch, the RES/+ switch allows to set the vehicle speed again to the one that is previously set before releasing the speed limiter.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000006578279

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

GST (Generic Scan Tool)

INFOID:0000000006578280

When GST is connected with a data link connector equipped on the vehicle side, it will communicate with the control unit equipped in the vehicle and then enable various kinds of diagnostic tests. Refer to GI-50, "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:0000000006578326

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-108, "DTC Index".)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

INFOID:0000000006578327

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-108, "DTC Index". These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-III.
1st trip DTC is specified in Service $07 of SAE J1979/ISO 15031-5. 1st trip DTC detection occurs without illuminating the MIL and therefore does not warn the driver of a malfunction.
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to EC-124, "Work Flow". Then perform DTC Confirmation Procedure or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

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

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

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 – P0308 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:0000000006710575

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-III will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

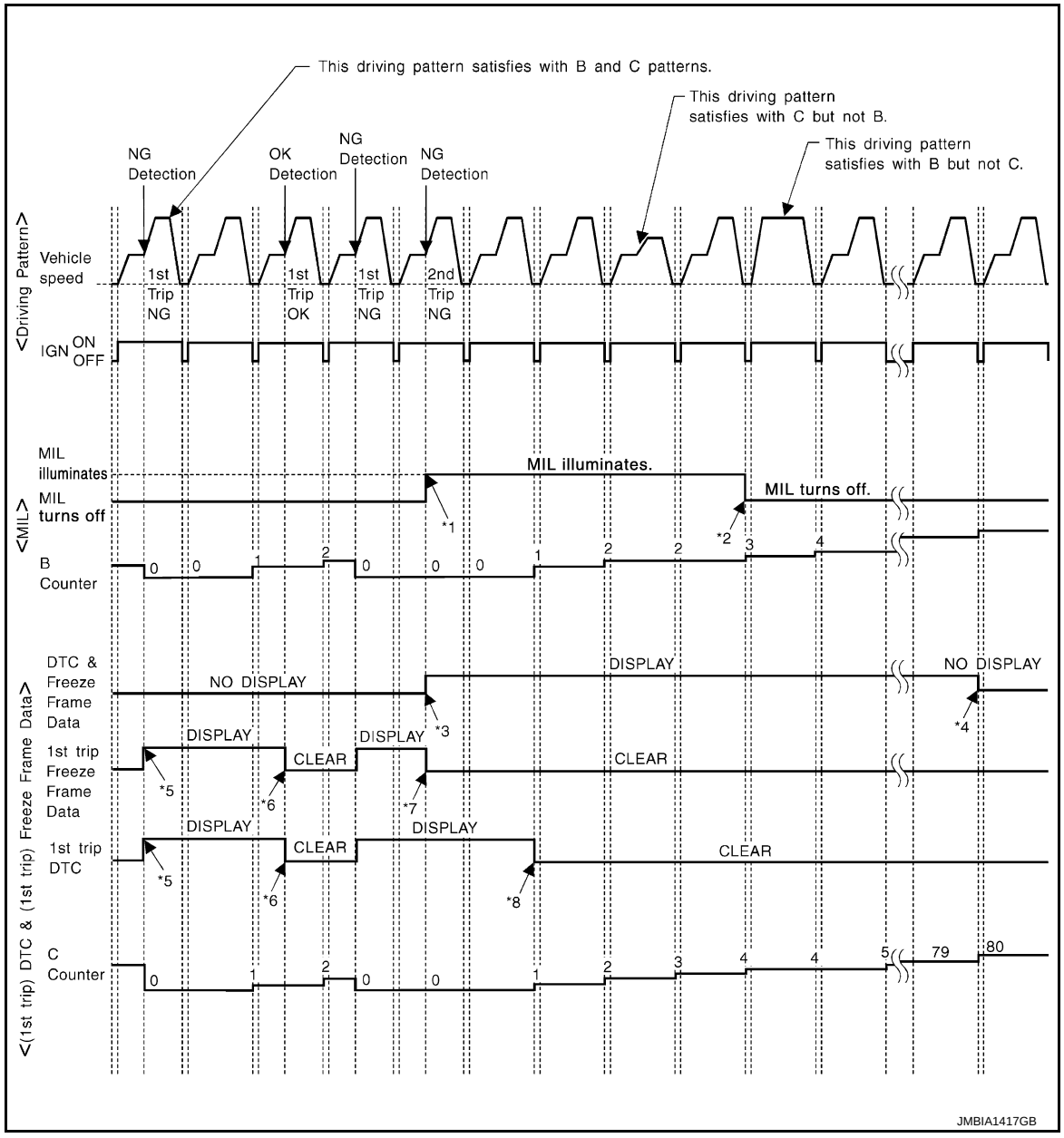
COUNTER SYSTEM CHART

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-77, "DIAGNOSIS DESCRIPTION : Driving Pattern".

Driving Pattern C

Refer to EC-77, "DIAGNOSIS DESCRIPTION : Driving Pattern".

Example:

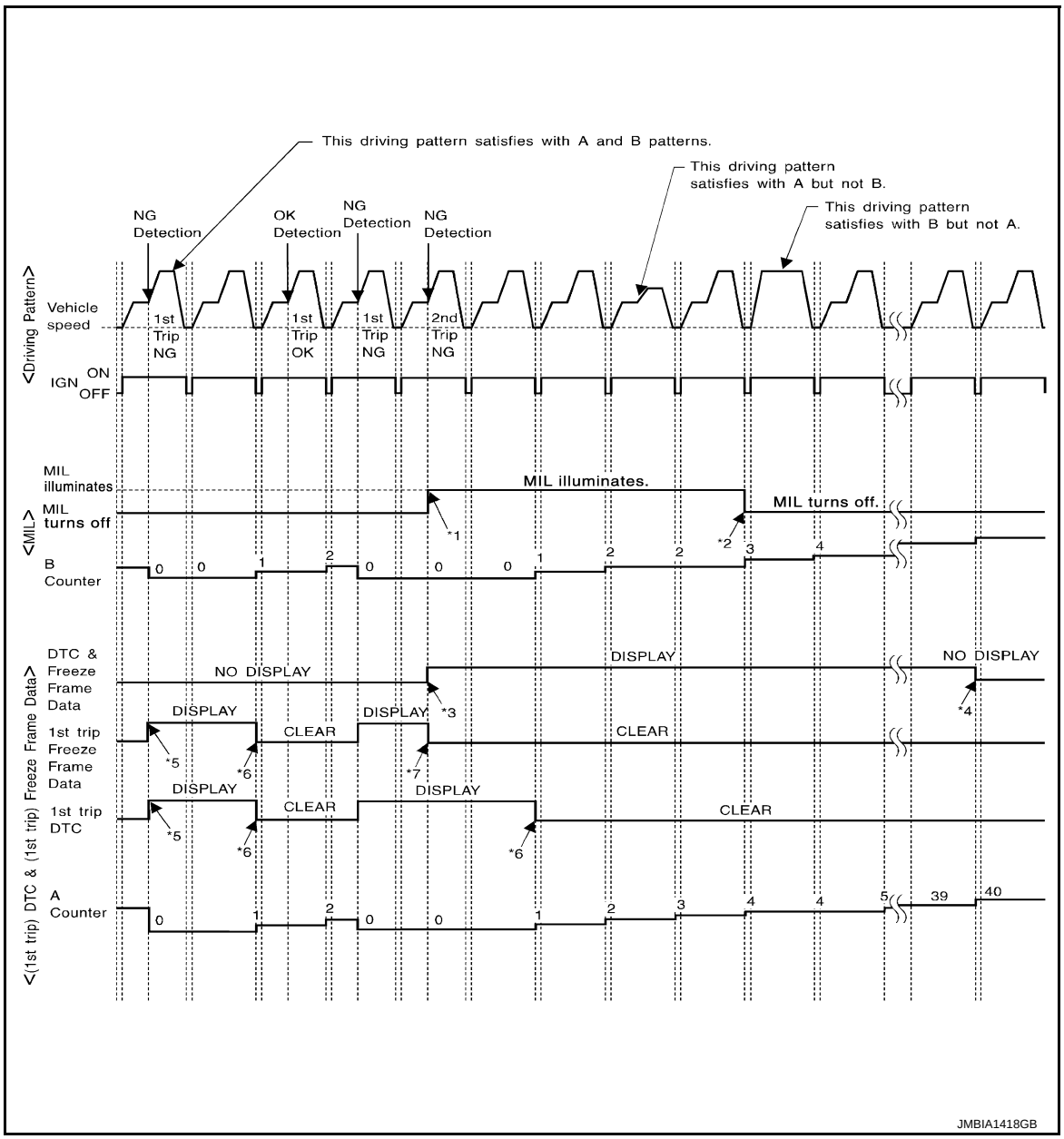
If the stored freeze frame data is as per the following:

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-77, "DIAGNOSIS DESCRIPTION : Driving Pattern".

Driving Pattern B
Refer to EC-77, "DIAGNOSIS DESCRIPTION : Driving Pattern".

DIAGNOSIS DESCRIPTION : Driving Pattern

INFOID:0000000006710576

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.

DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code

INFOID:0000000006578330

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

SRT 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”

Self-diagnosis result		Example				
		Diagnosis	Ignition cycle ← ON → OFF ← ON → OFF ← ON → OFF ← ON →			
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”.

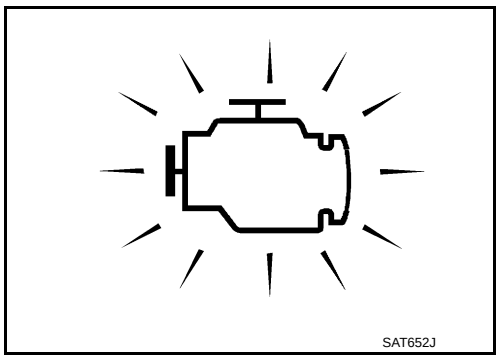
NOTE:

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 : Malfunction Indicator Lamp (MIL)

INFOID:0000000006578331

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-436, "Component Function Check".
2. When the engine is started, the MIL should go off.

   NOTE:

   If MIL continues to illuminate/blink, perform self-diagnoses and inspect/repair accordingly because an emission-related ECU has detected a malfunction in the emission control systems components and/or the powertrain control components (which affect vehicle emissions).

On Board Diagnosis Function

INFOID:0000000006578334

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.

Diagnostic test mode	Function
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-134, "Work Procedure".
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to EC-135, "Work Procedure".
Idle air volume learning	ECM can learn the idle air volume. Refer to EC-136, "Work Procedure".
Mixture ratio self-learning value clear	Mixture ratio self-learning value can be erased. Refer to EC-139, "Work Procedure".

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-436, "Diagnosis Procedure".

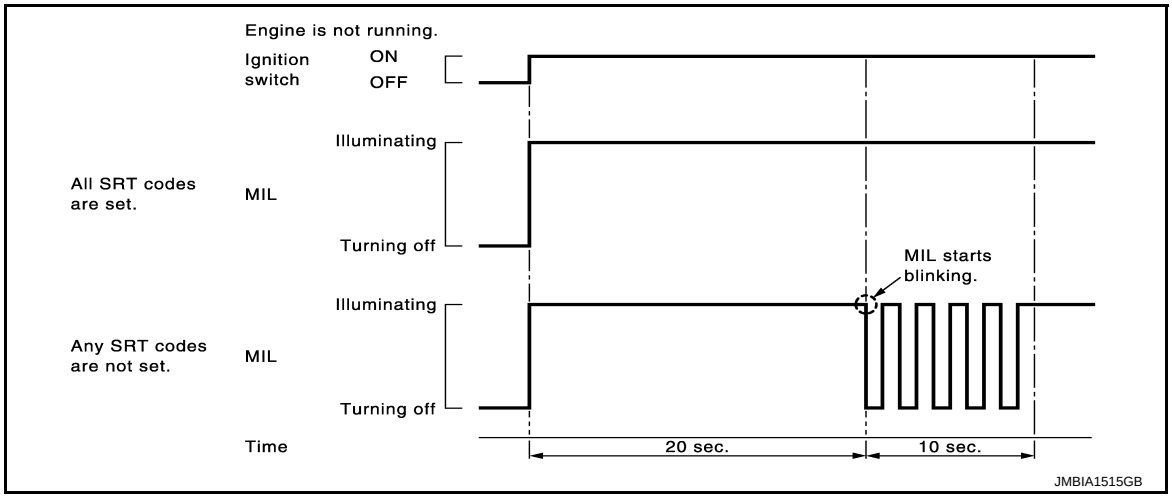
SRT STATUS MODE

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-78, "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-78, "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).

SELF-DIAGNOSTIC RESULTS MODE

Description

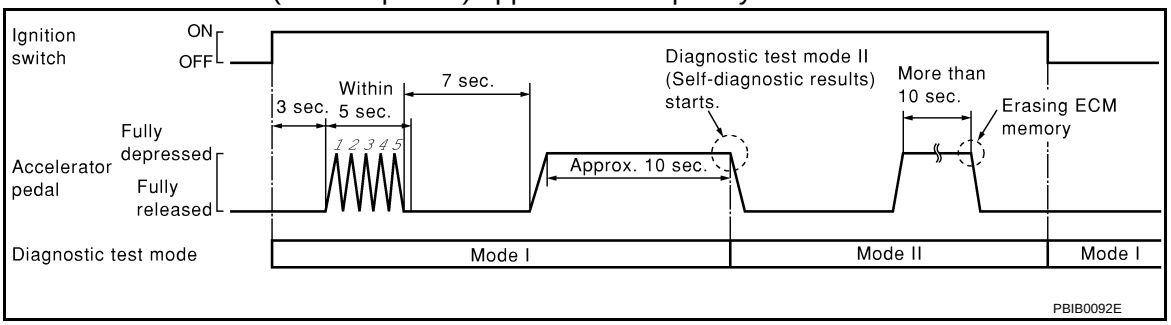
This function allows to indicate DTCs or 1st trip DTCs stored in ECM according to the number of times MIL is blinking.

How to Set Self-diagnostic Results Mode

NOTE:

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

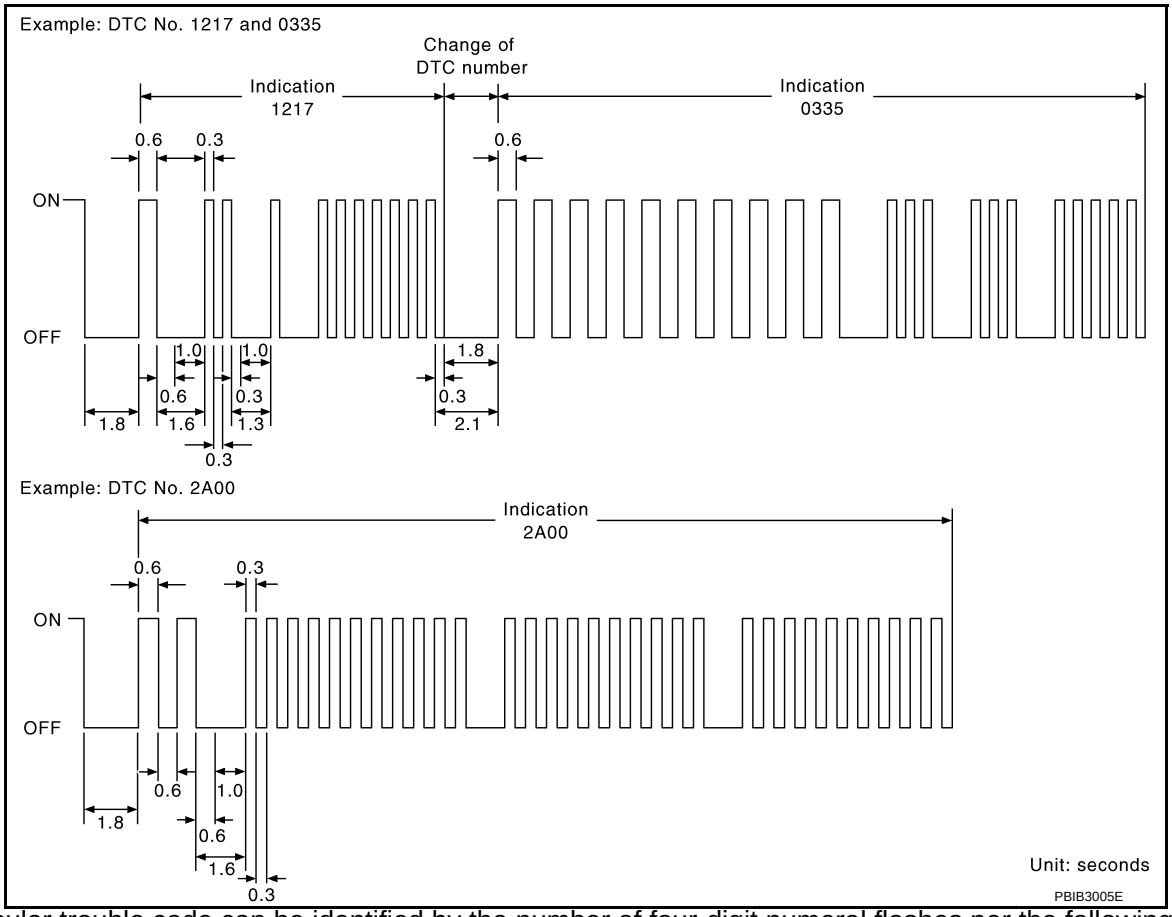
1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.
   - Fully depress the accelerator pedal.
   - Fully release the accelerator pedal.
3. Wait 7 seconds, fully depress the accelerator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



How to Read Self-diagnostic Results

The DTC and 1st trip DTC are indicated by the number of blinks of the MIL as shown below.
The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MIL illuminates in “malfunction warning” mode, it is a DTC; if two or more codes are displayed, they may be either

DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT-III or GST. A DTC will be used as an example for how to read a code.



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

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

The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-seconds) - OFF (0.6-seconds) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-seconds ON and 0.3-seconds OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.
A change from one trouble code to another occurs at an interval of 1.8-seconds OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. Refer to EC-108, "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-III Function

INFOID:0000000006416807

FUNCTION

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

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

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

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
CLSD THL POS LEARN	Ignition on and engine stopped.	When learning the throttle valve closed position
G SENSOR CALIBRATION	• Park the vehicle on a flat road. • Adjust pressure in all tires to the specified value.	Calibrates G sensor.

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

SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-108, "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-108, "DTC Index"), skip step 1.

1. Erase DTC in TCM. Refer to TM-157, "Diagnosis Description".
2. Select “ENGINE” using CONSULT-III.
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-108, "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.
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.

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

DATA MONITOR MODE

Monitored Item

×: Applicable

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

Monitored item	Unit	Description	Remarks
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 intake camshaft advance angle.	
INT/V SOL(B1)	%	• The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. • The advance angle becomes larger as the value increases.	
AIR COND RLY	ON/OFF	The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY	ON/OFF	Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
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.	

Monitored item	Unit	Description	Remarks
IDL A/V LEARN	YET/CMPLT	• Display the condition of Idle Air Volume Learning - YET: Idle air volume learning has not been performed yet. - CMPLT: Idle air volume learning has already been performed successfully.	
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 RES/+ switch signal.	
SET SW	ON/OFF	Indicates [ON/OFF] condition from 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	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.	

Monitored item	Unit	Description	Remarks
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	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.	
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 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.	
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.	

*: The item is indicated, but not used.

NOTE:

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

ACTIVE TEST MODE

Test Item

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

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

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to EC-78, "DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code".

SRT WORK SUPPORT Mode

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

DTC WORK SUPPORT Mode

Test mode	Test item	Corresponding DTC No.	Reference page
A/F SEN1	A/F SEN1 (B1) P1278/P1279	P0133	EC-215
	A/F SEN1 (B1) P1276	P0130	EC-205
HO2S2	HO2S2 (B1) P1146	P0138	EC-226
	HO2S2 (B1) P1147	P0137	EC-220
	HO2S2 (B1) P0139	P0139	EC-233

ECU DIAGNOSIS INFORMATION

ECM

Reference Value

INFOID:0000000006417044

VALUES ON THE DIAGNOSIS TOOL

Remarks:

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.

* Specification data may not be directly related to their components signals/values/operations.

I.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. this IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

Monitor Item	Condition		Values/Status
ENG SPEED	Run engine and compare CONSULT-III value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-148, "Diagnosis Procedure".		
B/FUEL SCHDL	See EC-148, "Diagnosis Procedure".		
A/F ALPHA-B1	See EC-148, "Diagnosis Procedure".		
COOLAN TEMP/S	Engine: After warming up		More than 70°C (158°F)
A/F SEN1 (B1)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 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-III value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	Ignition switch: ON (Engine stopped)		11 - 14 V
ACCEL SEN 1	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9 V
		Accelerator pedal: Fully depressed	4.0 - 4.8 V
ACCEL SEN 2*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
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

Monitor Item	Condition		Values/Status
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	10° - 20° BTDC
		2,000 rpm	25° - 45° 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 - 4.0 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%
		2,000 rpm	20% - 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	–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%
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

Monitor Item	Condition		Values/Status
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-III value with the speedometer indication.		Almost the same speed as the speedometer indication
IDL A/V LEARN	Engine: running	Idle air volume learning has not been performed yet.	YET
		Idle air volume learning has already been performed successfully.	CMPLT
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has 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%
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	RES/+ switch: Pressed	ON
		RES/+ switch: Released	OFF
SET SW	Ignition switch: ON	SET/– switch: Pressed	ON
		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 144 km/h (89 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF
FAN DUTY	Engine: Running		0 - 100%
ALT DUTY	Engine: Idle		0 - 80%

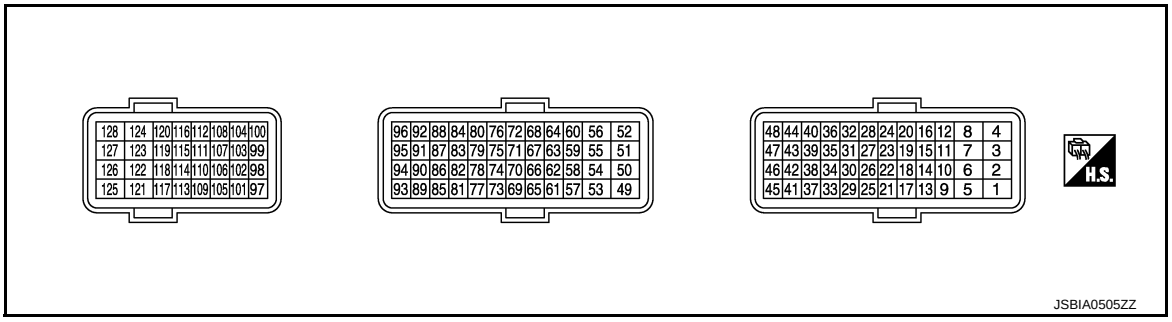
Monitor Item	Condition		Values/Status
BAT CUR SEN	• Engine speed: Idle • Battery: Fully charged*2 • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load		Approx. 2,600 - 3,500 mV
A/F ADJ-B1	Engine: Running		–0.330 - 0.330
P/N POSI SW	Ignition switch: ON	Selector lever: P or N (CVT), Neutral (M/T)	ON
		Selector lever: Except above	OFF
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
FUEL INJ TIM	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	Approx. 16 deg
		2,000 rpm	Approx. –170 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. 1.4 msec
		2,000 rpm	Approx. 1.0 msec
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.
A/F SEN1 DIAG2(B1)	**NOTE:** The item is indicated, but not used.		
HO2 S2 DIAG2(B1)	**NOTE:** The item is indicated, but not used.		
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. 211.0 deg
		2,000 rpm	Approx. 206.0 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. 980 - 1,200 mV
		Revving engine from idle to 4,000 rpm quickly	Approx. 1,100 - 2,900 mV

Monitor Item	Condition		Values/Status
EOP SENSOR	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	Approx. 1450 mV
		2,000 rpm	Approx. 2850 mV
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

*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-111, "How to Handle Battery".

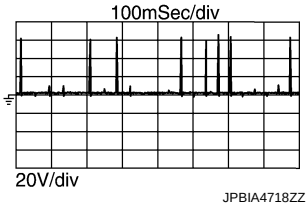
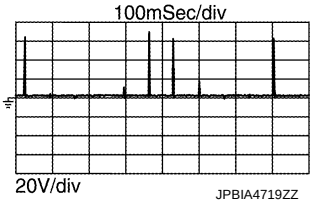
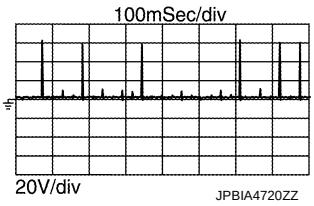
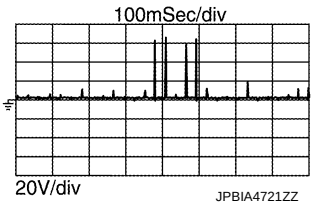
TERMINAL LAYOUT



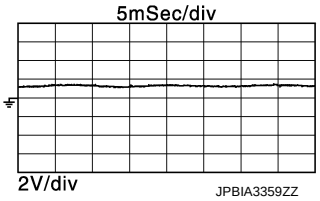
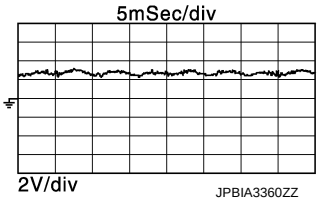
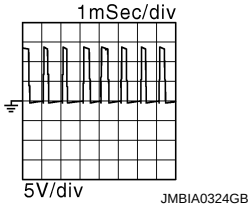
PHYSICAL VALUES

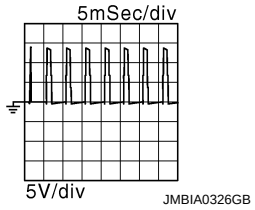
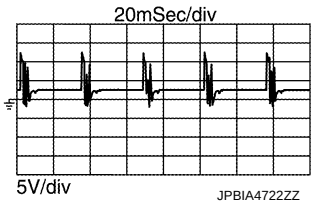
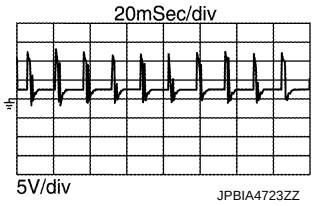
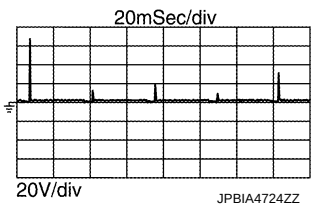
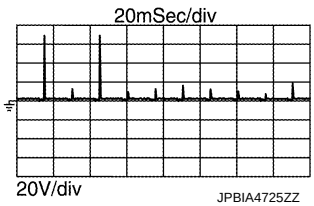
NOTE:
- ECM is located in the engine room left side near battery.
- Connect a break-out box (EG17550000) and harness adapter (EG17550400) between the ECM and ECM harness connector.
- Use extreme care not to 2 pins at one time.
- Data is for comparison and may not be exact.
- Specification data are reference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

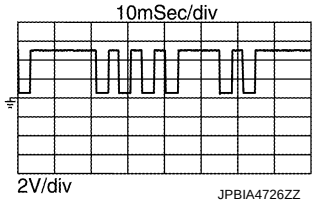
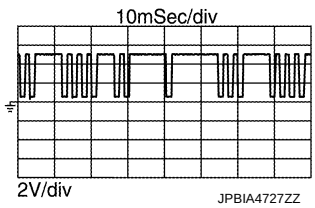
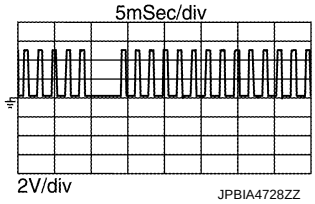
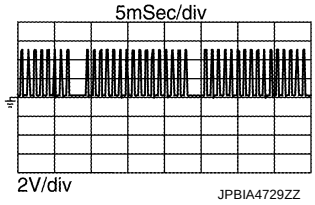
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
1 (B)	—	ECM ground (Fuel injector)	—	—	—
2 (B)	—	ECM ground (Fuel injector)	—	—	—

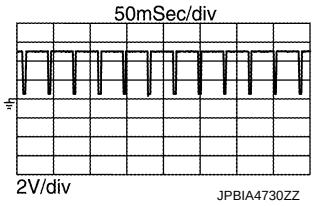
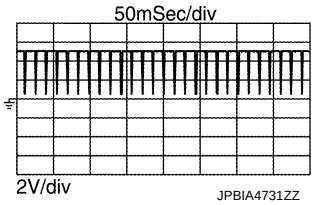
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
3 (G)	1 (B)	Fuel injector No. 1, 4 (HI)	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14 V) ★ 
4 (Y)		Fuel injector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

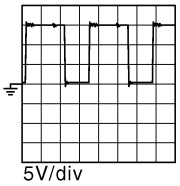
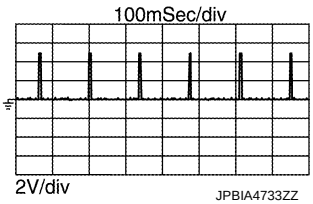
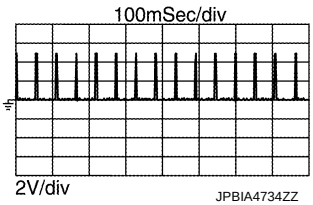
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
13 (G)	9 (W)	Mass air flow sensor	Input	[Ignition switch: ON] • Engine stopped	0.4 V
				[Engine is running] • Warm-up condition • Idle speed	0.9 - 1.2 V
				[Engine is running] • Warm-up condition • Engine 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.
17 (Y)	9 (W)	Intake air temperature sensor 1	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.
18 (GR)	44 (SB)	Fuel rail pressure sensor	Input	[Engine is running] • Warm-up condition • Idle speed	0.8 V
				[Engine is running] • Warm-up condition • Revving engine from idle to 4,000 rpm quickly	0.8 - 2.5 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)	—	[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 (—)	—	Sensor ground (Knock sensor)	—	—	—
36 (W)	35 (—)	Knock sensor	Input	[Engine is running] • Idle speed	2.5 V

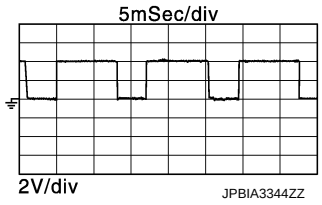
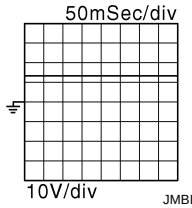
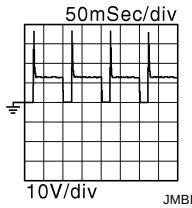
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
38 (B)	—	Shield	—	—	—
39 (R)	44 (SB)	Sensor power supply (Fuel rail pressure sensor)	—	[Ignition switch: ON]	5.0 V
41 (W)	44 (SB)	Turbocharger boost sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.9 V
				[Engine is running] • Warm-up condition • Engine speed is 2,000 rpm	2.0 V
42 (BG)	44 (SB)	Atmospheric pressure sensor	Input	[Ignition switch: ON]	1.8 - 4.8 V Output voltage varies with atmospheric pressure.
43 (G)	44 (SB)	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★ 
44 (SB)	—	Sensor ground (Fuel rail pressure sensor, turbocharger boost sensor, atmospheric pressure 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★ 

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
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★ 
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)
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

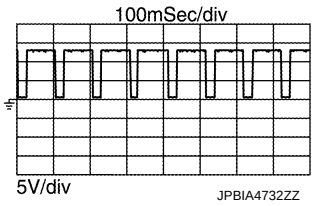
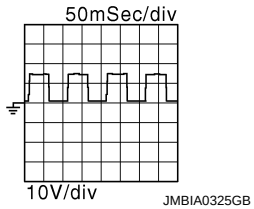
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
59 (L)	—	Sensor ground [Camshaft position sensor (PHASE), exhaust camshaft position sensor]	—	—	—
60 (W)	—	Sensor ground [Crankshaft position sensor (POS)]	—	—	—
62 (B)	—	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5 V
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★ 
				[Engine is running] • Engine speed is 2,000 rpm	1.0 - 2.0★ 
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★ 
				[Engine is running] • Engine speed: 2,000 rpm	4.0 V★ 
66 (SB)	127 (B/Y)	Starter relay control	Output	[Ignition switch: ON] • Selector lever: P or N	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON] • Selector lever: Except above	0 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
67 (LG)	59 (L)	Exhaust 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★ 
				[Engine is running] • Engine speed is 2,000 rpm	1.0 - 2.0★ 
68 (Y)	—	Sensor power supply (Battery current sensor, battery temperature sensor, G sensor)	—	[Ignition switch: ON]	5 V
72 (GR)	—	Sensor power supply [Camshaft position sensor (PHASE)]	—	[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

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
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	7 - 10 V★  JMBIA0038GB
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★  JPBIA4733ZZ
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.2 - 0.5 V★  JPBIA4734ZZ
83 (G)	87 (BR)	G sensor	Input	[Engine is running] • Warm-up condition • Idle speed	2.5 V
85 (G)	127 (B/Y)	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	6.5 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.

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
91 (BR)	127 (B/Y)	Fuel pump control module (FPCM)	Output	[When cranking engine]	0 - 0.5 V
				[Engine is running] • Warm-up condition	0 - 4.0 V★  JPBIA3344ZZ
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)
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
96 (R)	127 (B/Y)	Fuel pump control module (FPCM) check	Input	[When cranking engine]	0 V
				[Engine is running] • Warm-up condition • Idle speed	9 V
98 (BR)	127 (B/Y)	ASCD MAIN switch	Input	[Ignition switch: ON] ASCD MAIN switch: OFF	0 V
				[Ignition switch: ON] ASCD MAIN switch: ON	BATTERY VOLTAGE (11 - 14 V)
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

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
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-III 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)
107 (L)	127 (B/Y)	Speed limiter MAIN switch	Input	[Ignition switch: ON] Speed limiter MAIN switch: OFF	0 V
				[Ignition switch: ON] Speed limiter MAIN switch: ON	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)
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] • RES/+ switch: Pressed	3 V
				[Ignition switch: ON] • 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 (SB)	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

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
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 (GR)	127 (B/Y)	Throttle control motor power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
123 (B/Y)	—	ECM ground	—	—	—
124 (B/Y)	—	ECM ground	—	—	—
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★  JPBIA4732ZZ
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★  JMBIA0325GB
				[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:0000000006548501

NON DTC RELATED ITEM

Detected items	Engine operating condition in fail-safe mode	Remarks	Reference page
Malfunction indicator circuit	Engine speed will not rise more than 2,500 rpm due to the fuel cut	When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system. Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail safe function. The fail safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.	EC-436, "Component Function Check"

DTC RELATED ITEM

DTC No.	Detected items	Engine operating condition in fail safe mode
P0011	Intake valve timing control	The signal is not energized to the intake valve timing control solenoid valve and the valve control does not function.
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.
P0088		Engine speed is limited.
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-III displays the engine coolant temperature decided by ECM.
		Condition: Just as ignition switch is turned ON or START — Engine coolant temperature decided (CONSULT-III display): 40°C (104°F)
		Condition: Approx. 4 minutes or more after engine starting — Engine coolant temperature decided (CONSULT-III display): 80°C (176°F)
		Condition: Except as shown above — Engine coolant temperature decided (CONSULT-III display): 40 - 80°C (104 - 176°F) (Depends on the time)
		When the fail safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.
P0190	FRP sensor	• Engine speed is limited. • High pressure fuel pump is activated at maximum discharge pressure.
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.
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.

DTC No.	Detected items	Engine operating condition in fail safe mode
P0524	Engine oil pressure	• The signal is not energized to the intake valve timing control solenoid valve and the valve control does not function. • Engine speed will not rise more than 2,400 rpm due to the fuel cut.
P0605	ECM	(When ECM calculation function is malfunctioning:) ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P0607		Engine speed will not rise more than 3,500 rpm due to the fuel cut.
P062B		Type1 • Engine torque is limited. • Idle engine speed is increased. • Fuel injector power supply shut-off. • High fuel pressure limitation.
		Type2 • Engine torque is limited. • Fuel injection shut-off of malfunction cylinder. • Mixture ratio feedback control does not function. • Idle engine speed is increased.
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.
P1805	Brake switch	ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.
		Vehicle condition: Driving condition
		When engine is idling: Normal
		When accelerating: Poor acceleration
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:0000000006548502

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 • P0097 P0098 Intake air temperature sensor 2 • P0102 P0103 Mass air flow sensor • P0107 P0108 Atmospheric pressure sensor • P0112 P0113 Intake air temperature sensor 1 • P0117 P0118 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor • P0197 P0198 Engine oil temperature sensor • P0327 P0328 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 Camshaft position sensor (PHASE) • P0500 P0501 P2159 P2162 Vehicle speed sensor • P0520 Engine oil pressure sensor • P0603 P0605 P0607 P0611 P062B ECM • P0643 Sensor power supply • P0705 Transmission range switch • P0850 Park/neutral position (PNP) switch • P1197 Out of gas* • P1220 Fuel pump control module (FPCM) • P1550 P1551 P1552 P1553 P1554 Battery current sensor • P1556 P1557 Batter temperature sensor • P158A ECM • P159A P159B P159C P159D G sensor • P1610 - P1615 NATS • P1650 P1651 P1652 Starter motor relay • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
2	• P0031 P0032 Air fuel ratio (A/F) sensor 1 heater • P037 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 P0133 Air fuel ratio (A/F) sensor 1 • P0137 P0138 P0139 Heated oxygen sensor 2 • P0237 P0238 Turbocharger boost sensor • P0444 EVAP canister purge volume control solenoid valve • P0603 ECM • 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) • P1805 Brake 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 • P0300 - P0304 Misfire • P0420 Three way catalyst function • P0506 P0507 Idle speed control system • P0524 Engine oil pressure • P1212 TCS communication line • P1564 ASCD steering switch • P1572 ASCD brake switch • P1574 ASCD vehicle speed sensor • P2119 Electric throttle control actuator

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

DTC Index

INFOID:0000000006548503

×:Applicable —: Not applicable

DTC*1		Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page
CONSULT-III GST*2	ECM*3					
U0101	0101	LOST COMM (TCM)	—	1	×	EC-159
U0122	0122	VDC MDL	—	2	×	EC-160
U1001	1001*4	CAN COMM CIRCUIT	—	2	—	EC-161
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	Flashing	—
P0011	0011	INT/V TIM CONT-B1	—	2	×	EC-162
P0014	0014	EXH/V TIM CONT-B1	—	2	×	EC-165
P0031	0031	A/F SEN1 HTR (B1)	—	2	×	EC-168
P0032	0032	A/F SEN1 HTR (B1)	—	2	×	EC-168
P0037	0037	HO2 HTR (B1)	—	2	×	EC-171
P0038	0038	HO2 HTR (B1)	—	2	×	EC-171
P0045	0045	TC BOOST SOL/V	—	2	—	EC-174
P0047	0047	TC/SC BOOST CONT A	—	1	×	EC-174
P0048	0048	TC/SC BOOST CONT A	—	1	—	EC-174
P0075	0075	INT/V TIM V/CIR-B1	—	2	×	EC-176
P0078	0078	EX V/T ACT/CIRC-B1	—	2	×	EC-179
P0087	0087	LOW FUEL PRES	—	2	×	EC-182
P0088	0088	HIGH FUEL PRES	—	2	×	EC-182
P0090	0090	FUEL PUMP	—	2	×	EC-182
P0097	0097	IAT SEN/CIRCUIT-B2	—	2	×	EC-185
P0098	0098	IAT SEN/CIRCUIT-B2	—	2	×	EC-185
P0102	0102	MAF SEN/CIRCUIT-B1	—	1	×	EC-189
P0103	0103	MAF SEN/CIRCUIT-B1	—	1	×	EC-189
P0107	0107	ABSL PRES SEN/CIRC	—	2	×	EC-194
P0108	0108	ABSL PRES SEN/CIRC	—	2	×	EC-194
P0112	0112	IAT SEN/CIRCUIT-B1	—	2	×	EC-198
P0113	0113	IAT SEN/CIRCUIT-B1	—	2	×	EC-198
P0117	0117	ECT SEN/CIRC	—	1	×	EC-200
P0118	0118	ECT SEN/CIRC	—	1	×	EC-200
P0122	0122	TP SEN 2/CIRC-B1	—	1	×	EC-202
P0123	0123	TP SEN 2/CIRC-B1	—	1	×	EC-202
P0130	0130	A/F SENSOR1 (B1)	—	2	×	EC-205
P0131	0131	A/F SENSOR1 (B1)	—	2	×	EC-209
P0132	0132	A/F SENSOR1 (B1)	—	2	×	EC-212
P0133	0133	A/F SENSOR1 (B1)	×	2	×	EC-215
P0137	0137	HO2S2 (B1)	×	2	×	EC-220
P0138	0138	HO2S2 (B1)	×	2	×	EC-226
P0139	0139	HO2S2 (B1)	×	2	×	EC-233
P0171	0171	FUEL SYS-LEAN-B1	—	2	×	EC-239
P0172	0172	FUEL SYS-RICH-B1	—	2	×	EC-243

DTC[*1]		Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page
CONSULT-III GST[*2]	ECM[*3]					
P0190	0190	FUEL PRES SEN/CIRC	—	1	×	EC-247
P0197	0197	EOT SEN/CIRC	—	2	×	EC-251
P0198	0198	EOT SEN/CIRC	—	2	×	EC-251
P0201	0201	INJECTOR CIRC-CYL1	—	2	×	EC-253
P0202	0202	INJECTOR CIRC-CYL2	—	2	×	EC-253
P0203	0203	INJECTOR CIRC-CYL3	—	2	×	EC-253
P0204	0204	INJECTOR CIRC-CYL4	—	2	×	EC-253
P0222	0222	TP SEN 1/CIRC-B1	—	1	×	EC-254
P0223	0223	TP SEN 1/CIRC-B1	—	1	×	EC-254
P0234	0234	TC SYSTEM-B1	—	1	×	EC-257
P0237	0237	TC BOOST SEN/CIRC-B1	—	2	×	EC-260
P0238	0238	TC BOOST SEN/CIRC-B1	—	2	×	EC-260
P0300	0300	MULTI CYL MISFIRE	—	1 or 2	× or —	EC-263
P0301	0301	CYL 1 MISFIRE	—	1 or 2	× or —	EC-263
P0302	0302	CYL 2 MISFIRE	—	1 or 2	× or —	EC-263
P0303	0303	CYL 3 MISFIRE	—	1 or 2	× or —	EC-263
P0304	0304	CYL 4 MISFIRE	—	1 or 2	× or —	EC-263
P0327	0327	KNOCK SEN/CIRC-B1	—	2	—	EC-269
P0328	0328	KNOCK SEN/CIRC-B1	—	2	—	EC-269
P0335	0335	CKP SEN/CIRCUIT	—	2	×	EC-271
P0340	0340	CMP SEN/CIRC-B1	—	2	×	EC-274
P0420	0420	TW CATALYST SYS-B1	×	2	×	EC-278
P0444	0444	PURG VOLUME CONT/V	—	2	×	EC-283
P0500	0500	VEHICLE SPEED SEN A[*5]	—	2	×	EC-286
P0501	0501	VEHICLE SPEED SEN A	—	2	×	EC-288
P0506	0506	ISC SYSTEM	—	2	×	EC-289
P0507	0507	ISC SYSTEM	—	2	×	EC-291
P0520	0520	EOP SENSOR/SWITCH	—	2	—	EC-293
P0524	0524	ENGINE OIL PRESSURE	—	1	—	EC-297
P0603	0603	ECM BACK UP/CIRCUIT[*6]	—	2	×	EC-300
P0605	0605	ECM	—	1 or 2	× or —	EC-302
P0607	0607	ECM	—	1 (CVT) 2 (M/T)	× (CVT) — (M/T)	EC-304
P0611	0611	FIC MODULE	—	2	—	EC-305
P062B	062B	ECM	—	2	×	EC-306
P0643	0643	SENSOR POWER/CIRC	—	1	×	EC-307
P0705	0705	T/M RANGE SENSOR A	—	2	×	TM-200
P0710	0710	FLUID TEMP SENSOR A	—	1	×	TM-202
P0715	0715	INPUT SPEED SENSOR A	—	2	×	TM-207
P0720	0720	OUTPUT SPEED SENSOR[*5]	—	2	×	TM-209
P0740	0740	TORQUE CONVERTER	—	2	×	TM-215
P0744	0744	TORQUE CONVERTER	—	2	×	TM-217

DTC[*1]		Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page
CONSULT-III GST[*2]	ECM[*3]					
P0745	0745	PC SOLENOID A	—	2	×	TM-219
P0746	0746	PC SOLENOID A	—	1	×	TM-221
P0776	0776	PC SOLENOID B	—	2	×	TM-223
P0778	0778	PC SOLENOID B	—	2	×	TM-225
P0840	0840	FLUID PRESS SEN/SW A	—	2	×	TM-230
P0850	0850	P-N POS SW/CIRCUIT	—	2	×	EC-309
P1078	1078	EXH TIM SEN/CIRC-B1	—	2	×	EC-313
P1197	1197	FUEL RUN OUT	—	2	—	EC-317
P1212	1212	TCS/CIRC	—	2	—	EC-319
P1217	1217	ENG OVER TEMP	—	1	×	EC-320
P1220	1220	FPCM	—	1	—	EC-323
P1225	1225	CTP LEARNING-B1	—	2	—	EC-326
P1226	1226	CTP LEARNING-B1	—	2	—	EC-327
P1550	1550	BAT CURRENT SENSOR	—	2	—	EC-328
P1551	1551	BAT CURRENT SENSOR	—	2	—	EC-331
P1552	1552	BAT CURRENT SENSOR	—	2	—	EC-331
P1553	1553	BAT CURRENT SENSOR	—	2	—	EC-334
P1554	1554	BAT CURRENT SENSOR	—	2	—	EC-337
P1556	1556	BAT TMP SEN/CIRC	—	2	—	EC-341
P1557	1557	BAT TMP SEN/CIRC	—	2	—	EC-341
P1564	1564	ASCD SW	—	1	—	EC-343
P1572	1572	ASCD BRAKE SW	—	1	—	EC-346
P1574	1574	ASCD VHL SPD SEN	—	1	—	EC-352
P158A	158A	G SENSOR	—	1	—	EC-354
P159A	159A	G SENSOR	—	2	—	EC-355 (M/T) EC-358 (CVT)
P159B	159B	G SENSOR	—	2	×	EC-360 (M/T) EC-364 (CVT)
P159C	159C	G SENSOR	—	2	×	EC-355 (M/T) EC-358 (CVT)
P159D	159D	G SENSOR	—	2	×	EC-355 (M/T) EC-358 (CVT)
P1610	1610	LOCK MODE	—	2	—	SEC-192
P1611	1611	ID DISCORD, IMMU-ECM	—	2	—	SEC-193
P1612	1612	CHAIN OF ECM-IMMU	—	2	—	SEC-194
P1614	1614	CHAIN OF IMMU-KEY	—	2	—	SEC-195
P1615	1615	DIFFERENCE OF KEY	—	2	—	SEC-198
P1650	1650	STR MTR RELAY 2	—	2	×	EC-366
P1651	1651	STR MTR RELAY	—	2	×	EC-369
P1652	1652	STR MTR SYS COMM	—	1	×	EC-372
P1740	1740	SLCT SOLENOID	—	2	×	TM-247
P1777	1777	STEP MOTOR	—	1	×	TM-250
P1778	1778	STEP MOTOR	—	2	×	TM-252
P1805	1805	BRAKE SW/CIRCUIT	—	2	—	EC-374

DTC*1		Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page
CONSULT-III GST*2	ECM*3					
P2100	2100	ETC MOT PWR-B1	—	1	×	EC-376
P2101	2101	ETC FNCTN/CIRC-B1	—	1	×	EC-378
P2103	2103	ETC MOT PWR	—	1	×	EC-376
P2118	2118	ETC MOT-B1	—	1	×	EC-381
P2119	2119	ETC ACTR-B1	—	1	×	EC-383
P2122	2122	APP SEN 1/CIRC	—	1	×	EC-385
P2123	2123	APP SEN 1/CIRC	—	1	×	EC-385
P2127	2127	APP SEN 2/CIRC	—	1	×	EC-388
P2128	2128	APP SEN 2/CIRC	—	1	×	EC-388
P2135	2135	TP SENSOR-B1	—	1	×	EC-391
P2138	2138	APP SENSOR	—	1	×	EC-394
P2159	2159	VEHICLE SPEED SEN B	—	2	×	EC-288
P2162	2162	VEHICLE SPEED SEN A-B	—	2	×	EC-398

*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 troubleshooting for this DTC needs CONSULT-III.

*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-III screen.

Test Value and Test Limit

INFOID:0000000006417225

The following is the information specified in Service $06 of 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	89H	84H	The amount of shift in air fuel ratio
			P2A00	8AH	84H	The amount of shift in air fuel ratio
			P0130	8BH	0BH	Difference in sensor output voltage
			P0133	8CH	83H	Response gain at the limited frequency
	02H	Heated oxygen sensor 2 (Bank 1)	P0138	07H	0CH	Minimum sensor output voltage for test cycle
			P0137	08H	0CH	Maximum sensor output voltage for test cycle
			P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
	03H	Heated oxygen sensor 3 (Bank 1)	P0143	07H	0CH	Minimum sensor output voltage for test cycle
			P0144	08H	0CH	Maximum sensor output voltage for test cycle
			P0146	80H	0CH	Sensor output voltage
			P0145	81H	0CH	Difference in sensor output voltage

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P0151	83H	0BH	Minimum sensor output voltage for test cycle
			P0151	84H	0BH	Maximum sensor output voltage for test cycle
			P0150	85H	0BH	Minimum sensor output voltage for test cycle
			P0150	86H	0BH	Maximum sensor output voltage for test cycle
			P0153	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0153	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A03	89H	84H	The amount of shift in air fuel ratio
			P2A03	8AH	84H	The amount of shift in air fuel ratio
			P0150	8BH	0BH	Difference in sensor output voltage
			P0153	8CH	83H	Response gain at the limited frequency
	06H	Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for test cycle
			P0157	08H	0CH	Maximum sensor output voltage for test cycle
			P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
	07H	Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for test cycle
			P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage
			P0165	81H	0CH	Difference in sensor output voltage
CATALYST	21H	Three way catalyst function (Bank1)	P0420	80H	01H	O2 storage index
			P0420	82H	01H	Switching time lag engine exhaust index value
			P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2423	84H	84H	O2 storage index in HC trap catalyst
	22H	Three way catalyst function (Bank2)	P0430	80H	01H	O2 storage index
			P0430	82H	01H	Switching time lag engine exhaust index value
			P2424	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
EGR SYSTEM	31H	EGR function	P0400	80H	96H	Low Flow Faults: EGR temp change rate (short term)
			P0400	81H	96H	Low Flow Faults: EGR temp change rate (long term)
			P0400	82H	96H	Low Flow Faults: Difference between max EGR temp and EGR temp under idling condition
			P0400	83H	96H	Low Flow Faults: Max EGR temp
			P1402	84H	96H	High Flow Faults: EGR temp increase rate
VVT SYSTEM	35H	VVT Monitor (Bank1)	P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
	36H	VVT Monitor (Bank2)	P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
EVAP SYSTEM	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	3BH	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)
	3CH	EVAP control system leak (Very small leak)	P0456	80H	05H	Leak area index (for more than 0.02 inch)
			P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control valve close
O2 SENSOR HEATER	41H	A/F sensor 1 heater (Bank 1)	Low Input:P0031 High Input:P0032	81H	0BH	Converted value of Heater electric current to voltage
	42H	Heated oxygen sensor 2 heater (Bank 1)	Low Input:P0037 High Input:P0038	80H	0CH	Converted value of Heater electric current to voltage
	43H	Heated oxygen sensor 3 heater (Bank 1)	P0043	80H	0CH	Converted value of Heater electric current to voltage
	45H	A/F sensor 1 heater (Bank 2)	Low Input:P0051 High Input:P0052	81H	0BH	Converted value of Heater electric current to voltage
	46H	Heated oxygen sensor 2 heater (Bank 2)	Low Input:P0057 High Input:P0058	80H	0CH	Converted value of Heater electric current to voltage
	47H	Heated oxygen sensor 3 heater (Bank 2)	P0063	80H	0CH	Converted value of Heater electric current to voltage

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
SECONDARY AIR	71H	Secondary Air system	P0411	80H	01H	Secondary Air Injection System Incorrect Flow Detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary Air Injection System Insufficient Flow
			P2445	82H	01H	Secondary Air Injection System Pump Stuck Off
			P2448	83H	01H	Secondary Air Injection System High Airflow
			Bank1: P2440 Bank2: P2442	84H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2440	85H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2444	86H	01H	Secondary Air Injection System Pump Stuck On
FUEL SYSTEM	81H	Fuel injection system function (Bank 1)	P0171 or P0172	80H	2FH	Long term fuel trim
			P0171 or P0172	81H	24H	The number of lambda control clamped
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	80H	2FH	Long term fuel trim
			P0174 or P0175	81H	24H	The number of lambda control clamped

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

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

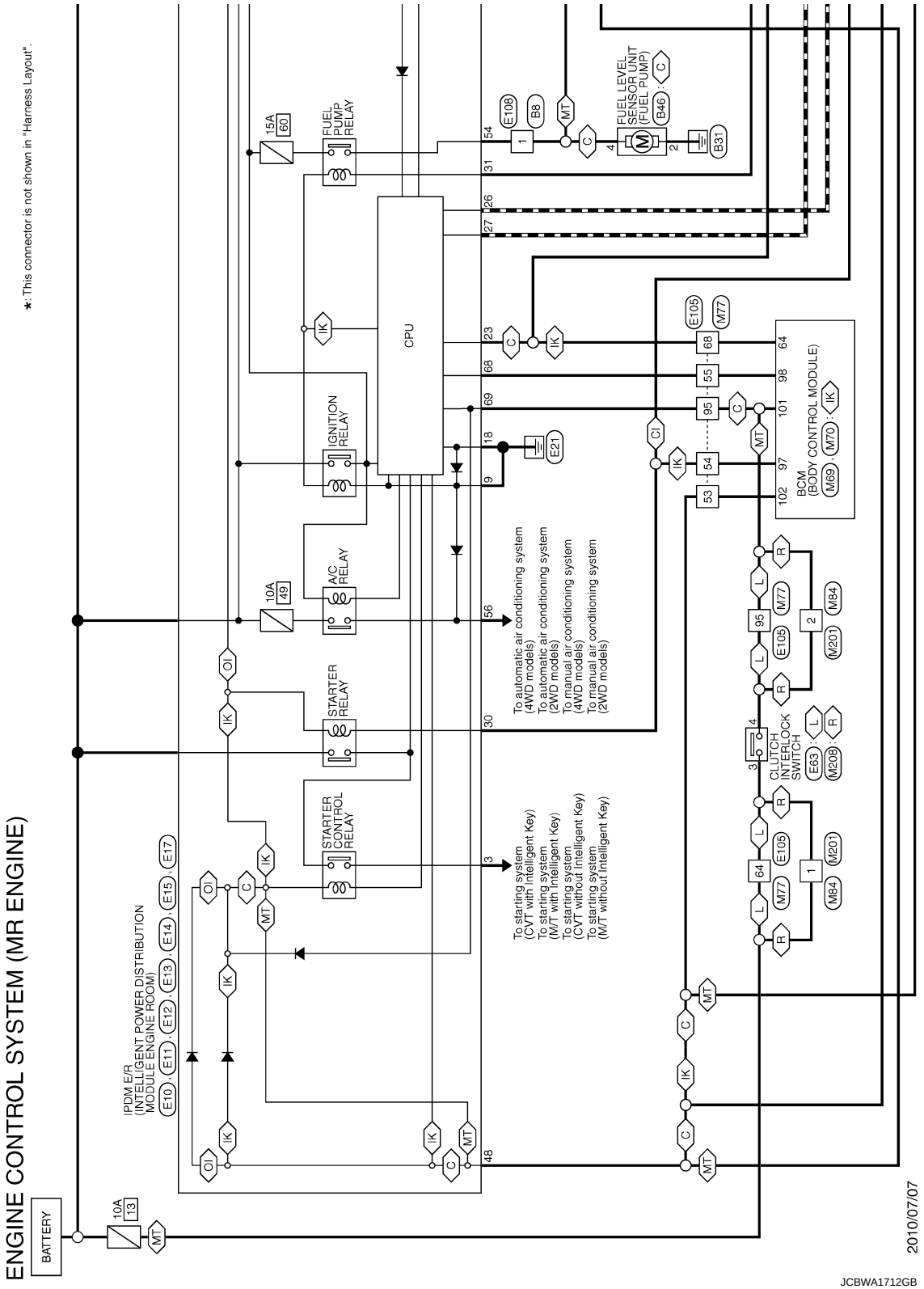
WIRING DIAGRAM

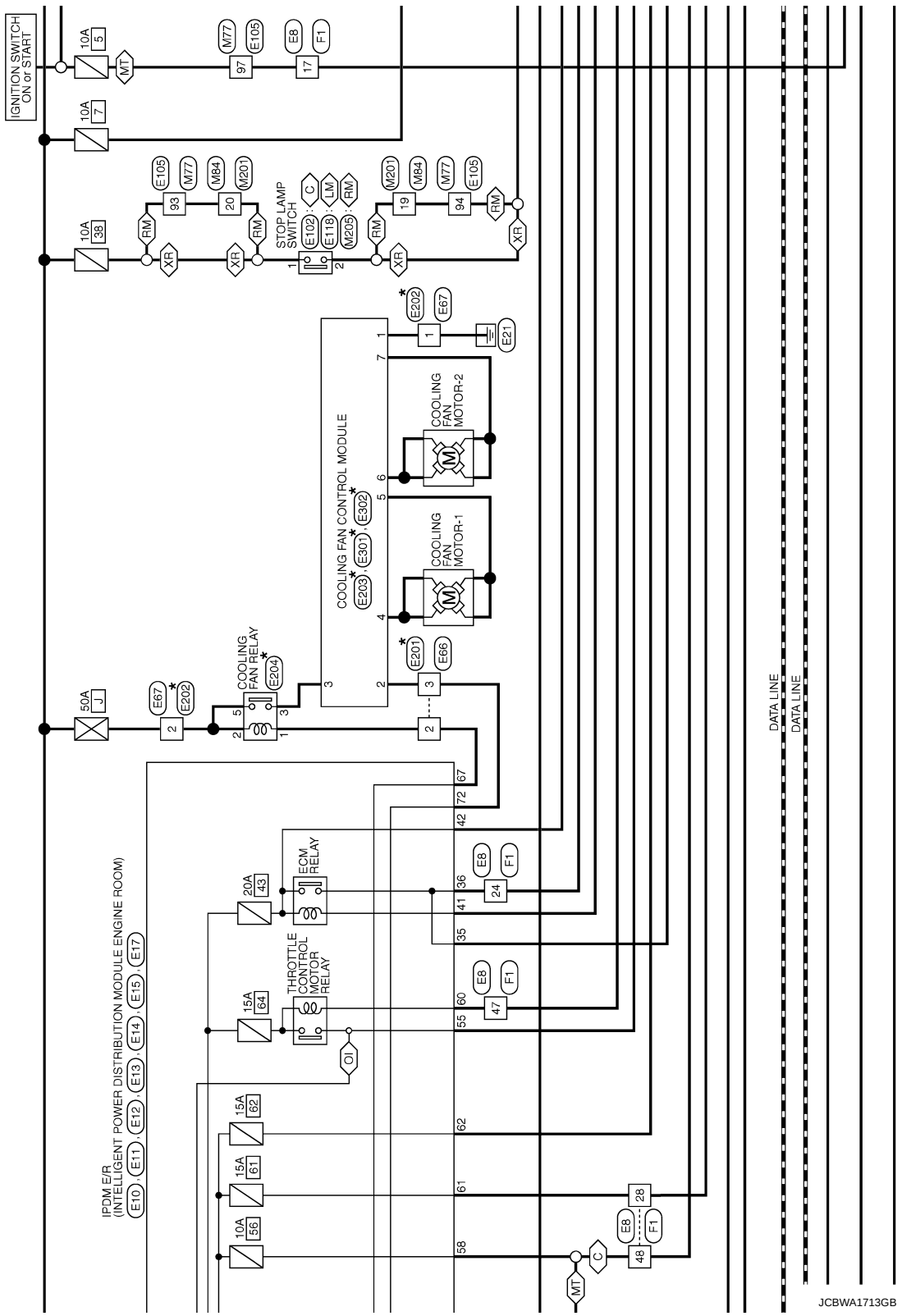
ENGINE CONTROL SYSTEM

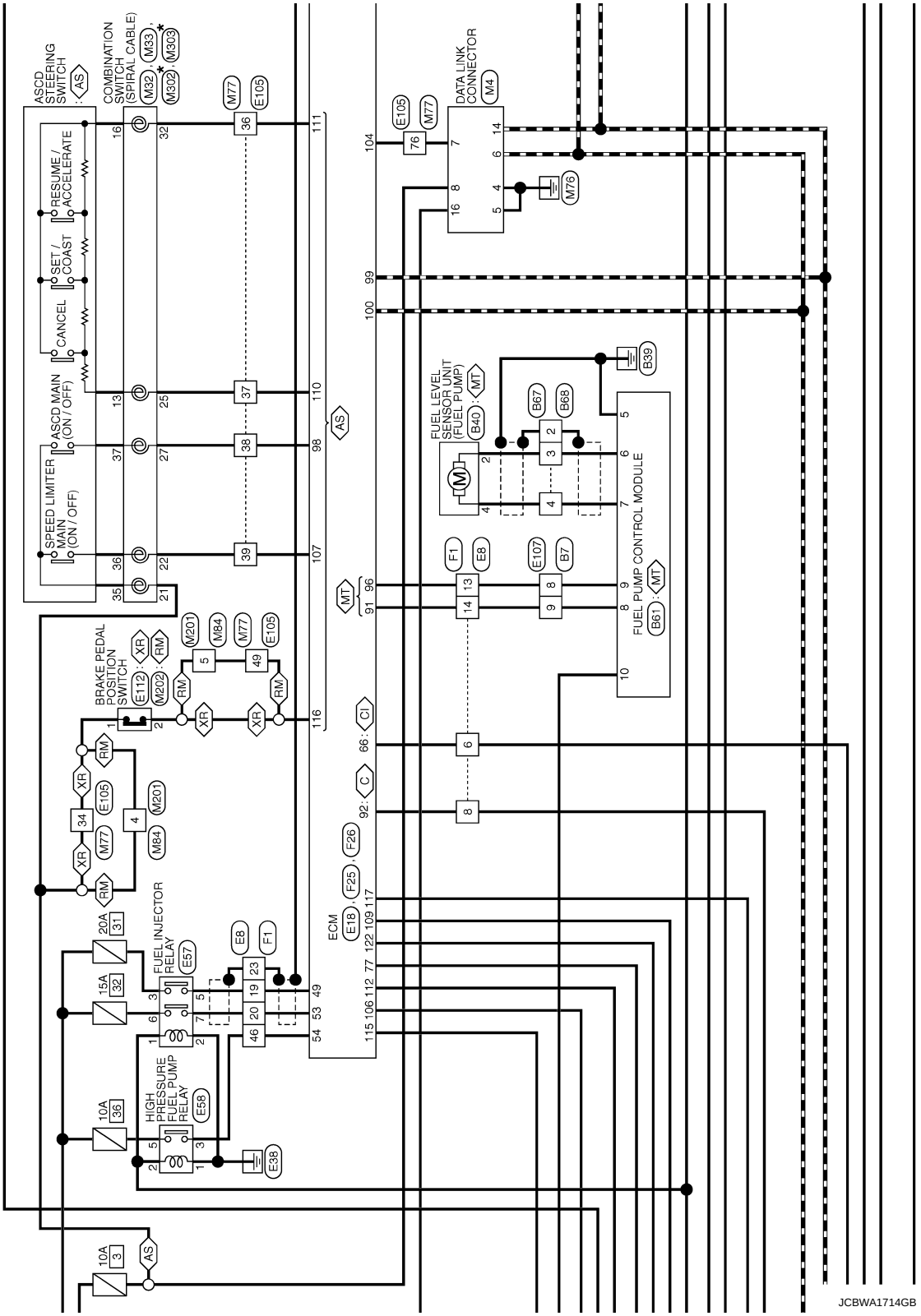
Wiring Diagram

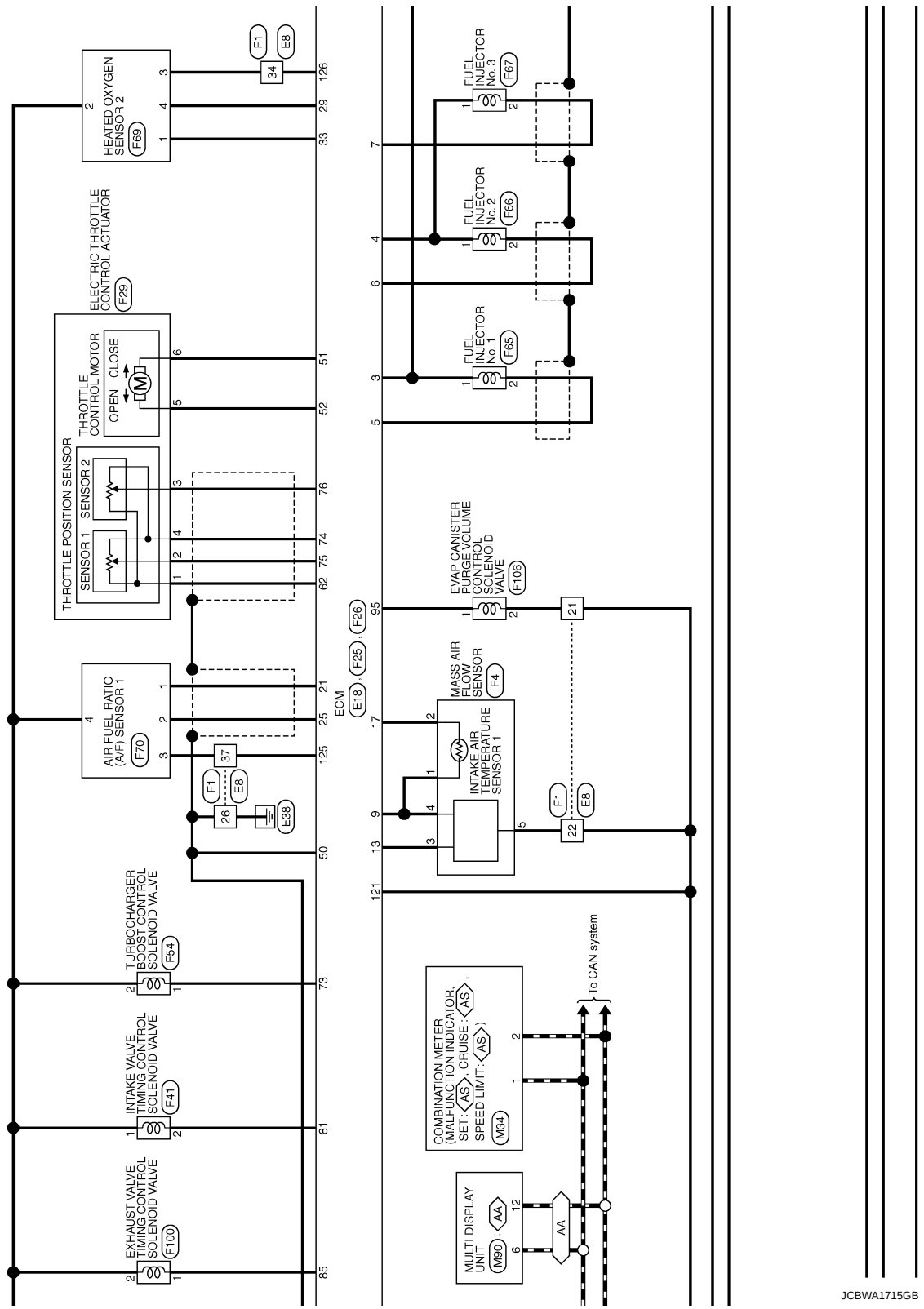
INFOID:0000000006417045

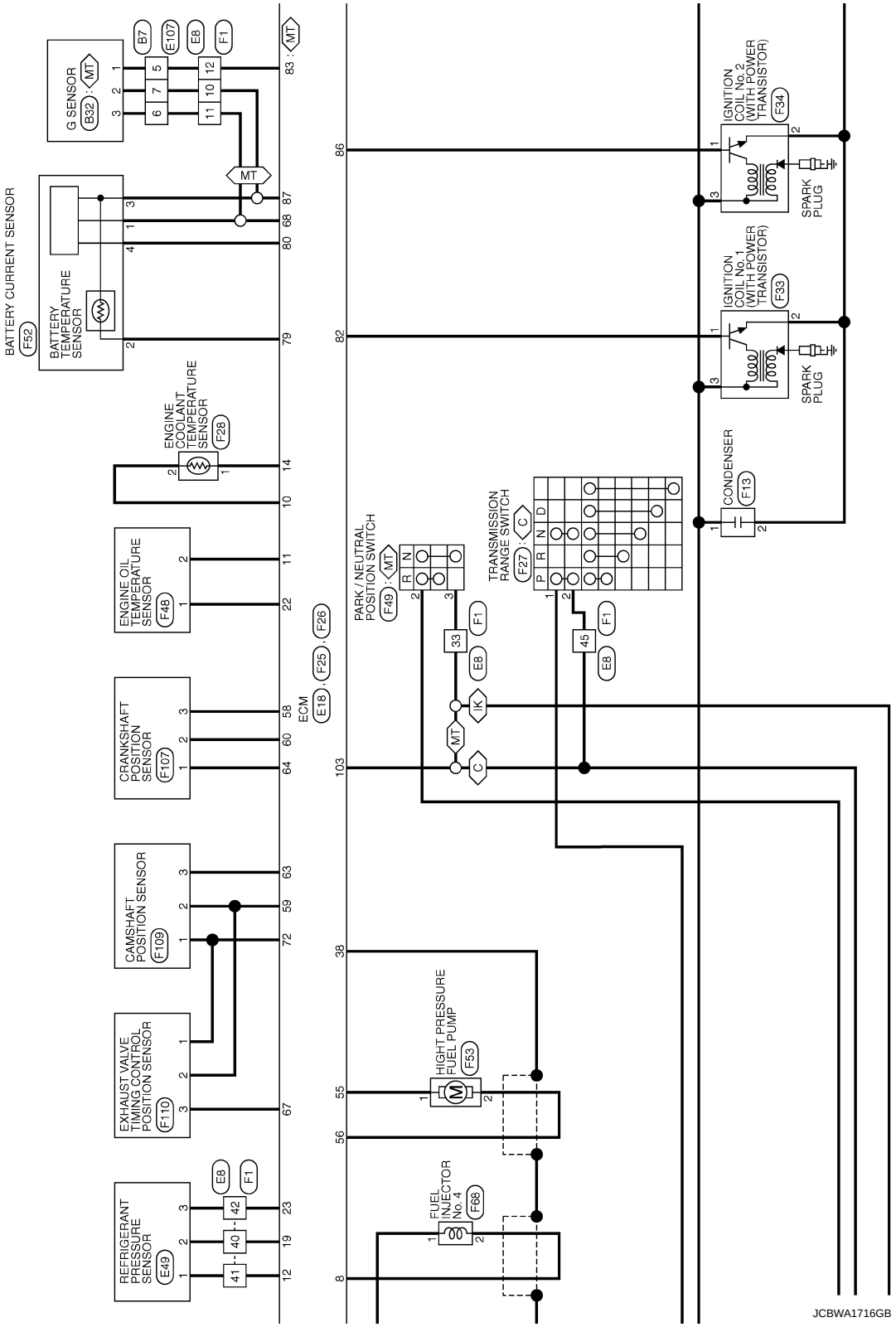
For connector terminal arrangements, harness layouts, and alphabets in a ⬡ (option abbreviation; if not described in wiring diagram), refer to GI-12, "Connector Information/Explanation of Option Abbreviation".

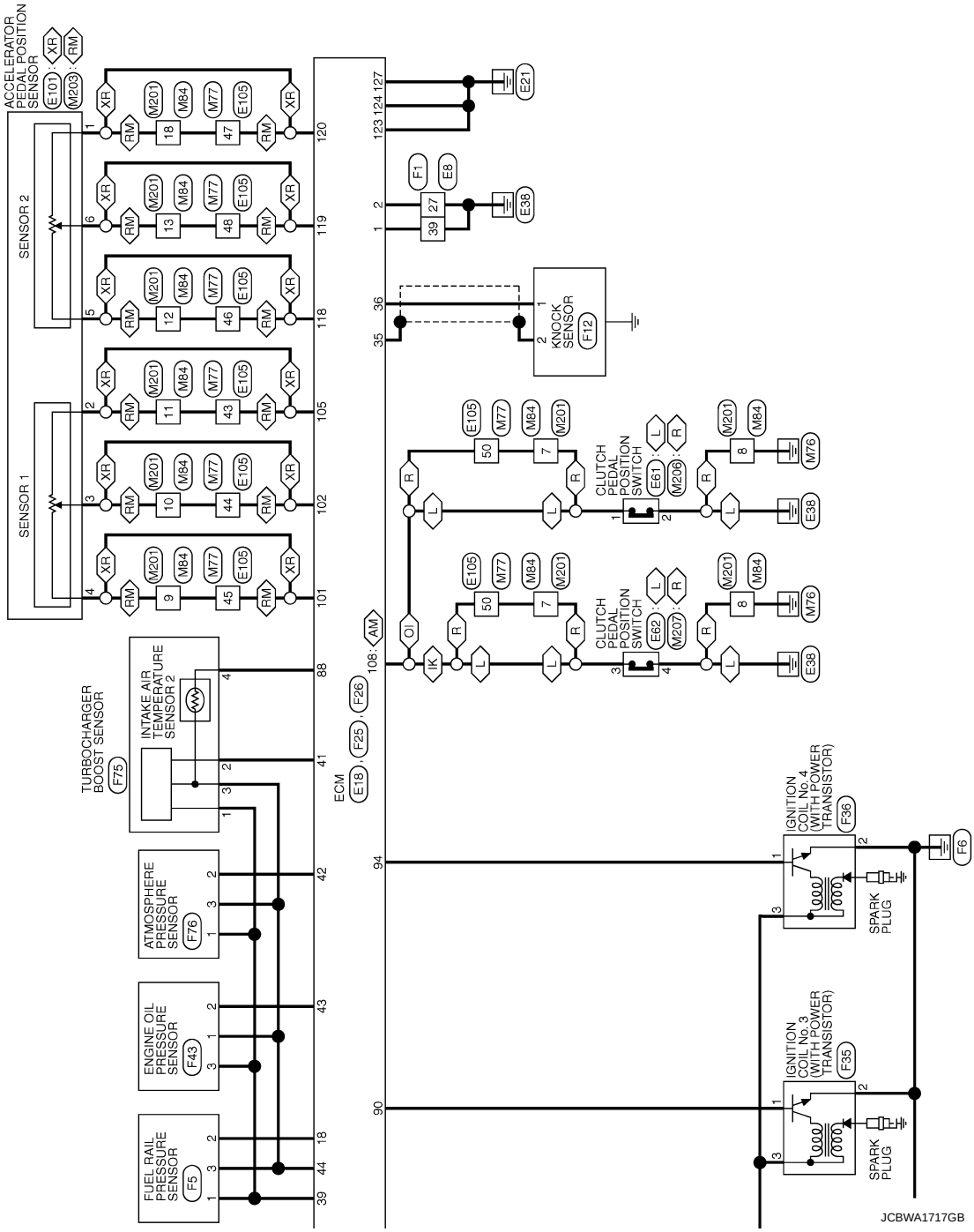



IGNITION SWITCH ON or START
10A 5
10A 7
10A 38
50A J
MT
RM
XR
STOP LAMP SWITCH
C
LM
RM
E102
E118
M205
COOLING FAN CONTROL MODULE
COOLING FAN MOTOR-2
COOLING FAN MOTOR-1
COOLING FAN RELAY
E202
E67
E21
E201
E66
E203
E301
E302
E204
DATA LINE
DATA LINE
IPDM E/R
(INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
E10
E11
E12
E13
E14
E15
E17
20A 43
ECM RELAY
15A 64
THROTTLE CONTROL MOTOR RELAY
OI
15A 62
15A 61
10A 56
E8
F1
JCBWA1713GB


ASCD STEERING SWITCH
AS
COMBINATION SWITCH (SPIRAL CABLE)
M32
M33
M302
M303
RESUME / ACCELERATE
SET / COAST
CANCEL
ASCD MAIN (ON / OFF)
SPEED LIMITER MAIN (ON / OFF)
DATA LINK CONNECTOR
M4
M76
FUEL LEVEL SENSOR UNIT (FUEL PUMP)
B40
MT
FUEL PUMP CONTROL MODULE
B61
BRAKE PEDAL POSITION SWITCH
E112
M202
M201
M84
M77
E105
FUEL INJECTOR RELAY
E57
HIGH PRESSURE FUEL PUMP RELAY
E58
E38
ECM
E18
F25
F26
E8
F1
E107
B7
B67
B68
B39
20A
15A
10A
JCBWA1714GB


HEATED OXYGEN SENSOR 2
F69
F1
E8
34
126
29
33
ELECTRIC THROTTLE CONTROL ACTUATOR
F29
THROTTLE CONTROL MOTOR
OPEN CLOSE
THROTTLE POSITION SENSOR
SENSOR 1
SENSOR 2
6
5
51
52
3
4
2
1
76
74
75
62
AIR FUEL RATIO (A/F) SENSOR 1
F70
4
1
2
3
21
25
125
37
F1
E8
26
E38
50
TURBOCHARGER BOOST CONTROL SOLENOID VALVE
F54
2
1
73
INTAKE VALVE TIMING CONTROL SOLENOID VALVE
F41
1
2
81
EXHAUST VALVE TIMING CONTROL SOLENOID VALVE
F100
2
1
85
ECM
E18
, F25
, F26
FUEL INJECTOR No. 3
F67
FUEL INJECTOR No. 2
F66
FUEL INJECTOR No. 1
F65
7
4
6
3
5
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
F106
95
1
2
21
MASS AIR FLOW SENSOR
F4
INTAKE AIR TEMPERATURE SENSOR 1
17
2
1
4
3
9
13
121
5
F1
E8
22
COMBINATION METER
(MALFUNCTION INDICATOR,
SET : AS , CRUISE : AS ,
SPEED LIMIT : AS)
M34
2
1
To CAN system
MULTI DISPLAY UNIT
M90
AA
6
12
AA
JCBWA1715GB


BATTERY CURRENT SENSOR
F52
BATTERY TEMPERATURE SENSOR
G SENSOR
B32
MT
B7
E107
E8
F1
ENGINE COOLANT TEMPERATURE SENSOR
F28
ENGINE OIL TEMPERATURE SENSOR
F48
CRANKSHAFT POSITION SENSOR
F107
CAMSHAFT POSITION SENSOR
F109
EXHAUST VALVE TIMING CONTROL POSITION SENSOR
F110
REFRIGERANT PRESSURE SENSOR
E49
ECM
E18
F25
F26
PARK / NEUTRAL POSITION SWITCH
F49
TRANSMISSION RANGE SWITCH
F27
C
HIGHT PRESSURE FUEL PUMP
F53
FUEL INJECTOR No.4
F68
IGNITION COIL No.2 (WITH POWER TRANSISTOR)
F34
IGNITION COIL No.1 (WITH POWER TRANSISTOR)
F33
SPARK PLUG
CONDENSER
F13
IK
JCBWA1716GB


ACCELERATOR PEDAL POSITION SENSOR
XR
RM
E101
M203
SENSOR 2
SENSOR 1
M201
M84
M77
E105
TURBOCHARGER BOOST SENSOR
F75
INTAKE AIR TEMPERATURE SENSOR 2
F26
ATMOSPHERE PRESSURE SENSOR
F76
ENGINE OIL PRESSURE SENSOR
F43
FUEL RAIL PRESSURE SENSOR
F5
ECM
E18
F25
AM
OI
IK
KNOCK SENSOR
F12
E21
F1
E8
E38
CLUTCH PEDAL POSITION SWITCH
E61
M206
E62
M207
M76
IGNITION COIL No. 4 (WITH POWER TRANSISTOR)
F36
IGNITION COIL No. 3 (WITH POWER TRANSISTOR)
F35
SPARK PLUG
F6
JCBWA1717GB

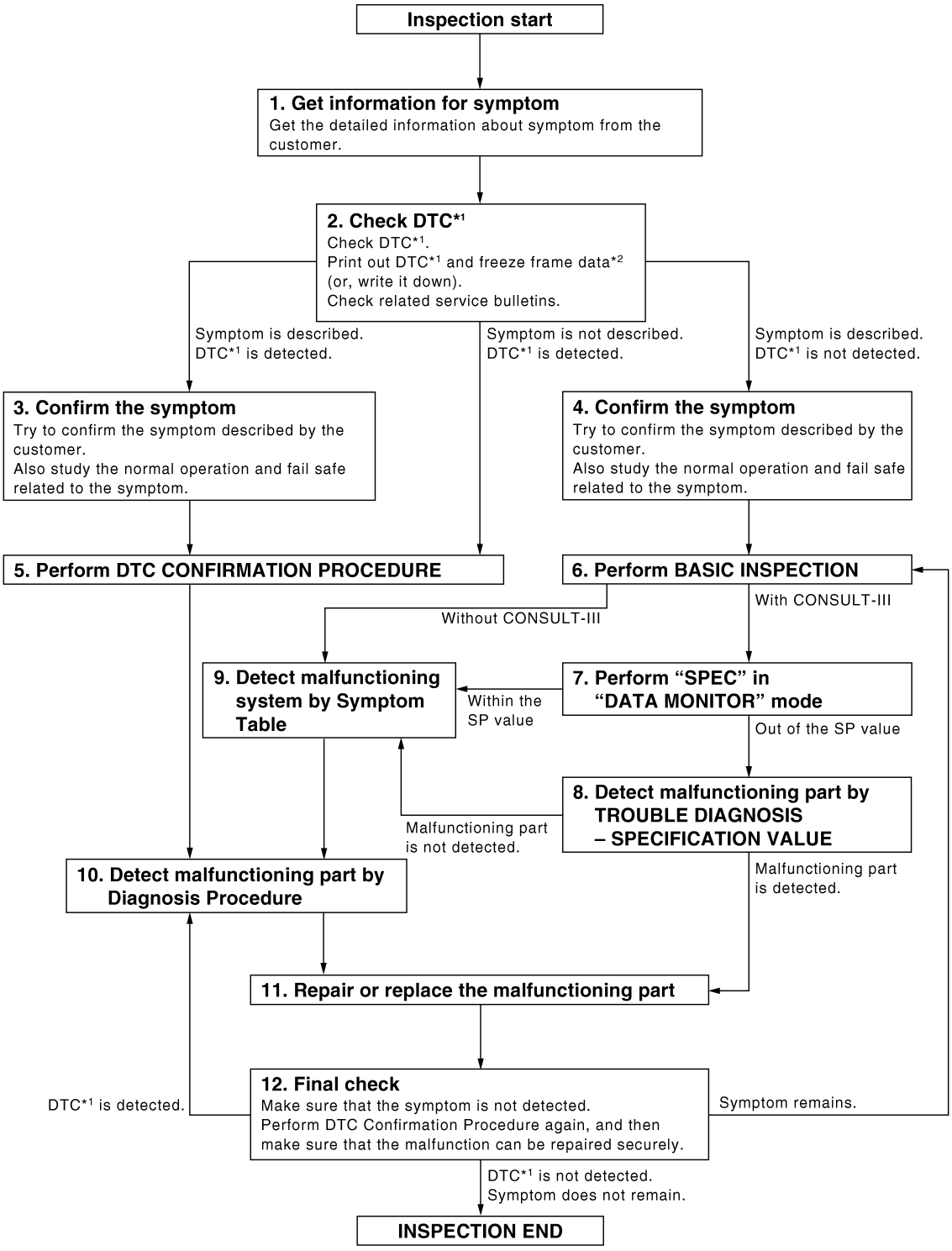
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000006416756

OVERALL SEQUENCE



*1: Include 1st trip DTC.
*2: Include 1st trip freeze frame data.

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DETAILED FLOW

1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the “Diagnostic Work Sheet”. (Refer to EC-127, "Diagnostic Work Sheet".)

>> GO TO 2.

2.CHECK DTC

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

- Record DTC and freeze frame data. (Print them out using CONSULT-III or GST.)
- Erase DTC.

With CONSULT-III :“How to Erase DTC and 1st Trip DTC” in EC-83, "CONSULT-III Function".
Without CONSULT-III : “How to Erase Self-diagnostic Results” in EC-79, "On Board Diagnosis Function".

- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to EC-437, "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-442, "Description" and EC-104, "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-442, "Description" and EC-104, "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-106, "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-108, "DTC Index".

6.PERFORM BASIC INSPECTION

Perform EC-129, "Work Procedure".

Do you have CONSULT-III?

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

7. PERFORM SPEC IN DATA MONITOR MODE

With CONSULT-III
Make sure that “MAS A/F SE-B1”, “B/FUEL SCHDL” and “A/F ALPHA-B1” are within the SP value using CONSULT-III in “SPEC” of “DATA MONITOR” mode. Refer to EC-147, "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-148, "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-437, "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-44, "Circuit Inspection".

Is malfunctioning part detected?

YES >> GO TO 11.
NO >> Monitor input data from related sensors or check the voltage of related ECM terminals using CONSULT-III. Refer to EC-90, "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-III :“How to Erase DTC and 1st Trip DTC” in EC-83, "CONSULT-III Function".
   Without CONSULT-III :“How to Erase Self-diagnostic Results” in EC-79, "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 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 >> With CONSULT-III :Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM and TCM (Transmission Control Module). (Refer to “How to Erase DTC and 1st

Trip DTC" in EC-83, "CONSULT-III Function".) If the completion of SRT is needed, drive vehicle under the specific DRIVING PATTERN in EC-142, "Description".

NO-2 >> ⊗Without CONSULT-III :Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM and TCM (Transmission Control Module). (Refer to "How to Erase Self-diagnostic Results" in EC-79, "On Board Diagnosis Function".) If the completion of SRT is needed, drive vehicle under the specific DRIVING PATTERN inEC-142, "Description".

Diagnostic Work Sheet

INFOID:0000000006416757

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.

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:0000000006416758

1.INSPECTION START

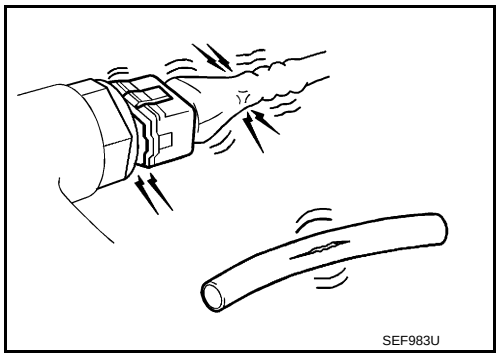
1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:

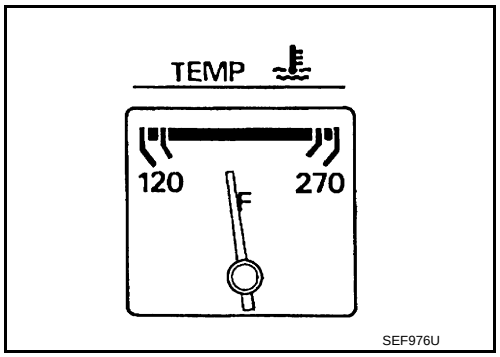
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket

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

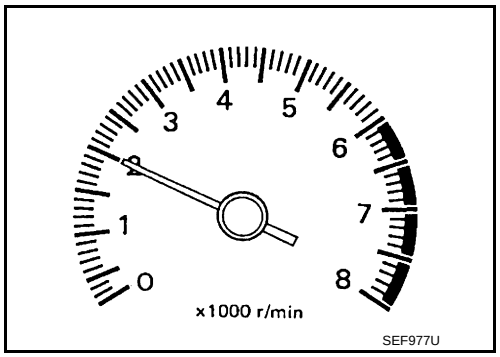


SEF976U

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-III or GST.

Is any DTC detected?

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



SEF977U

2.REPAIR OR REPLACE

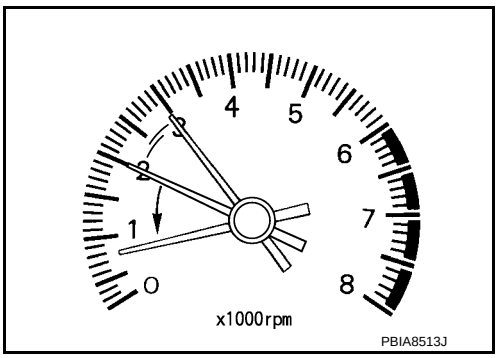
Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> 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-443, "Special Repair Requirement".
   For specification, refer to EC-449, "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-134, "Work Procedure".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-135, "Work Procedure".

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-136, "Work Procedure".

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-443, "Special Repair Requirement".
   For specification, refer to EC-449, "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-274, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-271, "DTC Logic".

Is the inspection result normal?

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

9. CHECK ECM FUNCTION

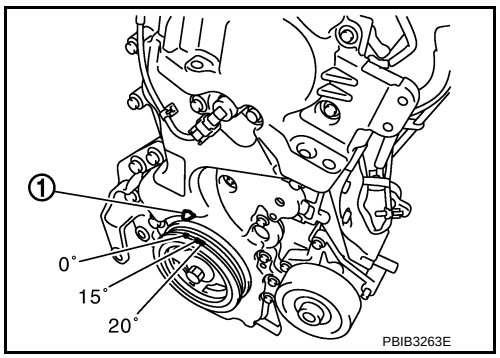
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to SEC-50, "ECM : Work Procedure".

>> 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-444, "Special Repair Requirement"
For specification, refer to EC-449, "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-134, "Work Procedure".

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-135, "Work Procedure".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-136, "Work Procedure".

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

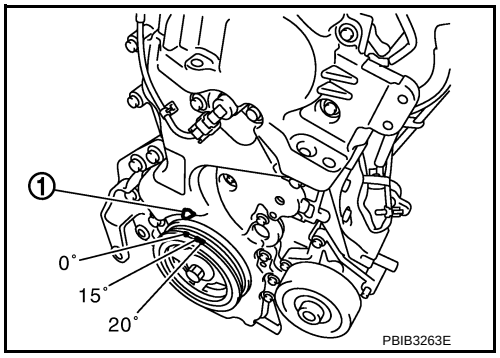
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
For procedure, refer to EC-443, "Special Repair Requirement".
For specification, refer to EC-449, "Idle Speed".

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-444, "Special Repair Requirement".
For specification, refer to EC-449, "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-67, "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-274, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-271, "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-50, "ECM : Work Procedure".

>> GO TO 4.

ADDITIONAL SERVICE WHEN REPLACING ECM

Description

INFOID:0000000006416759

When replacing ECM, this procedure must be performed.

Work Procedure

INFOID:0000000006416760

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

Refer to SEC-50, "ECM : Work Procedure".

>> GO TO 2.

2. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-134, "Work Procedure".

>> GO TO 3.

3. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-135, "Work Procedure".

>> GO TO 4.

4. PERFORM IDLE AIR VOLUME LEARNING

Refer toEC-136, "Work Procedure".

>> GO TO 5.

5. PERFORM G SENSOR CALIBRATION

Refer to EC-138, "Work Procedure" (M/T models) or TM-377, "Procedure" (CVT models).

>> END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

Description

INFOID:0000000006416765

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.

Work Procedure

INFOID:0000000006416766

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:0000000006416767

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.

Work Procedure

INFOID:0000000006416768

1.START

With CONSULT-III

1. Turn ignition switch ON.
2. Select “CLSD THL POS LEAR” in “WORK SUPPORT” mode of “ENGINE” using CONSULT-III.
3. Follow the instructions on the CONSULT-III 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-III

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:0000000006416769

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.

Work Procedure

INFOID:0000000006416770

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

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

Do you have CONSULT-III?

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

2.IDLE AIR VOLUME LEARNING

With CONSULT-III
1. Perform Accelerator Pedal Released Position Learning. Refer to EC-134, "Work Procedure".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-135, "Work Procedure".
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-III screen?

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

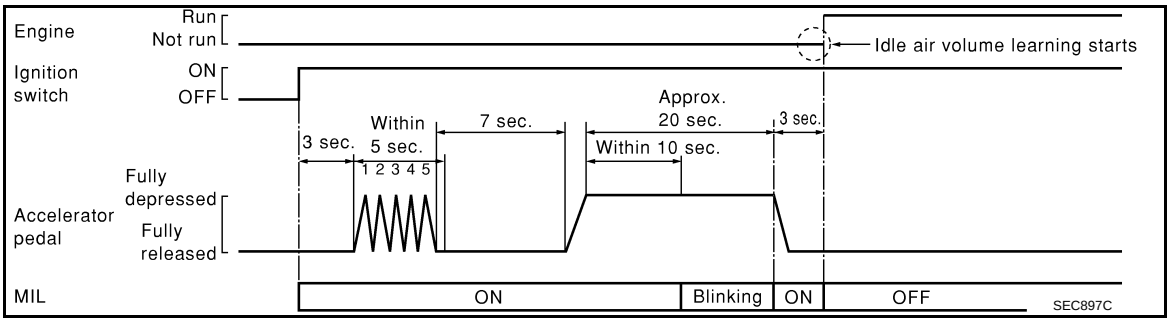
3.IDLE AIR VOLUME LEARNING

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

1. Perform Accelerator Pedal Released Position Learning. Refer to EC-134, "Work Procedure".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-135, "Work Procedure".
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-449, "Idle Speed" and EC-449, "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 toEC-147, "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:0000000006649061

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

Work Procedure

INFOID:0000000006649062

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-9, "Tire Air Pressure".

>> GO TO 2.

2.PERFORM CALIBRATION

With CONSULT-III

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:0000000006416771

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

Work Procedure

INFOID:0000000006416772

1.START

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

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

>> END

FUEL PRESSURE

Work Procedure

INFOID:0000000006417061

FUEL PRESSURE RELEASE

With CONSULT-III

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

Without CONSULT-III

1. Remove fuel pump fuse located in IPDM E/R.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.

FUEL PRESSURE CHECK

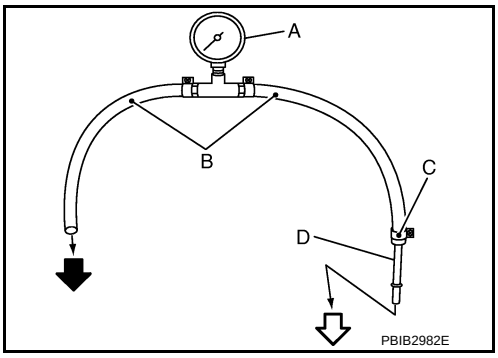
CAUTION:

- **Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.**
- **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:

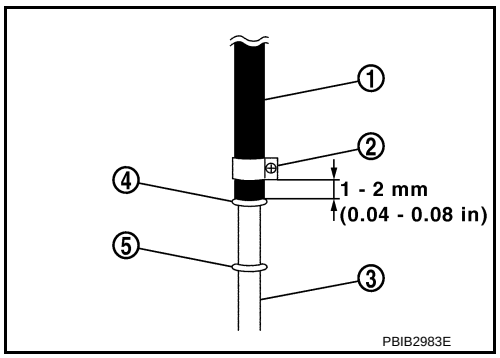
Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because J10 models do not have fuel return system.

1. Release fuel pressure to zero.
2. Prepare fuel hose for fuel pressure check B and fuel tube adapter [SST: KV10118400] D, then connect fuel pressure gauge A.
   - ⇦: To quick connector
   - ⬅: To fuel tube (engine side)
   - C: Clamp
   - Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
   - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
   - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
   - Use Pressure Gauge to check fuel pressure.



3. Remove fuel hose.
   - Do not twist or kink fuel hose because it is plastic hose.

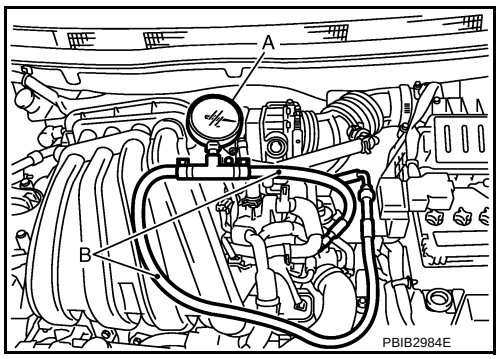
4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.
   - No.2 spool (5)
   - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
   - Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
   - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
   - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
   - When reconnecting fuel line, always use new clamps.
   - Use a torque driver to tighten clamps.
   - Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).



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

   - Make sure that clamp screw does not contact adjacent parts.

5. Connect fuel tube adapter to quick connector.
   - A: Fuel pressure gauge
   - B: Fuel hose for fuel pressure check
6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
7. Turn ignition switch ON and check for fuel leakage.
8. Start engine and check for fuel leakage.
9. Read the indication of fuel pressure gauge.
   - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
   - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.



At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2, 51 psi)

10. If result is unsatisfactory, go to next step.
11. Check the following.
    - Fuel hoses and fuel tubes for clogging
    - Fuel filter for clogging
    - Fuel pump
    - Fuel pressure regulator for clogging

    If OK, replace fuel pressure regulator.
    If NG, repair or replace.

HOW TO SET SRT CODE

Description

INFOID:0000000006417226

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

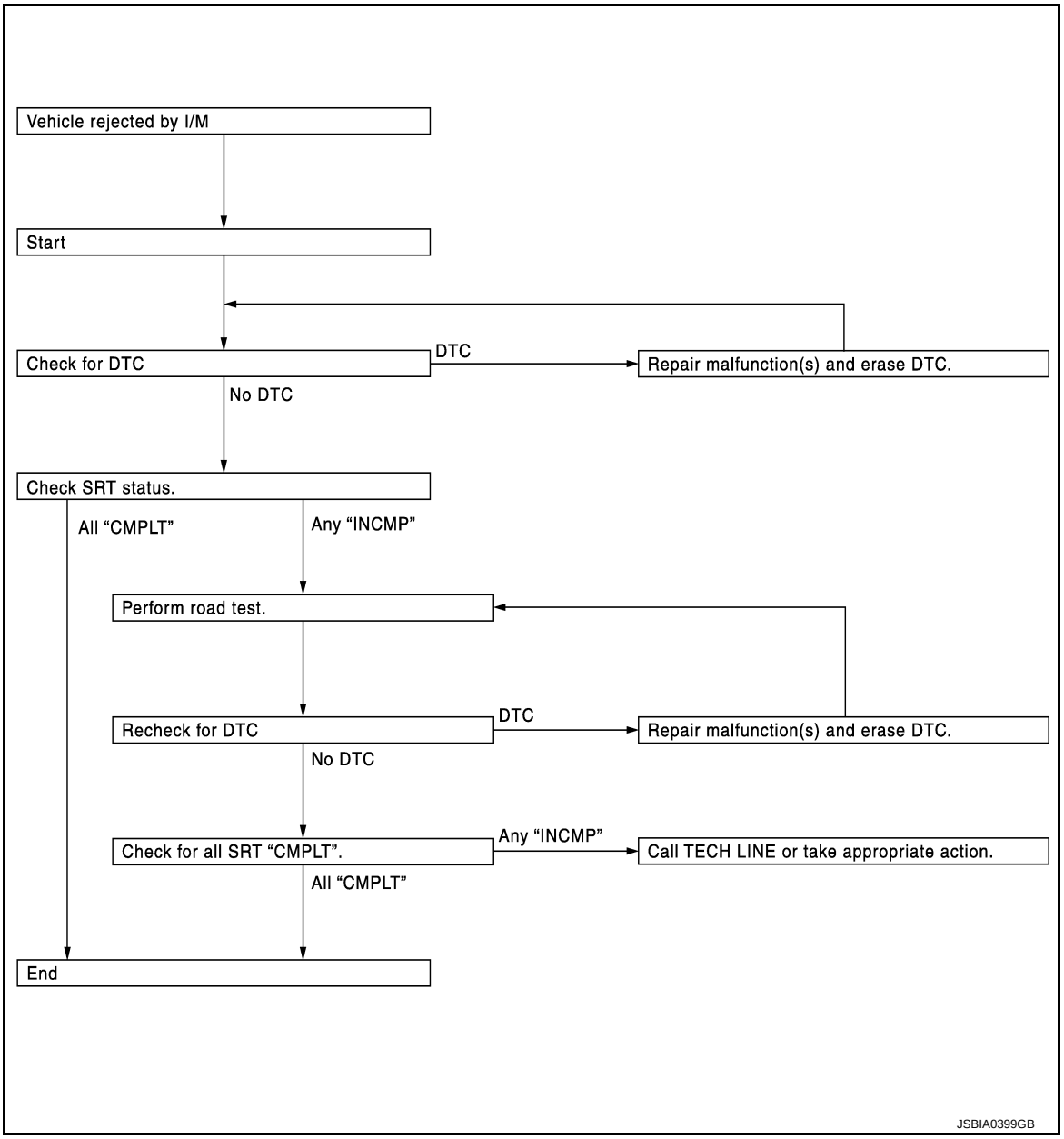
The table below shows required self-diagnostic items to set the SRT to “CMPLT”.

SRT item*1 (CONSULT-III indication)	Required self-diagnostic items to set the SRT to “CMPLT”	Corresponding DTC No.
CATALYST	Three way catalyst function	P0420
HO2S	Air fuel ratio (A/F) sensor 1	P0130, P0133
	Heated oxygen sensor 2	P0137
	Heated oxygen sensor 2	P0138
	Heated oxygen sensor 2	P0139
EGR/VVT SYSTEM	Intake value timing control function	P0011

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

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.

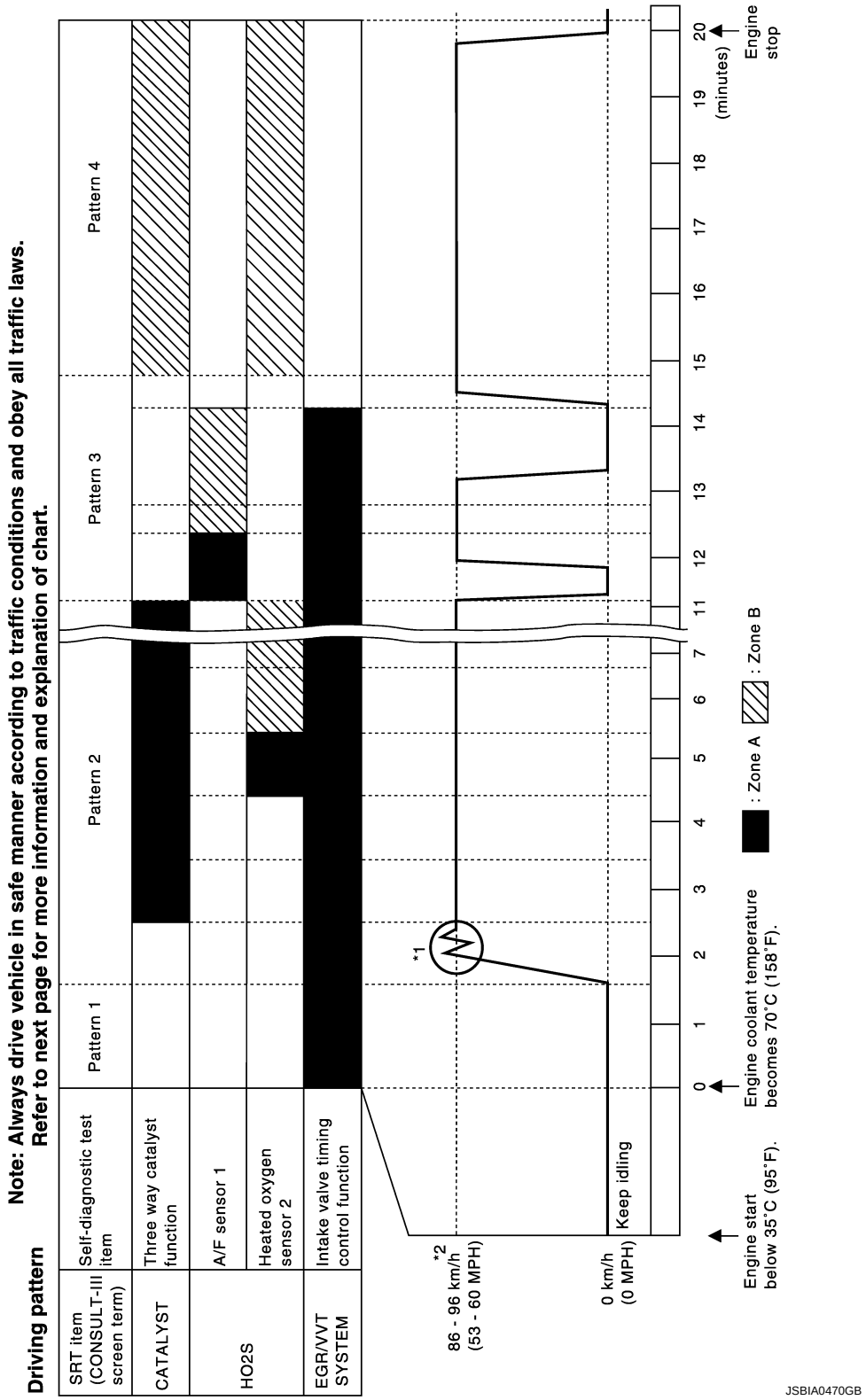


SRT Set Driving Pattern

INFOID:0000000006417227

CAUTION:

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



NOTE:

*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 refers to the range where the time, required for the diagnosis under normal conditions*, is the shortest.
Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.
*: Normal conditions refer to the following:
- Sea level
- Flat road
- Ambient air temperature: 20 - 30°C (68 - 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.
  Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Work Procedure

INFOID:0000000006417228

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-108, "DTC Index".
NO >> GO TO 2.

2.CHECK SRT STATUS

WITH CONSULT-III
Select “SRT STATUS” in “DTC & SRT CONFIRMATION” mode of “ENGINE” using CONSULT-III.
WITHOUT CONSULT-III
Perform “SRT status” mode with EC-79, "On Board Diagnosis Function".
WITH GST
Select Service $01 with GST.

Is SRT code(s) set?

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

3.DTC CONFIRMATION PROCEDURE

1. Select “SRT WORK SUPPORT” in “DTC & SRT CONFIRMATION” mode of “ENGINE” using CONSULT-III.
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-142, "Description".
3. Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-108, "DTC Index".
NO >> GO TO 9.

4.PERFORM ROAD TEST

- Check the “Performance Priority” in the “SRT ITEM” table. Refer to EC-142, "Description".
- Perform the most efficient SRT set driving pattern to set the SRT properly. Refer to EC-143, "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

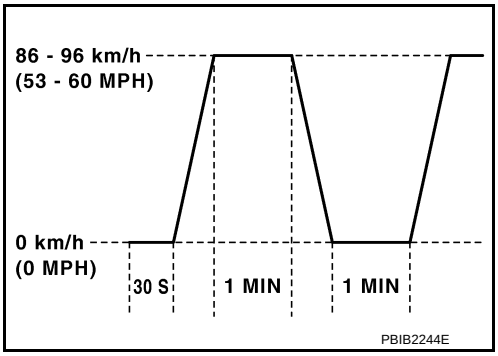
1. Drive the vehicle. And depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds.
2. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again

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

• 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 9.

9.CHECK SRT STATUS

WITH CONSULT-III
Select “SRT STATUS” in “DTC & SRT CONFIRMATION” mode of “ENGINE” using CONSULT-III.
WITHOUT CONSULT-III
Perform “SRT status” mode with EC-79, "On Board Diagnosis Function".
WITH GST
Select Service $01 with GST.

Is SRT(s) set?

YES >> END
NO >> Call TECH LINE or take appropriate action.

DTC/CIRCUIT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:0000000006546921

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

Component Function Check

INFOID:0000000006546922

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-III
NOTE:
Perform “SPEC” in “DATA MONITOR” mode in maximum scale display.
1. Perform EC-129, "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-III.
3. Make sure that monitor items are within the SP value.

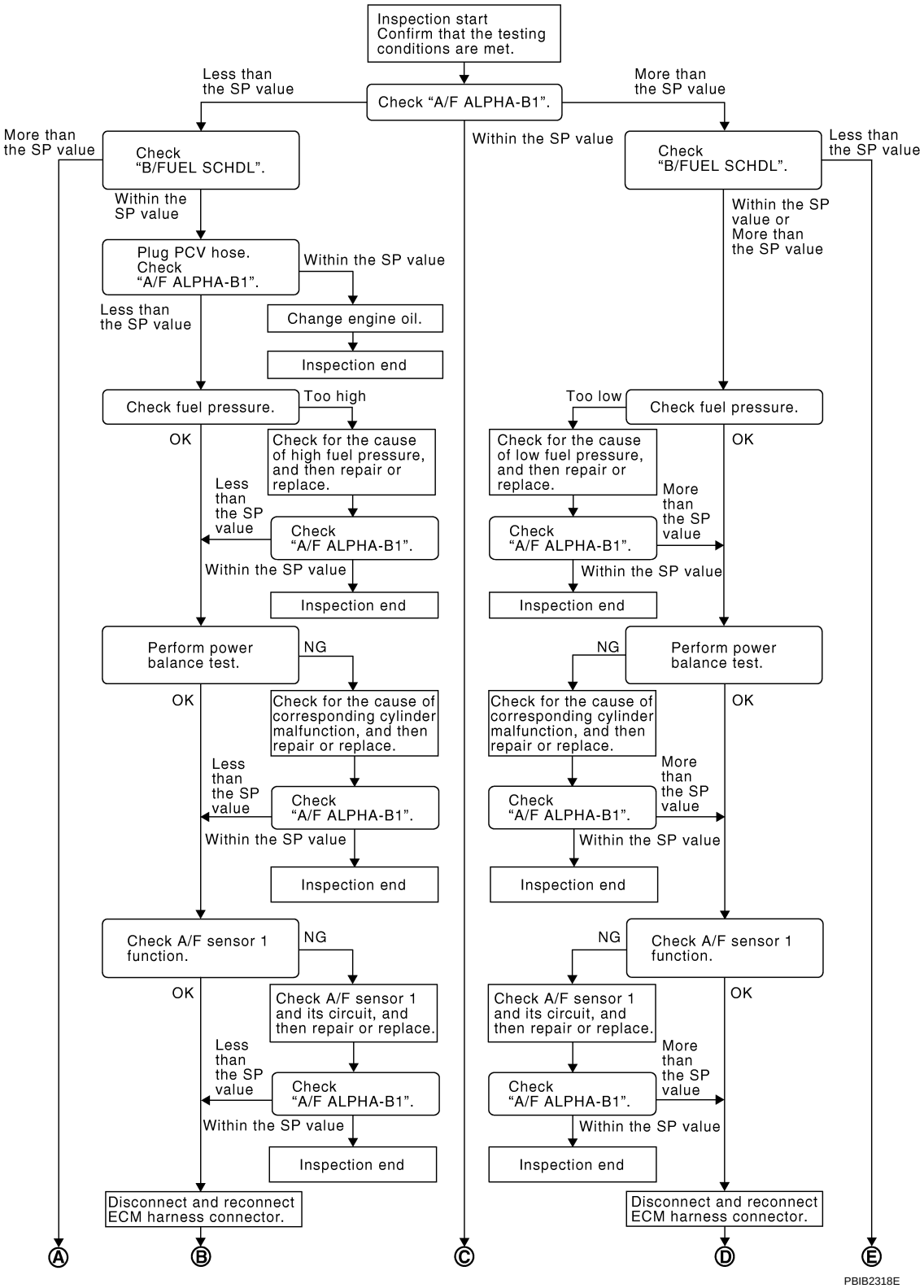
Is the inspection result normal?

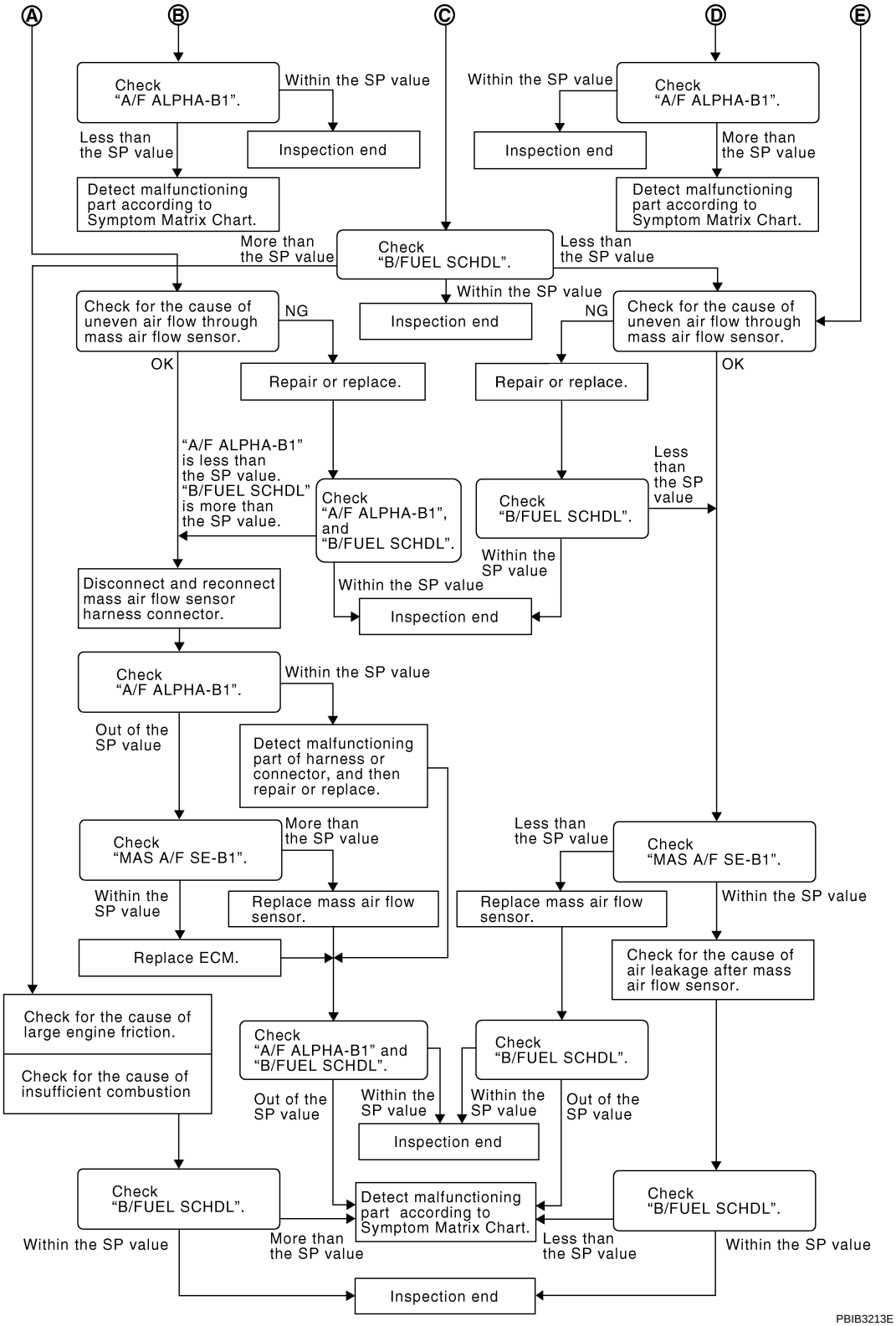
YES >> END
NO >> Proceed to EC-148, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006546923

OVERALL SEQUENCE





DETAILED PROCEDURE

1. CHECK "A/F ALPHA-B1"

With CONSULT-III

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-147, "Component Function Check".
3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

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

Is the measurement value within the SP value?

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

2. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

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

3. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

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

4. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

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

5. CHANGE ENGINE OIL

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

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

>> **INSPECTION END**

6. CHECK FUEL PRESSURE

Check fuel pressure. (Refer to EC-140, "Work Procedure".)

Is the inspection result normal?

YES >> GO TO 9.
NO-1 >> Fuel pressure is too high: Replace “fuel filter and fuel pump assembly” and then GO TO 8.
NO-2 >> Fuel pressure is too low: GO TO 7.

7. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly” and then GO TO 8.
NO >> Repair or replace and then GO TO 8.

8. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

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

9. PERFORM POWER BALANCE TEST

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

Is the inspection result normal?

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

10. DETECT MALFUNCTIONING PART

Check the following.
1. Ignition coil and its circuit (Refer to EC-414, "Component Function Check".)
2. Fuel injector and its circuit (Refer to EC-400, "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 11.
NO >> Repair or replace malfunctioning part and then GO TO 11.

11. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

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

12. CHECK A/F SENSOR 1 FUNCTION

Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1.
- For DTC P0130, refer to EC-205, "DTC Logic".
- For DTC P0131, refer to EC-209, "DTC Logic".
- For DTC P0132, refer to EC-212, "DTC Logic".
- For DTC P0133, refer to EC-215, "DTC Logic".

Is any DTC detected?

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

13. CHECK A/F SENSOR 1 CIRCUIT

Perform DIAGNOSTIC PROCEDURE according to corresponding DTC.

>> GO TO 14.

14. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> GO TO 15.

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect ECM harness connector.

3. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 16.

16. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-437, "Symptom Table".

17. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

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

18. DETECT MALFUNCTIONING PART

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

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

19. CHECK INTAKE SYSTEM

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

Is the inspection result normal?

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

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

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

Is the measurement value within the SP value?

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

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

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

>> GO TO 22.

22. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-189, "DTC Logic". Then GO TO 29.
NO >> GO TO 23.

23. CHECK “MAS A/F SE-B1”

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

Is the measurement value within the SP value?

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

24. REPLACE ECM

1. Replace ECM.
2. Perform EC-133, "Work Procedure".

>> GO TO 29.

25. CHECK INTAKE SYSTEM

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

Is the inspection result normal?

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

26. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

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

27. CHECK “MAS A/F SE-B1”

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

Is the measurement value within the SP value?

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

28. CHECK INTAKE SYSTEM

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

>> GO TO 30.

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

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-437, "Symptom Table".

30. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-437, "Symptom Table".

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000006546924

1.CHECK FUSE

Check that the following fuse is not fusing.

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

Is the fuse fusing?

YES >> Replace the fuse after repairing the applicable circuit.
NO >> GO TO 2.

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to GI-44, "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 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-42, "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-34, "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.

+		–		Continuity
ECM		IPDM E/R		
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-42, "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	
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.

U0101 CAN COMM CIRCUIT

Description

INFOID:0000000006546925

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:0000000006546926

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-159, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006546927

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

U0122 VEHICLE DYNAMICS CONTROL MODULE

Description

INFOID:0000000006635006

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:0000000006635007

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

Diagnosis Procedure

INFOID:0000000006635008

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

U1001 CAN COMM CIRCUIT

Description

INFOID:0000000006546931

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:0000000006546932

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-161, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006546933

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

P0011 IVT CONTROL

DTC Logic

INFOID:0000000006546934

DTC DETECTION LOGIC

NOTE:
If DTC P0011 is displayed with DTC P0075, first perform the trouble diagnosis for EC-307, "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-III

1. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Maintain the following conditions for at least 6 consecutive seconds. Hold the accelerator pedal as steady as possible.

ENG SPEED	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-III” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-163, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT-III

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

ENG SPEED	1,200 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	1st or 2nd position
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:
Always drive at a safe speed.

2. Check 1st trip DTC.

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

Is 1st trip DTC detected?

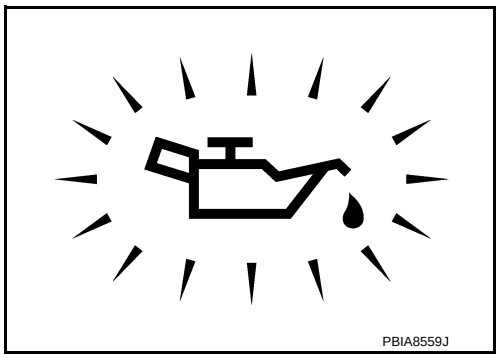
YES >> Proceed to EC-163, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006546935

1.CHECK OIL PRESSURE WARNING LAMP

1. Start engine.
2. Check oil pressure warning lamp and confirm it is not illuminated.


PBIA8559J

Is oil pressure warning lamp illuminated?

YES >> Check the engine oil level. Refer to LU-8, "Inspection".
NO >> GO TO 2.

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Check the intake valve timing control solenoid valve. Refer to EC-164, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace intake valve timing control solenoid valve. Refer to EM-67, "Exploded View".

3.CHECK CRANKSHAFT POSITION SENSOR (POS)

Check the crankshaft position sensor (POS). Refer to EC-273, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace crankshaft position sensor (POS). Refer to EM-103, "Exploded View".

4.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Check the camshaft position sensor (PHASE). Refer to EC-276, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace camshaft position sensor (PHASE). Refer to EM-78, "Exploded View".

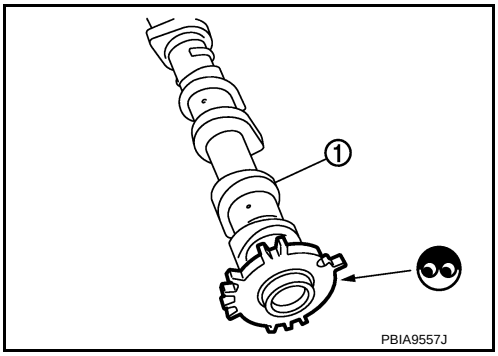
5.CHECK CAMSHAFT (INT)

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-79, "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-68, "Removal and Installation".
NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to LU-8, "Inspection", “INSPECTION AFTER INSTALLATION”.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Clean lubrication line.

Component Inspection

INFOID:0000000006546936

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		

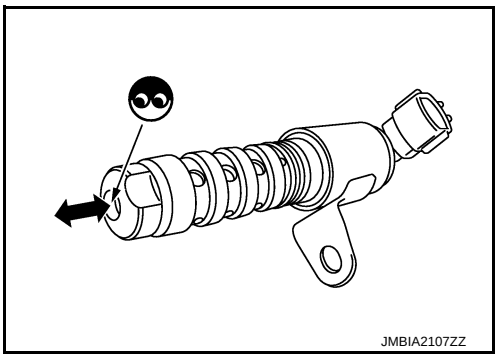
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace intake valve timing control solenoid valve. Refer to EM-67, "Exploded View".

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve. Refer to EM-67, "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-67, "Exploded View".

P0014 EVT CONTROL

DTC Logic

INFOID:0000000006599048

DTC DETECTION LOGIC

NOTE:

- **If DTC P0014 is displayed with DTC P0078, first perform trouble diagnosis for DTC P0078. Refer to EC-179, "DTC Logic".**
- **If DTC P0014 is displayed with P1078, first perform trouble diagnosis for P1078. Refer to EC-313, "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-III

1. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Maintain the following conditions for at least 6 consecutive seconds. Hold the accelerator pedal as steady as possible.

ENG SPEED	1,200 - 2,000 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	D position

4. Let engine idle for 10 seconds.
5. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-166, "Diagnosis Procedure"

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT-III
1. Select “DATA MONITOR” mode of “ENGINE” using CONSULT-III.
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	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:
Always drive at a safe speed.

3. Check 1st trip DTC.

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

Is 1st trip DTC detected?

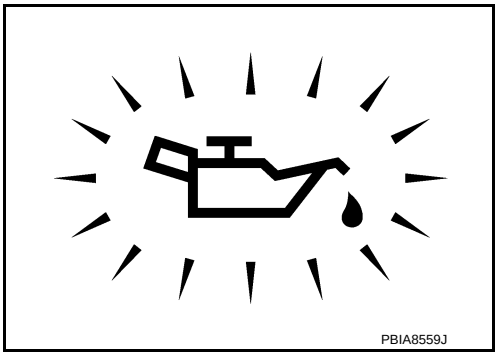
YES >> Proceed to EC-166, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006599049

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-8, "Inspection".
NO >> GO TO 2.

2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE

Check the exhaust valve timing control solenoid valve. Refer to EC-164, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-67, "Exploded View".

3.CHECK CRANKSHAFT POSITION SENSOR (POS)

Check the crankshaft position sensor (POS). Refer to EC-273, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace crankshaft position sensor (POS). Refer to EM-103, "Exploded View".

4.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR

Check the exhaust valve timing control position sensor. Refer to EC-276, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace exhaust valve timing control position sensor. Refer to EM-78, "Exploded View".

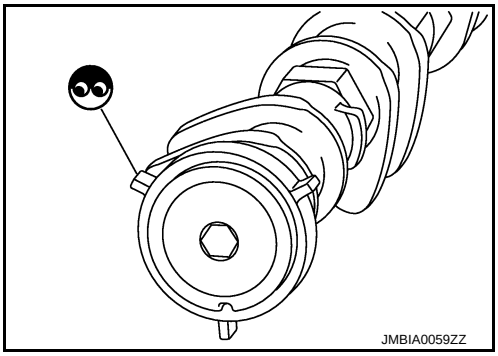
5.CHECK CAMSHAFT (EXH)

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-79, "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-68, "Removal and Installation".
NO >> GO TO 7.

7.CHECK LUBRICATION CIRCUIT

Refer to LU-8, "Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Clean lubrication line.

Component Inspection

INFOID:0000000006598857

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		

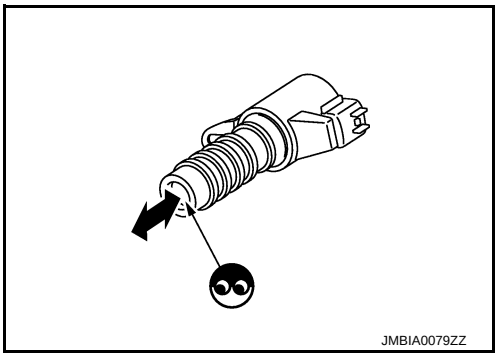
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-67, "Exploded View".

2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove exhaust valve timing control solenoid valve. Refer to EM-67, "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-67, "Exploded View".

P0031, P0032 A/F SENSOR 1 HEATER

DTC Logic

INFOID:0000000006546938

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.)	• Harness or connectors (A/F sensor 1 heater circuit is open or shorted.) • 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-168, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006546939

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-169, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "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-38, "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:0000000006546940

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-38, "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:0000000006546942

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-III

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

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-171, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006546943

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-172, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "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:0000000006546944

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:0000000006599307

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

Diagnosis Procedure

INFOID:0000000006599308

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 GROUND 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-175, "Component Inspection".

Is the inspection result normal?

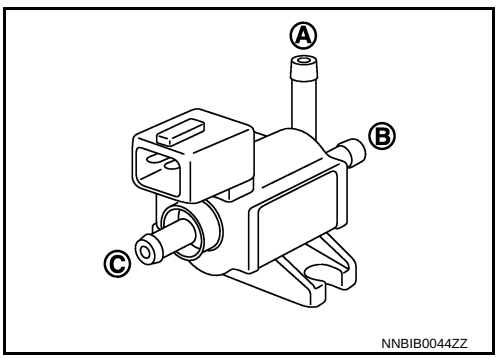
YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace turbocharger boost control solenoid valve. Refer to EM-36, "Exploded View".

Component Inspection

INFOID:0000000006599309

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.



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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-36, "Exploded View".

P0075 IVT CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000006546946

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-176, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006546947

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	1	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	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.

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	2	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-177, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace intake valve timing control solenoid valve.

Component Inspection

INFOID:0000000006546948

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-67, "Exploded View".

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve. Refer to EM-67, "Exploded View".

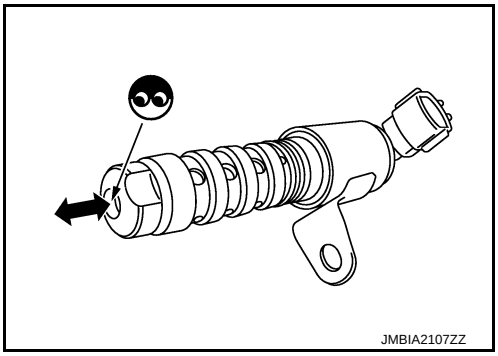
2. Provide 12 V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

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-67, "Exploded View".

P0078 EVT CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000006598855

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-179, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006598856

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-177, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace exhaust valve timing control solenoid valve.

Component Inspection

INFOID:0000000006599052

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-67, "Exploded View".

2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove exhaust valve timing control solenoid valve. Refer to EM-67, "Exploded View".

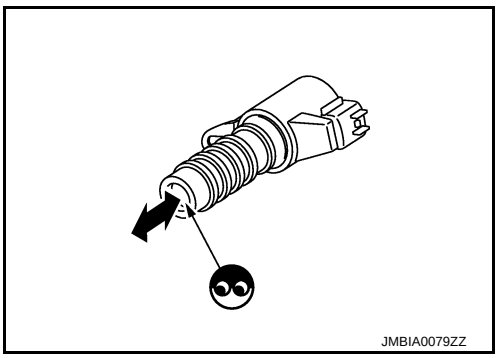
2. Provide 12 V DC between exhaust valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check that the plunger moves as shown in the figure.

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-67, "Exploded View".

P0087, P0088, P0090 FRP CONTROL SYSTEM

DTC Logic

INFOID:0000000006598858

DTC DETECTION LOGIC

NOTE:

- **If DTC P0087 or P0090 is displayed with DTC P1197, first perform the trouble diagnosis for DTC P1197.**
- DTC P0087 or P0090 may be displayed when running out of gas.

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/cm^2, 188.5 psi) at engine cold start [water temperature 5°C (41°F) –40C° (104°F)]. • Fuel rail pressure remains at 3.5 MPa (35 bar, 35.7 kg/cm^2, 507.5 psi) or less for 1 second or more during engine idle condition after cold start [water temperature 5°C (41°F) –40C° (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/cm^2, 392 psi)	• Harness or connectors (The fuel pump circuit is open or shorted.) • Fuel system
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) – 40C° (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)	
P0090	FUEL PUMP (High pressure fuel pump performance)	• 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 18.5MPa (185 bar, 188.7 kg/cm^2, 2682.5 psi) or more for 0.3 seconds or more during engine rev.	

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

1. Check that the fuel tank is 1/8 full of fuel.
2. 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 “COOLAN TEMP/S” on “DATA MONITOR” mode of “ENGINE” using CONSULT-III reaches at least 70°C (158°F).
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-183, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

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-183, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006598859

1.PERFORM THE HIGH PRESSURE FUEL PUMP COMPONENT INSPECTION

Perform the high pressure fuel pump component inspection. Refer to EC-183, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace the fuel pump. FL-6, "2WD : Exploded View" (2WD) or FL-10, "4WD : Exploded View" (4WD).

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

INFOID:0000000006598860

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)	9 - 11 Ω

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace high pressure fuel pump. Refer to EM-43, "Exploded View".

2.CHECK HIGH PRESSURE FUEL PUMP-II

With CONSULT-III
1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.

3. Check “FUEL PRES SEN” in “DATA MONITOR” of “ENGINE” using CONSULT-III.

Data monitor item	Condition	Voltage (Approx.)
FUEL PRES SEN V	Engine speed: idle	980 – 1,200 mV
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,100 – 2,900 mV

⊗Without CONSULT-III
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	0.98 – 1.2 V
			Engine speed: Revving engine from idle to 4,000 rpm quickly	1.1 – 2.9 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure fuel pump. Refer to EM-43, "Exploded View".

P0097, P0098 IAT SENSOR 2

DTC Logic

INFOID:0000000006635009

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 0.305 V or less.	• Harness or connectors (Intake air temperature sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Atmospheric pressure 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 • Atmosphere pressure 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-186, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006635010

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-187, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace turbocharger boost sensor (with intake air temperature sensor 2). Refer to EM-28, "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-42, "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
		Atmosphere pressure sensor	F76	1
		Turbocharger boost sensor	F75	1
F26	68	Battery current sensor	F52	1
		G sensor	B32	3
	72	Camshaft position sensor	F109	1
		EVT control position sensor	F110	1
E18	118	APP sensor 2	E101*1 M203*2	5

*1: CVT models

*2: RHD with M/T models

Is the inspection result normal?

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

Component Inspection

INFOID:0000000006635011

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				
1	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-28, "Exploded View".

P0102, P0103 MAF SENSOR

DTC Logic

INFOID:0000000006546955

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-189, "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-189, "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-189, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006546956

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-26, "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 MASS AIR FLOW SENSOR

Check the mass air flow sensor. Refer to EC-191, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace mass air flow sensor. Refer to EM-26, "Exploded View".

Component Inspection

INFOID:0000000006546957

1. CHECK MASS AIR FLOW SENSOR-I

With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT-III and select “DATA MONITOR” mode 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.)	0.7 - 1.1 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
	Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

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

Without CONSULT-III

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

ECM			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.)	0.7 - 1.1 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
			Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

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

Is the inspection result normal?

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

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

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

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

Is the inspection result normal?

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

3.CHECK MASS AIR FLOW SENSOR-II

With CONSULT-III

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-III and select “DATA MONITOR” mode 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.)	0.7 - 1.1 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
	Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

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

Without CONSULT-III

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Check the voltage between ECM harness connector and ground.

ECM			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.)	0.7 - 1.1 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
			Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

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

Is the inspection result normal?

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

4.CHECK MASS AIR FLOW SENSOR-III

With CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.

4. Connect CONSULT-III and select “DATA MONITOR” mode 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.)	0.7 - 1.1 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
	Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

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

⊗Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector and ground.

ECM			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.)	0.7 - 1.1 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
			Idle to about 4,000 rpm	0.7 - 1.1 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-26, "Exploded View".

P0107, P0108 ATMOSPHERIC PRESSURE SENSOR

DTC Logic

INFOID:0000000006598921

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0107	ABSL PRES SEN/CIRC (Atmospheric pressure sensor circuit low input)	An excessively low voltage from the atmospheric pressure sensor is sent to ECM.	• Harness or connectors (Atmospheric pressure 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.) (Turbocharger boost sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) • Atmospheric pressure sensor • 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
P0108	ABSL PRES SEN/CIRC (Atmospheric pressure sensor circuit high input)	An excessively high voltage from the atmospheric pressure 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 let it idle for 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:0000000006598922

1.CHECK ATMOSPHERIC PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch OFF.

2. Disconnect atmospheric pressure sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between atmospheric pressure sensor harness connector and ground.

+		–	Voltage (Approx.)
Atmospheric pressure sensor			
Connector	Terminal		
F76	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
		Atmospheric pressure sensor	F76	1
		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*1 M203*2	5

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

Is inspection result normal?

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

3.CHECK ATMOSPHERIC PRESSURE SENSOR GROUND CIRCUIT

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

+		–		Continuity
Atmospheric pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
F76	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 ATMOSPHERIC PRESSURE SENSOR INPUT SIGNAL CIRCUIT

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

+		–		Continuity
Atmospheric pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
F76	2	F25	42	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 ATMOSPHERIC PRESSURE SENSOR

Check the atmospheric pressure sensor. Refer to EC-196, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace atmospheric pressure sensor. Refer to EC-447, "Removal and Installation".

Component Inspection

INFOID:0000000006598923

1.CHECK ATMOSPHERIC PRESSURE SENSOR

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

ECM		
Connector	+	–
	Terminal	
F25	42	44

NOTE:
Because the sensor is absolute pressure sensor, output value may differ depending on atmospheric pressure and altitude.

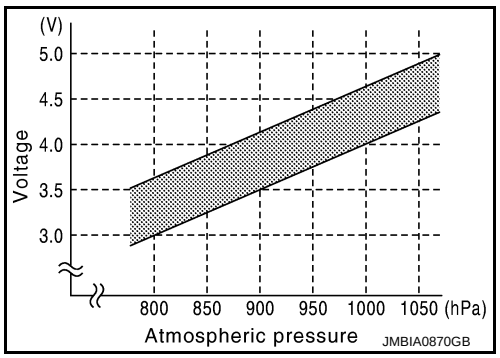
3. Measure the atmospheric pressure.

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

4. Check the atmospheric 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 >> INSPECTION END

NO >> Replace atmospheric pressure sensor. Refer to EC-447, "Removal and Installation".

P0112, P0113 IAT SENSOR

DTC Logic

INFOID:0000000006546959

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 circuit low input)	An excessively low voltage from the intake air temperature sensor is sent to ECM.	• Harness or connectors (Intake air temperature sensor circuit is open or shorted.) • Intake air temperature sensor
P0113	IAT SEN/CIRCUIT- B1 (Intake air temperature sensor circuit high input)	An excessively high voltage from the intake air 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 1st trip DTC.

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:0000000006546960

1.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor (with intake air temperature sensor) 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 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 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

Check the intake air temperature sensor. Refer to EC-199, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to EM-26, "Exploded View".

Component Inspection

INFOID:0000000006546961

1.CHECK INTAKE AIR TEMPERATURE SENSOR

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

Mass air flow sensor		Condition		Resistance (kΩ)
+	–			
Terminals				
1	2	Intake air temperature [°C (°F)]	25 (77)	1.800 - 2.200

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to EM-26, "Exploded View".

P0117, P0118 ECT SENSOR

DTC Logic

INFOID:0000000006546967

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-200, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006546968

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-201, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace engine coolant temperature sensor. Refer to EM-90, "Exploded View".

Component Inspection

INFOID:0000000006546969

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
+	–			
Terminals				
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. Refer to EM-90, "Exploded View".

P0122, P0123 TP SENSOR

DTC Logic

INFOID:0000000006546971

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-307, "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-202, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006546972

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 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	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-203, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace electric throttle control actuator. Refer to EM-28, "Exploded View".

Component Inspection

INFOID:0000000006546973

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-135, "Work Procedure".
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-28, "Exploded View".

P0130 A/F SENSOR 1

DTC Logic

INFOID:0000000006546987

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-III

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

Is 1st trip DTC detected?

YES >> Proceed to EC-206, "Diagnosis Procedure".
NO-1 >> With CONSULT-III: GO TO 3.
NO-2 >> Without CONSULT-III: GO TO 7.

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

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

Does the indication fluctuates around 2.2 V?

YES >> GO TO 4.
NO >> Proceed to EC-206, "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-III.
2. Touch “START”.
3. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III 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-III screen?

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

5. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-II

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

Which does “TESTING” change to?

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

6. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-III

Touch “SELF-DIAG RESULT”

Which is displayed on CONSULT-III screen?

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

7. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform Component Function Check. Refer to EC-206, "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-206, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006546988

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

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:0000000006546989

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-42, "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-38, "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:0000000006546991

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-III

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-III.
3. Check “A/F SEN1 (B1)” indication.

With GST

Follow the procedure “With CONSULT-III” above.

Is the indication constantly approx. 0 V?

YES >> Proceed to EC-210, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

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

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

NOTE:

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

4. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-210, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006601127

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-42, "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-38, "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:0000000006546994

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-III

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-III.
3. Check “A/F SEN1 (B1)” indication.

With GST

Follow the procedure “With CONSULT-III” above.

Is the indication constantly approx. 5 V?

YES >> Proceed to EC-213, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

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

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

NOTE:

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

4. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC is detected?

YES >> Proceed to EC-213, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006601130

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-42, "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-38, "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

P0133 A/F SENSOR 1

DTC Logic

INFOID:0000000006598863

DTC DETECTION LOGIC

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0133	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 circuit slow response]	The response of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time.	• Harness or connectors (A/F sensor 1 circuit is open or shorted.) • A/F sensor 1 • A/F sensor 1 heater • Fuel pressure • Fuel injector • Intake air leaks • Exhaust gas leaks • PCV • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always 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-III?

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

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
4. Let engine idle for 1 minute.
5. Select “ENGINE” using CONSULT-III.
6. Select “A/F SEN1(B1) P1278/P1279” (for DTC P0133) of “A/F SEN1” in “DTC WORK SUPPORT” mode.
7. Touch “START”.

Is “COMPLETED” displayed on CONSULT-III screen?

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

3.PERFORM DTC CONFIRMATION PROCEDURE-II

Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Proceed to EC-216, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. After perform the following procedure, “TESTING” will be displayed on the CONSULT-III screen.

- Increase the engine speed up to between 4,000 and 5,000 rpm and maintain that speed for 10 seconds.

- Fully release accelerator pedal and then let engine idle for about 10 seconds.

If “TESTING” is not displayed after 10 seconds, refer to EC-558, "Component Function Check".

2. Wait for about 20 seconds at idle as per the condition that “TESTING” is displayed on the CONSULT-III screen.
3. Make sure that “TESTING” changes to “COMPLETED”.

If “TESTING” changed to “OUT OF CONDITION”, refer to EC-558, "Component Function Check".

4. Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Proceed to EC-216, "Diagnosis Procedure".

5.CHECK AIR-FUEL RATIO SELF-LEARNING VALUE

With GST

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

Is the total percentage within ±15%?

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

6.DETECT MALFUNCTIONING PART

Check the following.

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

>> Repair or replace malfunctioning part.

7.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Restart engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
3. Let engine idle for 1 minute.
4. Increase the engine speed up to between 4,000 and 5,000 rpm and maintain that speed for 10 seconds.
5. Fully release accelerator pedal and then let engine idle for about 1 minute.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-216, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006598864

1.RETIGHTEN A/F SENSOR 1

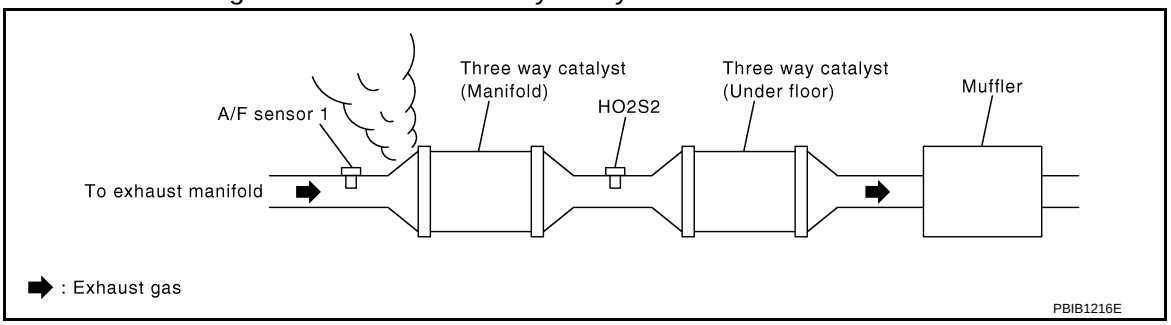
Loosen and retighten the A/F sensor 1. Refer to EM-166, "Exploded View".

>> 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 1.



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-546, "Work Procedure".
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-635, "DTC Logic" or EC-639, "DTC Logic".
NO >> GO TO 5.

5. 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 7.
NO >> GO TO 6.

6. CHECK A/F SENSOR 1 INPUT SIGNAL 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.

7.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 8.
NO >> Repair or replace error-detected parts.

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

Check the air fuel ratio (a/f) sensor 1 heater. Refer to EC-578, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 12.

9.CHECK MASS AIR FLOW SENSOR

Check the mass air flow sensor. Refer to EC-590, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace mass air flow sensor. Refer to EM-26, "Exploded View".

10.CHECK PCV VALVE

Check the PCV valve. Refer to EC-804, "Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace PCV valve. Refer to EM-53, "Exploded View".

11.CHECK INTERMITTENT INCIDENT

Perform GI-42, "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 malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-38, "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) and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

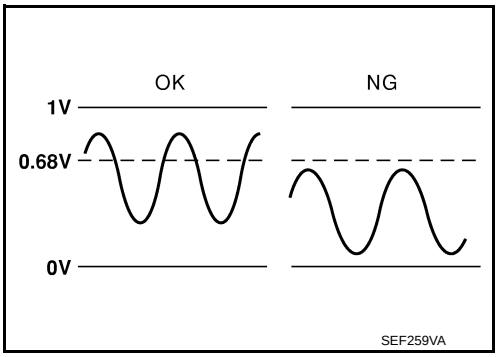
P0137 HO2S2

DTC Logic

INFOID:0000000006546997

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-III?

Do you have CONSULT-III?

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

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always 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-III

1. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches 70°C (158°F).
7. Open engine hood.

8. Select “HO2S2 (B1) P1147” of “HO2S2” in “DTC WORK SUPPORT” mode of “ENGINE” using CONSULT-III.
9. Follow the instruction of CONSULT-III.
   NOTE:
   It will take at most 10 minutes until “COMPLETED” is displayed.
10. Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Proceed to EC-222, "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-221, "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-222, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006546998

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground 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-222, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006546999

1.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-139, "Work Procedure".
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-239, "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-223, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "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:0000000006547000

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

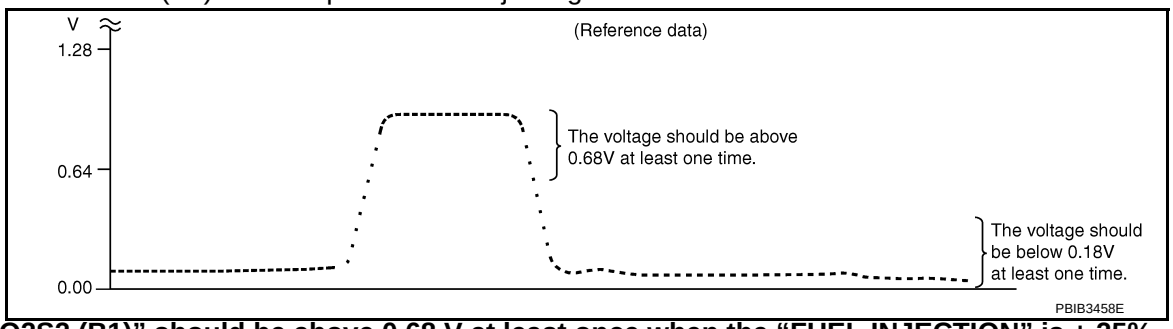
YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode of “ENGINE” using CONSULT-III, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.

7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ± 25%.



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

Is the inspection result normal?

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

3.CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

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

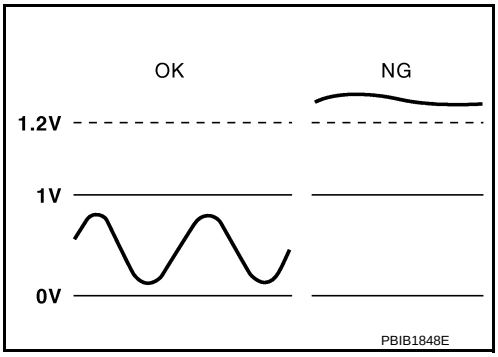
INFOID:0000000006547002

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.

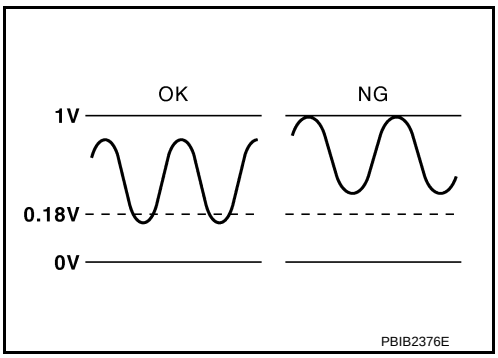
MALFUNCTION A

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-228, "Diagnosis Procedure".
NO-1 >> With CONSULT-III: GO TO 3.
NO-2 >> Without CONSULT-III: GO TO 5.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

NOTE:
For better results, perform “DTC WORK SUPPORT” at a temperature of 0 to 30°C (32 to 86°F).

1. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indication is more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches 70°C (158°F).
7. Open engine hood.
8. Select “HO2S2 (B1) P1146” of “HO2S2” in “DTC WORK SUPPORT” mode of “ENGINE” using CONSULT-III.
9. Follow the instruction of CONSULT-III.
   NOTE:
   It will take at most 10 minutes until “COMPLETED” is displayed.
10. Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT-III

OK >> INSPECTION END
NG >> Proceed to EC-228, "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-228, "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-228, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006601195

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground 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-228, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006547004

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-226, "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-231, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "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-139, "Work Procedure".
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-226, "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-231, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "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:0000000006547005

1. INSPECTION START

Do you have CONSULT-III?

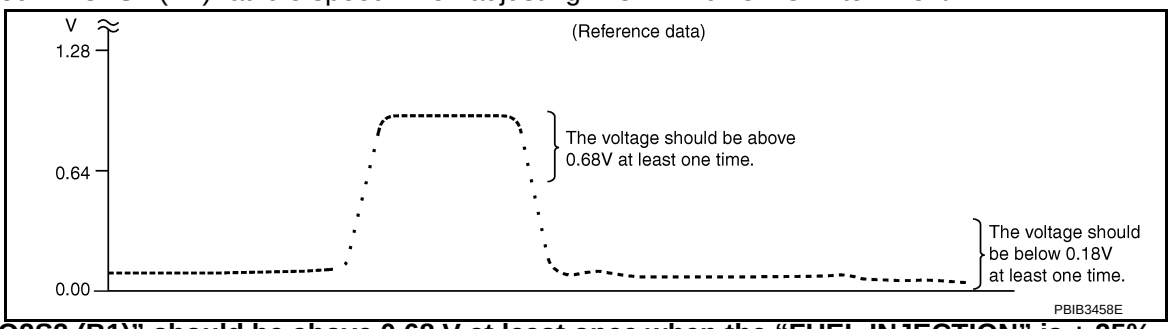
Do you have CONSULT-III?

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

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode of “ENGINE” using CONSULT-III, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ± 25%.



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

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

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

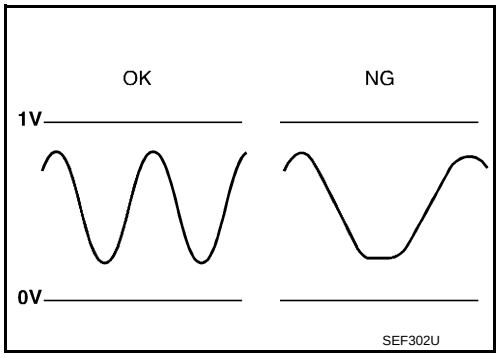
P0139 HO2S2

DTC Logic

INFOID:0000000006547007

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 • Intake air system

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 6.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always 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-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. 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-III.
8. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).
9. Open engine hood.
10. Select “HO2S2 (B1) P0139” in “DTC WORK SUPPORT” mode of “ENGINE” using CONSULT-III.

11. Start engine and follow the instruction of CONSULT-III display.
NOTE:
It will take at most 10 minutes until “COMPLETED” is displayed.

Is “COMPLETED” displayed on CONSULT-III screen?

YES >> GO TO 5.
NO >> 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 SELF-DIAGNOSIS

With CONSULT-III
Perform ECM self-diagnosis.

Is DTC “P0139” detected?

YES >> Proceed to EC-235, "Diagnosis Procedure".
NO >> INSPECTION END

6.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-234, "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-235, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006601196

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground 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-222, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006547009

1.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-139, "Work Procedure".
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-239, "DTC Logic" or EC-243, "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-236, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "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:0000000006547010

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

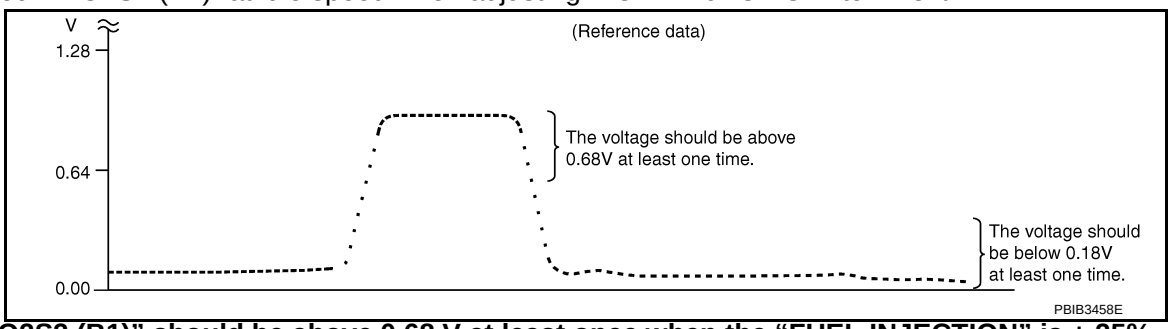
YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.

5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode of “ENGINE” using CONSULT-III, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ± 25%.



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

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

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

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000006547014

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-139, "Work Procedure".
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-240, "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-240, "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?

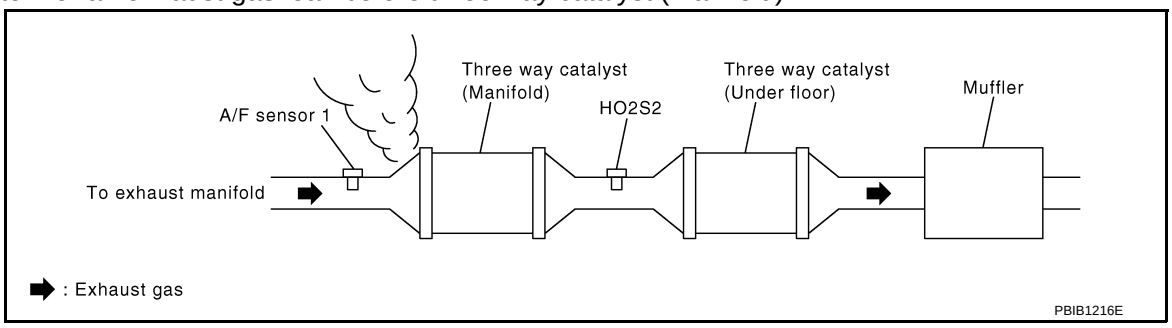
YES >> Proceed to EC-240, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547015

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-140, "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-47, "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, "4WD : Exploded View" (4WD).
NO >> Repair or replace error-detected parts.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-III
1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode of “ENGINE” using CONSULT-III.
3. For specification, refer to EC-449, "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-449, "Mass Air Flow Sensor".

Is the measurement value within the specification?

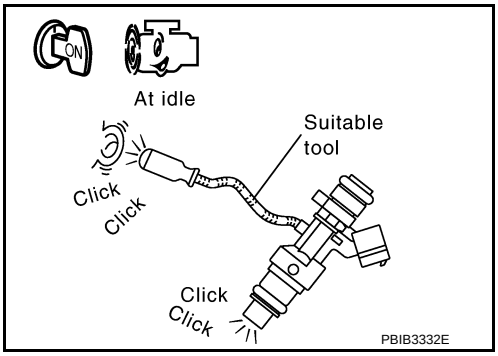
YES >> GO TO 7.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-189, "DTC Logic".

7. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT-III
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode of “ENGINE” using CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-III
1. Let engine idle.

2. Listen to each fuel injector operating sound.



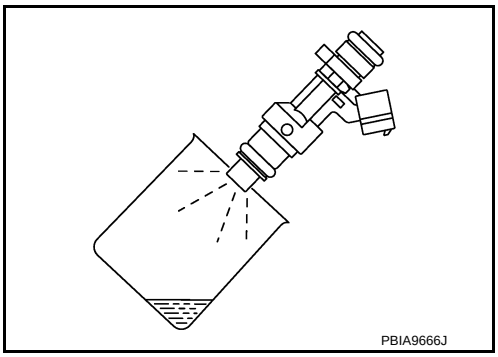
Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for “FUEL INJECTOR”, refer to EC-400, "Component Function Check".

8. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all fuel injector harness connectors.
4. Remove fuel tube assembly. Refer to EM-47, "Removal and Installation".
   Keep fuel hose and all fuel injectors connected to fuel tube.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each fuel injector.
7. Crank engine for about 3 seconds.



Fuel should be sprayed evenly for each fuel injector.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones. Refer to EM-47, "Removal and Installation".

P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000006547016

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-139, "Work Procedure".
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-244, "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-244, "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?

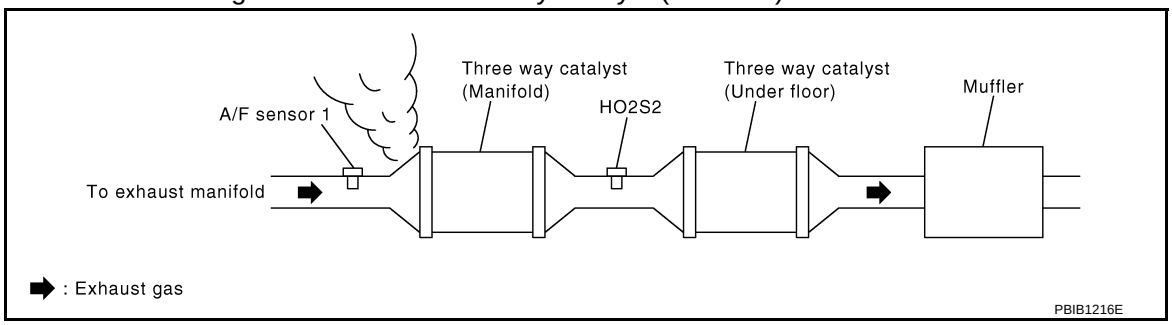
YES >> Proceed to EC-244, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006601314

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-140, "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-47, "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, "4WD : Exploded View" (4WD).
NO >> Repair or replace error-detected parts.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-III
1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode of “ENGINE” using CONSULT-III.
3. For specification, refer to EC-449, "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-449, "Mass Air Flow Sensor".

Is the measurement value within the specification?

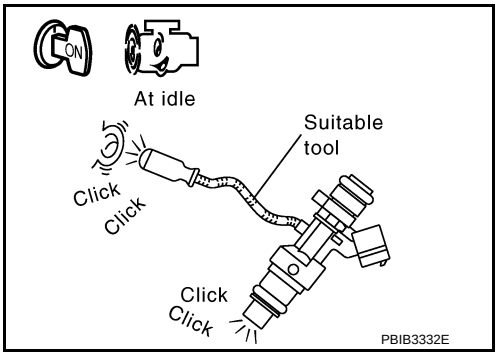
YES >> GO TO 7.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-189, "DTC Logic".

7. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT-III
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode of “ENGINE” using CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-III
1. Let engine idle.

2. Listen to each fuel injector operating sound.



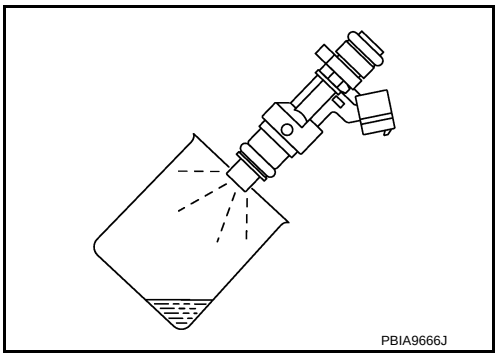
Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for “FUEL INJECTOR”, refer to EC-400, "Component Function Check".

8. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all fuel injector harness connectors.
4. Remove fuel tube assembly. Refer to EM-47, "Removal and Installation".
   Keep fuel hose and all fuel injectors connected to fuel tube.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each fuel injector.
7. Crank engine for about 3 seconds.



Fuel should be sprayed evenly for each fuel injector.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones. Refer to EM-47, "Removal and Installation".

P0190 FRP SENSOR

DTC Logic

INFOID:0000000006598865

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0190	FUEL PRES SEN/CIRC (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.) (Atmospheric pressure sensor 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 • Atmospheric pressure sensor • 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 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-247, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006598866

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
		Atmospheric pressure sensor	F76	1
		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*1 M203*2	5

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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-42, "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-249, "Component Inspection".

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection

INFOID:0000000006598867

1.CHECK FRP SENSOR

Ⓗ WITH CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect harness connector disconnected.
3. Start the engine.
4. Select “DATA MONITOR” mode of “ENGINE” using CONSULT-III.

5. Check that the “FUEL PRES SEN V” indication.

Monitor Item	Condition	Values/Status
FUEL PRES SEN V	Engine speed: Idle	980 – 1,200 mV
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,100 – 2,900 mV

⊗WITHOUT CONSULT-III
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	0.98 – 1.2 V
			[Engine is running] • Warm-up condition • Revving engine from idle to 4,000 rpm quickly	1.1 – 2.9 V

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Replace FRP sensor. Refer to EM-47, "Exploded View".

P0197, P0198 EOT SENSOR

DTC Logic

INFOID:0000000006598868

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-251, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006598869

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	F25	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	F25	11	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-252, "Component Inspection".

Is the inspection result normal?

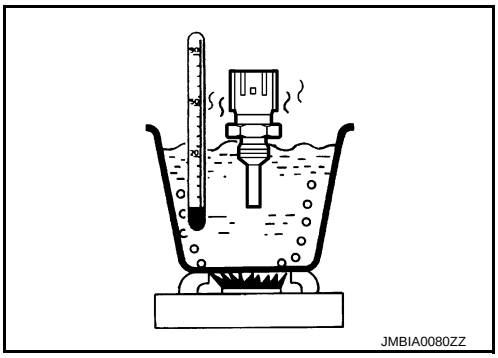
YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace engine oil temperature sensor. Refer to EM-103, "Exploded View".

Component Inspection

INFOID:0000000006598870

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)	2.1 - 2.9
			50 (122)	0.68 - 1.00
			90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine oil temperature sensor. Refer to EM-103, "Exploded View".

P0201, P0202, P0203, P0204 FUEL INJECTOR

DTC Logic

INFOID:0000000006598871

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-253, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006598872

1.PERFORM TROUBLE DIAGNOSIS FOR INJECTOR

Perform trouble diagnosis for injector. Refer to EC-400, "Component Function Check".

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P0222, P0223 TP SENSOR

DTC Logic

INFOID:0000000006547027

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-274, "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-254, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547028

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-256, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace electric throttle control actuator. Refer to EM-28, "Exploded View".

Component Inspection

INFOID:0000000006547029

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-135, "Work Procedure".
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-28, "Exploded View".

P0234 TC SYSTEM

DTC Logic

INFOID:0000000006598873

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-260, "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-257, "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-258, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006598874

1.CHECK BOOST CONTROL ACTUATOR HOSE

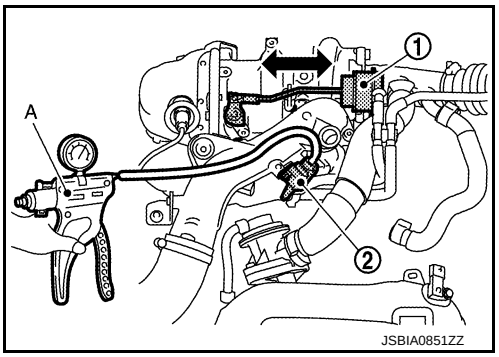
Check disconnection, looseness or improper connection of hose between turbocharger boost control solenoid valve and boost control actuator.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Proceed to EC-258, "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 wheel.
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 [60 kPa (600 mbar, 450 mmHg, 17.72 inHg)] with battery voltage to terminals 1 and 2	Boost control actuator rod operates
Supply pressure [60 kPa (600 mbar, 450 mmHg, 17.72 inHg)] without battery voltage to terminals 1 and 2	Boost control actuator rod not operates

CAUTION:
Do not supply pressure over 70 kPa (700 mbar, 525 mmHg, 20.67 inHg)

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-258, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006598875

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 GROUND 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-175, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace turbocharger boost control solenoid valve. Refer to EM-36, "Exploded View".

6.CHECK BOOST CONTROL ACTUATOR

Check the boost control actuator. Refer to EM-37, "Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace exhaust manifold and turbocharger assembly. Refer to EM-36, "Exploded View".

7.CHECK TURBOCHARGER BOOST SENSOR

Check the turbocharger boost sensor. Refer to EC-262, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace turbocharger boost sensor. Refer to EM-31, "Exploded View".

P0237, P0238 TC BOOST SENSOR

DTC Logic

INFOID:0000000006598877

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.) (Atmospheric pressure 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 • Atmospheric pressure 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-260, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006598878

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
		Atmospheric pressure sensor	F76	1
		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*1 M203*2	5

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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-262, "Component Inspection".

Is the inspection result normal?

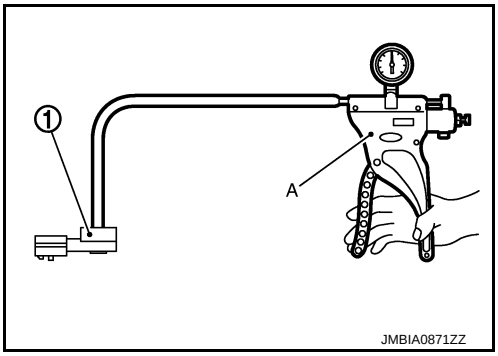
YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace turbocharger boost sensor. Refer to EM-36, "Exploded View".

Component Inspection

INFOID:0000000006598879

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-36, "Exploded View".

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Logic

INFOID:0000000006548489

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-264, "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-264, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006548490

1.CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Start engine and run it at idle speed.
2. Listen for the sound of the intake air leak.
3. Check PCV hose connection.

Is intake air leak detected?

YES >> Discover air leak location and repair.
NO >> GO TO 2.

2.CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 3.
YES-2 >> Without CONSULT-III: GO TO 4.
NO >> Repair or replace it.

3.PERFORM POWER BALANCE TEST

With CONSULT-III
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode of “ENGINE” using CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

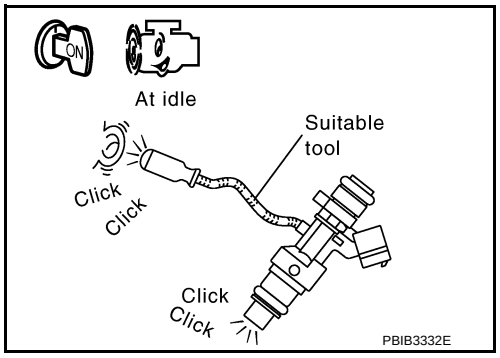
Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 4.

4. CHECK FUNCTION OF FUEL INJECTOR

1. Start engine and let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



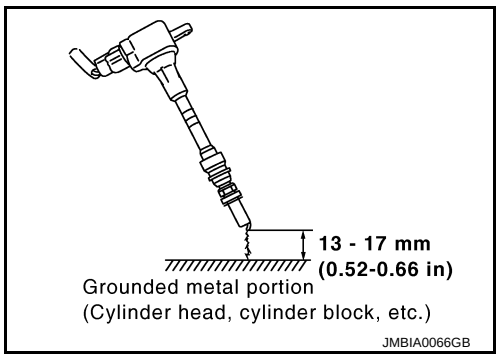
Is the inspection result normal?

YES >> GO TO 5.
NO >> Perform trouble diagnosis for FUEL INJECTOR. Refer to EC-400, "Diagnosis Procedure".

5. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **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 9.
NO >> GO TO 6.

6. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

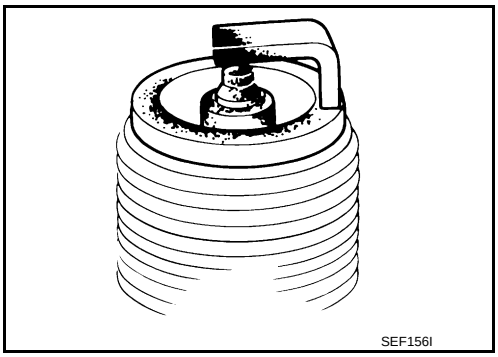
Spark should be generated.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-414, "Diagnosis Procedure".

7.CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.



Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-24, "Inspection".
NO >> Repair or clean spark plug. Then GO TO 8.

8.CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace spark plug(s) with standard type one(s). For spark plug type. Refer to EM-23, "Removal and Installation".

9.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-17, "Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

10.CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to EC-140, "Work Procedure".
3. Install fuel pressure gauge and check fuel pressure. Refer to EC-140, "Work Procedure".

At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2, 51 psi)

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 11.

11.DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”. Refer to FL-6, "2WD : Exploded View" (2WD) or FL-10, "4WD : Exploded View" (4WD).
NO >> Repair or replace.

12.CHECK IGNITION TIMING

Check the following items.
For procedure, refer to EC-129, "Work Procedure".
For specification, refer to EC-449, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Follow the EC-129, "Work Procedure".

13. 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 14.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK A/F SENSOR 1 HEATER

Check the A/F sensor 1 heater. Refer to EC-169, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace A/F sensor 1. Refer to EM-38, "Exploded View".

15. CHECK MASS AIR FLOW SENSOR

With CONSULT-III
Check “MASS AIRFLOW” in “DATA MONITOR” mode of “ENGINE” using CONSULT-III.

1.0 - 4.0 g·m/sec : at idling
2.0 - 10.0 g·m/sec : at 2,500 rpm

With GST
Check mass air flow sensor signal in Service $01 with GST.

1.0 - 4.0 g·m/sec : at idling
2.0 - 10.0 g·m/sec : at 2,500 rpm

Is the measurement value within the specification?

YES >> GO TO 16.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-189, "DTC Logic".

16. CHECK SYMPTOM TABLE

Check items on the rough idle symptom in EC-437, "Symptom Table".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair or replace error-detected parts.

17. ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.
Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-72, "Diagnosis Description".

>> GO TO 18.

18. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

P0327, P0328 KS

DTC Logic

INFOID:0000000006547034

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-269, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547035

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-270, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace knock sensor. Refer to EM-103, "Exploded View".

Component Inspection

INFOID:0000000006547036

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-103, "Exploded View".

P0335 CKP SENSOR (POS)

DTC Logic

INFOID:0000000006547038

DTC DETECTION LOGIC

NOTE:
If DTC P0340 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.
Refer to EC-307, "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-271, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547039

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-273, "Component Inspection".

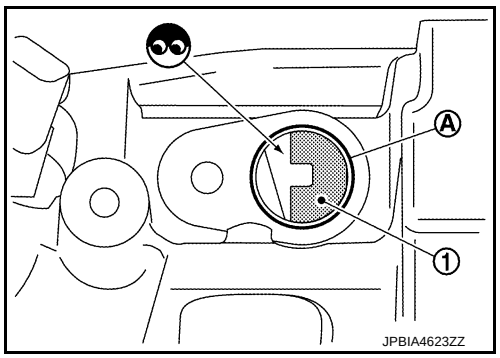
Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace crankshaft position sensor (POS). Refer to EM-103, "Exploded View".

6.CHECK GEAR TOOTH

1. Remove crankshaft position sensor (POS). Refer to EM-103, "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-42, "Intermittent Incident".
NO >> Replace the signal plate. Refer to EM-103, "Exploded View".

Component Inspection

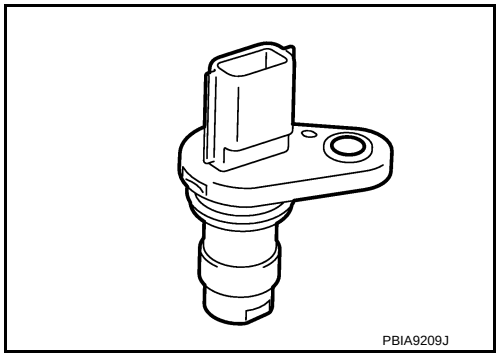
INFOID:0000000006547040

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-103, "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-103, "Exploded View".

P0340 CMP SENSOR (PHASE)

DTC Logic

INFOID:0000000006547042

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.) (Atmospheric pressure sensor 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 • Atmospheric pressure sensor • 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-275, "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-275, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547043

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-124, "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 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
		Atmospheric pressure sensor	F76	1
		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*1 M203*2	5

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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-276, "Component Inspection".

Is the inspection result normal?

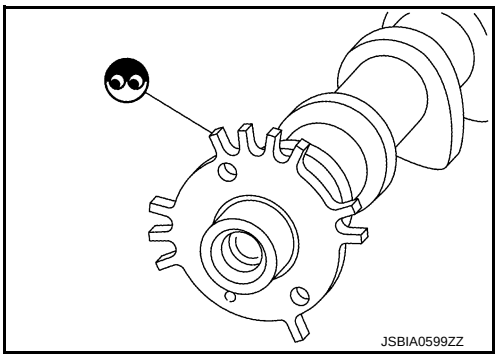
YES >> GO TO 7.
NO >> Replace camshaft position sensor (PHASE). Refer to EM-79, "Removal and Installation".

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-42, "Intermittent Incident".
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-79, "Removal and Installation".



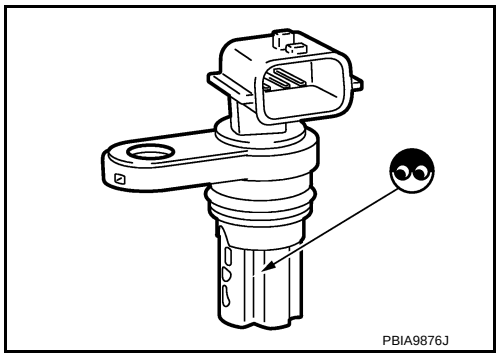
Component Inspection

INFOID:0000000006547044

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-79, "Removal and Installation".

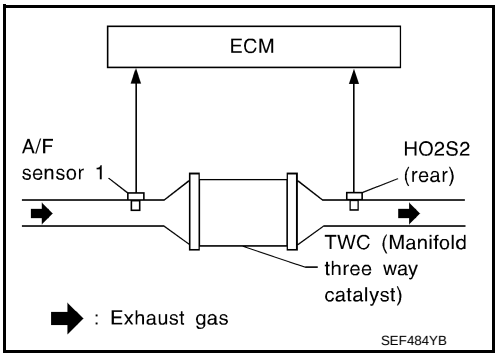
P0420 THREE WAY CATALYST FUNCTION

DTC Logic

INFOID:0000000006548483

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-III be used?

YES >> GO TO 2.
NO >> GO TO 6.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III
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-III.
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-III.
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-III 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-280, "Diagnosis Procedure".
NO >> INSPECTION END

6. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-279, "Component Function Check".

NOTE:

Use component function check to check the overall 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-280, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006548484

1. PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. 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-280, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006548485

1.CHECK EXHAUST SYSTEM

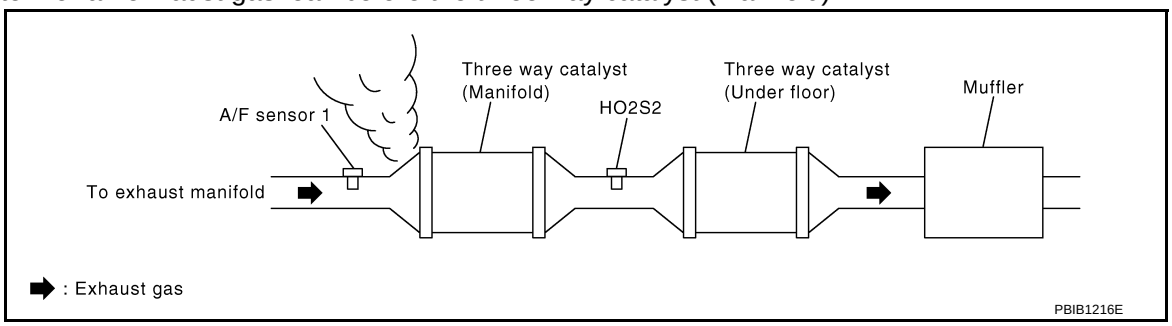
Visually check exhaust tubes and muffler for dent.

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-129, "Work Procedure".
For specification, refer to EC-449, "Ignition Timing"
For specification, refer to EC-449, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Follow the EC-129, "Work Procedure".

5.CHECK FUEL INJECTOR

Check the fuel injector. Refer to EC-400, "Component Function Check".

Is the inspection result normal?

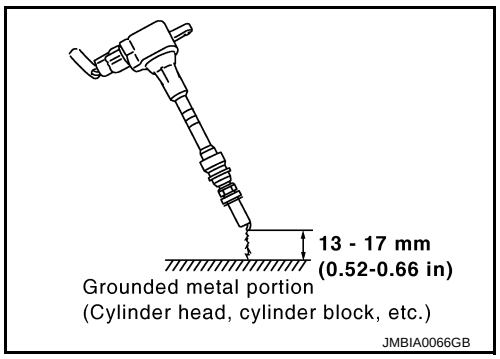
YES >> GO TO 6.
NO >> Perform EC-400, "Diagnosis Procedure".

6.CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.

8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **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.

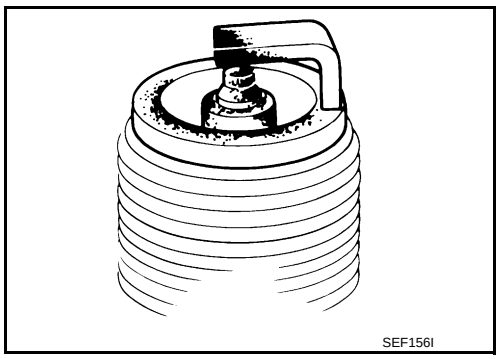
Spark should be generated.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-414, "Diagnosis Procedure".

8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc. Refer to EM-24, "Inspection".



Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-24, "Inspection".
NO >> Repair or clean spark plug. Refer to EM-53, "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-23, "Removal and Installation".

10. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Remove fuel injector assembly.
   Refer to EM-47, "Exploded View".
   Keep fuel hose and all fuel injectors connected to fuel tube.
3. Disconnect all ignition coil harness connectors.
4. Reconnect all fuel injector harness connectors disconnected.
5. Turn ignition switch ON.

Does fuel drip from fuel injector?

YES >> GO TO 11.
NO >> Replace the fuel injector(s) from which fuel is dripping. Refer to EM-47, "Exploded View".

11. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the trouble fixed?

YES >> INSPECTION END
NO >> Replace three way catalyst assembly. Refer to EM-33, "2WD : Exploded View" (2WD), EM-34, "4WD : Exploded View" (4WD).

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000006548486

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

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-283, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006548487

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-1 >> With CONSULT-III: GO TO 4.
YES-2 >> Without CONSULT-III: 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	1	F26	95	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 4.
YES-2 >> Without CONSULT-III: GO TO 5.
NO >> Repair or replace error-detected parts.

4.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III
1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT-III.
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-42, "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-284, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-28, "Exploded View".

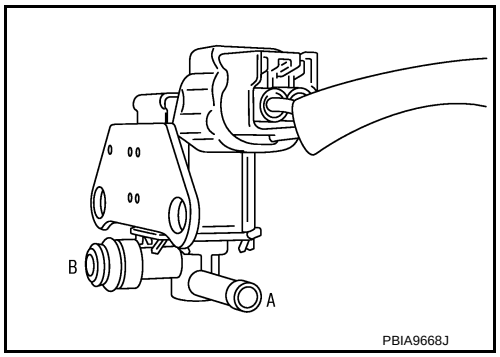
Component Inspection

INFOID:0000000006548488

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III
1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Turn ignition switch ON.

5. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT-III.
6. Touch “Qd” and “Qu” on CONSULT-III screen to adjust “PURG VOL C/V” opening and check air passage continuity of EVAP canister purge volume control solenoid valve 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-III

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Check air passage continuity of EVAP canister purge volume control solenoid valve 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-28, "Exploded View".

P0500 VSS

Description

INFOID:0000000006547103

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.

DTC Logic

INFOID:0000000006547104

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-304, "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-286, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547106

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-366, "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-142, "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 toMWI-36, "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 toTM-413, "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-168, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace or replace error-detected parts.

P0501, P2159 VEHICLE SPEED SENSOR

Description

INFOID:0000000006635012

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-48, "DIRECT INJECTION GASOLINE SYSTEM : System Description".

DTC Logic

INFOID:0000000006635013

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-108, "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-288, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006635014

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

With CONSULT-III
Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-131, "CONSULT-III Function".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Perform Diagnosis Procedure corresponding to DTC indicated.

P0506 ISC SYSTEM

Description

INFOID:0000000006547107

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:0000000006547108

DTC DETECTION LOGIC

NOTE:
If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name (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-136, "Work Procedure", 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-289, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547109

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-447, "Removal and Installation".

P0507 ISC SYSTEM

Description

INFOID:0000000006547110

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:0000000006547111

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-136, "Work Procedure", 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-291, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547112

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-447, "Removal and Installation".

P0520 EOP SENSOR

DTC Logic

INFOID:0000000006598891

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (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.) (Atmospheric pressure sensor 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 • Atmospheric pressure sensor • 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-293, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006598892

1.CHECK ENGINE OIL

1. Turn ignition switch OFF.
2. Check engine oil level and pressure. Refer to LU-8, "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
		Atmospheric pressure sensor	F76	1
		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[*1] M203[*2]	5

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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-42, "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-296, "Component Inspection".

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection

INFOID:0000000006598893

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-103, "Exploded View".

P0524 ENGINE OIL PRESSURE

DTC Logic

INFOID:0000000006598894

DTC DETECTION LOGIC

NOTE:
If DTC P0524 is displayed with DTC P0520, P0075, or P0081, perform trouble diagnosis for DTC P0520, P0075, or P0081 first. Refer to EC-176, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	Detecting condition	Possible cause
P0524	ENGINE OIL PRESSURE (Engine oil pressure too low)	Engine oil pressure is low because there is a gap between angle of target and phase-control angle.	• Engine oil pressure or level too low • Crankshaft position sensor • Camshaft position sensor • Intake valve timing control solenoid valve • Accumulation of debris to the signal pick-up portion of the camshaft • Timing chain installation • Foreign matter caught in the oil groove for intake valve timing control

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.PRECONDITIONING-II

Check oil level and oil pressure. Refer to LU-8, "Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Proceed to LU-8, "Inspection".

3.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT-III
1. Select “DATA MONITOR” mode of “ENGINE” using CONSULT-III.
2. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	More than 1,700 rpm
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:
Always drive at a safe speed.

3. Check 1st trip DTC.

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

Is 1st trip DTC detected?

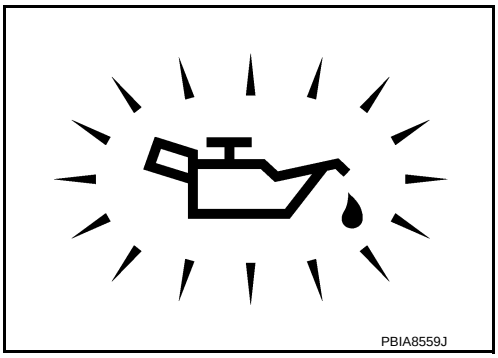
YES >> Proceed to EC-298, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006598895

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 >> Proceed to MWI-66, "Diagnosis Procedure".
NO >> GO TO 2.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-164, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-67, "Exploded View".

3. CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-273, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace crankshaft position sensor. Refer to EM-78, "Exploded View".

4. CHECK CAMSHAFT POSITION SENSOR

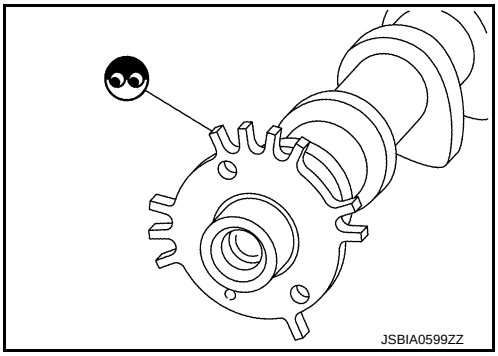
Refer to EC-276, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning camshaft position sensor. Refer to EM-78, "Exploded View".

5. CHECK CAMSHAFT (INT)

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



Is the inspection result normal?

YES >> GO TO 6.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-79, "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-67, "Exploded View".
NO >> GO TO 7.

7.CHECK LUBRICATION CIRCUIT

Perform “Inspection of Camshaft Sprocket (INT) Oil Groove”. Refer to EM-82, "Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. refer to GI-42, "Intermittent Incident".
NO >> Clean lubrication line.

P0603 ECM POWER SUPPLY

DTC Logic

INFOID:0000000006598896

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

Is 1st trip DTC detected?

YES >> Proceed to EC-300, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006598897

1.CHECK ECM POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the voltage between ECM harness connector terminals.

ECM			Voltage
Connector	+	–	
	Terminal		
E18	106	127	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK INTERMITTENT INCIDENT

Perform GI-42, "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-300, "DTC Logic".

Is the 1st trip DTC P0603 displayed again?

YES >> Replace ECM. Refer to EC-447, "Removal and Installation".
NO >> INSPECTION END

P0605 ECM

DTC Logic

INFOID:0000000006547114

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition		Possible cause
P0605	ECM (Engine control module)	A)	ECM calculation function is malfunctioning.	ECM
		B)	ECM EEP-ROM system is malfunctioning.	
		C)	ECM self shut-off function is malfunctioning.	
		D)	ECM temperature sensor is malfunctioning.	

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. Turn ignition switch ON.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-302, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-302, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Repeat step 2 for 32 times.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-302, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547115

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to EC-302, "DTC Logic".

Is the 1st trip DTC P0605 displayed again?

YES >> Replace ECM. Refer to EC-447, "Removal and Installation".
NO >> INSPECTION END

P0607 ECM

DTC Logic

INFOID:0000000006547117

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0607	ECM (CAN communication bus)	When detecting error during the initial diagnosis of CAN controller of ECM.	ECM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to EC-304, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547118

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to EC-304, "DTC Logic".
4. Check DTC.

Is the DTC P0607 displayed again?

YES >> Replace ECM. Refer to EC-447, "Removal and Installation".
NO >> INSPECTION END

P0611 ECM PROTECTION

Description

INFOID:0000000006598898

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:0000000006598899

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-305, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006598900

1.INSPECTION START

1. Perform DTC confirmation procedure. Refer to EC-302, "DTC Logic".
2. Check 1st trip DTC.

Is DTC P0605 detected?

YES >> Proceed to EC-302, "Diagnosis Procedure".
NO >> Explain the customer about the activation of the protection function.

P062B ECM

Description

INFOID:0000000006598901

This DTC is detected when the ECM-integrated injector driver unit has a malfunction. For injector driver unit, refer to EC-31, "ECM".

DTC Logic

INFOID:0000000006598902

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-306, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006598903

1.CHECK FUEL INJECTOR

Check fuel injector. Refer toEC-400, "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-306, "DTC Logic".
4. Check 1st trip DTC.

Is the DTC P062B displayed again?

YES >> Replace ECM. Refer to EC-447, "Removal and Installation".
NO >> INSPECTION END

P0643 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000006547119

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.) • Refrigerant pressure sensor • Crankshaft position sensor • Accelerator pedal position sensor 1 • Throttle 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.

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-307, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547120

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-42, "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
F26	58	CKP sensor	F107	3
	62	TP sensor	F29	1
E18	101	APP sensor	E101*1 M203*2	4

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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-423, "Diagnosis Procedure".
- Crankshaft position sensor
  Refer to EC-273, "Component Inspection".
- Throttle position sensor
  Refer to EC-203, "Component Inspection".
- Accelerator pedal position sensor
  Refer to EC-387, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace malfunctioning component.

P0850 PNP SWITCH

Description

INFOID:0000000006548426

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:0000000006547122

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-III?

Do you have CONSULT-III?

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

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always 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-III

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode of “ENGINE” using CONSULT-III. 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-310, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select “DATA MONITOR” mode of “ENGINE” using CONSULT-III.
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 70°C (158°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-310, "Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-310, "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-310, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006547123

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-310, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006547124

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-201, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace transmission range switch. Refer to TM-278, "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	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.

8. CHECK PNP SWITCH

Check the PNP switch. Refer to TM-73, "PARK/NEUTRAL POSITION (PNP) SWITCH : Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace PNP switch. Refer to TM-77, "Removal and Installation".

P1078 EVT CONTROL POSITION SENSOR

DTC Logic

INFOID:0000000006598904

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.) (Atmospheric pressure sensor 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 • Atmospheric pressure sensor • 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-313, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006598905

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
		Atmospheric pressure sensor	F76	1
		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*1 M203*2	5

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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.

+		–		
EVT control position sensor		ECM		Continuity
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-315, "Component Inspection".

Is the inspection result normal?

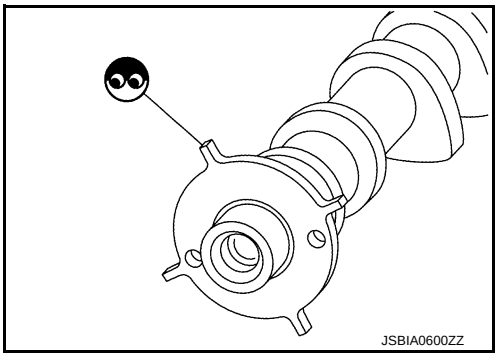
YES >> GO TO 6.
NO >> Replace EVT control position sensor. Refer to EM-79, "Removal and Installation".

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-42, "Intermittent Incident".
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-79, "Removal and Installation".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Component Inspection

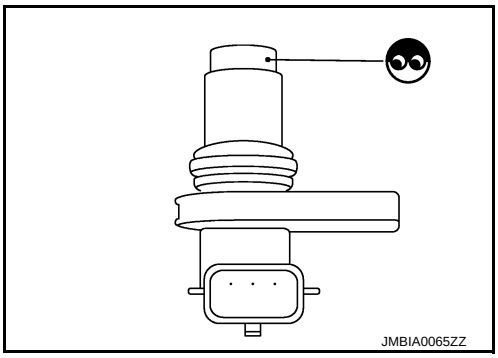
INFOID:0000000006598906

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-67, "Exploded View".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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-67, "Exploded View".

P1197 OUT OF GAS

Description

INFOID:0000000006599037

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:0000000006599038

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 1.5 MPa (15 bar, 15.3 kg/cm^2, 217.5 psi) or less for 3 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. • Fuel rail pressure remains at 0.23 MPa (2.3 bar, 2.346 kg/cm^2, 33.35 psi) or less for 5 seconds or more with the fuel level too low. **NOTE:** Allow engine coolant temperature to reach 70°C (158°F) or more once.	• 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-318, "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-III 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-318, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006599039

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-III 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-317, "DTC Logic".

Is 1st trip DTC detected?

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

2.CHECK LOW PRESSURE FUEL PUMP

Refer to EC-405, "M/T MODELS : Component Function Check" (M/T models), EC-407, "EXCEPT FOR M/T MODELS : Component Function Check" (Except for M/T models).

Is inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK HIGH PRESSURE FUEL PUMP

Refer to EC-410, "Component Function Check".

Is inspection result normal?

YES >> Check the fuel hose for disconnection and looseness.
NO >> Repair or replace error-detected parts.

P1212 TCS COMMUNICATION LINE

Description

INFOID:0000000006547126

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:0000000006547127

DTC DETECTION LOGIC

NOTE:
- **If DTC P1212 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-161, "DTC Logic".**
- **If DTC P1212 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-304, "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-319, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547128

Perform the trouble diagnosis for TCS. Refer to BRC-145, "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-108, "DTC Index".
- Trouble diagnosis for DTC P0607 Refer to EC-304, "DTC Logic".

P1217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000006547129

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-304, "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-11, "Draining". Also, replace the engine oil. Refer to CO-12, "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-14, "Engine 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-320, "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-321, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006547130

1.PERFORM COMPONENT FUNCTION CHECK-I

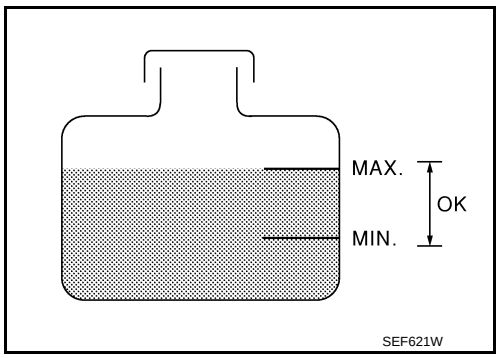
WARNING:

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-321, "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-321, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

With CONSULT-III
1. Turn ignition switch ON.
2. Perform “FAN DUTY CONTROL” in “ACTIVE TEST” mode of “ENGINE” using CONSULT-III.
3. Check that cooling fan speed varies according to the percentage.

Without CONSULT-III
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-321, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006547131

1.CHECK COOLING FAN OPERATION

With CONSULT-III
1. Turn ignition switch ON.
2. Perform “FAN DUTY CONTROL” in “ACTIVE TEST” mode of “ENGINE” using CONSULT-III.
3. Check that cooling fan speed varies according to the percentage.

Without CONSULT-III
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-420, "Diagnosis Procedure".

2.CHECK COOLING SYSTEM FOR LEAK-I

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

Is leakage detected?

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

3.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak.
- Hose (Refer to CO-11, "Inspection".)
- Radiator (Refer to CO-15, "RADIATOR : Inspection".)
- Water pump (Refer to CO-22, "Inspection".)

>> Repair or replace malfunctioning part.

4. CHECK RADIATOR CAP

Check radiator cap. Refer to CO-15, "RADIATOR CAP : Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace radiator cap. Refer to CO-17, "Exploded View".

5. CHECK THERMOSTAT

Check thermostat. Refer to CO-25, "Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace thermostat. Refer to CO-24, "Removal and Installation".

6. CHECK WATER CONTROL VALVE

Check water control valve. Refer to CO-27, "Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace water control valve. Refer to CO-26, "Exploded View".

7. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-201, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace engine coolant temperature sensor. Refer to CO-26, "Exploded View".

8. OVERHEATING CAUSE ANALYSIS

If the cause cannot be isolated, check the CO-9, "Troubleshooting Chart".

>> INSPECTION END

P1220 FUEL PUMP CONTROL MODULE (FPCM)

DTC Logic

INFOID:0000000006599303

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1220	FPCM (Fuel pump control module)	During engine cranking, the signal voltage of the FPCM to the ECM is too low.	• Harness or connectors (FPCM circuit is open or shorted) (Fuel pump circuit is open or shorted) • FPCM

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 between 12 - 15 V at idle.**
- **Before performing the following procedure, check that the engine coolant temperature is –10°C (14°F) or more.**

>> 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 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-323, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006599304

1.CHECK FPCM POWER SUPPLY

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

+		–	Voltage
FPCM			
Connector	Terminal		
B61	10	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK FPCM POWER SUPPLY CIRCUIT

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

+		–		Continuity
FPCM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
B61	10	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.

3.CHECK FPCM GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between FPCM harness connector and ground.

+		–	Continuity
FPCM			
Connector	Terminal		
B61	5	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 FPCM INPUT AND OUTPUT CIRCUITS

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

FPCM		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B61	8	F26	91	Existed
	9		96	

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 FUEL PUMP CONTROL CIRCUIT

1. Disconnect fuel level sensor unit (fuel pump) harness connector.
2. Check the continuity between FPCM harness connector and fuel level sensor unit (fuel pump) harness connector.

FPCM		Fuel level sensor unit (fuel pump)		Continuity
Connector	Terminal	Connector	Terminal	
B61	6	B40	2	Existed
	7		4	

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 FPCM

Check the FPCM. Refer to EC-325, "Component Inspection (FPCM)".

Is the inspection result normal?

YES >> Check intermittent incident .Refer to GI-42, "Intermittent Incident".
NO >> Replace FPCM. Refer to EC-448, "Removal and Installation".

Component Inspection (FPCM)

INFOID:0000000006599000

1. CHECK FUEL PUMP CONTROL MODULE (FPCM)

Check the voltage between FPCM terminals as per the following conditions.

FPCM			Condition	Voltage (Approx.)
Connector	+	–		
	Terminal			
B61	7	6	For 1 second after turning ignition switch ON	10 V
			More than 1 second after turning ignition switch ON	0 V
			Idle speed	10 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace FPCM. Refer to EC-448, "Removal and Installation".

P1225 TP SENSOR

DTC Logic

INFOID:0000000006547133

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-326, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547134

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct. Refer to EM-26, "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-28, "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-135, "Work Procedure".

P1226 TP SENSOR

DTC Logic

INFOID:0000000006547137

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-327, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006635005

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct. Refer to EM-26, "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-28, "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-135, "Work Procedure".

P1550 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000006547144

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.) (Atmospheric pressure sensor 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 • Atmospheric pressure sensor • 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-329, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547145

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
		Atmospheric pressure sensor	F76	1
		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*1 M203*2	5

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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-330, "Component Inspection".

Is the inspection result normal?

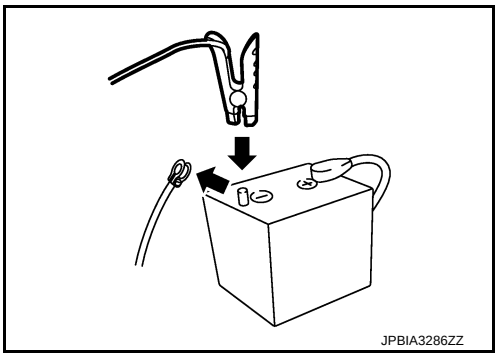
YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace battery negative cable assembly. Refer to PG-125, "Exploded View".

Component Inspection

INFOID:0000000006547146

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-111, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly. Refer to PG-125, "Exploded View".

P1551, P1552 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000006547148

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.) (Atmospheric pressure sensor 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 • Atmospheric pressure sensor • 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-332, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006634539

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
		Atmospheric pressure sensor	F76	1
		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*1 M203*2	5

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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-330, "Component Inspection".

Is the inspection result normal?

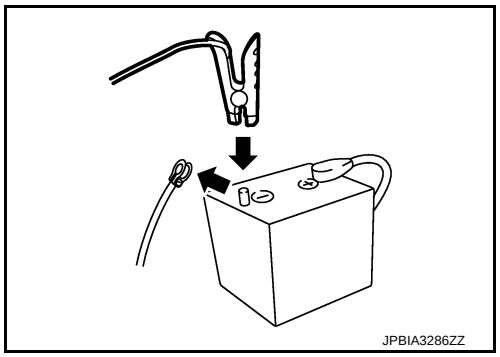
YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace battery negative cable assembly. Refer to PG-125, "Exploded View".

Component Inspection

INFOID:0000000006547150

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.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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-111, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly. Refer to PG-125, "Exploded View".

P1553 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000006547152

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.) (Atmospheric pressure sensor 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 • Atmospheric pressure sensor • 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-335, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006634540

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
		Atmospheric pressure sensor	F76	1
		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*1 M203*2	5

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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-330, "Component Inspection".

Is the inspection result normal?

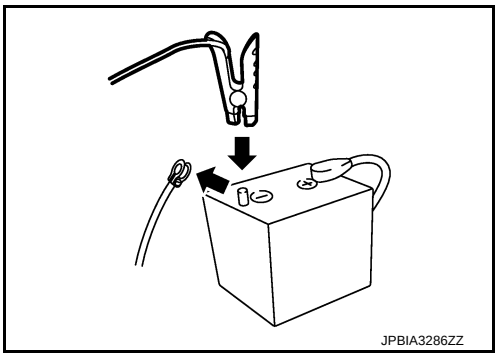
YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace battery negative cable assembly. Refer to PG-125, "Exploded View".

Component Inspection

INFOID:0000000006547154

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-111, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly. Refer to PG-125, "Exploded View".

P1554 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000006547156

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.) (Atmospheric pressure sensor 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 • Atmospheric pressure sensor • Turbocharger boost sensor • Engine oil pressure sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-337, "Component Function Check".

NOTE:

Use component function check to check the overall function of the 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-338, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006547157

1.PRECONDITIONING

TESTING CONDITION:

- **Before performing the following procedure, confirm that battery voltage is more than 12.8 V at idle.**
- **Before performing the following procedure, confirm that all load switches and A/C switch are turned OFF.**

>> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK

With CONSULT-III
1. Start engine and let it idle.
2. Select “BAT CUR SEN” in “DATA MONITOR” mode of “ENGINE” using CONSULT-III.
3. Check “BAT CUR SEN” indication for 10 seconds.
   “BAT CUR SEN” should be above 2,300 mV at least once.

Without CONSULT-III
1. Start engine and let it idle.
2. Check 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-338, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006635004

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
		Atmospheric pressure sensor	F76	1
		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[*1] M203[*2]	5

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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-330, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace battery negative cable assembly. Refer to PG-125, "Exploded View".

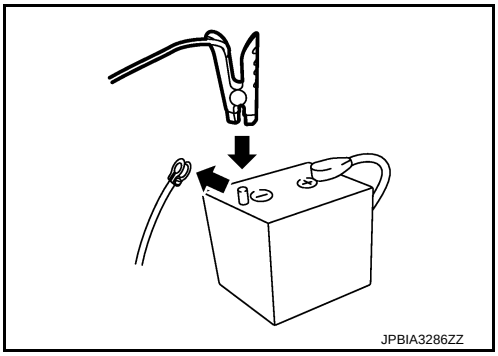
Component Inspection

INFOID:0000000006547159

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-111, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly. Refer to PG-125, "Exploded View".

P1556, P1557 BATTERY TEMPERATURE SENSOR

DTC Logic

INFOID:0000000006598907

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-341, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006598908

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-342, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace battery negative cable assembly. Refer to PG-125, "Exploded View".

Component Inspection

INFOID:0000000006598909

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-125, "Exploded View".

P1564 ASCD STEERING SWITCH

DTC Logic

INFOID:0000000006547161

DTC DETECTION LOGIC

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-302, "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 RES/+ switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press 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-343, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547162

1.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-III

1. Turn ignition switch ON.
2. Select “CANCEL SW”, “RESUME/ACC SW” and “SET SW” in “DATA MONITOR” mode of “ENGINE” using CONSULT-III.
3. Check each item indication as per the following conditions.

Monitor item	Condition		Indication
CANCEL SW	CANCEL switch	Pressed	ON
		Released	OFF
RESUME/ACC SW	RES/+ switch	Pressed	ON
		Released	OFF

Monitor item	Condition		Indication
SET SW	SET/– switch	Pressed	ON
		Released	OFF

⊗ Without CONSULT-III
1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals.

ECM			Condition	Voltage (Approx.)
Connector	+	-		
	Terminal			
E18	110	111	CANCEL switch: Pressed	1 V
			SET/- switch: Pressed	2 V
			RES/+ switch: Pressed	3 V
			All ASCD steering switches: Released	4 V

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "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-345, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace ASCD steering switch. Refer to ST-9, "Exploded View".

Component Inspection

INFOID:0000000006547163

1. CHECK ASCD STEERING SWITCH-I

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

Combination switch (Spiral cable)			Condition		Continuity
Connector	+	–			
	Terminals				
M303	35	36	Speed limiter MAIN switch	Pressed	Existed
				Released	Not existed
		37	ASCD MAIN switch	Pressed	Existed
				Released	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD steering switch. Refer to ST-9, "Exploded View".

2. 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	CANCEL switch: Pressed	250 Ω
			SET/– switch: Pressed	660 Ω
			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 ASCD BRAKE SWITCH

DTC Logic

INFOID:0000000006547165

DTC DETECTION LOGIC

NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-302, "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-352, "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-352, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006599040

1.CHECK OVERALL FUNCTION-I

With CONSULT-III
1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode of “ENGINE” using CONSULT-III.
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-III
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-III
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-III
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-42, "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 M202*2	1	Ground	Battery voltage

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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*1 M202*2	2	E18	116	Existed

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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-426, "Component Inspection (Brake Pedal Position Switch)"

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace brake pedal position switch. Refer to BR-20, "Exploded View" (LHD) or BR-88, "Exploded View" (RHD).

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 M205*3	1	Ground	Battery voltage

*1: CVT models
*2: LHD with M/T models
*3: RHD with 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 M205*3	2	E18	115	Existed

*1: CVT models
*2: LHD with M/T models
*3: RHD with 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-350, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace stop lamp switch. Refer to BR-20, "Exploded View" (LHD) or BR-88, "Exploded View" (RHD).

Component Inspection (Brake Pedal Position Switch)

INFOID:0000000006547167

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" (LHD) or BR-77, "Inspection and Adjustment" (RHD).
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" (LHD) or BR-88, "Exploded View" (RHD).

Component Inspection (Stop Lamp Switch)

INFOID:0000000006547169

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" (LHD) or BR-77, "Inspection and Adjustment" (RHD).
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" (LHD) or BR-88, "Exploded View" (RHD).

P1574 ASCD VEHICLE SPEED SENSOR

Description

INFOID:0000000006547170

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-64, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description" for ASCD functions.

DTC Logic

INFOID:0000000006547171

DTC DETECTION LOGIC

NOTE:

- **If DTC P1574 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-161, "DTC Logic".**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-286, "DTC Logic"**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-302, "DTC Logic"**
- **If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-304, "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-352, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547172

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-159, "CONSULT-III Function (TRANSMISSION)".

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-131, "CONSULT-III Function".

Is DTC detected?

NO >> INSPECTION END
YES >> Perform trouble shooting relevant to DTC indicated.

P158A ECM

DTC Logic

INFOID:0000000006635030

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-354, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006635031

1.PERFORM CALIBRATION OF G SENSOR

Perform calibration of G sensor. Refer to EC-138, "Work Procedure".

>> INSPECTION END

P159A, P159C, P159D G SENSOR
FOR M/T MODELS

FOR M/T MODELS : DTC Logic

INFOID:0000000006635015

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.) (Intake air temperature sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Atmospheric pressure 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 • Atmosphere pressure 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-356, "FOR M/T MODELS : Diagnosis Procedure".
NO >> INSPECTION END

FOR M/T MODELS : Diagnosis Procedure

INFOID:0000000006635016

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-357, "FOR M/T MODELS : Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> 1. Replace G sensor. Refer to TM-282, "Exploded View".
2. Perform calibration of G sensor. Refer to EC-138, "Work Procedure".

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-42, "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
		Atmosphere pressure sensor	F76	1
		Turbocharger boost sensor	F75	1
F26	68	Battery current sensor	F52	1
		G sensor	B32	3
	72	Camshaft position sensor	F109	1
		EVT control position sensor	F110	1
E18	118	APP sensor 2	E101*1 M203*2	5

*1: CVT models

*2: RHD with M/T models

Is the inspection result normal?

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

FOR M/T MODELS : Component Inspection

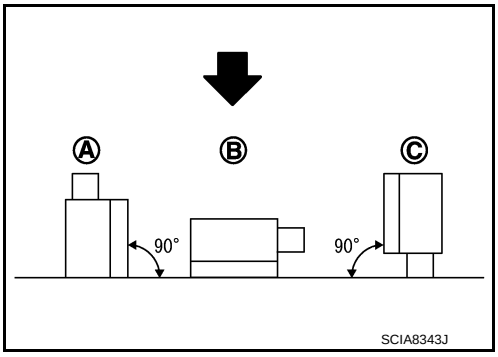
INFOID:0000000006635017

1.CHECK G SENSOR

With CONSULT-III

1. Remove G sensor. Refer to TM-282, "Exploded View".
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-III to check indications according to the following conditions:

: Direction of gravitational force



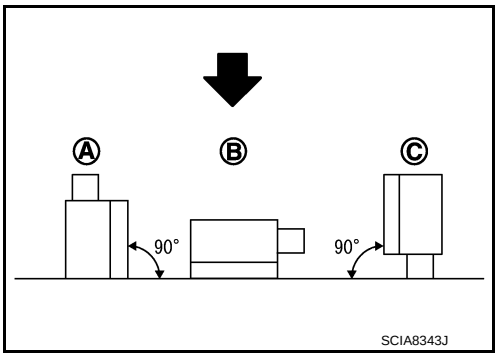
Monitor item	Condition	Value (V)
G SENSOR	Parallel with the table (0G) (B)	2.18 – 2.82
	Vertical to the table (–1G) (A) ↓ Parallel with the table (0G) (B) ↓ Vertical to the table (1G) (C)	0.85 – 1.49* ↓ 2.18 – 2.82* ↓ 3.51 – 4.15*

*: Check that voltage rises as the G sensor measurement condition changes in the order of (A), (B), and (C).

Ⓧ Without CONSULT-III

1. Remove G sensor. Refer to TM-282, "Exploded View".
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. Refer to TM-282, "Exploded View".

EXCEPT FOR M/T MODELS

EXCEPT FOR M/T MODELS : Description

INFOID:0000000006635018

ECM receives a G sensor signal from TCM via CAN communication to switch combustion for the direct injection gasoline system. For the direct injection gasoline system, refer toEC-48, "DIRECT INJECTION GASOLINE SYSTEM : System Description".

EXCEPT FOR M/T MODELS : DTC Logic

INFOID:0000000006635019

DTC DETECTION LOGIC

NOTE:
- If DTC P159A, P159C or P159D is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to EC-108, "DTC Index".
- If DTC P159A, P159C or P159D is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-304, "DTC 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: G sensor signal transmitted from TCM via CAN communication is less than −1.5 G (0.5V) or more than 1.5 G (4.5V) continuously for 5 seconds or more.	• Harness or connectors (CAN communication line is open or shorted) (G sensor circuit is open or shorted.) • G sensor • TCM
P159C	G SENSOR (G sensor circuit low input)	When ECM detects the following status: G sensor signal transmitted from TCM via CAN communication is less than −1.5 G (0.5V) continuously for 5 seconds or more.	
P159D	G SENSOR (G sensor circuit high input)	When ECM detects the following status: G sensor signal transmitted from TCM via CAN communication is more than 1.5 G (4.5V) 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-359, "EXCEPT FOR M/T MODELS : Diagnosis Procedure".
NO >> INSPECTION END

EXCEPT FOR M/T MODELS : Diagnosis Procedure

INFOID:0000000006635020

1.CHECK DTC WITH TCM

With CONSULT-III
Check DTC with TCM. Refer to TM-159, "CONSULT-III Function (TRANSMISSION)".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform Diagnosis Procedure corresponding to DTC indicated.

2.PERFORM DIAGNOSIS PROCEDURE OF G SENSOR

Perform Diagnosis Procedure of G sensor. Refer to TM-236, "Diagnosis Procedure".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".

P159B G SENSOR
FOR M/T MODELS
FOR M/T MODELS : DTC Logic

INFOID:0000000006635021

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (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.) (Atmospheric pressure 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 • Atmosphere pressure 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-361, "FOR M/T MODELS : Diagnosis Procedure".
NO >> INSPECTION END

FOR M/T MODELS : Diagnosis Procedure

INFOID:0000000006635022

1.PERFORM CALIBRATION OF G SENSOR

Perform calibration of G sensor. Refer to EC-138, "Work Procedure".

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC Confirmation Procedure. Refer to EC-360, "FOR M/T MODELS : 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-138, "Work Procedure".

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-363, "FOR M/T MODELS : Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> 1. Replace G sensor. Refer to TM-282, "Exploded View".
2. Perform calibration of G sensor. Refer to EC-138, "Work Procedure".

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-42, "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
		Atmosphere pressure sensor	F76	1
		Turbocharger boost sensor	F75	1
F26	68	Battery current sensor	F52	1
		G sensor	B32	3
	72	Camshaft position sensor	F109	1
		EVT control position sensor	F110	1
E18	118	APP sensor 2	E101*1 M203*2	5

*1: CVT models

*2: RHD with M/T models

Is the inspection result normal?

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

FOR M/T MODELS : Component Inspection

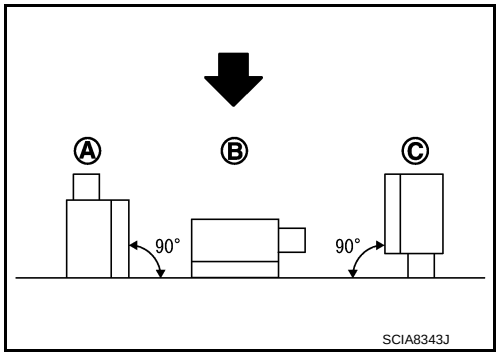
INFOID:0000000006635023

1. CHECK G SENSOR

With CONSULT-III

1. Remove G sensor. Refer to TM-282, "Exploded View".
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-III 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*

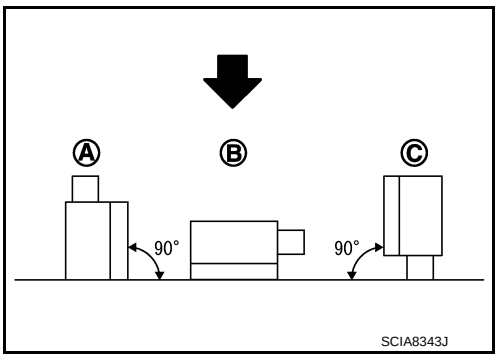
*: Check that voltage rises as the G sensor measurement condition changes in the order of (A), (B), and (C).

Without CONSULT-III

1. Remove G sensor. Refer to TM-282, "Exploded View".
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. Refer to TM-282, "Exploded View".

EXCEPT FOR M/T MODELS

EXCEPT FOR M/T MODELS : Description

INFOID:0000000006635024

ECM receives a G sensor signal from TCM via CAN communication to switch combustion for the direct injection gasoline system. For the direct injection gasoline system, refer to EC-48, "DIRECT INJECTION GASOLINE SYSTEM : System Description".

EXCEPT FOR M/T MODELS : DTC Logic

INFOID:0000000006635025

DTC DETECTION LOGIC

NOTE:

- If DTC P159B is displayed with DTC UXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to EC-108, "DTC Index".
- If DTC P159B is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-304, "DTC Logic".

DTC No.	Trouble diagnosis (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: G sensor signal transmitted from TCM via CAN communication is less than –0.3 G (2.275V) or more than 3.0 G (2.725 V) continuously for 5 seconds or more.	• Harness or connectors (CAN communication line is open or shorted) (G sensor circuit is open or shorted.) • G sensor • G sensor fitting condition • TCM

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 at least 5 seconds at 35 km/h (22 MPH) or more.
3. Stop the vehicle and let it idle 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-365, "EXCEPT FOR M/T MODELS : Diagnosis Procedure".
NO >> INSPECTION END

EXCEPT FOR M/T MODELS : Diagnosis Procedure

INFOID:0000000006635026

1.CHECK DTC WITH TCM

With CONSULT-III
Check DTC with TCM. Refer to TM-159, "CONSULT-III Function (TRANSMISSION)".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform Diagnosis Procedure corresponding to DTC indicated.

2.PERFORM CALIBRATION OF G SENSOR

Perform calibration of G sensor. Refer to EC-138, "Work Procedure".

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC Confirmation Procedure. Refer to EC-364, "EXCEPT FOR M/T MODELS : DTC Logic".

Is 1st trip DTC detected?

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

4.CHECK G SENSOR FITTING CONDITION

Check G sensor fitting condition.

Is the inspection result normal?

YES >> GO TO 5.
NO >> 1. Adjust parts fitting condition.
2. Perform calibration of G sensor. Refer to TM-182, "Procedure".

5.PERFORM DIAGNOSIS PROCEDURE OF G SENSOR

Perform Diagnosis procedure of G sensor. Refer to TM-236, "Diagnosis Procedure".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".

P1650 STARTER MOTOR RELAY 2

Description

INFOID:0000000006548525

ECM controls ON/OFF state of the starter relay, according to the engine and vehicle condition. Models with no Intelligent Key System transmit a control signal directly to IPDM E/R. 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:0000000006548526

DTC DETECTION LOGIC

NOTE:
- If DTC P1650 is displayed with DTC U1001, perform the trouble diagnosis for DTC U1001. Refer to EC-161, "DTC Logic".
- If DTC P1650 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to EC-304, "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-134, "DTC Logic" or SEC-136, "DTC Logic".
- If DTC P1650 is displayed with B26F9 or B26FA of BCM, perform the trouble diagnosis for B209F or B20A0. Refer to SEC-128, "DTC Logic" or SEC-130, "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.

>> 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-367, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

With CONSULT-III

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-III.
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-III

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-367, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006548527

1.CHECK STARTER RELAY POWER SUPPLY CIRCUIT

Check the starter motor relay power supply circuit. Refer to PCS-33, "Diagnosis Procedure" (With Intelligent Key system) or PCS-62, "Diagnosis Procedure" (Without Intelligent Key system).

Is the inspection result normal?

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

2.CHECK STARTER RELAY CONTROL SIGNAL CIRCUIT

With Intelligent Key system

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.

Without Intelligent Key system
1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

+		–		Continuity
IPDM E/R		ECM		
Connector	Terminal	Connector	Terminal	
E13	30	F26	66	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-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-34, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P1651 STARTER MOTOR RELAY

Description

INFOID:0000000006548528

ECM controls ON/OFF state of the starter relay, according to the engine and vehicle condition. Models with no Intelligent Key System transmit a control signal directly to IPDM E/R. 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:0000000006548529

DTC DETECTION LOGIC

NOTE:

- If DTC P1650 is displayed with DTC U1001, perform the trouble diagnosis for DTC U1001. Refer to EC-161, "DTC Logic".
- If DTC P1650 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to EC-304, "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-134, "DTC Logic" or SEC-136, "DTC Logic".
- If DTC P1650 is displayed with B26F9 or B26FA of BCM, perform the trouble diagnosis for B209F or B20A0. Refer to SEC-128, "DTC Logic" or SEC-130, "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.

>> 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-370, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006548530

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-III Function (IPDM E/R)".

Is the inspection result normal?

YES-1 >> With Intelligent Key system: GO TO 3.
YES-2 >> Without Intelligent Key system: GO TO 6.
NO >> Perform trouble diagnosis for DTC indicated.

3.CHECK DTC WITH BCM

Check DTC with BCM. Refer to BCS-36, "BCM : CONSULT-III 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.

+		–		Continuity
ECM		IPDM E/R		
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.

+		–		Continuity
ECM		BCM		
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 7.
NO >> Repair or replace error-detected parts.

6.CHECK CRANKING REQUEST SIGNAL CIRCUIT-III

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	
F26	92	E13	23	Existed

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

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-34, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P1652 STARTER MOTOR SYSTEM COMM

Description

INFOID:0000000006548531

ECM controls ON/OFF state of the starter relay, according to the engine and vehicle condition. Models with no Intelligent Key System transmit a control signal directly to IPDM E/R. 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:0000000006548532

DTC DETECTION LOGIC

NOTE:

- If DTC P1650 is displayed with DTC U1001, perform the trouble diagnosis for DTC U1001. Refer to EC-161, "DTC Logic".
- If DTC P1650 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to EC-304, "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-134, "DTC Logic" or SEC-136, "DTC Logic".
- If DTC P1650 is displayed with B26F9 or B26FA of BCM, perform the trouble diagnosis for B209F or B20A0. Refer to SEC-128, "DTC Logic" or SEC-130, "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. Turn ignition switch ON and wait at least 5 minutes.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EC-372, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006548533

1.INSPECTION START

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to EC-372, "DTC Logic".
3. Check DTC.

Is the P1652 displayed again?

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

2.CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-34, "Removal and Installation".
NG >> Repair or replace error-detected parts.

P1805 BRAKE SWITCH

DTC Logic

INFOID:0000000006547177

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-374, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547178

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 M205*3	1	Ground	Battery voltage

*1: CVT models
*2: LHD with M/T models
*3: RHD with 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 M205*3	2	E18	115	Existed

*1: CVT models
*2: LHD with M/T models
*3: RHD with 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-375, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace stop lamp switch. Refer to BR-20, "Exploded View" (LHD) or BR-88, "Exploded View" (RHD).

Component Inspection (Stop Lamp Switch)

INFOID:0000000006547179

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" (LHD) or BR-77, "Inspection and Adjustment" (RHD).
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" (LHD) or BR-88, "Exploded View" (RHD).

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

DTC Logic

INFOID:0000000006547181

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-376, "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-376, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547182

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-42, "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-42, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

DTC Logic

INFOID:0000000006547184

DTC DETECTION LOGIC

NOTE:

- **If DTC P2101 is displayed with DTC P2100, first perform the trouble diagnosis for DTC P2100. Refer to EC-376, "DTC Logic".**
- **If DTC P2101 is displayed with DTC P2119, first perform the trouble diagnosis for DTC P2119. Refer to EC-383, "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-378, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547185

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-26, "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-135, "Work Procedure".

6.CHECK THROTTLE CONTROL MOTOR

Check the throttle control motor. Refer to EC-380, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace electric throttle control actuator. Refer to EM-28, "Exploded View".

Component Inspection

INFOID:0000000006547186

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-28, "Exploded View".

P2118 THROTTLE CONTROL MOTOR

DTC Logic

INFOID:0000000006547189

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-381, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547190

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-382, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace electric throttle control actuator. Refer to EM-28, "Exploded View".

Component Inspection

INFOID:0000000006547191

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-28, "Exploded View".

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Logic

INFOID:0000000006547194

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-383, "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-383, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547195

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct. Refer to EM-26, "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-28, "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-135, "Work Procedure".

P2122, P2123 APP SENSOR

DTC Logic

INFOID:0000000006547198

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-307, "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-385, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547199

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*1 M203*2	4	Ground	5 V

*1: LHD models or RHD with CVT models
*2: RHD with M/T models

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*1 M203*2	4	E18	101	Existed

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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*1 M203*2	2	E18	105	Existed

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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*1 M203*2	3	E18	102	Existed

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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-387, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace accelerator pedal assembly. Refer to EM-28, "Exploded View".

Component Inspection

INFOID:0000000006547200

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-28, "Exploded View".

P2127, P2128 APP SENSOR

DTC Logic

INFOID:0000000006547203

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-388, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547204

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[*1] M203[*2]	5	Ground	5 V

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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
		Atmospheric pressure sensor	F76	1
		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*1 M203*2	5

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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 M203*2	1	E18	120	Existed

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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*1 M203*2	6	E18	119	Existed

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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-390, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace accelerator pedal assembly. Refer to EM-28, "Exploded View".

Component Inspection

INFOID:0000000006547205

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-28, "Exploded View".

P2135 TP SENSOR

DTC Logic

INFOID:0000000006547208

DTC DETECTION LOGIC

NOTE:
If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-307, "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-391, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547209

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-392, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace electric throttle control actuator. Refer to EM-28, "Exploded View".

Component Inspection

INFOID:0000000006635034

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-135, "Work Procedure".
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-28, "Exploded View".

P2138 APP SENSOR

DTC Logic

INFOID:0000000006547213

DTC DETECTION LOGIC

NOTE:
If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-307, "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.) (Atmospheric pressure 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 • Atmospheric pressure 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-395, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006547214

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*1 M203*2	4	Ground	5 V

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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*1 M203*2	4	E18	101	Existed

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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*1 M203*2	5	Ground	5 V

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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
		Atmospheric pressure sensor	F76	1
		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*1 M203*2	5

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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 M203*2	1	E18	120	Existed
	2		105	

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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*1 M203*2	3	E18	102	Existed
	6		119	

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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-390, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace accelerator pedal assembly. Refer to EM-28, "Exploded View".

Component Inspection

INFOID:0000000006635033

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-28, "Exploded View".

P2162 VEHICLE SPEED SENSOR

Description

INFOID:0000000006635027

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-48, "DIRECT INJECTION GASOLINE SYSTEM : System Description".

DTC Logic

INFOID:0000000006635028

DTC DETECTION LOGIC

NOTE:

- If DTC P2162 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to EC-108, "DTC Index".
- If DTC P2162 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-304, "DTC Logic".

DTC No.	Trouble diagnosis (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 5 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 15 seconds.
   NOTE:
   Never depress the accelerator pedal during idle running.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-398, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006635029

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

With CONSULT-III

Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-131, "CONSULT-III 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-III
1. Stop the vehicle.
2. Set the parking brake.
3. Use CONSULT-III 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-168, "Diagnosis Procedure".

3.CHECK REAR WHEEL SENSOR-II

With CONSULT-III
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-42, "Intermittent Incident".
NO >> Perform trouble diagnosis of the rear wheel sensor. Refer to BRC-168, "Diagnosis Procedure"

FUEL INJECTOR

Component Function Check

INFOID:0000000006547236

1.INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

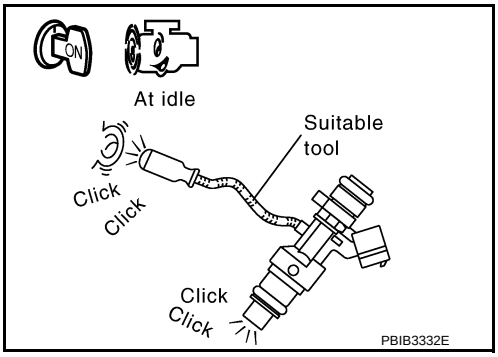
YES >> GO TO 2.
NO >> Proceed to EC-400, "Diagnosis Procedure".

2.CHECK FUEL INJECTOR FUNCTION

With CONSULT-III
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode of “ENGINE” using CONSULT-III.
3. Check that each circuit produces a momentary engine speed drop.

Without CONSULT-III
1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-400, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006547237

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-42, "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-403, "Component Inspection (Fuel Injector Relay)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident"
NO >> Replace fuel injector relay. Refer to PG-7, "Standardized Relay".

11. CHECK FUEL INJECTOR

Check the fuel injector. Refer to EC-403, "Component Inspection (Fuel Injector)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident"
NO >> Replace malfunctioning fuel injector. Refer to EM-47, "Exploded View".

Component Inspection (Fuel Injector)

INFOID:0000000006547238

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-47, "Exploded View"

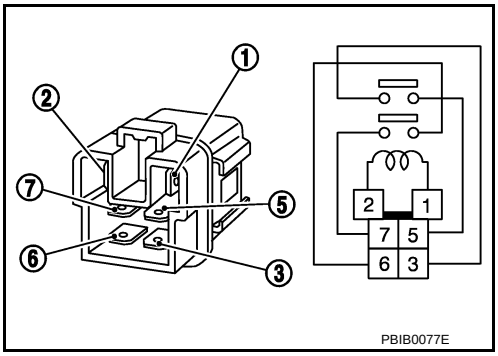
Component Inspection (Fuel Injector Relay)

INFOID:0000000006635940

1. CHECK FUEL INJECTOR RELAY

1. Turn ignition switch OFF.
2. Remove fuel injector relay. Refer to PG-7, "Standardized 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
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. Refer to PG-7, "Standardized Relay".

LOW PRESSURE FUEL PUMP
M/T MODELS

M/T MODELS : Component Function Check

INFOID:0000000006598997

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-405, "M/T MODELS : Diagnosis Procedure".

M/T MODELS : Diagnosis Procedure

INFOID:0000000006642407

1.CHECK FPCM POWER SUPPLY

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

+		–	Voltage
FPCM			
Connector	Terminal		
B61	10	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK FPCM POWER SUPPLY CIRCUIT

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

+		–		Continuity
FPCM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
B61	10	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.

3.CHECK FPCM GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between FPCM harness connector and ground.

+		–	Continuity
FPCM			
Connector	Terminal		
B61	5	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 FPCM INPUT AND OUTPUT CIRCUITS

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

FPCM		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B61	8	F26	91	Existed
	9		96	

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 FUEL PUMP CONTROL CIRCUIT

1. Disconnect fuel level sensor unit (fuel pump) harness connector.
2. Check the continuity between FPCM harness connector and fuel level sensor unit (fuel pump) harness connector.

FPCM		Fuel level sensor unit (fuel pump)		Continuity
Connector	Terminal	Connector	Terminal	
B61	6	B40	2	Existed
	7		4	

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 LOW PRESSURE FUEL PUMP

Check the low pressure fuel pump. Refer to EC-406, "M/T MODELS : Component Inspection (Low Pressure Fuel Pump)".

Is the inspection result normal?

YES >> Check intermittent incident .Refer to GI-42, "Intermittent Incident".
NO >> Replace fuel level sensor unit. Refer to FL-6, "2WD : Exploded View" (2WD) or FL-10, "4WD : Exploded View" (4WD).

7.CHECK FPCM

Check the FPCM. Refer to EC-407, "M/T MODELS : Component Inspection (FPCM)".

Is the inspection result normal?

YES >> Check intermittent incident .Refer to GI-42, "Intermittent Incident".
NO >> Replace FPCM. Refer to EC-448, "Removal and Installation".

M/T MODELS : Component Inspection (Low Pressure Fuel Pump)

INFOID:0000000006598999

1.CHECK FUEL PRESSURE REGULATOR

1. Turn ignition switch OFF.
2. Check low fuel pressure. Refer to EC-140, "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" (2WD) or FL-10, "4WD : Exploded View" (4WD).

M/T MODELS : Component Inspection (FPCM)

INFOID:0000000006635037

1.CHECK FUEL PUMP CONTROL MODULE (FPCM)

Check the voltage between FPCM terminals as per the following conditions.

FPCM			Condition	Voltage (Approx.)
Connector	+	–		
	Terminal			
B61	7	6	For 1 second after turning ignition switch ON	10 V
			More than 1 second after turning ignition switch ON	0 V
			Idle speed	10 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace FPCM. Refer to EC-448, "Removal and Installation".

EXCEPT FOR M/T MODELS

EXCEPT FOR M/T MODELS : Component Function Check

INFOID:0000000006642504

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-405, "M/T MODELS : Diagnosis Procedure".

EXCEPT FOR M/T MODELS : Diagnosis Procedure

INFOID:0000000006642591

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 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	4	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				
Connector	Terminal	Connector	Terminal	
B46	4	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	2	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-409, "EXCEPT FOR M/T MODELS : Component Inspection (Low Pressure Fuel Pump)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace fuel level sensor unit. Refer to FL-6, "2WD : Exploded View" (2WD) or FL-10, "4WD : Exploded View" (4WD).

EXCEPT FOR M/T MODELS : Component Inspection (Low Pressure Fuel Pump)

INFOID:0000000006642506

1.CHECK FUEL PRESSURE REGULATOR

1. Turn ignition switch OFF.
2. Check low fuel pressure. Refer to EC-140, "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" (2WD) or FL-10, "4WD : Exploded View" (4WD).

HIGH PRESSURE FUEL PUMP

Component Function Check

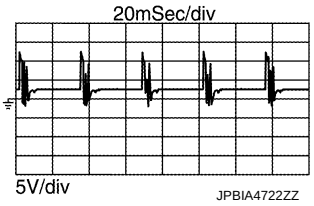
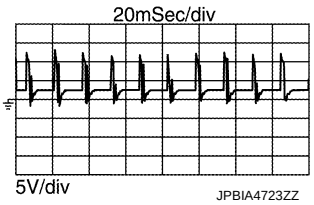
INFOID:0000000006598991

1.CHECK HIGH PRESSURE FUEL PUMP FUNCTION

With CONSULT-III
1. Start engine.
2. Check “FUEL PRES SEN V” in “DATA MONITOR” mode of “ENGINE” using CONSULT-III.

Monitor Item	Condition	Values/Status
FUEL PRES SEN V	Engine speed: Idle	980 – 1,200 mV
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,100 – 2,900 mV

Without CONSULT-III
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-410, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006598992

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-413, "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-7, "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-413, "Component Inspection".

Is inspection result normal?

YES >> GO TO 10.
NO >> Replace high pressure fuel pump. Refer to EM-43, "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-78, "Exploded View".
2. Check camshaft. Refer to EM-82, "Inspection".

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace camshaft. Refer to EM-78, "Exploded View".

Component Inspection

INFOID:0000000006598993

1. CHECK HIGH PRESSURE FUEL PUMP SOLENOID

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

High pressure fuel pump		Condition		Resistance
+	–			
Terminal				
1	2	Temperature	20 – 30°C (68 – 86°F)	9 – 11 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure fuel pump. Refer to EM-43, "Exploded View".

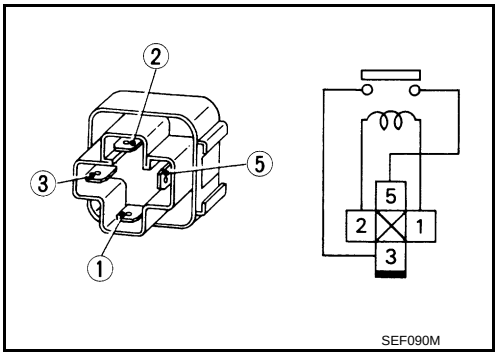
Component Inspection (High Pressure Fuel Pump Relay)

INFOID:0000000006635941

1. CHECK HIGH PRESSURE FUEL PUMP RELAY

1. Turn ignition switch OFF.
2. Remove high pressure fuel pump relay. Refer to PG-7, "Standardized 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. Refer to PG-7, "Standardized Relay".

IGNITION SIGNAL

Component Function Check

INFOID:0000000006547244

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

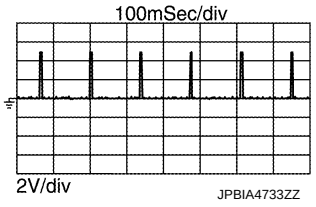
Does the engine start?

YES >> GO TO 2.
NO >> Proceed to EC-414, "Diagnosis Procedure".

2.IGNITION SIGNAL FUNCTION

With CONSULT-III
1. Perform “POWER BALANCE” in “ACTIVE TEST” mode of “ENGINE” using CONSULT-III.
2. Check that each circuit produces a momentary engine speed drop.

Without CONSULT-III
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-414, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006547245

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-417, "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-416, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-53, "Exploded View".

Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000006547246

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?

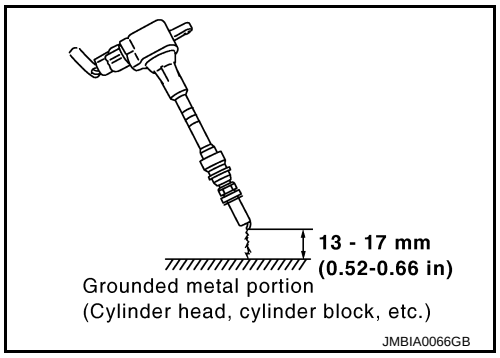
YES >> GO TO 2.

NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-53, "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-III to release fuel pressure, or fuel pressure applies again during the following procedure.
4. Start engine.
5. After engine stalls, crank it two or three times to release all fuel pressure.
6. Turn ignition switch OFF.
7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils. Refer to EM-53, "Exploded View".
8. Remove ignition coil and spark plug of the cylinder to be checked. Refer to .0EM-53, "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-53, "Exploded View".

Component Inspection (Condenser)

INFOID:0000000006547247

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:0000000006547232

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred via the CAN communication line.

Component Function Check

INFOID:0000000006547233

1.CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

With CONSULT-III
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode of “ENGINE” using CONSULT-III.
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-418, "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-418, "Diagnosis Procedure".

3.CHECK HEATER FAN CONTROL SWITCH FUNCTION

With CONSULT-III
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-418, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006547234

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to EC-418, "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-25, "Work Flow".

>> INSPECTION END

3.CHECK HEADLAMP SYSTEM

Check the headlamp system. Refer to EXL-43, "Work Flow".

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Check the heater fan control system. refer to HA-72, "Work Flow".

>> INSPECTION END

COOLING FAN

Component Function Check

INFOID:0000000006547229

1.CHECK COOLING FAN FUNCTION

With CONSULT-III
1. Turn ignition switch ON.
2. Perform “FAN DUTY CONTROL” in “ACTIVE TEST” mode of “ENGINE” using CONSULT-III.
3. Check that cooling fan speed varies according to the percentage.

Without CONSULT-III
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-420, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006547230

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-422, "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-7, "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-422, "Component Inspection (Cooling Fan Motor)".

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace cooling motor. Refer to CO-20, "Exploded View".

Component Inspection (Cooling Fan Motor)

INFOID:0000000006647296

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?

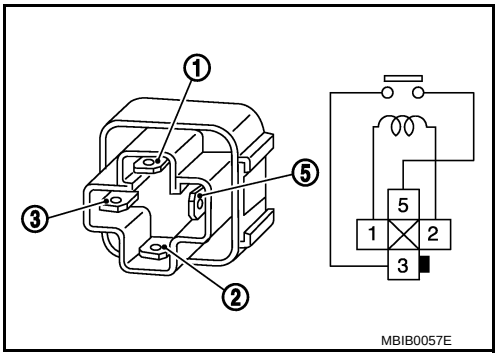
YES >> INSPECTION END
NO >> Replace malfunctioning cooling fan motor. Refer to CO-20, "Exploded View".

Component Inspection (Cooling Fan Relay)

INFOID:0000000006647297

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. Refer to PG-7, "Standardized Relay".

REFRIGERANT PRESSURE SENSOR

Component Function Check

INFOID:0000000006547259

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-423, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006547260

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-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor. Refer to HAC-96, "Exploded View".
NO >> Repair or replace error-detected parts.

BRAKE PEDAL POSITION SWITCH

Component Function Check

INFOID:0000000006599041

1.CHECK BRAKE PEDAL POSITION SWITCH FUNCTION

With CONSULT-III

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

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-425, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006599042

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 M202*2	1	Ground	Battery voltage

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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*1 M202*2	2	E18	116	Existed

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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-426, "Component Inspection (Brake Pedal Position Switch)"

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace brake pedal position switch. Refer to BR-20, "Exploded View" (LHD) or BR-88, "Exploded View" (RHD).

Component Inspection (Brake Pedal Position Switch)

INFOID:0000000006635035

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" (LHD) or BR-77, "Inspection and Adjustment" (RHD).
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" (LHD) or BR-88, "Exploded View" (RHD).

CLUTCH PEDAL POSITION SWITCH

Component Function Check

INFOID:0000000006635930

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-427, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006635931

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.

With Intelligent key system

+		–	Voltage
Clutch pedal position switch			
Connector	Terminal		
E62*1 M207*2	3	Ground	Battery voltage

*1: LHD models
*2: RHD models

Without Intelligent key system

+		–	Voltage
Clutch pedal position switch			
Connector	Terminal		
E61*1 M206*2	1	Ground	Battery voltage

*1: LHD models
*2: RHD models

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.

With Intelligent key system

+		–		Continuity
Clutch pedal position switch		ECM		
Connector	Terminal	Connector	Terminal	
E62*1 M207*2	3	E18	108	Existed

*1: LHD models
*2: RHD models

Without Intelligent key system

+		–		Continuity
Clutch pedal position switch		ECM		
Connector	Terminal	Connector	Terminal	
E61*1 M206*2	1	E18	108	Existed

*1: LHD models
*2: RHD models

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

With Intelligent key system

+		–	Continuity
Clutch pedal position switch			
Connector	Terminal		
E62*1 M207*2	3	Ground	Existed

*1: LHD models
*2: RHD models

Without Intelligent key system

+		–	Continuity
Clutch pedal position switch			
Connector	Terminal		
E61*1 M206*2	1	Ground	Existed

*1: LHD models
*2: RHD models

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-429, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace clutch pedal position switch. Refer to CL-16, "LHD : Exploded View" (LHD models) or CL-18, "RHD : Exploded View" (RHD models).

Component Inspection

INFOID:0000000006635932

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.

With Intelligent Key system

Clutch pedal position switch		Condition		Continuity
+	–			
Terminal				
3	4	Clutch pedal	Fully released	Existed
			Slightly depressed	Not existed

Without Intelligent Key system

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-17, "LHD : Inspection and Adjustment" (LHD models) or CL-19, "RHD : Inspection and Adjustment" (RHD models).
2. Check the continuity between clutch pedal position switch terminals as per the following conditions.

With Intelligent Key system

Clutch pedal position switch		Condition		Continuity
+	–			
Terminal				
3	4	Clutch pedal	Fully released	Existed
			Slightly depressed	Not existed

Without Intelligent Key system

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-16, "LHD : Exploded View" (LHD models) or CL-18, "RHD : Exploded View" (RHD models).

ASCD MAIN SWITCH

Component Function Check

INFOID:0000000006548495

1.CHECK ASCD MAIN SWITCH FUNCTION

With CONSULT-III
1. Turn ignition switch ON.
2. Select “MAIN SW” in “DATA MONITOR” mode of “ENGINE” using CONSULT-III.
3. Check “MAIN SW” indication as per the following condition.

Monitor item	Condition		Indication
MAIN SW	ASCD MAIN switch	Pressed	ON
		Released	OFF

Without CONSULT-III
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	98	127	ASCD MAIN switch	Pressed	Battery voltage
				Released	0 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-430, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006548496

1.CHECK ASCD MAIN SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between combination switch harness connector and ground.

+		–	Voltage
Combination switch			
Connector	Terminal		
M32	21	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK ASCD MAIN SWITCH INPUT SIGNAL CIRCUIT

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

+		–		Continuity
ECM		Combination switch		
Connector	Terminal	Connector	Terminal	
E18	98	M303	37	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 ASCD STEERING SWITCH

Check the ASCD steering switch. Refer to EC-431, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace ASCD steering switch. Refer to ST-9, "Exploded View".

Component Inspection

INFOID:0000000006635928

1. CHECK ASCD STEERING SWITCH-I

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

Combination switch (Spiral cable)			Condition		Continuity
Connector	+	–			
	Terminals				
M303	35	36	Speed limiter MAIN switch	Pressed	Existed
				Released	Not existed
		37	ASCD MAIN switch	Pressed	Existed
				Released	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD steering switch. Refer to ST-9, "Exploded View".

2. 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	CANCEL switch: Pressed	250 Ω
			SET/– switch: Pressed	660 Ω
			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".

SPEED LIMITER MAIN SWITCH

Component Function Check

INFOID:0000000006548492

1.CHECK SPEED LIMITER MAIN SWITCH FUNCTION

With CONSULT-III
1. Turn ignition switch ON.
2. Select “SL MAIN SW” in “DATA MONITOR” mode of “ENGINE” using CONSULT-III.
3. Check “SL MAIN SW” indication as per the following condition.

Monitor item	Condition		Indication
SL MAIN SW	Speed limiter MAIN switch	Pressed	ON
		Released	OFF

Without CONSULT-III
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	107	127	Speed limiter MAIN switch	Pressed	Battery voltage
				Released	0 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-432, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006548493

1.CHECK SPEED LIMITER MAIN SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between combination switch harness connector and ground.

+		–	Voltage
Combination switch			
Connector	Terminal		
M32	21	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK SPEED LIMITER MAIN SWITCH INPUT SIGNAL CIRCUIT

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

+		–		Continuity
ECM		Combination switch		
Connector	Terminal	Connector	Terminal	
E18	107	M303	36	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 ASCD STEERING SWITCH

Check the ASCD steering switch. Refer to EC-433, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace ASCD steering switch. Refer to ST-9, "Exploded View".

Component Inspection

INFOID:0000000006635929

1. CHECK ASCD STEERING SWITCH-I

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

Combination switch (Spiral cable)			Condition		Continuity
Connector	+	–			
	Terminals				
M303	35	36	Speed limiter MAIN switch	Pressed	Existed
				Released	Not existed
		37	ASCD MAIN switch	Pressed	Existed
				Released	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD steering switch. Refer to ST-9, "Exploded View".

2. 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	CANCEL switch: Pressed	250 Ω
			SET/– switch: Pressed	660 Ω
			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".

INFORMATION DISPLAY (ASCD)

Component Function Check

INFOID:0000000006599001

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-434, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006599002

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-286, "DTC Logic".
NO-3 >> Perform trouble diagnosis for DTC P1574. Refer to EC-352, "DTC Logic".

2.CHECK DTC WITH COMBINATION METER

Refer to MWI-23, "CONSULT-III Function".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis for DTC indicated.

3.CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-69, "Removal and Installation".
NO >> Repair or replace error-detected parts.

INFORMATION DISPLAY (SPEED LIMITER)

Component Function Check

INFOID:0000000006548498

1.CHECK INFORMATION DISPLAY (SPEED LIMITER) FUNCTION

1. Start engine.
2. Press speed limiter MAIN switch.
3. Drive the vehicle at more than 30 km/h (20 MPH).
   CAUTION:
   Always drive vehicle at a safe speed.
4. Press SET/– switch.
5. Perform a test drive on a flat road conditions. Check that the speedometer indicated the same value as the set speed indicator on the information display while depressing the accelerator pedal until just before a kickdown occurs.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-435, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006635036

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-286, "DTC Logic".
NO-3 >> Perform trouble diagnosis for DTC P1574. Refer to EC-352, "DTC Logic".

2.CHECK DTC WITH COMBINATION METER

Refer to MWI-23, "CONSULT-III Function".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis for DTC indicated.

3.CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-69, "Removal and Installation".
NO >> Repair or replace error-detected parts.

MALFUNCTION INDICATOR LAMP

Component Function Check

INFOID:0000000006547249

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-436, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006547250

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-23, "CONSULT-III Function".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis for DTC indicated.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-69, "Removal and Installation".
NO >> Repair or replace error-detected parts.

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM

Symptom Table

INFOID:0000000006417051

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-405, EC-407
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-140
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-400
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-445
	FRP sensor circuit	1	1	2	2	2		2	2			2			EC-247
	High pressure fuel pump circuit			4		3									EC-410
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-446
	Incorrect idle speed adjustment						1	1	1	1		1			EC-443
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-378, EC-383
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-444
	Ignition circuit	1	1	2	2	2		2	2			2			EC-414
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-155
Mass air flow sensor circuit		1	1	2	3	2		2	2			2			EC-189
Engine coolant temperature sensor circuit							3			3					EC-200
Air fuel ratio (A/F) sensor 1 circuit															EC-205, EC-209, EC-212, EC-215
Throttle position sensor circuit							2			2					EC-202, EC-254, EC-326, EC-327
Accelerator pedal position sensor circuit				3	2	1									EC-385, EC-388, EC-394

	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-220, EC-226, EC-233
Knock sensor circuit			2								3			EC-269
Engine oil temperature sensor circuit			4		2						3			EC-251
Engine oil pressure sensor circuit			4		4	3	3	3			3			EC-293
Crankshaft position sensor (POS) circuit	2	2												EC-271
Camshaft position sensor (PHASE) circuit	3	2												EC-274
Turbocharger boost sensor circuit			3		3									EC-260
Vehicle speed signal circuit		2	3		3						3			EC-286, EC-288, EC-398
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-300, EC-302, EC-304, EC-305, EC-306
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-162, EC-176
Exhaust valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-165, EC-179
Exhaust valve timing control position sensor circuit	5	5	5	5	5		5	5			5			EC-313
Turbocharger boost control solenoid valve circuit			3		3									EC-174
PNP signal circuit			3		3		3	3			3			EC-309
Refrigerant pressure sensor circuit		2				3			3		4			EC-423
Cooling fan control module circuit	5	5	5	5	5		5	5	5	4	5			EC-420
Atmospheric pressure sensor circuit											3			EC-194
Battery current sensor circuit						4	5	5					3	EC-328, EC-331, EC-334, EC-337
Starter relay circuit	3													EC-366
Starter control relay circuit	3													EC-369
Electrical load signal circuit							3							EC-418

	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-44
ABS actuator and electric unit (control unit)			4											BRC-33

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-18, FL-23
	Fuel piping			5	5	5		5	5			5			EM-47
	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-26
	Air cleaner														EM-26
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)	5			5		5			5					EM-28
	Electric throttle control actuator														
	Air leakage from intake manifold/ Collector/Gasket														
Cranking	Battery	1	1	1		1		1	1			1		1	PG-124
	Generator circuit														CHG-8
	Starter circuit	3													STR-8, STR-9
	Signal plate	6													EM-104
	PNP signal	4													TM-77 , TM-278
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-91
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-104
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mecha-nism	Timing chain	5	5	5	5	5		5	5			5			EM-68
	Camshaft														EM-79
	Intake valve timing control														EM-68
	Exhaust valve timing control														EM-68
	Intake valve												3		EM-79
	Exhaust valve														

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EM-38, EX-6
	Three way catalyst														EM-33, EM-35, EX-6
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-40, EM-99, LU-13
	Oil level (Low)/Filthy oil														LU-8
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-17
	Thermostat									5					CO-24
	Water pump														CO-22
	Water gallery														CO-26
	Cooling fan									5					CO-20
	Coolant level (Low)/Contaminated coolant														CO-11
NATS (Nissan Anti-theft System)		1	1												SEC-17, SEC-173

1 - 6: The numbers refer to the order of inspection.

NORMAL OPERATING CONDITION

Description

INFOID:0000000006417052

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-48, "DIRECT INJECTION GASOLINE SYSTEM : System Description".

PERIODIC MAINTENANCE

IDLE SPEED

Description

INFOID:0000000006416761

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

Special Repair Requirement

INFOID:0000000006416762

1.CHECK IDLE SPEED

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

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

>> INSPECTION END

IGNITION TIMING

Description

INFOID:0000000006416763

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

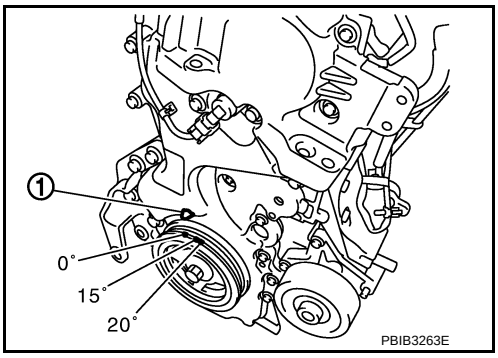
Special Repair Requirement

INFOID:0000000006416764

1.CHECK IGNITION TIMING

1. Attach timing light to the ignition coil No.4 harness.
2. Check ignition timing.

1 : Timing indicator



>> INSPECTION END

EVAPORATIVE EMISSION SYSTEM

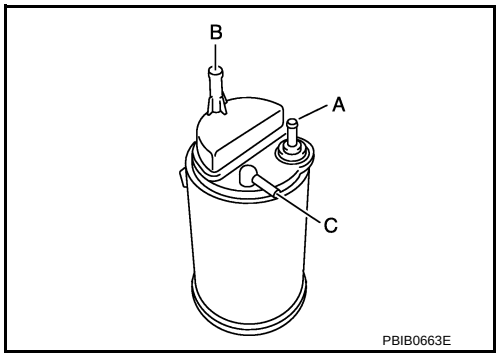
Inspection

INFOID:0000000006417062

1. Visually inspect EVAP vapor lines for improper attachment and for cracks, damage, loose connections, chafing and deterioration.
2. Check EVAP canister as follows:

a. Block port (B). Orally blow air through port (A). Check that air flows freely through port (C).

b. Block port (A). Orally blow air through port (B). Check that air flows freely through port (C).

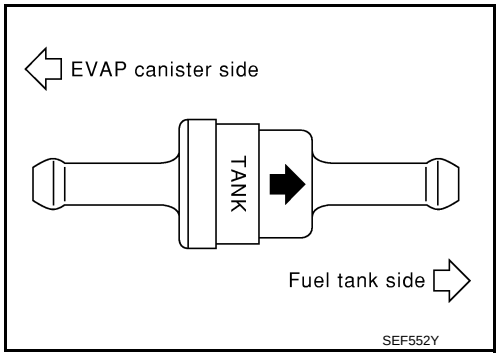


3. Visually inspect the fuel check valve for cracks, damage, loose connections chafing and deterioration.
4. Check fuel check valve as follows:

a. Blow air through connector on the fuel tank side. A considerable resistance should be felt and a portion of air flow should be directed toward the EVAP canister side.

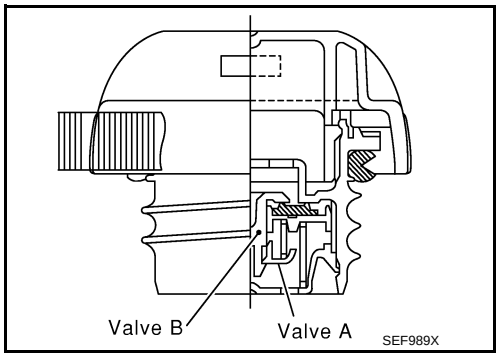
b. Blow air through connector on EVAP canister side. Air flow should be smoothly directed toward fuel tank side.

c. If fuel check valve is suspected or not properly functioning in step 1 and 2 above, replace it.



5. Inspect fuel tank filler cap vacuum relief valve for clogging, sticking, etc.

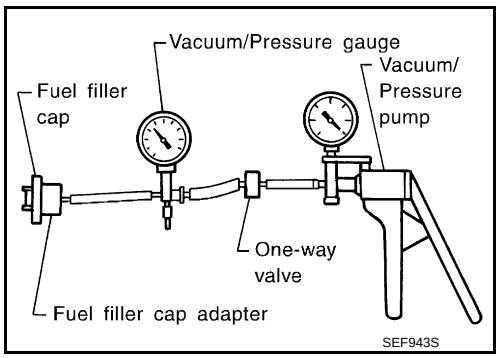
a. Wipe clean valve housing.



b. Check valve opening pressure and vacuum.

Pressure:	15.3 - 20.0 kPa (0.153 - 0.200 bar, 0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:	–6.0 to –3.4 kPa (–0.06 bar to –-0.034bar, –0.061 to –0.035 kg/cm^2, –0.87 to –0.49 psi)

c. If out of specification, replace fuel filler cap as an assembly.



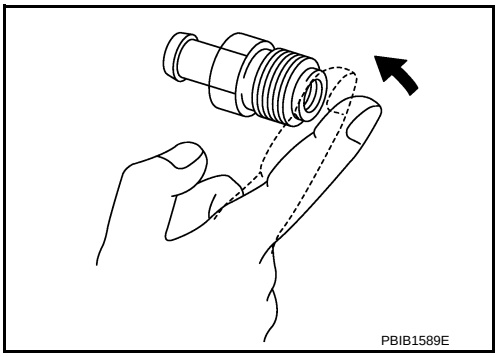
POSITIVE CRANKCASE VENTILATION

Inspection

INFOID:0000000006417040

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:0000000006417229

REMOVAL

1. Remove fusible link bracket. Keep a service area.
2. Disconnect ECM harness connectors. Refer to PG-4, "Harness Connector".
3. Remove ECM mounting nuts, and then remove ECM.

INSTALLATION

Install in the reverse order of removal.

CAUTION:

Must be perform additional service when replacing ECM. Refer toEC-133, "Work Procedure".

FUEL PUMP CONTROL MODULE (FPCM)

Removal and Installation

INFOID:0000000006417230

REMOVAL

1. Remove Luggage side lower finisher LH. Refer to INT-31, "LUGGAGE SIDE LOWER FINISHER : Removal and Installation".
2. Disconnect fuel pump control module (FPCM) connector.
3. Remove mounting bolts and then remove fuel pump control module (FPCM).

INSTALLATION

Install in the reverse order of removal.

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:0000000006417063

Transmission	Condition	Specification
CVT	No load* (in P or N position)	700 ± 50 rpm
M/T	No load* (in Neutral position)	700 ± 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:0000000006417064

Transmission	Condition	Specification
CVT	No load* (in P or N position)	15 ± 5° BTDC
M/T	No load* (in Neutral position)	15 ± 5° BTDC

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

INFOID:0000000006417065

Condition	Specification (Using CONSULT-III or GST)
At idle	10 – 35 %
At 2,500 rpm	10 – 35 %

Mass Air Flow Sensor

INFOID:0000000006417066

Supply voltage	Battery voltage (11 – 14 V)
Output voltage at idle	1.0 – 1.2V*
Mass air flow (Using CONSULT-III or GST)	1.0 – 4.0 g/sec at idle* 2.0 – 10.0 g/sec 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:0000000006752405

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the “SRS AIR BAG” and “SEAT BELT” of this Service Manual.

The vehicle may be equipped with a passenger air bag deactivation switch. Because no rear seat exists where a rear-facing child restraint can be placed, the switch is designed to turn off the passenger air bag so that a rear-facing child restraint can be used in the front passenger seat. The switch is located in the center of the instrument panel, near the ashtray. When the switch is turned to the ON position, the passenger air bag is enabled and could inflate for certain types of collision. When the switch is turned to the OFF position, the passenger air bag is disabled and will not inflate. A passenger air bag OFF indicator on the instrument panel lights up when the passenger air bag is switched OFF. The driver air bag always remains enabled and is not affected by the passenger air bag deactivation switch.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the “SRS AIR BAG”.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**
- **The vehicle may be equipped with a passenger air bag deactivation switch which can be operated by the customer. When the passenger air bag is switched OFF, the passenger air bag is disabled and will not inflate. When the passenger air bag is switched ON, the passenger air bag is enabled and could inflate for certain types of collision. After SRS maintenance or repair, make sure the passenger air bag deactivation switch is in the same position (ON or OFF) as when the vehicle arrived for service.**

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

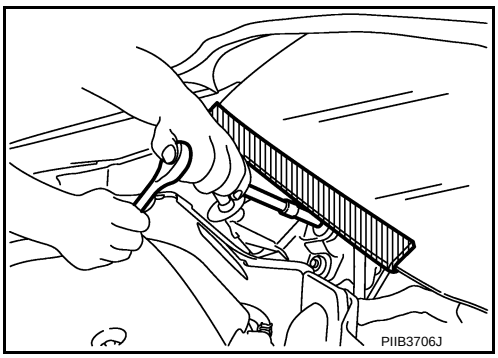
WARNING:

- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.**

Precaution for Procedure without Cowl Top Cover

INFOID:0000000006752406

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



On Board Diagnostic (OBD) System of Engine and CVT

INFOID:0000000006496178

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

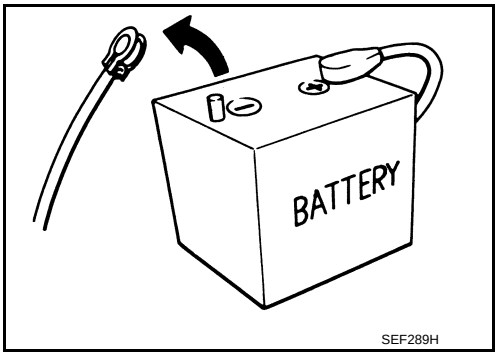
CAUTION:

- **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 MI to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MI 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 GI-3, "Contents".**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MI 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 MI to light up due to the malfunction of the fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

General Precautions

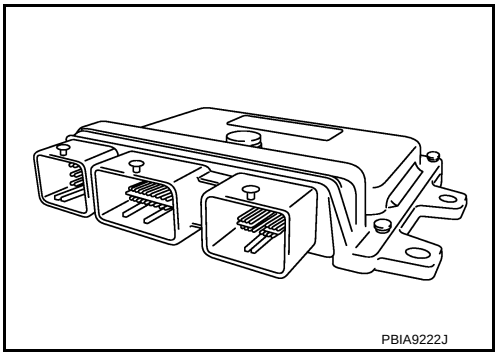
INFOID:0000000006496179

- **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.**

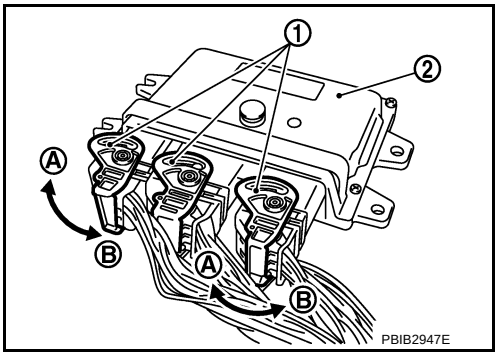


SEF289H

- **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. So, engine operation can vary slightly in this case. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- **If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.**
  - **Diagnostic trouble codes**
  - **1st trip diagnostic trouble codes**
  - **Freeze frame data**
  - **1st trip freeze frame data**
  - **System readiness test (SRT) codes**
  - **Test values**

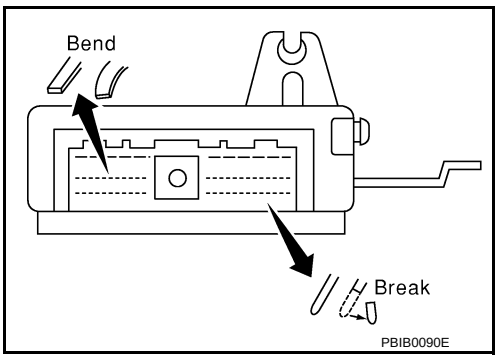

PBIA9222J

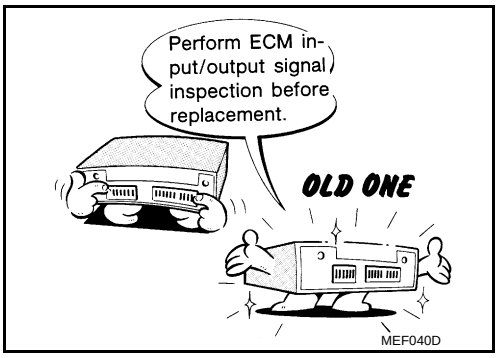
- **When connecting ECM harness connector (1), fasten (B) it securely with a lever as far as it will go as shown in the figure.**
  - ECM (2)
  - Loosen (A)



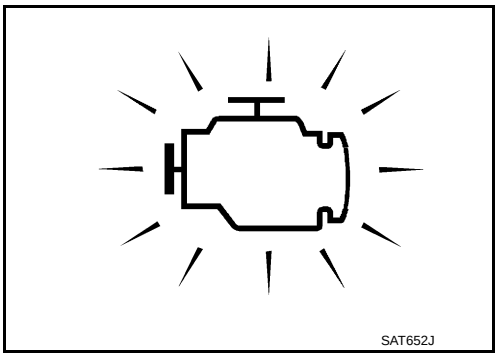
PBIB2947E

- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- **Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.**
- **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-508, "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).**

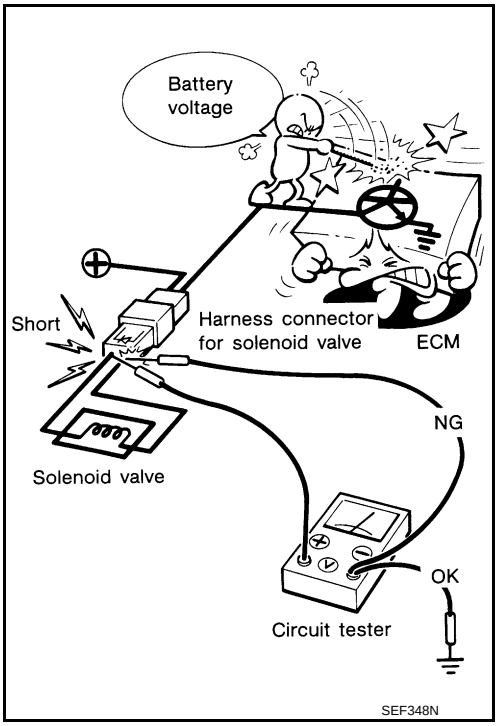




- **After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check.** The DTC should not be displayed in the DTC CONFIRMATION PROCEDURE if the repair is completed. The Component Function Check should be a good result if the repair is completed.

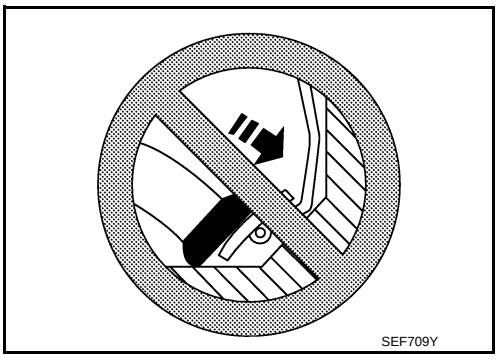


- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.

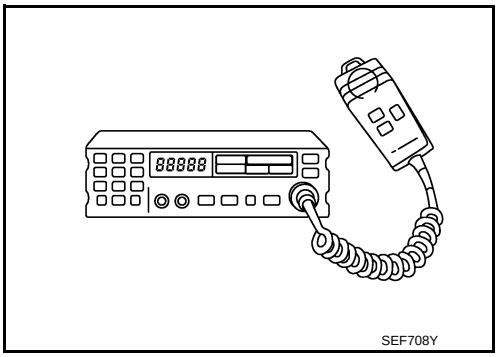


- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**

- **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.**

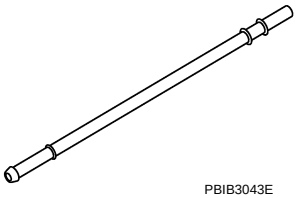
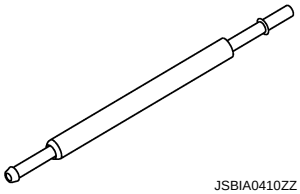


PREPARATION

PREPARATION

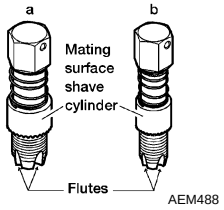
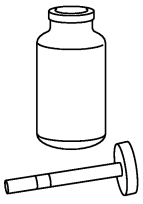
Special Service Tools

INFOID:0000000006496180

Tool number Tool name	Description
KV10118400 Fuel tube adapter  PBIB3043E	Measuring fuel pressure
KV10120000 Fuel tube adapter  JSBIA0410ZZ	

Commercial Service Tools

INFOID:0000000006496181

Tool name	Description
Oxygen sensor thread cleaner  AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor** **b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor**
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)  S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

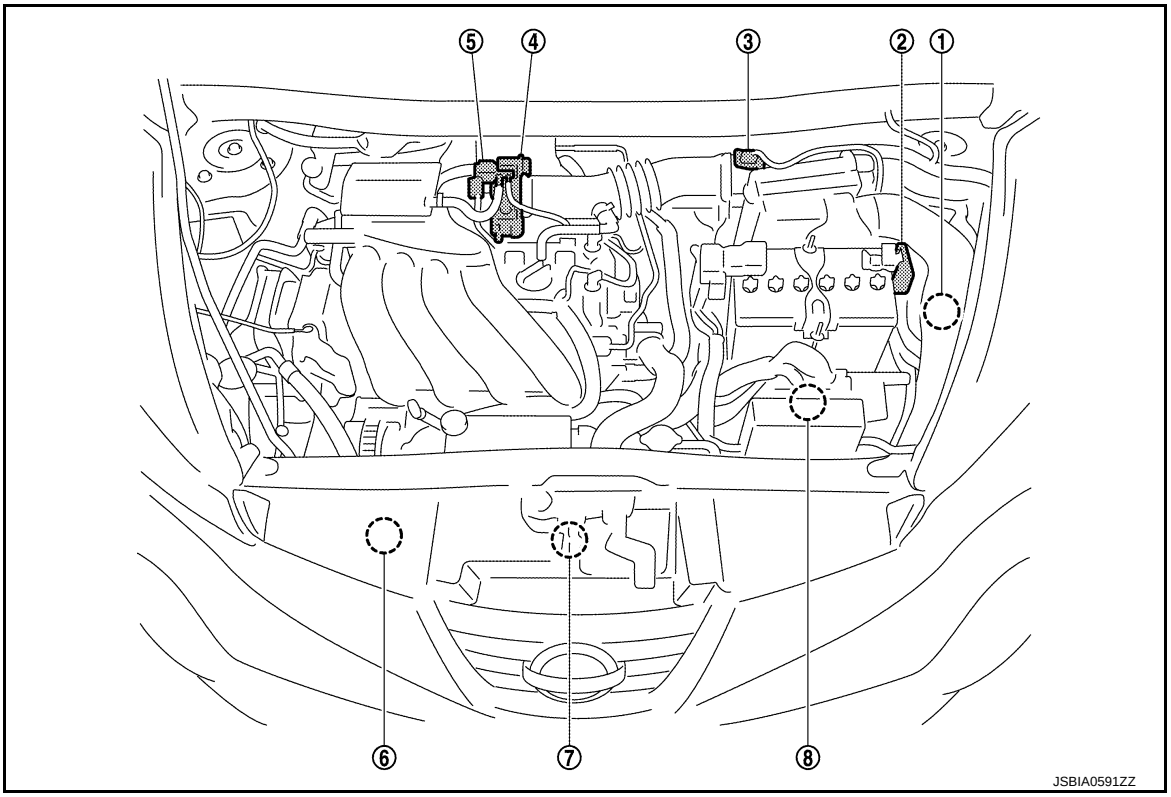
SYSTEM DESCRIPTION

COMPONENT PARTS

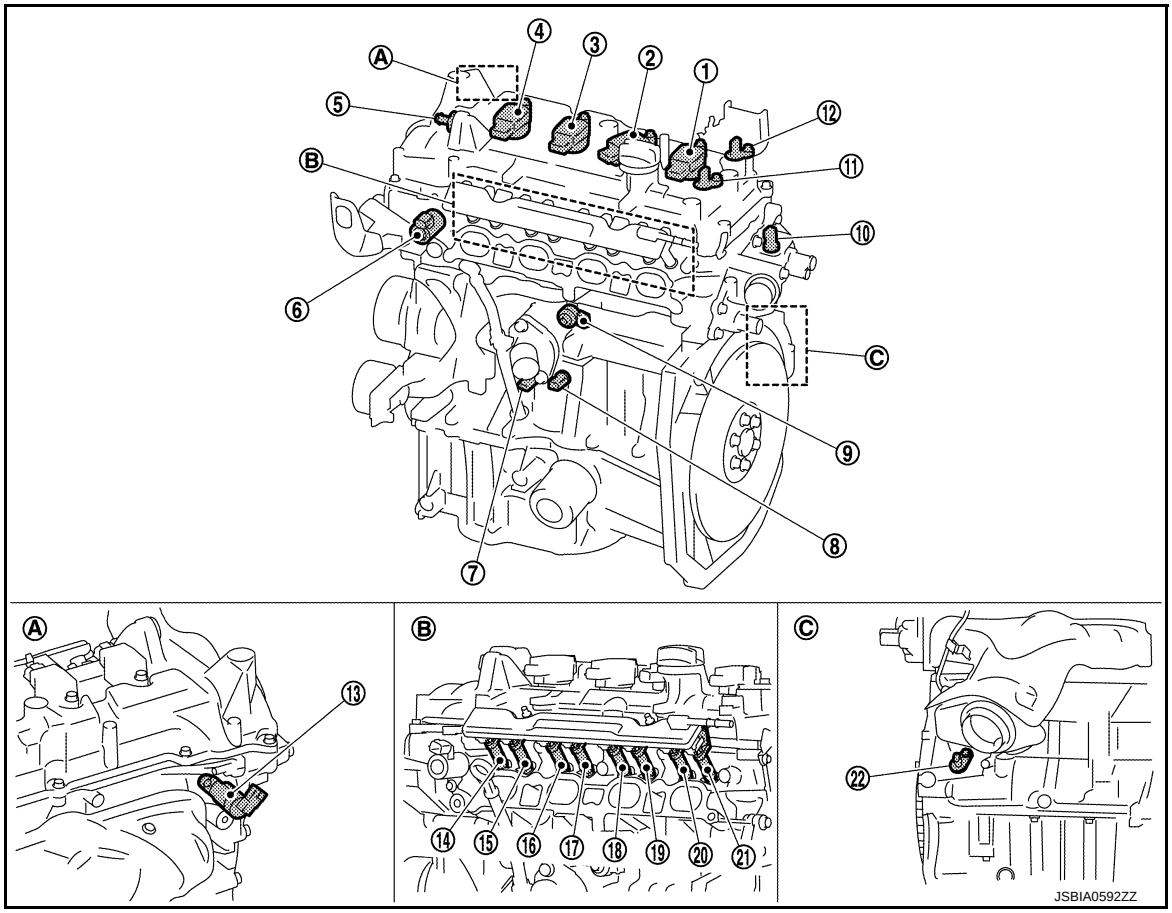
ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : Component Parts Location

INFOID:0000000006496182

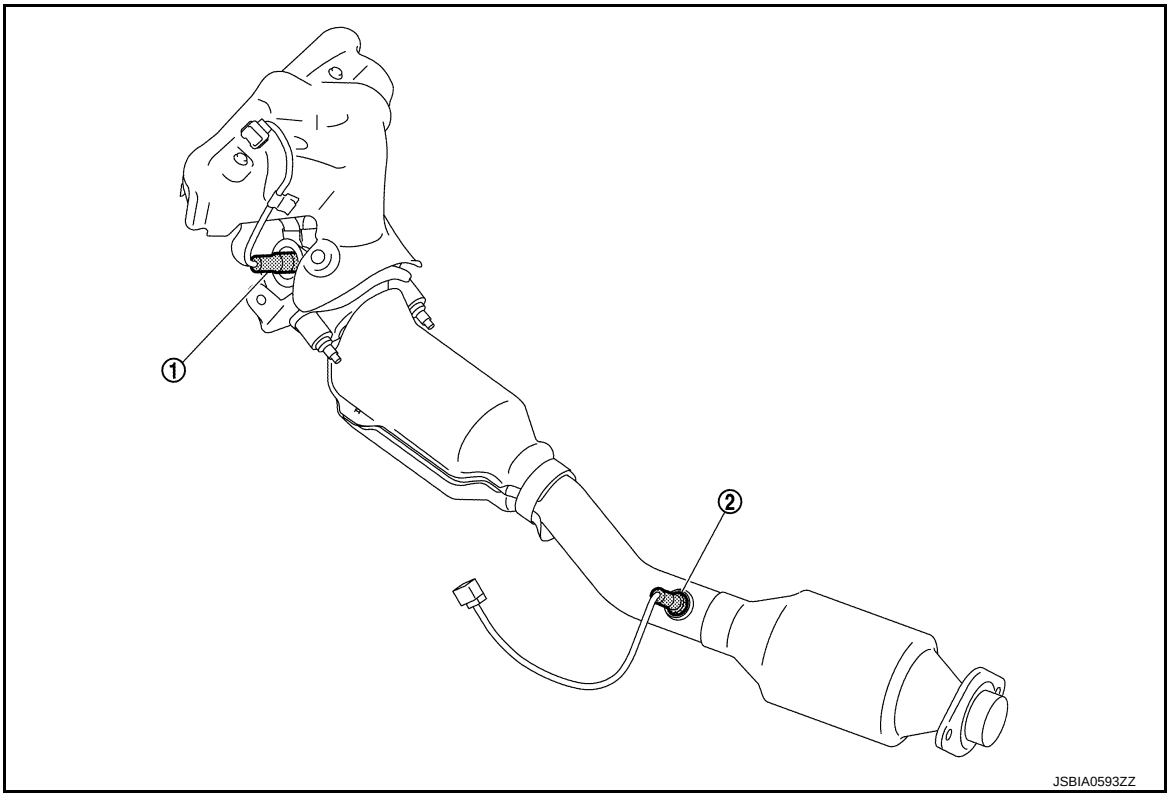


1. IPDM E/R
   Refer to PCS-5, "Component Parts Location".
2. Battery current sensor
   (with battery temperature sensor)
3. Mass air flow sensor
   (with intake air temperature sensor)
4. Electric throttle control actuator
   (with built in throttle position sensor and throttle control motor)
5. EVAP canister purge volume control solenoid valve
6. Refrigerant pressure sensor
   Refer to HA-14, "Component Parts Location".
7. Cooling fan motor
8. ECM

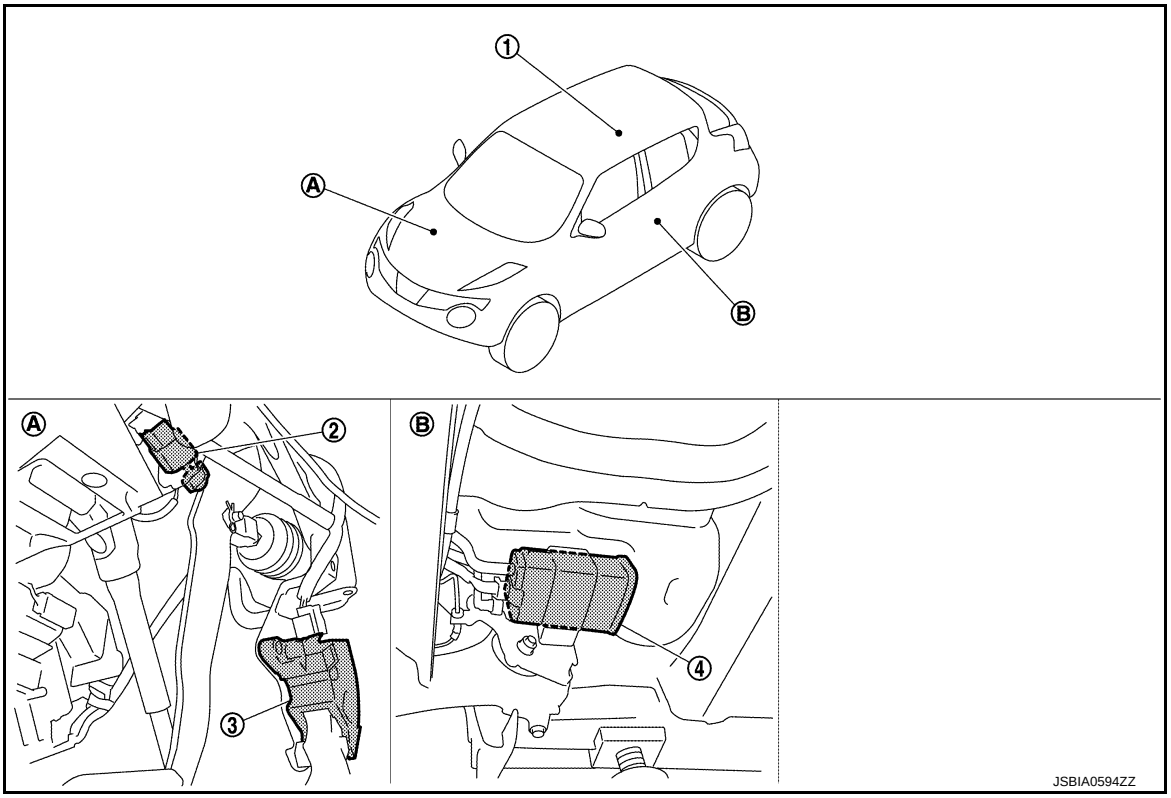


1. Ignition coil No.4 (with power transistor)
2. Ignition coil No.3 (with power transistor)
3. Ignition coil No.2 (with power transistor)
4. Ignition coil No.1 (with power transistor)
5. PCV valve
6. Intake valve timing control solenoid valve
7. Engine oil pressure sensor
8. Engine oil temperature sensor
9. Knock sensor
10. Engine coolant temperature sensor
11. Intake camshaft position sensor
12. Exhaust camshaft position sensor
13. Exhaust valve timing control solenoid valve
14. Fuel injector No.1 (Front)
15. Fuel injector No.1 (Rear)
16. Fuel injector No.2 (Front)
17. Fuel injector No.2 (Rear)
18. Fuel injector No.3 (Front)
19. Fuel injector No.3 (Rear)
20. Fuel injector No.4 (Front)
21. Fuel injector No.4 (Rear)
21. Crankshaft position sensor

A. Engine front right side
B. Left view of the engine
C. Engine rear right side



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



1. ASCD steering switch
2. Fuel level sensor unit, fuel filter and fuel pump assembly
3. Brake pedal position switch
4. Stop lamp switch
5. Clutch pedal position switch
6. Accelerator pedal position switch
7. EVAP canister
8. Fuel pump control module (FPCM)

A. Under of right side second seat
B. Periphery of pedals
C. Under of left side fuel tank
D. Behind the luggage side lower finisher LH

⇦: Vehicle front

ENGINE CONTROL SYSTEM : Component Description

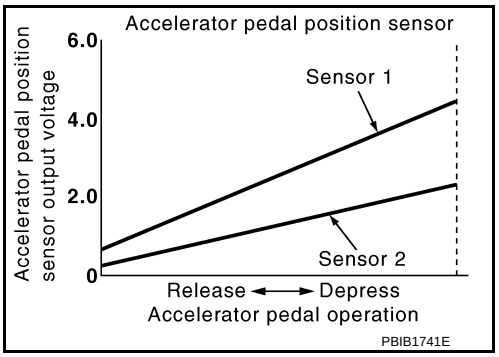
INFOID:0000000006496183

Component	Reference
ECM	EC-461, "ECM"
A/F sensor 1	EC-459, "Air Fuel Ratio Sensor 1"
A/F sensor 1 heater	EC-459, "Air Fuel Ratio Sensor 1 Heater"
Accelerator pedal position sensor	EC-459, "Accelerator Pedal Position Sensor"
ASCD steering switch	EC-459, "ASCD Steering Switch"
Battery current sensor	EC-460, "Battery Current Sensor (With Battery Temperature Sensor)"
Battery temperature sensor	EC-460, "Battery Current Sensor (With Battery Temperature Sensor)"
Brake pedal position switch	EC-467, "Stop Lamp Switch & Brake Pesal Position Switch"
Clutch pedal position switch	EC-461, "Clutch Pedal Position Switch"
Cooling fan motor	EC-461, "Cooling Fan"
Crankshaft position sensor	EC-461, "Crankshaft Position Sensor"
Electric throttle control actuator	EC-462, "Electric Throttle Control Actuator"
Engine coolant temperature sensor	EC-462, "Engine Coolant Temperature Sensor"
Engine oil pressure sensor	EC-462, "Engine Oil Pressure Sensor"
Engine oil tenperature sensor	EC-462, "Engine Oil Temperature Sensor"
EVAP canister purge volume control solenoid valve	EC-463, "EVAP Canister Purge Volume Control Solenoid Valve"
Exhaust camshaft position sensor	EC-460, "Camshaft Position Sensor"
Exhaust valve timing control solenoid valve	EC-463, "Exhaust Valve Timing Control Solenoid Valve"
Fuel injector	EC-463, "Fuel Injector"
Fuel pump	EC-464, "Fuel Pump"
Fuel pump control module (FPCM)	EC-464, "Fuel Pump Control Module (FPCM)"
Heated oxygen sensor 2	EC-464, "Heated Oxygen Sensor 2"
Heated oxygen sensor 2 heater	EC-464, "Heated Oxygen Sensor 2 Heater"
Ignition coil (with power transistor)	EC-465, "Ignition Coil With Power Transistor"
Intake air temperature sensor	EC-465, "Intake Air Temperature Sensor"
Intake camshaft position sensor	EC-460, "Camshaft Position Sensor"
Intake valve timing control solenoid valve	EC-466, "Intake Valve Timing Control Solenoid Valve"
Knock sensor	EC-466, "Knock Sensor"
Mass air flow sensor	EC-466, "Mass Air Flow Sensor"
PCV valve	EC-469, "Positive Crankcase Ventilation"
Refrigerant pressure sensor	EC-467, "Refrigerant Pressure Sensor"
Stop lamp switch	EC-467, "Stop Lamp Switch & Brake Pesal Position Switch"
Throttle control motor	EC-467, "Throttle Control Motor"
Throttle control motor relay	EC-467, "Throttle Control Motor Relay"
Throttle position sensor	EC-468, "Throttle Position Sensor"

Accelerator Pedal Position Sensor

INFOID:0000000006496184

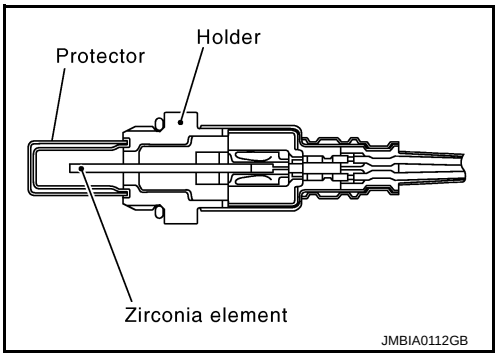
The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage 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.



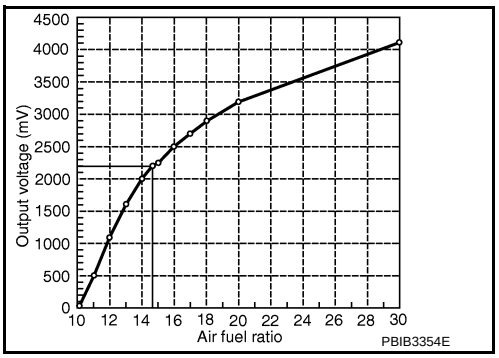
Air Fuel Ratio Sensor 1

INFOID:0000000006496185

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



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



Air Fuel Ratio Sensor 1 Heater

INFOID:0000000006496186

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Air fuel ratio (A/F) sensor 1 heater control	Air fuel ratio (A/F) sensor 1 heater
Mass air flow sensor	Amount of intake air		

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

ASCD Steering Switch

INFOID:0000000006496189

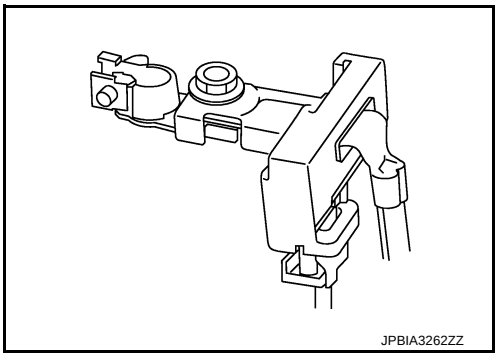
ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.
Refer to EC-477, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description" for the ASCD function.

Battery Current Sensor (With Battery Temperature Sensor)

INFOID:0000000006635082

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 to CHG-9, "POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : System Description (Gasoline Engine Models)".



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

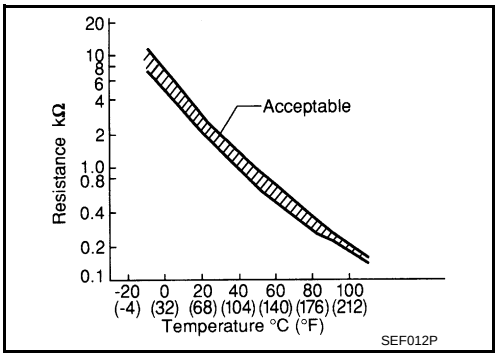
The battery current sensor is installed to the battery negative cable. The sensor measures the charging/discharging current of the battery.

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

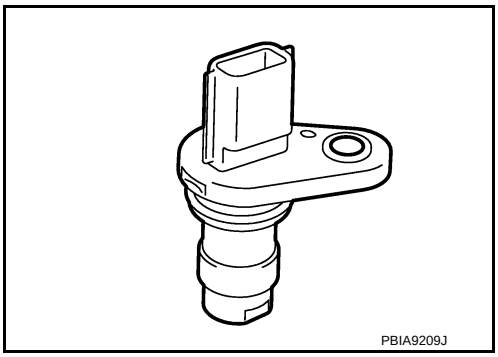
*: These data are reference values and are measured between battery temperature sensor signal terminal and sensor ground.



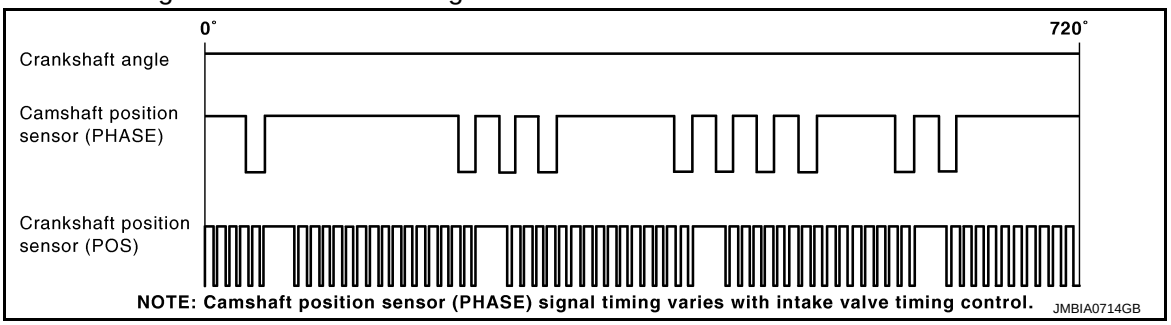
Camshaft Position Sensor

INFOID:0000000006496190

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



ECM receives the signals as shown in the figure.



Clutch Pedal Position Switch

INFOID:0000000006496191

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).

Cooling Fan

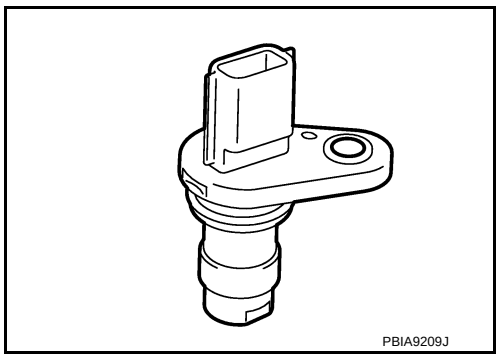
INFOID:0000000006496192

Cooling fan operates at low and high speed when the current flows in the cooling fan motor.
Refer to EC-479, "COOLING FAN CONTROL : System Description" for cooling fan operation.

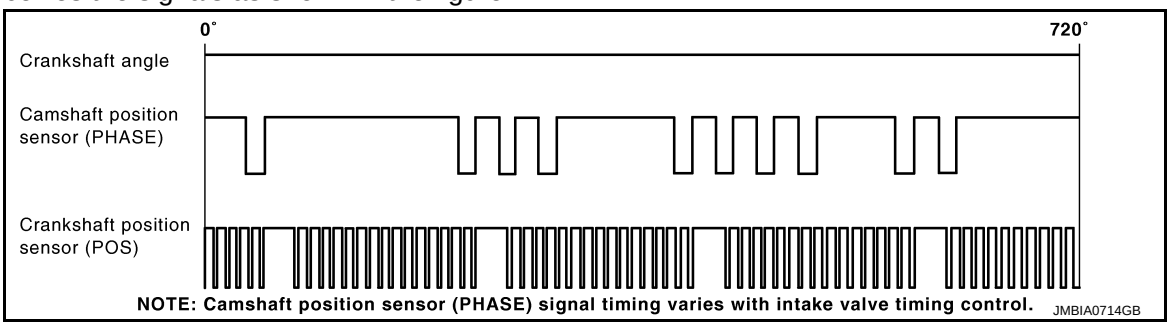
Crankshaft Position Sensor

INFOID:0000000006496193

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



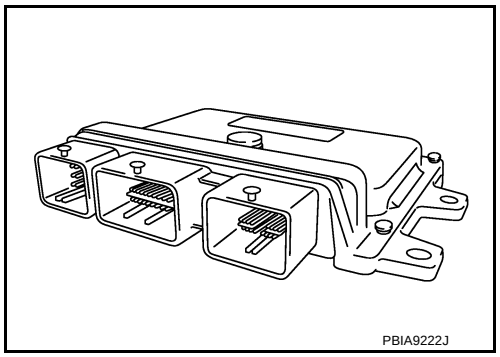
ECM receives the signals as shown in the figure.



ECM

INFOID:0000000006496194

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



Electric Throttle Control Actuator

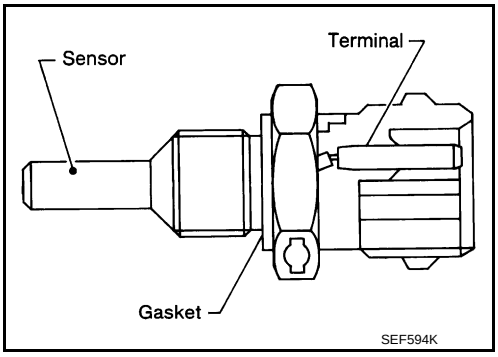
INFOID:0000000006496195

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle valve in response to driving conditions via the throttle control motor.

Engine Coolant Temperature Sensor

INFOID:0000000006496196

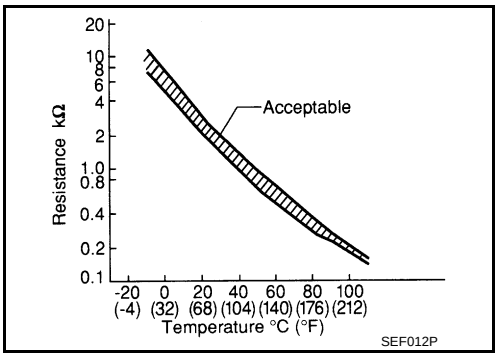
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The 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	2.35 - 2.73
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

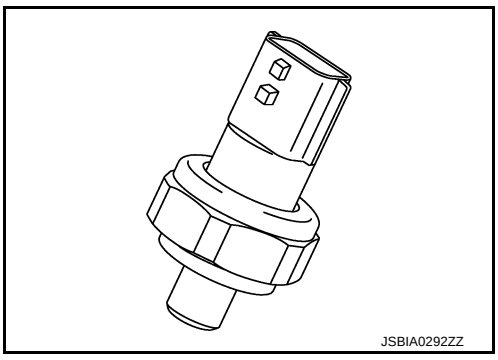
*: These data are reference values and are measured between ECM terminals 38 (Engine coolant temperature sensor signal) and 44.



Engine Oil Pressure Sensor

INFOID:0000000006635083

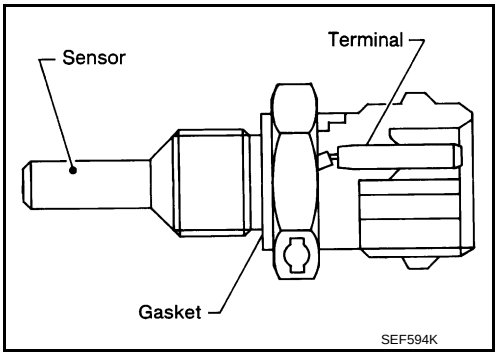
The engine oil pressure (EOP) sensor is detects engine oil pressure and transmits a voltage signal to the ECM.



Engine Oil Temperature Sensor

INFOID:0000000006635084

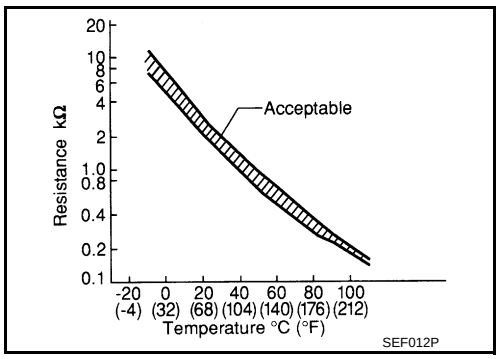
The engine oil temperature sensor is used to detect the engine oil temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine oil temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance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



<Reference data>

Engine oil temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260
110 (230)	0.6	0.143 - 0.153

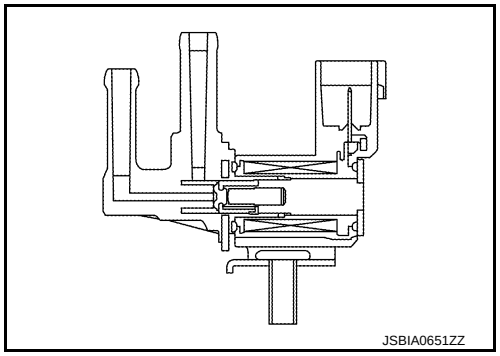
*: These data are reference values and are measured between ECM terminals.



EVAP Canister Purge Volume Control Solenoid Valve

INFOID:0000000006496197

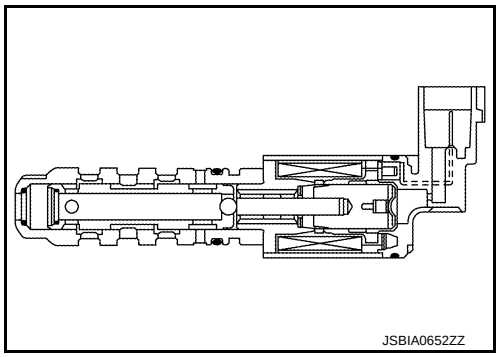
The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will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



Exhaust Valve Timing Control Solenoid Valve

INFOID:0000000006635085

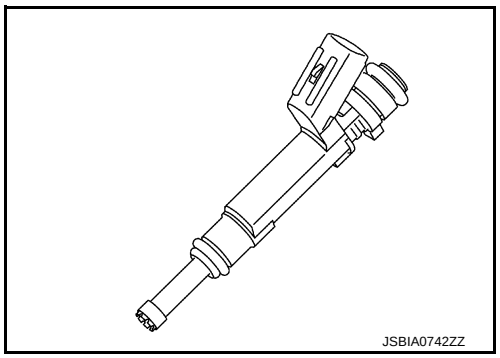
Exhaust valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The exhaust valve timing control solenoid valve changes the oil amount and direction of flow through exhaust valve timing control unit or stops oil flow.
The longer pulse width retards valve angle.
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.



Fuel Injector

INFOID:0000000006496198

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



Fuel Pump

INFOID:0000000006496199

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay ↓ Fuel pump
Battery	Battery voltage*		

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

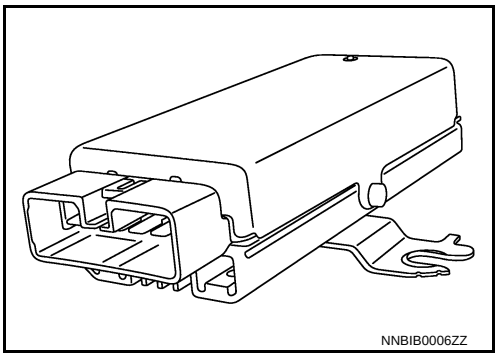
The ECM activates the fuel pump for a few seconds after the ignition switch is turned ON to improve engine start ability. If the ECM receives a engine speed signal from the crankshaft position sensor (POS) and camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.

Fuel Pump Control Module (FPCM)

INFOID:0000000006734942

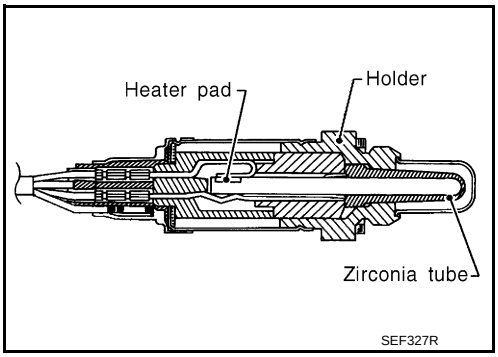
The fuel pump control module (FPCM) controls the discharging volume of the fuel pump by transmitting the FPCM control signals (Low/Mid/High) depending on driving conditions.


NNBIB0006ZZ

Heated Oxygen Sensor 2

INFOID:0000000006496200

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.



SEF327R

Heated Oxygen Sensor 2 Heater

INFOID:0000000006496201

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Engine coolant temperature sensor	Engine coolant temperature		
Mass air flow sensor	Amount of intake air		

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

OPERATION

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

Ignition Coil With Power Transistor

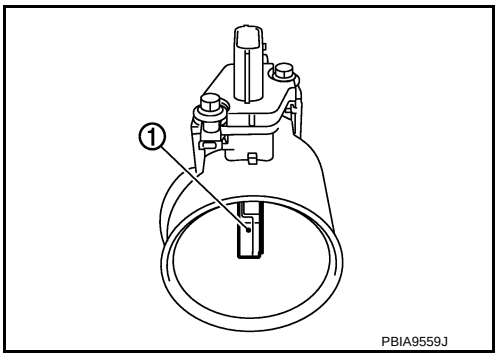
INFOID:0000000006496202

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.

Intake Air Temperature Sensor

INFOID:0000000006496203

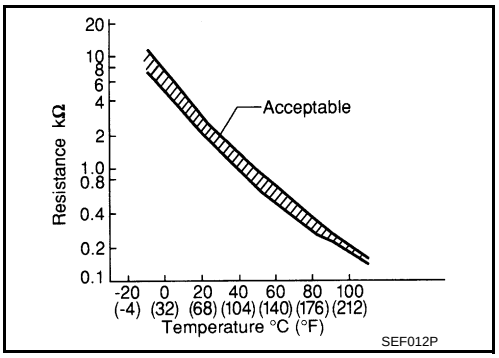
The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response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



<Reference data>

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

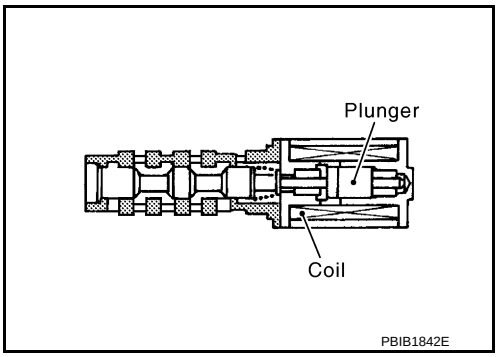
*: These data are reference values and are measured between ECM terminals 46 (Intake air temperature sensor signal) and 55.



Intake Valve Timing Control Solenoid Valve

INFOID:0000000006496204

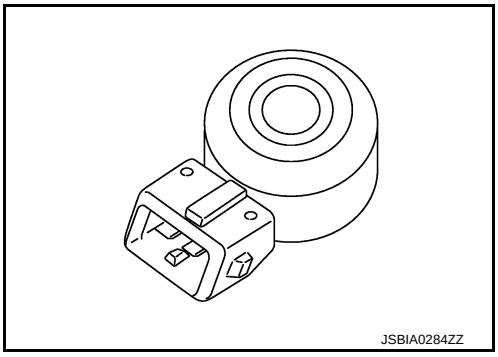
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.
The longer pulse width advances valve angle.
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.



Knock Sensor

INFOID:0000000006496205

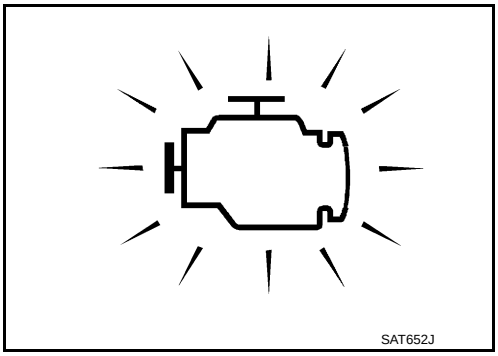
The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.



Malfunction Indicator

INFOID:0000000006496206

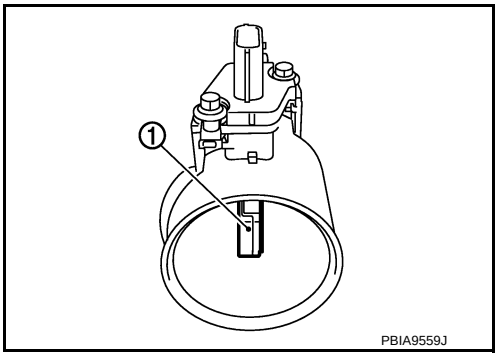
The Malfunction Indicator (MI) is located on the combination meter.
The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
When the engine is started, the MI should turn off. If the MI remains illuminated, the on board diagnostic system has detected an engine system malfunction.
For details, refer to EC-497, "DIAGNOSIS DESCRIPTION : Malfunction Indicator (MI)".



Mass Air Flow Sensor

INFOID:0000000006496207

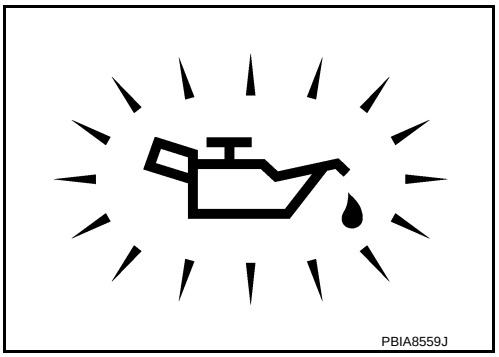
The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows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



Oil Pressure Warning Lamp

INFOID:0000000006635112

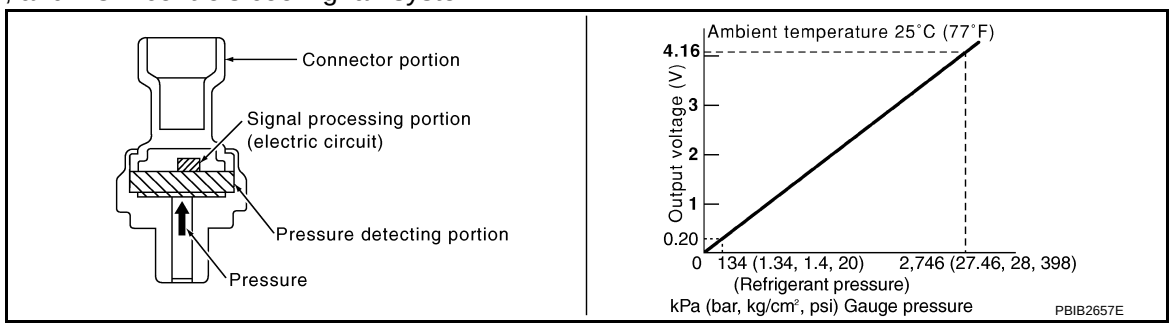
Oil pressure warning lamp is located on the combination meter.
It indicates the low pressure of the engine oil and the malfunction of the engine oil pressure system.
Combination meter turns the oil pressure warning lamp ON/OFF according to the oil pressure warning lamp signal received from ECM via CAN communication.
For details, refer to EC-485, "ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description".



Refrigerant Pressure Sensor

INFOID:0000000006496209

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 Pesal Position Switch

INFOID:0000000006496210

Stop lamp switch and brake pedal position switch are installed to 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

Throttle Control Motor

INFOID:0000000006496211

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 feed-back to the ECM to control the throttle valve in response to driving conditions via the throttle control motor.

Throttle Control Motor Relay

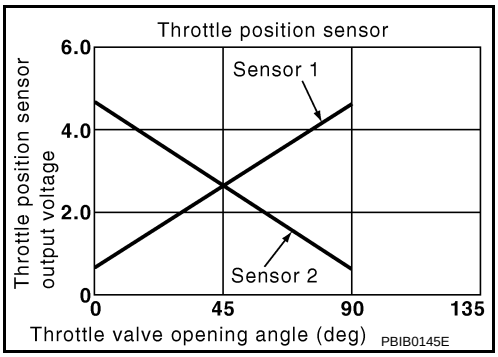
INFOID:0000000006496212

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 Position Sensor

INFOID:0000000006496213

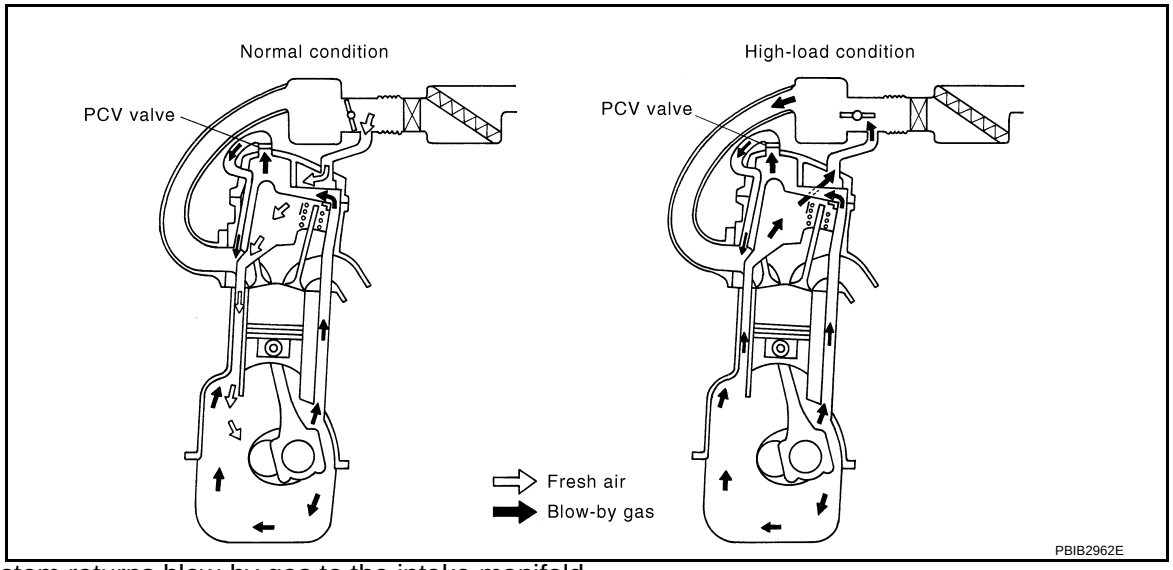
Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position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



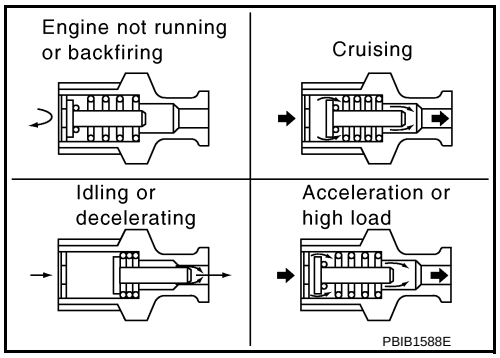
STRUCTURE AND OPERATION

Positive Crankcase Ventilation

INFOID:0000000006496208



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.

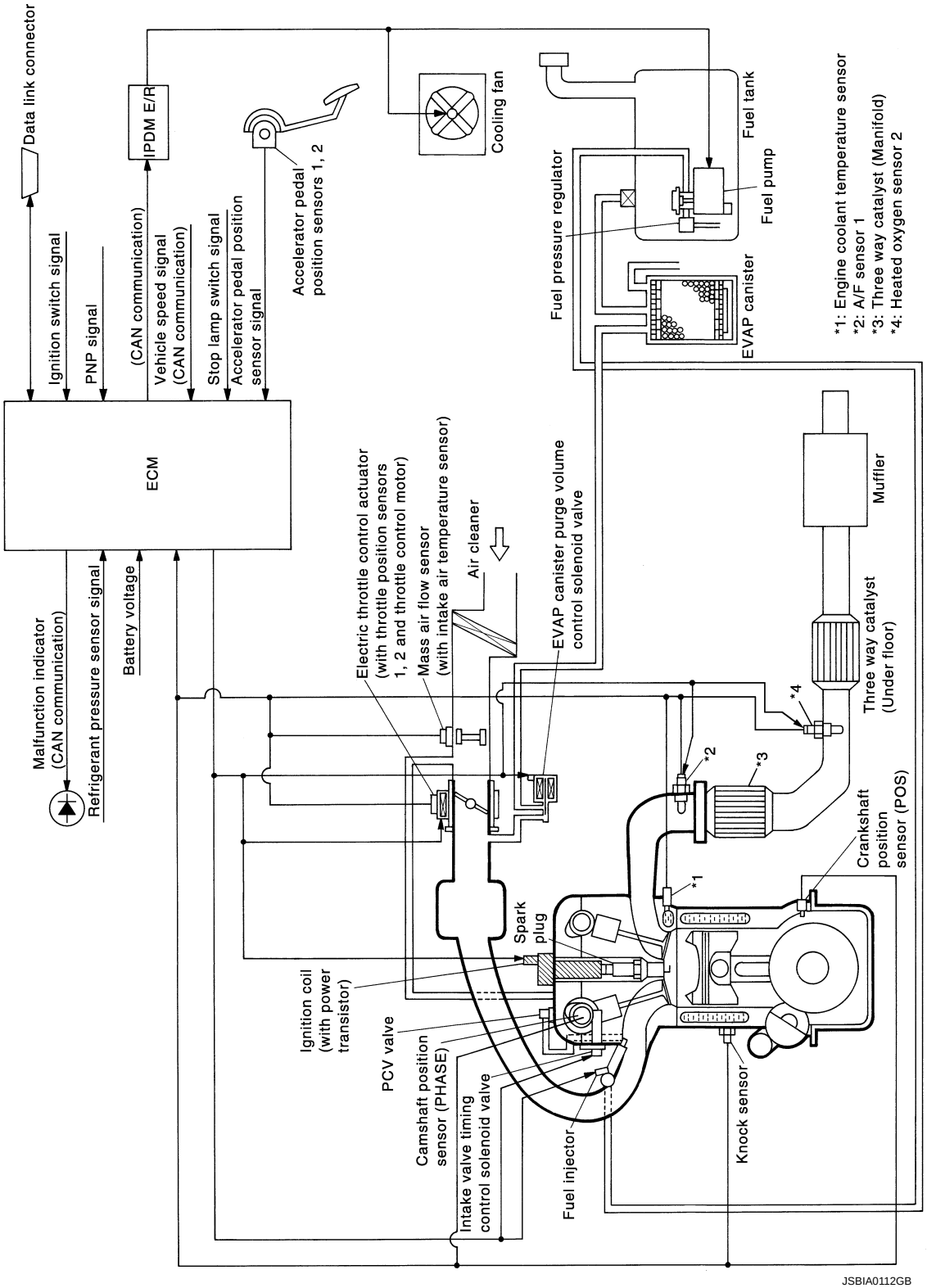


SYSTEM

ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : System Diagram

INFOID:0000000006496214



ENGINE CONTROL SYSTEM : System Description

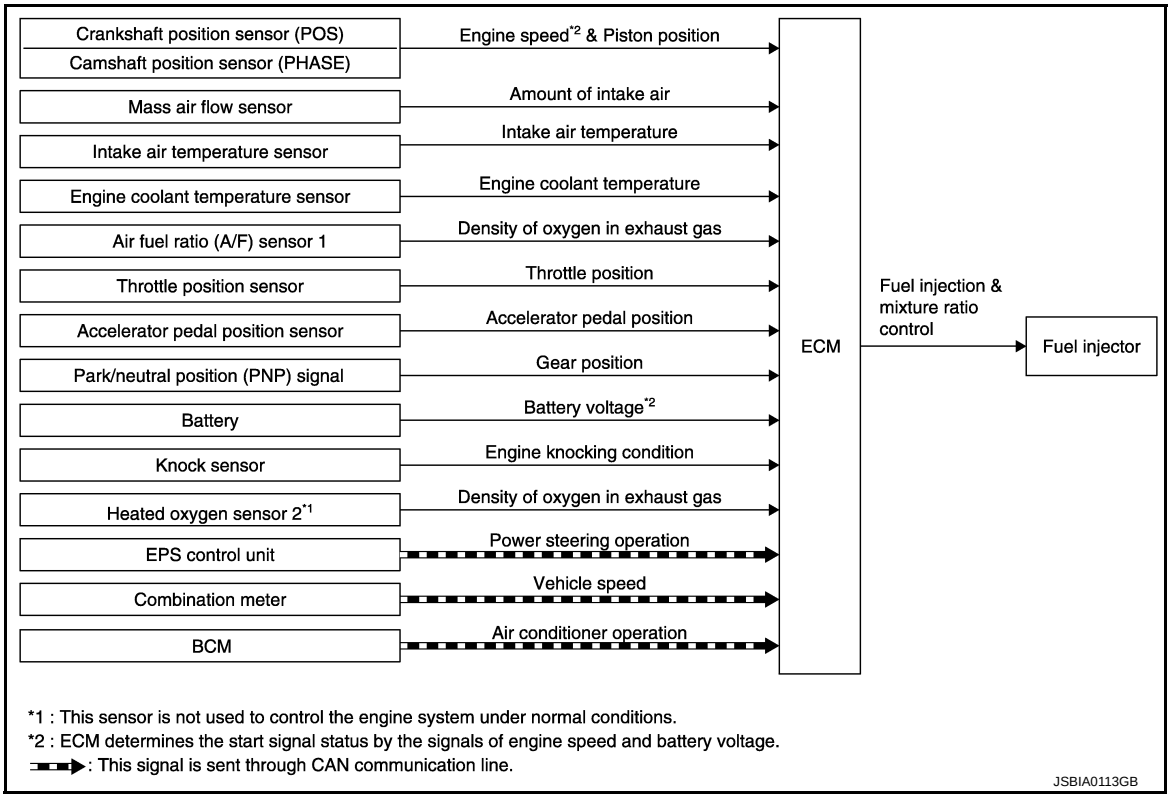
INFOID:0000000006496215

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

MULTIPORT FUEL INJECTION SYSTEM

MULTIPORT FUEL INJECTION SYSTEM : System Diagram

INFOID:0000000006496217



MULTIPORT FUEL INJECTION SYSTEM : System Description

INFOID:0000000006496218

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed*4 Piston position	Fuel injection & mixture ratio control	Fuel injector
Camshaft position sensor			
Mass air flow sensor	Amount of intake air		
Intake air temperature sensor	Intake air temperature		
Engine coolant temperature sensor	Engine coolant temperature		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) switch*1	PNP signal		
Transmission range switch*2			
Battery	Battery voltage*4		
Knock sensor	Engine knocking condition		
Heated oxygen sensor 2*3	Density of oxygen in exhaust gas		
EPS control unit	EPS operation signal*5		
Combination meter	Vehicle speed*5		
BCM	A/C ON signal*5 Blower fan signal*5		

*1: M/T models
*2: CVT models
*3: This sensor is not used to control the engine system under normal conditions.
*4: ECM determines the start signal status by the signals of engine speed and battery voltage.
*5: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

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

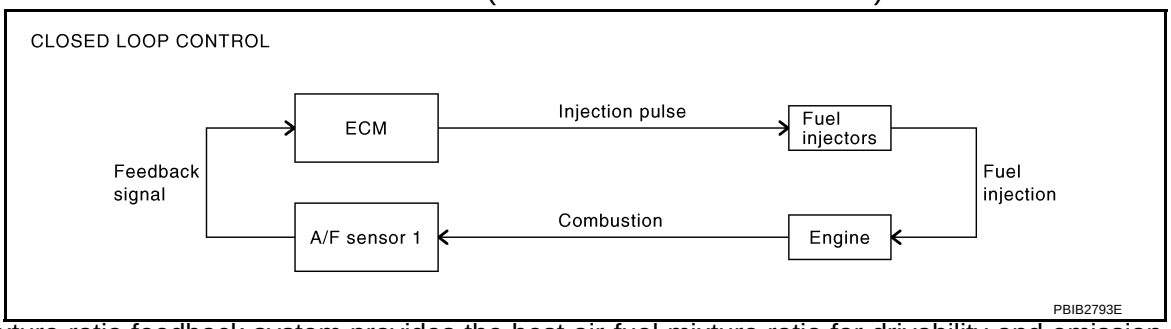
VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

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

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

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for drivability and emission control. The three way catalyst (manifold) can better reduce CO, HC and NOx emissions. This system uses A/F sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about A/F sensor 1, refer to EC-459, "Air Fuel Ratio 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 heated sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (CVT models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

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

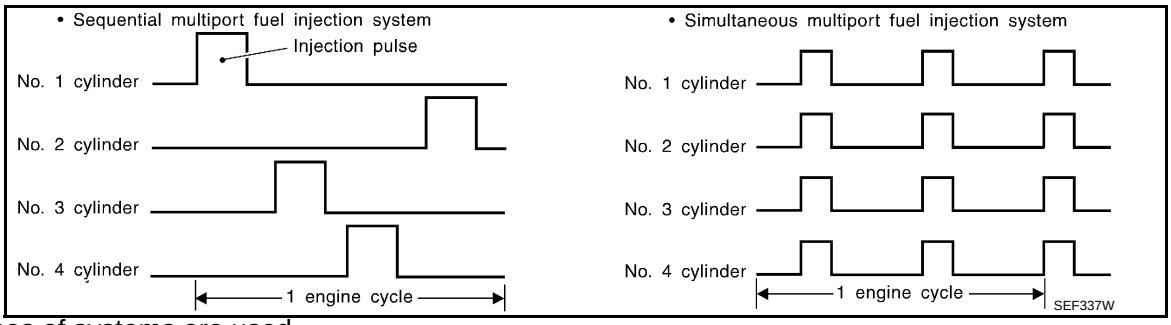
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of “injection pulse duration” to automatically compensate for the difference between the two ratios.

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

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

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

FUEL INJECTION TIMING



Two types of systems are used.

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

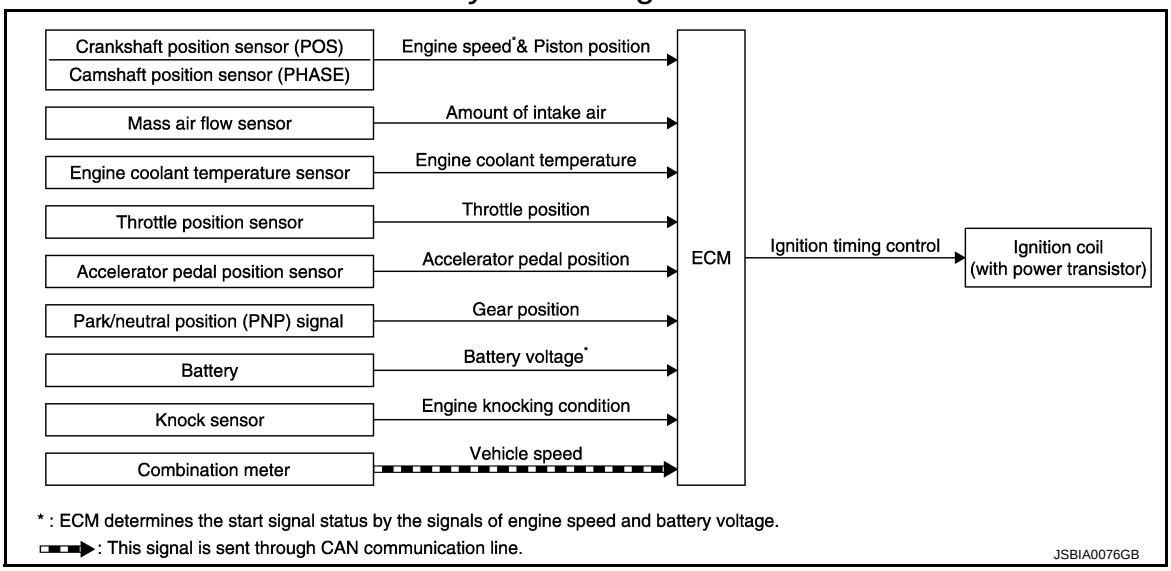
FUEL SHUT-OFF

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

ELECTRIC IGNITION SYSTEM

ELECTRIC IGNITION SYSTEM : System Diagram

INFOID:0000000006496219



ELECTRIC IGNITION SYSTEM : System Description

INFOID:0000000006496220

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed*3 Piston position	Ignition timing control	Ignition coil (with power transistor)
Camshaft position sensor			
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		
Park/neutral position (PNP) switch*1	PNP signal		
Transmission range switch*2			
Battery	Battery voltage*3		
Knock sensor	Engine knocking		
Combination meter	Vehicle speed*4		

*1: M/T models
*2: CVT models
*3: ECM determines the start signal status by the signals of engine speed and battery voltage.
*4: This signal is sent to the ECM through CAN communication line.

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 signal. Computing this information, ignition signals are transmitted to the power transistor.
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

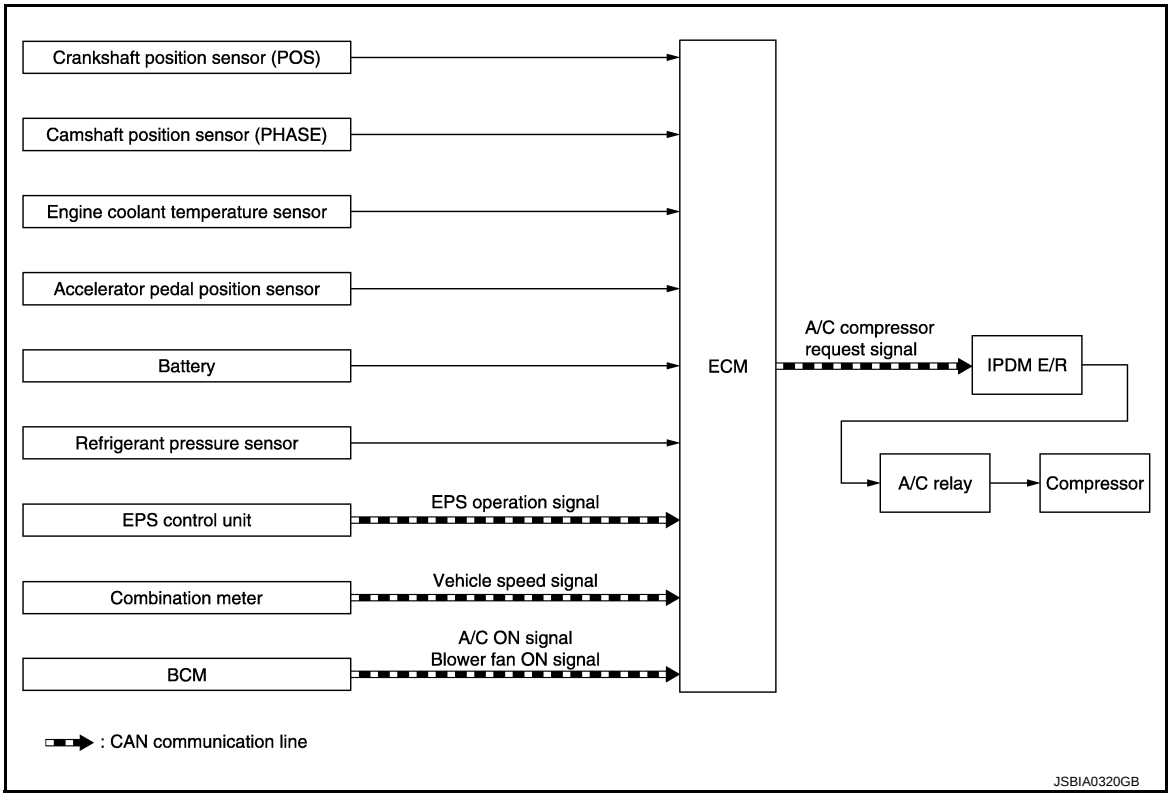
- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

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

AIR CONDITIONING CUT CONTROL

AIR CONDITIONING CUT CONTROL : System Diagram

INFOID:0000000006496221



AIR CONDITIONING CUT CONTROL : System Description

INFOID:0000000006496222

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor Camshaft position sensor	Engine speed*1 Piston position	A/C compressor request signal	IPDM E/R ↓ Air conditioner relay ↓ Compressor
Engine coolant temperature sensor	Engine coolant temperature		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*1		
Refrigerant pressure sensor	Refrigerant pressure		
EPS control unit	EPS operation signal*2		
Combination meter	Vehicle speed signal*2		
BCM	A/C ON signal*2 Blower fan signal*2		

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.
*2: This signal is sent to the ECM through CAN communication line.

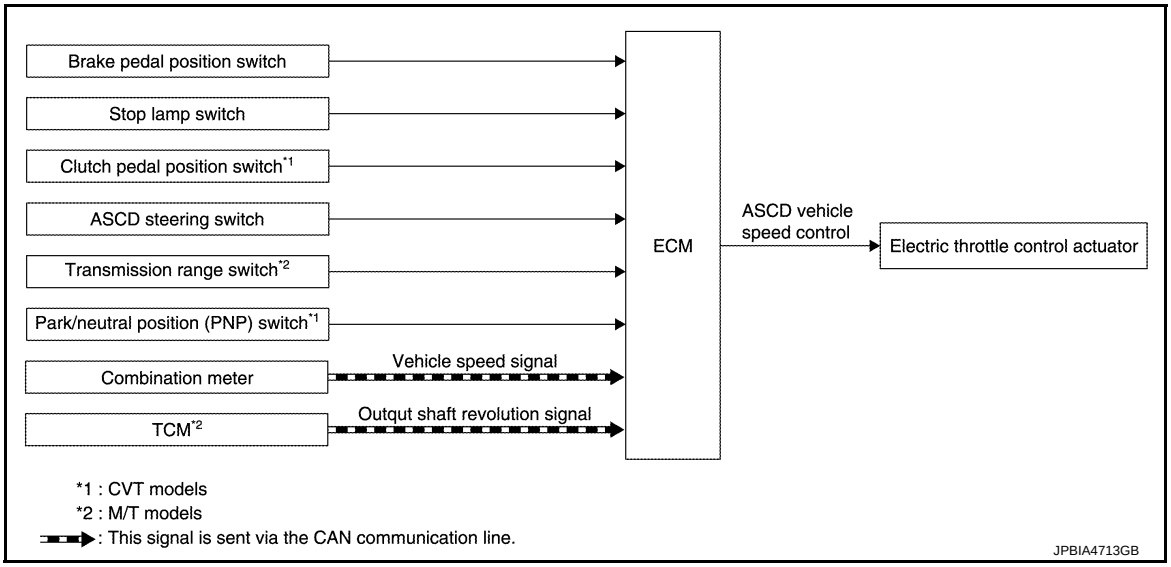
SYSTEM DESCRIPTION

This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.
- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Diagram

INFOID:0000000006496223



AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description

INFOID:0000000006496224

INPUT/OUTPUT SIGNAL CHART

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

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

BASIC ASCD SYSTEM

- Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can be set the vehicle speed in the set speed range.
- ECM controls throttle angle of electric throttle control actuator to regulate engine speed.
- Operation status of ASCD is indicated in combination meter.
- If any malfunction occurs in the ASCD system, it automatically deactivates the ASCD control.

Refer to EC-487, "AUTMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function" for ASCD operating instructions.

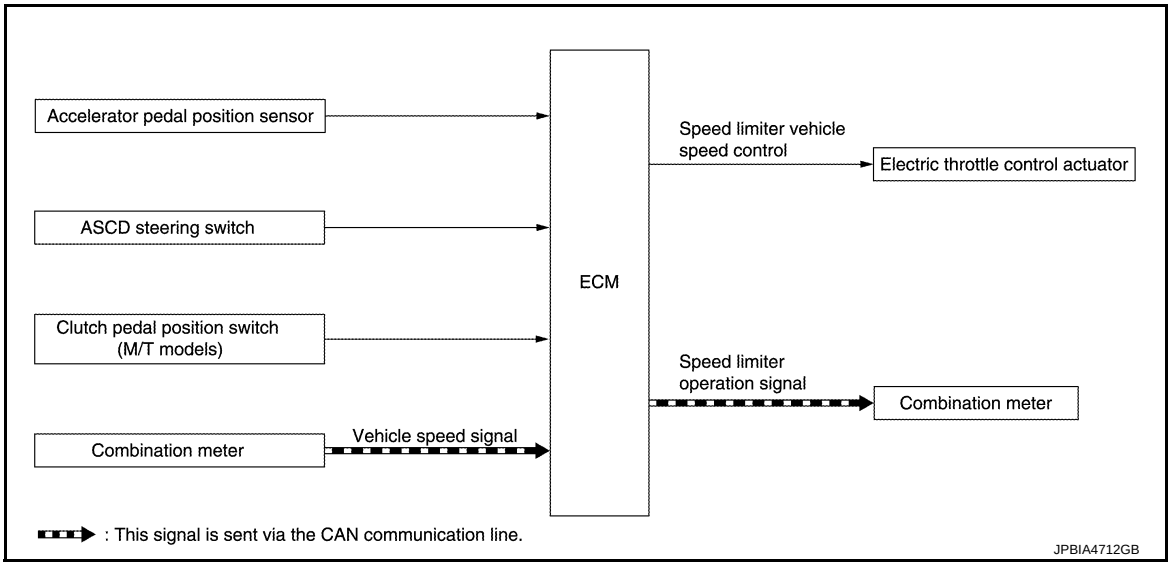
CAUTION:

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

SPEED LIMITER

SPEED LIMITER : System Diagram

INFOID:0000000006496225



SPEED LIMITER : System Description

INFOID:0000000006496226

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Accelerator pedal position sensor	Accelerator pedal position	• Speed limiter vehicle speed control • Speed limiter operation signal*	• Electric throttle control actuator • Combination meter (Information display)
ASCD steering switch	ASCD steering switch operation		
Clutch pedal position switch (M/T models)	Clutch pedal operation		
Combination meter	Vehicle speed*		

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

BASIC SPEED LIMITER SYSTEM

- Speed limiter is a system that enables to restrict the vehicle speed within the set speed that is selected by the driver. Driver can be set the vehicle speed in the set speed range.
- ECM controls throttle angle of electric throttle control actuator to regulate vehicle speed.
- Operation status of speed limiter is indicated on the information display in the combination meter.
- Unlike cancel conditions for ASCD, the speed limiter is not cancelled even when the clutch pedal is depressed. ECM detects a clutch pedal position switch signal and controls engine revolutions to maintain a set speed when shifting gears.
- If any malfunction occurs in speed limiter system, it automatically deactivates the speed limiter control.

Refer to EC-488, "SPEED LIMITER : Switch Name and Function" for speed limiter operating instructions.

CAUTION:

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

NOTE:

Since the speed limiter is controlled by the electric throttle control actuator, vehicle speed may exceed a set speed during downhill driving.

CAN COMMUNICATION

CAN COMMUNICATION : System Description

INFOID:0000000006496227

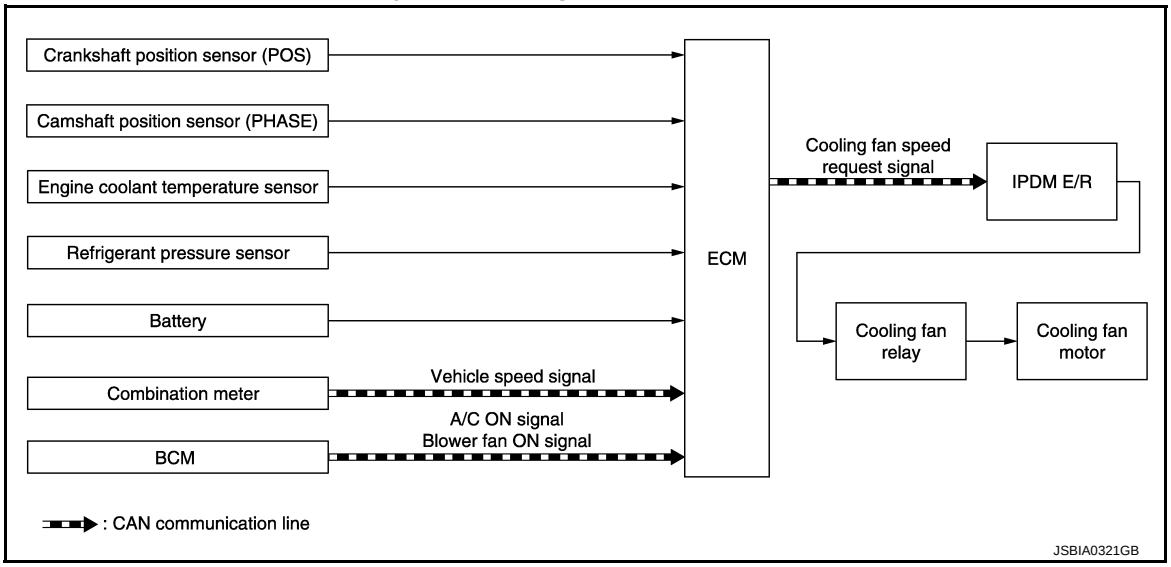
CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information 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-31, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart", about CAN communication for detail.

COOLING FAN CONTROL

COOLING FAN CONTROL : System Diagram

INFOID:0000000006496228



COOLING FAN CONTROL : System Description

INFOID:0000000006496229

INPUT/OUTPUT SIGNAL CHART

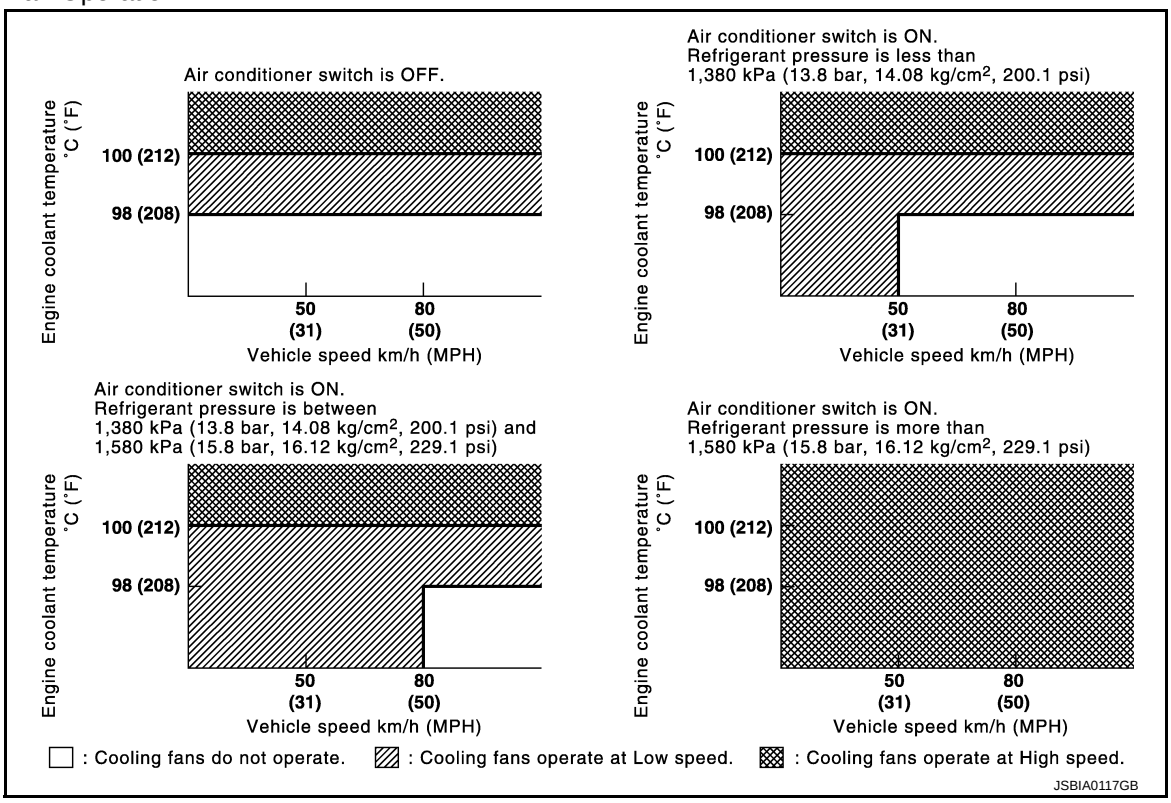
Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor Camshaft position sensor	Engine speed*1 Piston position	Cooling fan speed request signal	IPDM E/R ↓ Cooling fan relay ↓ Cooling fan motor
Engine coolant temperature sensor	Engine coolant temperature		
Refrigerant pressure sensor	Refrigerant pressure		
Battery	Battery voltage*1		
Combination meter	Vehicle speed*2		
BCM	A/C ON signal*2 Blower fan signal*2		

*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.
*2: This signal is sent to ECM through CAN communication line.

SYSTEM DESCRIPTION

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

Cooling Fan Operation



Cooling Fan Relay Operation

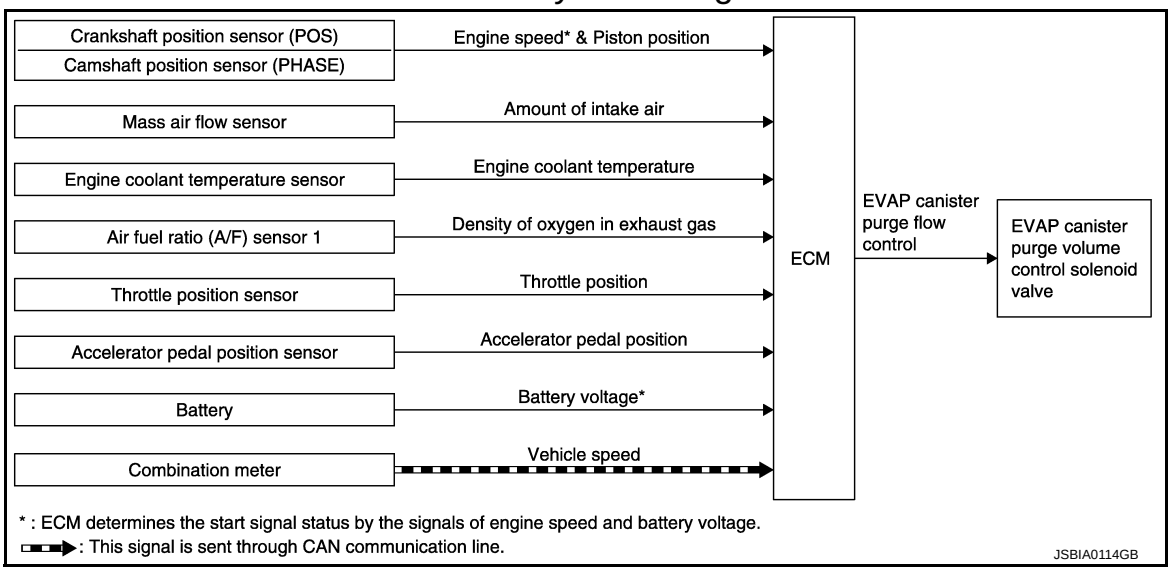
The ECM controls cooling fan relays through CAN communication line.

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

EVAPORATIVE EMISSION SYSTEM

EVAPORATIVE EMISSION SYSTEM : System Diagram

INFOID:0000000006496230



EVAPORATIVE EMISSION SYSTEM : System Description

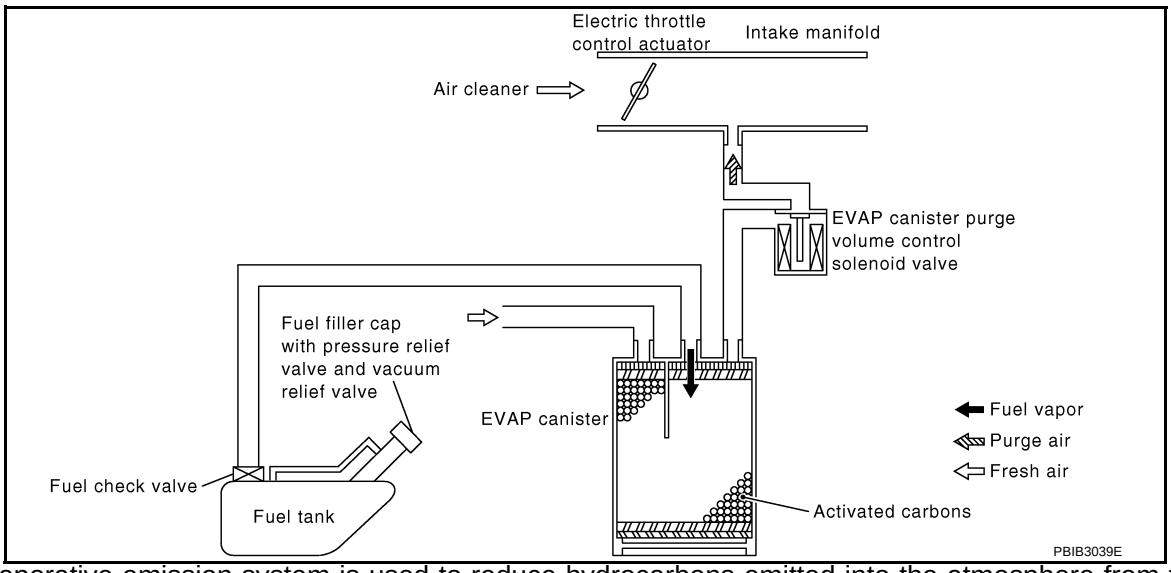
INFOID:0000000006496231

INPUT/OUTPUT SIGNAL CHART

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

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.
*2: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

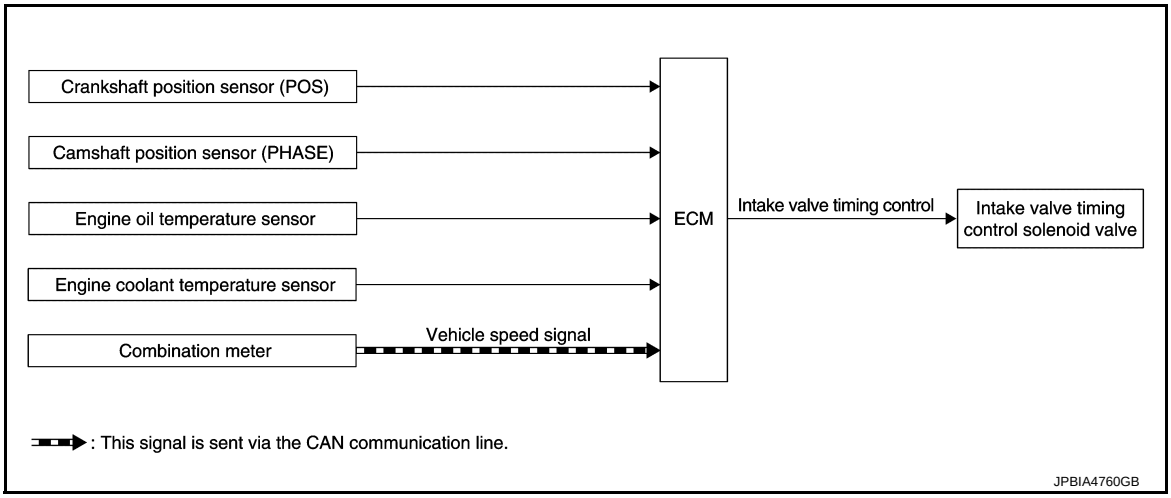


The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon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

INTAKE VALVE TIMING CONTROL

INTAKE VALVE TIMING CONTROL : System Diagram

INFOID:0000000006496232



INTAKE VALVE TIMING CONTROL : System Description

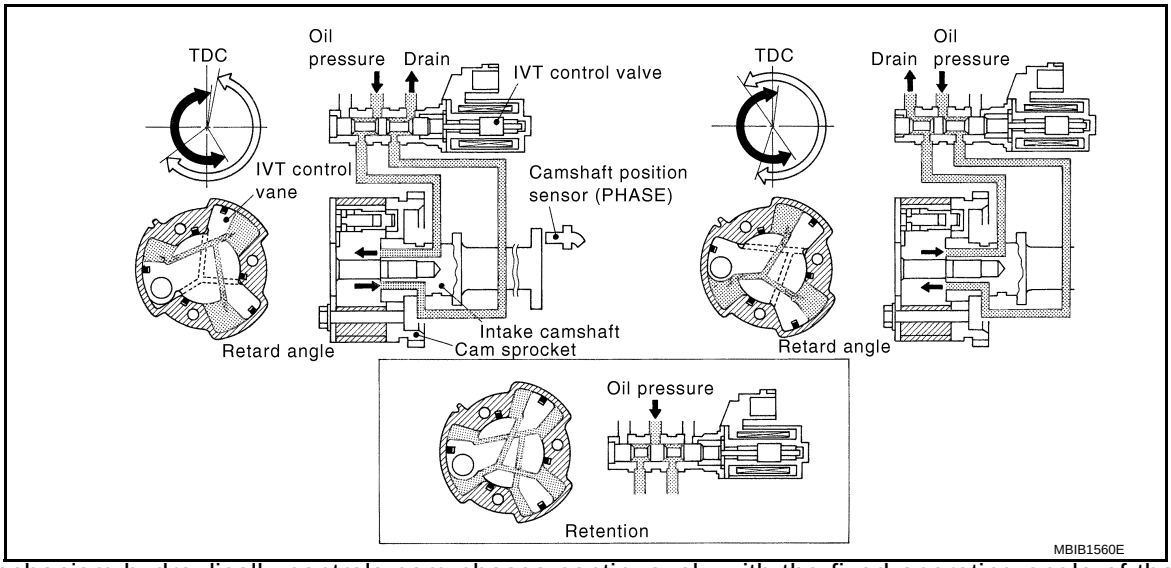
INFOID:0000000006496233

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed*1 Piston position	Intake valve timing control	Intake valve timing control solenoid valve
Camshaft position sensor			
Engine oil temperature sensor	Engine oil temperature		
Engine coolant temperature sensor	Engine coolant temperature		
Combination meter	Vehicle speed*2		

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.
*2: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

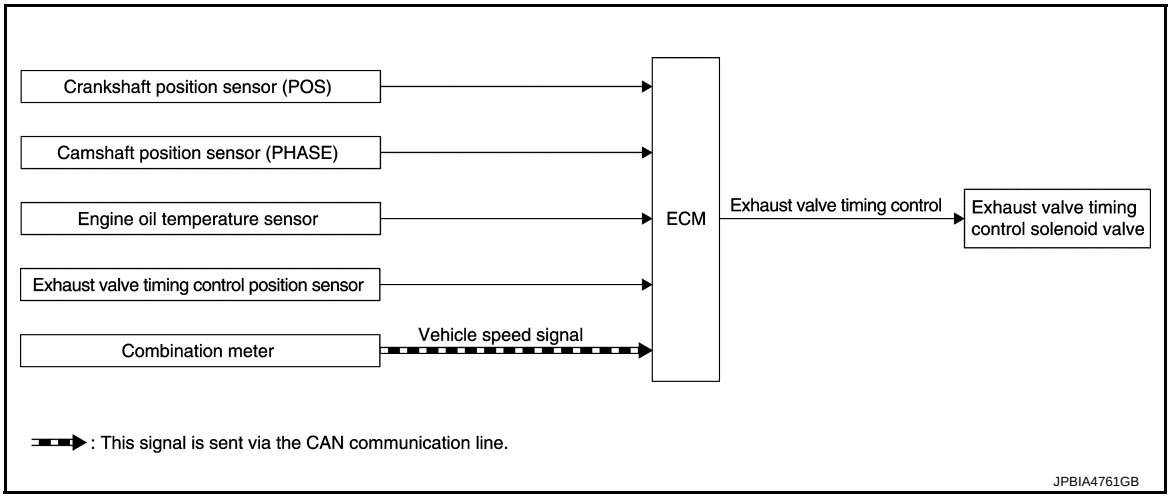


This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.
The ECM receives signals such as crankshaft position, camshaft position, engine speed, engine oil temperature and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals 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:0000000006635093



EXHAUST VALVE TIMING CONTROL : System Description

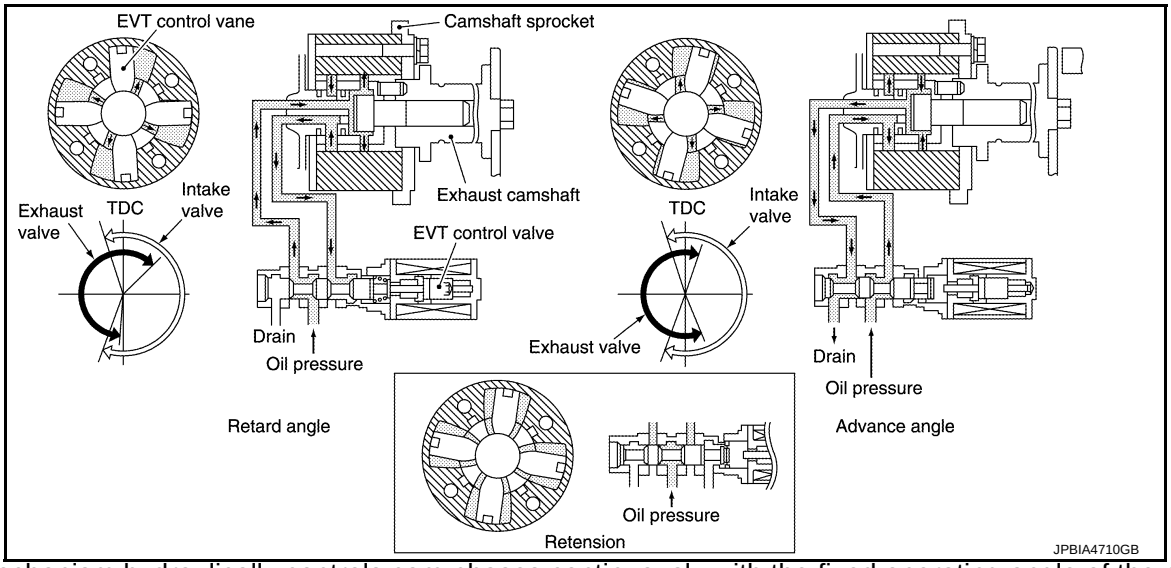
INFOID:0000000006635094

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed*1 Piston position	Exhaust valve timing control	Exhaust valve timing control solenoid valve
Camshaft position sensor			
Engine oil temperature sensor	Engine oil temperature		
Engine coolant temperature sensor	Engine coolant temperature		
Combination meter	Vehicle speed*2		

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.
*2: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

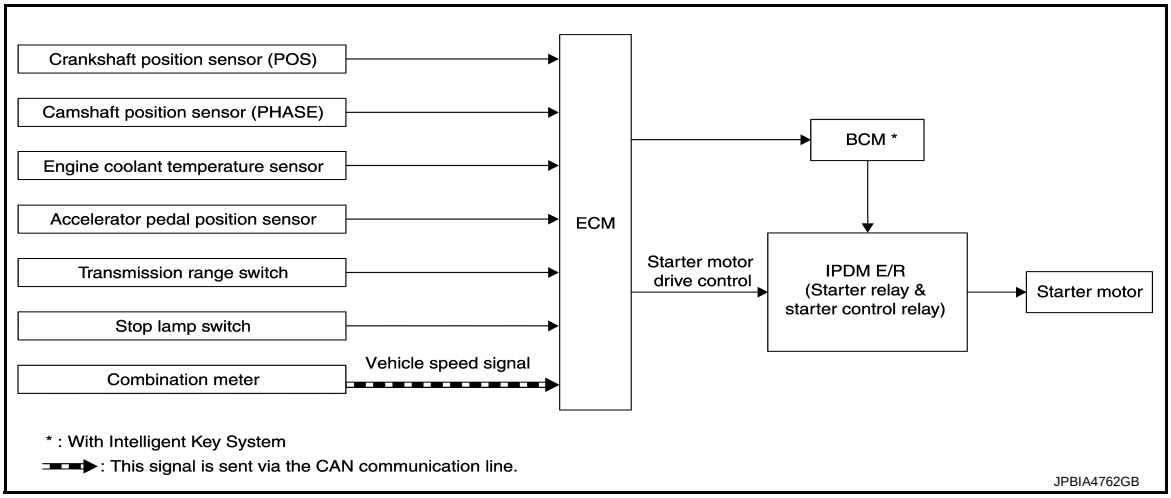


This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the exhaust valve.
The ECM receives signals such as crankshaft position, camshaft position, engine speed, engine oil temperature and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals 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.

STARTER MOTOR DRIVE CONTROL

STARTER MOTOR DRIVE CONTROL : System Diagram

INFOID:0000000006635095



STARTER MOTOR DRIVE CONTROL : System Description

INFOID:0000000006635096

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed*1 Piston position	Starter motor drive control	• BCM*3 • IPDM E/R (Starter relay & starter control relay)
Camshaft position sensor			
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	Vehicle speed signal*2		

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.
*2: This signal is sent to the ECM through CAN communication line.
*3: With Intelligent Key system

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 no Intelligent Key System transmit a control signal directly to IPDM E/R. 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.

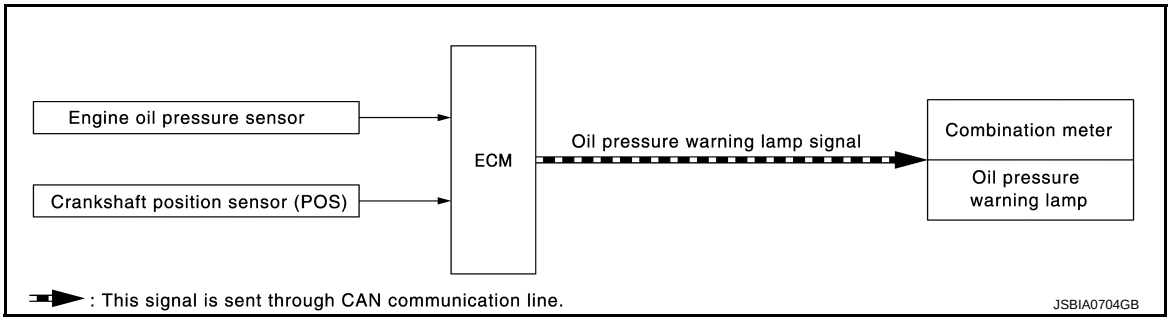
IPDM E/R detects an operating state of the starter motor relay and the starter motor control relay and transmits a feed back signal to ECM via CAN Communication.

ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE

ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Dia-

gram

INFOID:0000000006709863



ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description

INFOID:0000000006709864

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	Combination meter • Oil pressure warning lamp
Crankshaft position sensor (POS)	Engine speed		

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

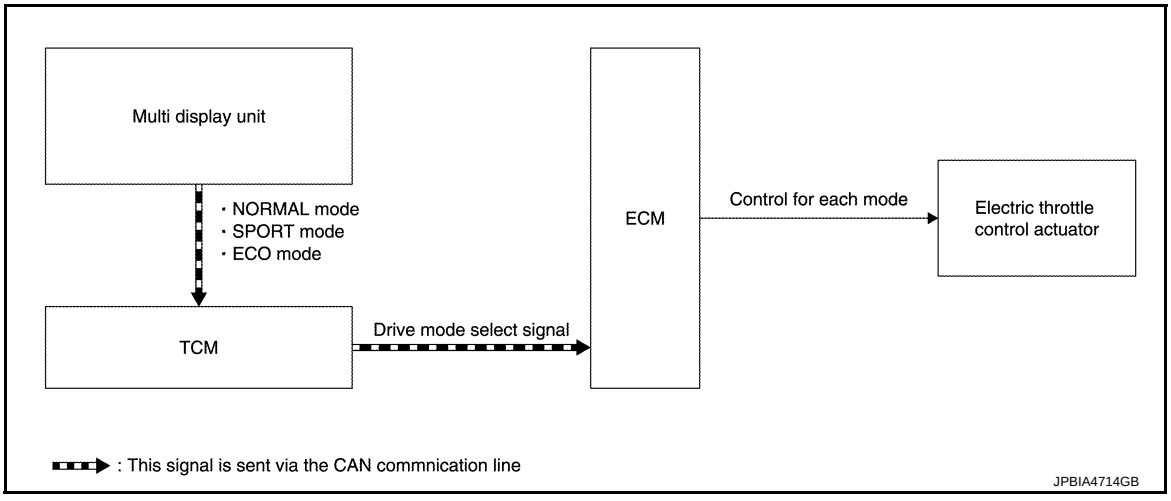
*: When detecting a normal engine oil pressure, ECM turns OFF the oil pressure warning lamp.

NISSAN DYNAMIC CONTROL SYSTEM

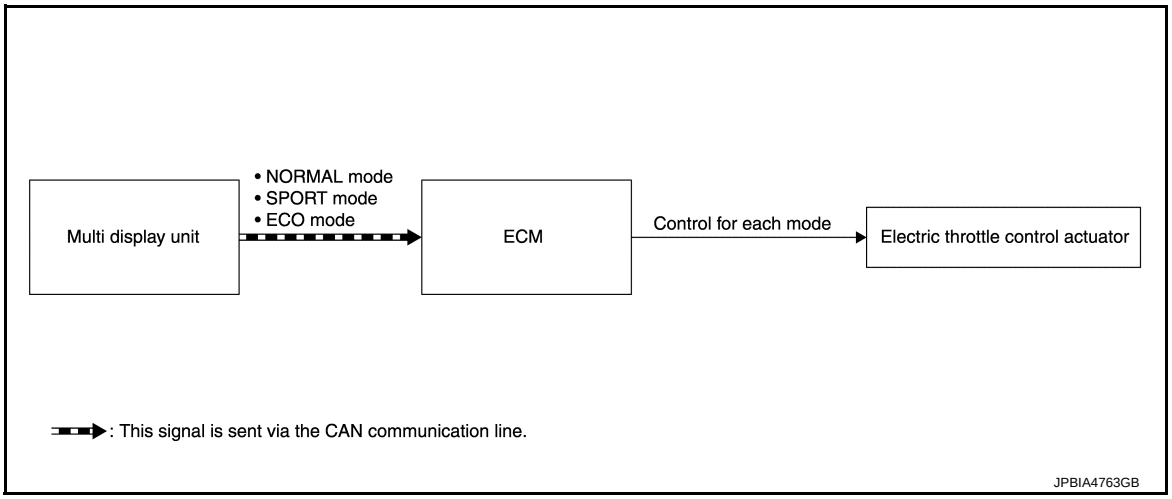
NISSAN DYNAMIC CONTROL SYSTEM : System Diagram

INFOID:0000000006732874

CVT models



M/T models



NISSAN DYNAMIC CONTROL SYSTEM : System Description

INFOID:0000000006732875

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.

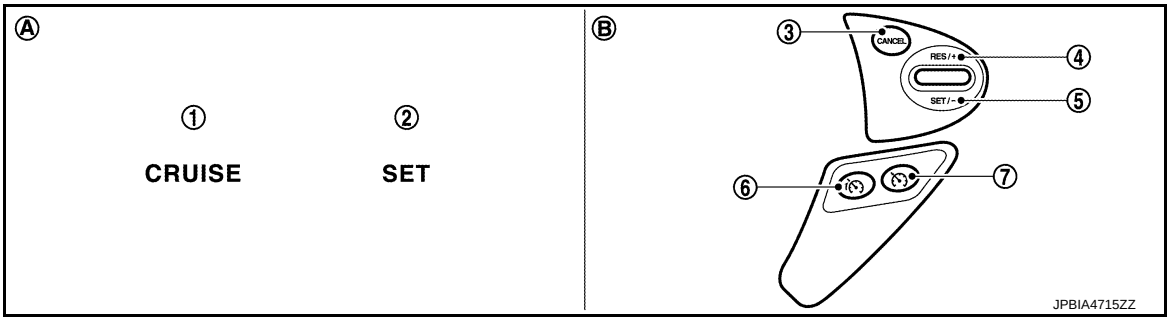
OPERATION

AUTMATIC SPEED CONTROL DEVICE (ASCD)

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

INFOID:0000000006709880

SWITCHES AND INDICATORS



1. CRUISE indicator
2. SET indicator
3. CANCEL switch
4. RES / + switch
5. SET / – switch
6. Speed limiter MAIN Switch
7. ASCD MAIN switch

A. On the combination meter (Information display)
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)	194 km/h (120 MPH)

SWITCH OPERATION

Item	Function
CANCEL switch	Cancels the cruise control driving.
RES / + switch	• Resumes the set speed. • Increases speed incrementally during cruise control driving.
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 194 km/h (120 MPH), press SET/– switch. (Then SET indicator in combination meter illuminates.)

ACCELERATE OPERATION

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

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.
- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to neutral position. (M/T models)
- Selector lever is changed to N, P 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 will cancel the cruise operation and inform the driver by blinking indicator lamp.

• Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE indicator may blink slowly.
  When the engine coolant temperature decreases to the normal operating temperature, CRUISE indicator will stop blinking and the cruise operation will be able to work by pressing SET/– switch or RES/+ switch.
• Malfunction for some self-diagnoses regarding ASCD control: SET indicator will blink quickly.

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

COAST OPERATION

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

RESUME OPERATION

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

• Brake pedal is released
• Clutch pedal is released (M/T models)
• Selector lever is in other than P and N positions (CVT models)
• Vehicle speed is greater than 40 km/h (25 MPH) and less than 194 km/h (120 MPH)

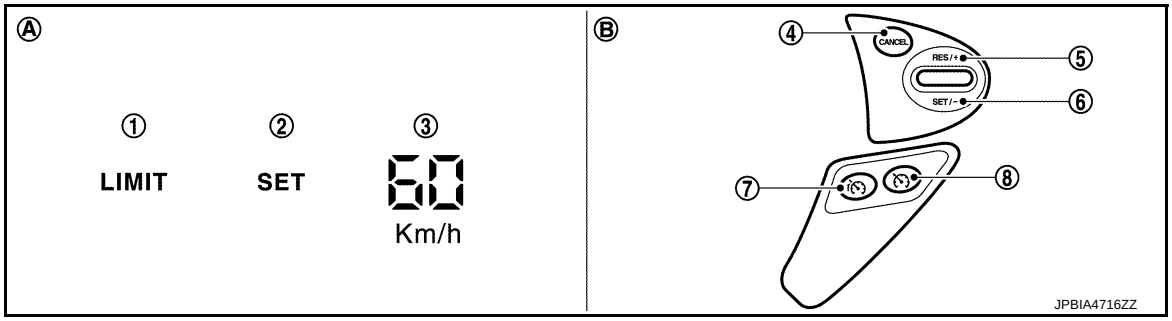
SPEED LIMITER

SPEED LIMITER : Switch Name and Function

INFOID:0000000006709881

SWITCHES AND INDICATORS

NOTE:
Shared with ASCD switch.



1. Speed limiter indicator
2. SET indicator
3. Set speed indicator
4. CANCEL switch
5. RES / + switch
6. SET / – switch
7. Speed limiter MAIN Switch
8. ASCD MAIN switch
A. On the combination meter (Information display)
B. On the steering wheel

SET SPEED RANGE

Speed limiter system can be set the following vehicle speed.

Minimum speed (Approx.)	Maximum speed (Approx.)
30 km/h (20 MPH)	210 km/h (130 MPH)

SWITCH OPERATION

Item	Function
CANCEL switch	Cancels the speed limiter control.
RES / + switch	• Resumes the set speed. • Increases the set speed incrementally.
SET / – switch	• Sets desired speed. • Decreases the set speed incrementally.
Speed limiter MAIN switch	Master switch to activate the speed limiter system.

SET OPERATION

- Press speed limiter MAIN switch. (LIMIT indicated on the information display)
- By pressing the SET/– switch, the vehicle speed can be set within the range between 30 km/h and 210 km/h (in the metric system mode) or 20 MPH and 130 MPH (in the yard/pound system mode). (SET and set speed is indicated on the information display)
- When pressing the RES/+ switch, the set speed can be increased.
- When pressing the SET/– switch, the set speed can be decreased.

CANCEL CONDITION

- When any of following conditions exist, speed limiter control is canceled.
  - Speed limiter MAIN switch is pressed. (Set speed is cleared.)
  - ASCD MAIN switch is pressed. (Set speed is cleared.)
  - CANCEL switch is pressed.
- When accelerator pedal is fully depressed (Kickdown), speed limiter control is temporarily released. And driver can be driven above set speed (Set speed indicator is blinked).
- When the ECM detects any of the following conditions, the ECM cancels the speed limiter operation and informs the driver by blinking speed limiter indicator and SET indicator.
  - Malfunction for some self-diagnosis regarding ASCD system.

RESUME OPERATION

After the speed limiter is released by other method than the MAIN switch, the RES/+ switch allows to set the vehicle speed again to the one that is previously set before releasing the speed limiter.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000006709657

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

GST (Generic Scan Tool)

INFOID:0000000006709658

When GST is connected with a data link connector equipped on the vehicle side, it will communicate with the control unit equipped in the vehicle and then enable various kinds of diagnostic tests. Refer to EC-490, "Diagnosis 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:0000000006635101

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 MI 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 MI illuminates. The MI 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 MI, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: Applicable —: Not applicable

Items	MI				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-522, "DTC Index".)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

INFOID:0000000006635102

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 MI 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 MI lights up. In other words, the DTC is stored in the ECM memory and the MI 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 MI 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-522, "DTC Index". These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-III.
1st trip DTC is specified in Service $07 of SAE J1979/ISO 15031-5. 1st trip DTC detection occurs without illuminating the MI 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-537, "Work Flow". Then perform DTC Confirmation Procedure or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

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

Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MI 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:0000000006635103

RELATIONSHIP BETWEEN MI, 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 MI will come on.
- The MI 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-III will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

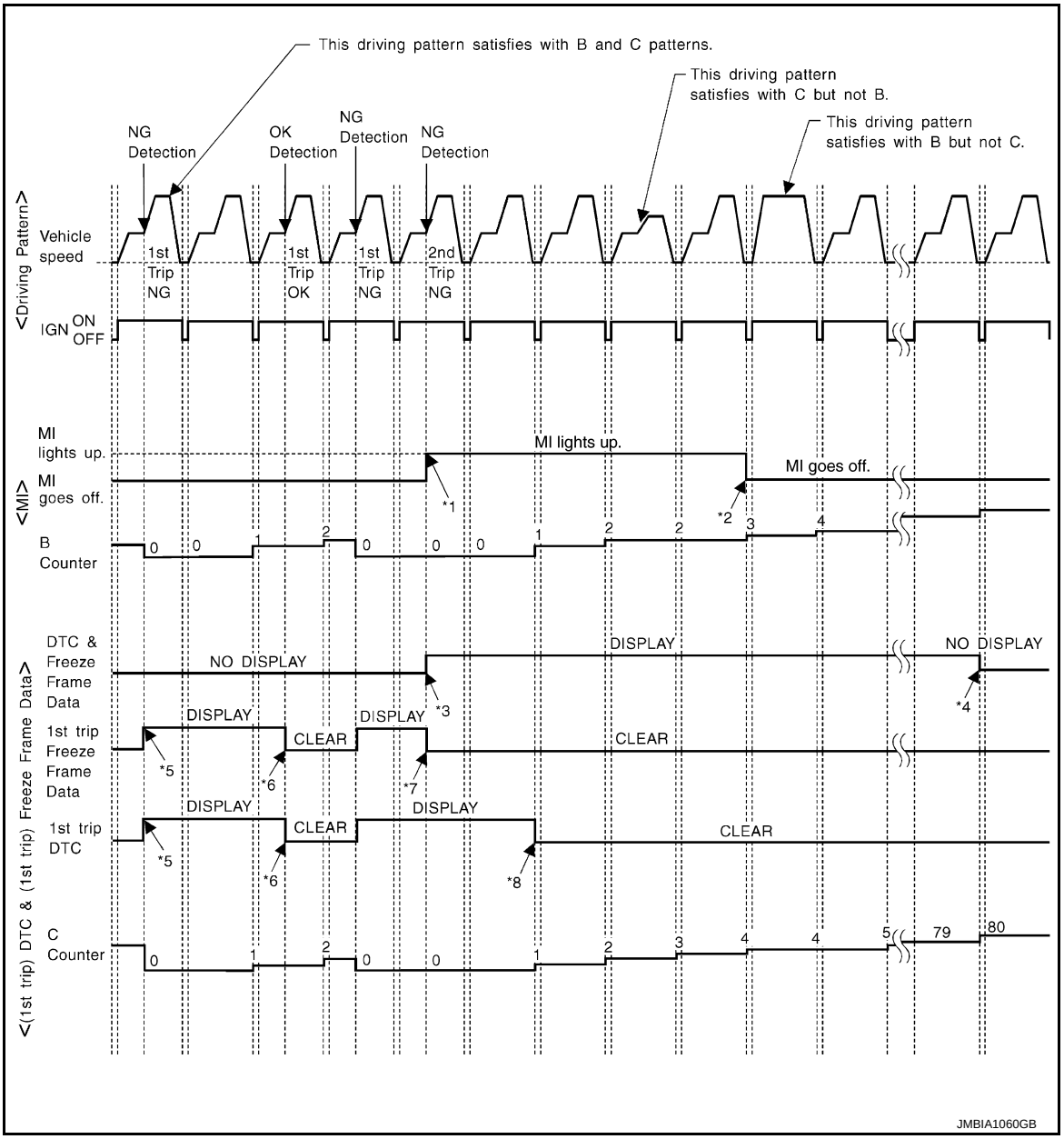
COUNTER SYSTEM CHART

Items	Fuel Injection System	Misfire	Other
MI (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 MI, 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, MI will light up.

*2: MI 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”

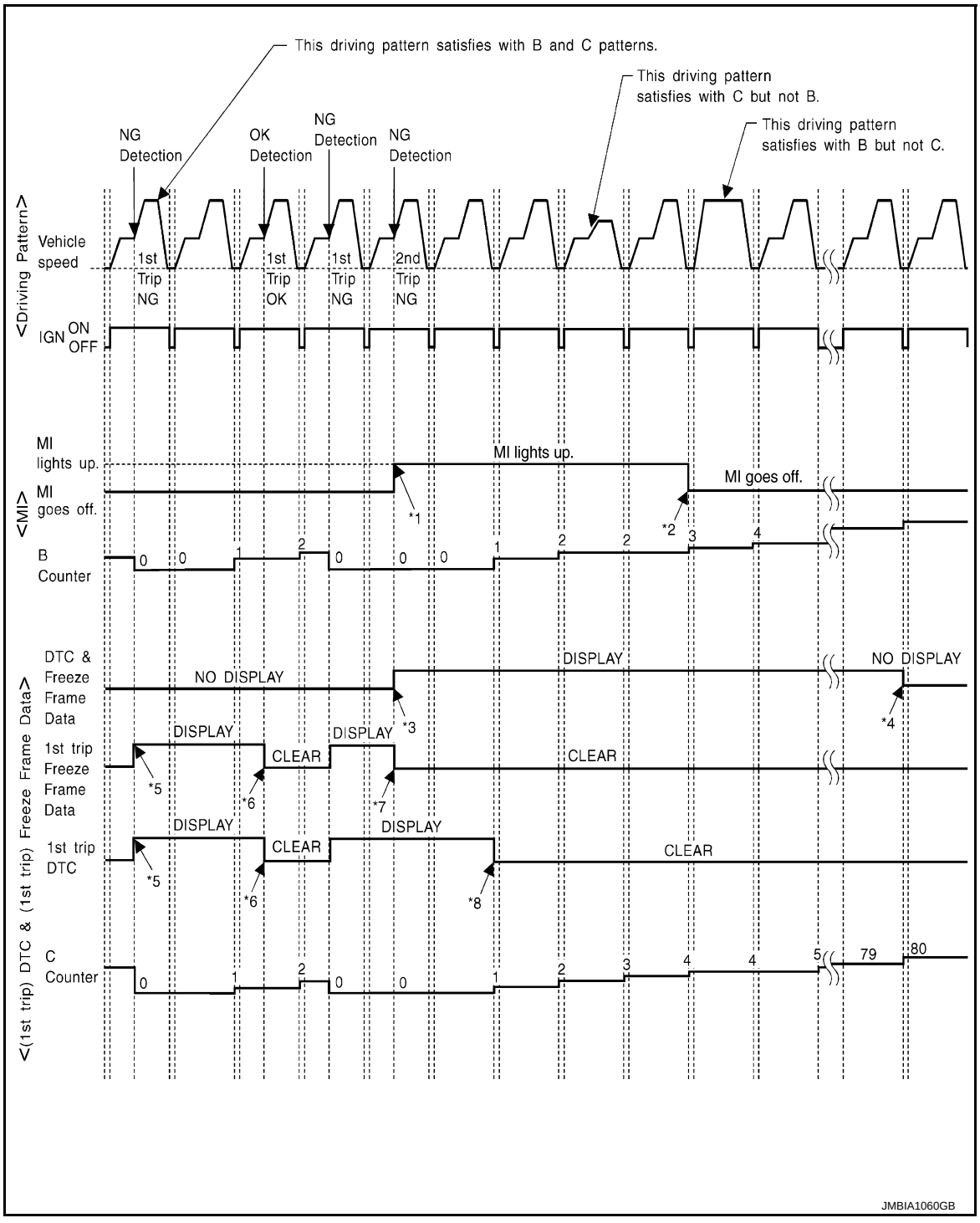
Driving Pattern B

Refer to EC-495, "DIAGNOSIS DESCRIPTION : Driving Pattern".

Driving Pattern C

Refer to EC-495, "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 MI, 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, MI will light up.

*2: MI 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-495, "DIAGNOSIS DESCRIPTION : Driving Pattern".
Driving Pattern B
Refer to EC-495, "DIAGNOSIS DESCRIPTION : Driving Pattern".

DIAGNOSIS DESCRIPTION : Driving Pattern

INFOID:0000000006709939

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.

DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code

INFOID:0000000006635105

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

SRT 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”

Self-diagnosis result		Example				
		Diagnosis	Ignition cycle ← ON → OFF ← ON → OFF ← ON → OFF ← ON →			
NG exists	Case 3	P0400	OK	OK	—	—
		P0402	—	—	—	—
		P1402	NG	—	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	—	1st trip DTC	DTC (= MI 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”.

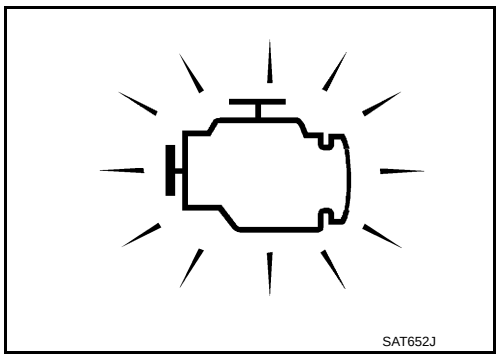
NOTE:

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 : Malfunction Indicator (MI)

INFOID:0000000006635106

- When detecting a DTC that affects exhaust gas, the exhaust emission-related control module transmits a malfunction indicator signal to ECM via CAN communication line.
  ECM prioritizes (MI: 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 MI, according to the signal transmitted from ECM, and alerts the driver of malfunction detection.
- Control modules that a DTC of MI ON/Blink is stored (Control module varies among DTCs.):


SAT652J

- ECM
- TCM

1. The MI illuminates when ignition switch is turned ON (engine is not running).
   NOTE:
   Check the MI circuit if MI does not illuminate. Refer to EC-789, "Component Function Check".
2. When the engine is started, the MI should go off.
   NOTE:
   If MI remains ON or continues blinking, a DTC(s) that affects exhaust gas is detected. In this case, Selfdiagnosis is required for performing inspection and repair.

On Board Diagnosis Function

INFOID:0000000006709941

ON BOARD DIAGNOSIS ITEM

The on board diagnostic system has the following functions.

Diagnostic test mode	Function
Bulb check	MI can be checked.
SRT status	ECM can read if SRT codes are set.
Malfunction warning	If ECM detects a malfunction, it illuminates or blinks MI 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-542, "Description".
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to EC-543, "Description".
Idle air volume learning	ECM can learn the idle air volume. Refer to EC-544, "Description".
Mixture ratio self-learning value clear	Mixture ratio self-learning value can be erased. Refer to EC-546, "Description".

BULB CHECK MODE

Description

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

Operation Procedure

1. Turn ignition switch ON.
2. The MI on the instrument panel should stay ON.
   If it remains OFF, check MI circuit. Refer to EC-789, "Component Function Check".

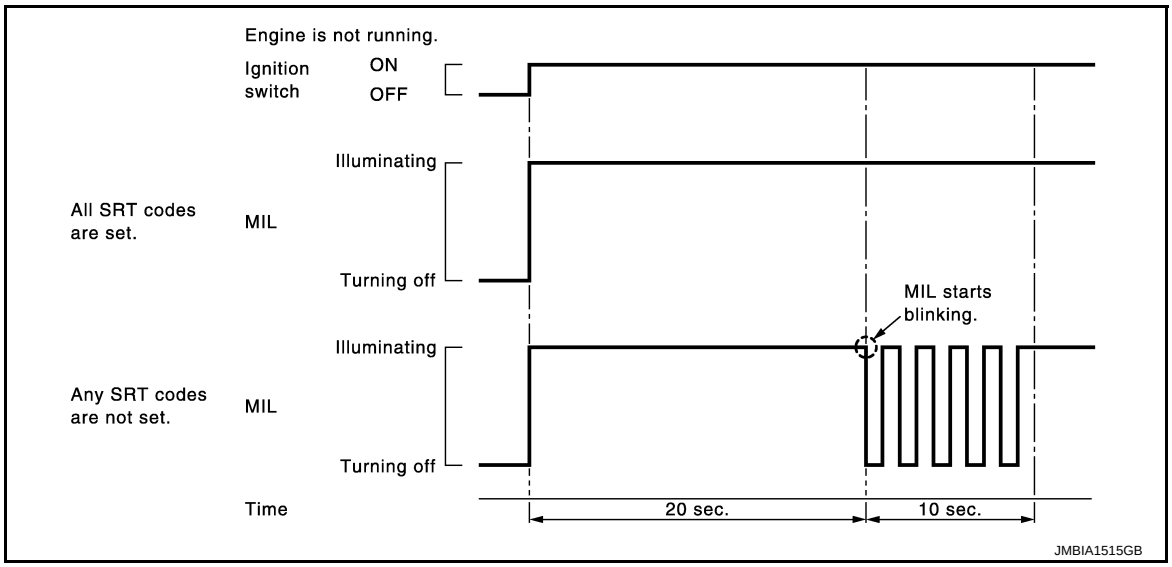
SRT STATUS MODE

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-496, "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 MI if all SRT codes are set.
   - ECM blinks MI for about 10 seconds if all SRT codes are not set.



MALFUNCTION WARNING MODE

Description

In this function ECM turns on or blinks MI 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 MI illuminates.
   If it remains OFF, check MI circuit. Refer to EC-789, "Component Function Check".
3. Start engine and let it idle.
   - For two trip detection logic diagnoses, ECM turns on MI when it detects the same malfunction twice in the two consecutive driving cycles.
   - For 1st trip detection logic diagnoses, ECM turns on MI when it detects a malfunction in one driving cycle.
   - ECM blinks MI when it detects a malfunction that may damage the three way catalyst (misfire).

SELF-DIAGNOSTIC RESULTS MODE

Description

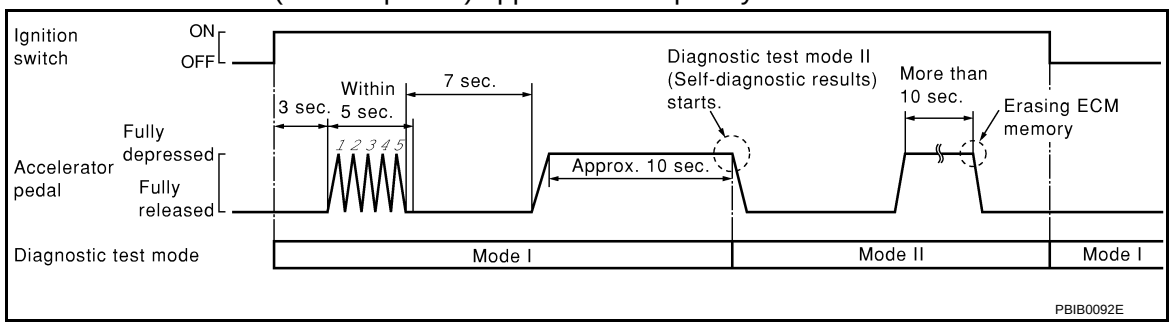
This function allows to indicate DTCs or 1st trip DTCs stored in ECM according to the number of times MI is blinking.

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.

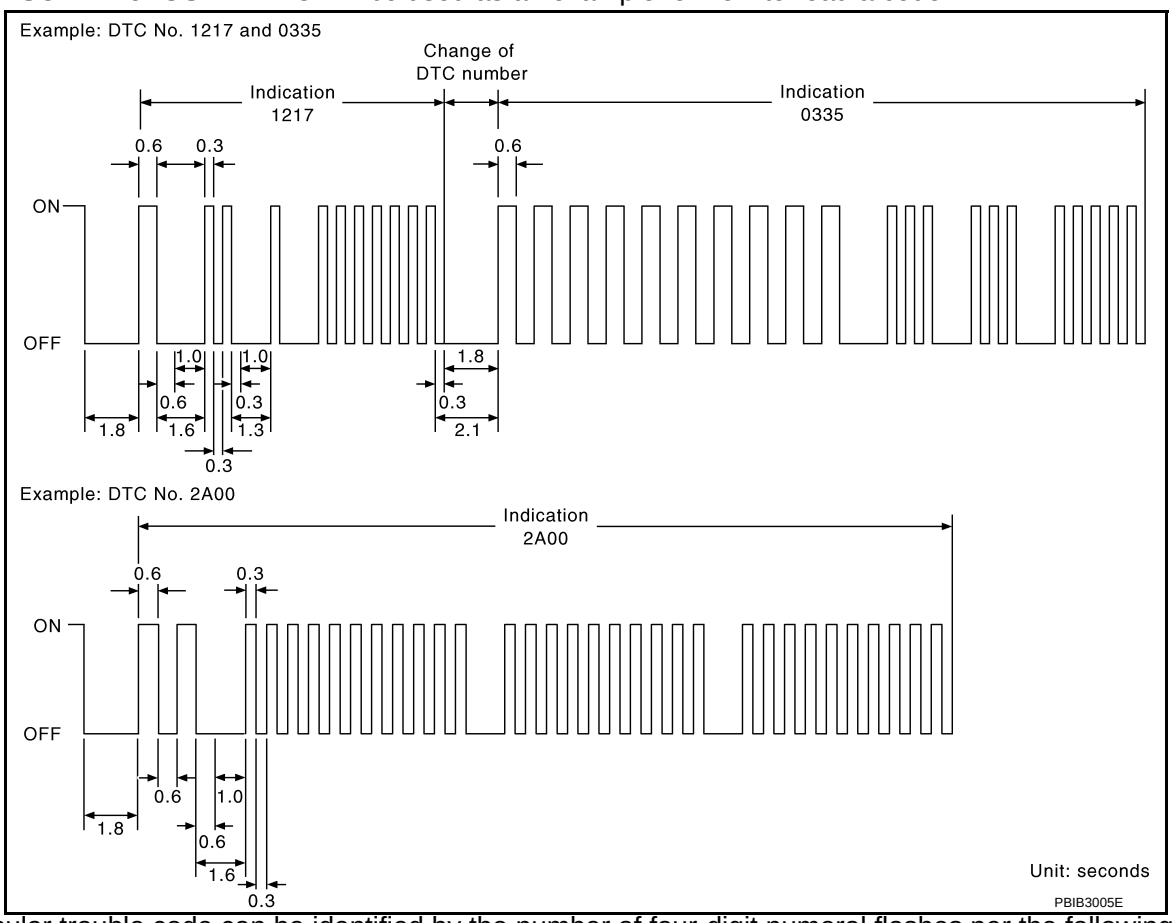
1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.
   - Fully depress the accelerator pedal.
   - Fully release the accelerator pedal.
3. Wait 7 seconds, fully depress the accelerator pedal and keep it depressed for approx. 10 seconds until the MI starts blinking.
   NOTE:
   Do not release the accelerator pedal for 10 seconds if MI 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 MI as shown below.
The DTC and 1st trip DTC are displayed at the same time. If the MI 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 MI illuminates in “malfunction warning” mode, it is a DTC; if two or more codes are displayed, they may be either DTCs

or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT-III or GST. A DTC will be used as an example for how to read a code.



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

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

The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-seconds) - OFF (0.6-seconds) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-seconds ON and 0.3-seconds OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.
A change from one trouble code to another occurs at an interval of 1.8-seconds OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. Refer to EC-522, "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-III Function

INFOID:0000000006496239

FUNCTION

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

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	• THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	• THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing mixture ratio self-learning value
TARGET IDLE RPM ADJ*	• IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	• IDLE CONDITION	When adjusting target ignition timing
CLSD THL POS LEARN	• IGNITION ON AND ENGINE STOPPED.	When learning throttle valve closed position

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

SELF DIAGNOSTIC RESULT MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-522, "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.

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

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DTC RESULTS	• The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to EC-522, "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.
S-FUEL TRM-B1 [%]	• “Short-term fuel trim” at the moment a malfunction is detected is displayed. • The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
ENGINE SPEED [rpm]	• The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	• The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH·P/S [%]	• The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	• The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	• The intake air temperature at the moment a malfunction is detected is displayed.
FUEL SYS-B1	• “Fuel injection system status” at the moment a malfunction is detected is displayed. • One mode in the following is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment) Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control Mode5: Open loop - has not yet satisfied condition to go to closed loop

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

DATA MONITOR MODE

Monitored Item

Monitored item	Unit	Description	Remarks
ENG SPEED	rpm	• Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	• Accuracy becomes poor if engine speed drops below the idle rpm. • If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1	V	• The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated. • When engine is running, specification range is indicated in “SPEC”.
B/FUEL SCHDL	ms	• “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	• When engine is running, specification range is indicated in “SPEC”.

Monitored item	Unit	Description	Remarks
A/F ALPHA-B1	%	• The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • When engine is running, specification range is indicated in “SPEC”. • This data also includes the data for the air-fuel ratio learning control.
COOLAN TEMP/S	°C or °F	• The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	• When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
A/F SEN1 (B1)	V	• The A/F signal computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed.	
HO2S2 (B1)	V	• The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S2 MNTR(B1)	RICH/LEAN	• Display of heated oxygen sensor 2 signal: RICH: means the amount of oxygen after three way catalyst is relatively small. LEAN: means the amount of oxygen after three way catalyst is relatively large.	• When the engine is stopped, a certain value is indicated.
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BATTERY VOLT	V	• The power supply voltage of ECM is displayed.	
ACCEL SEN 1	V	• The accelerator pedal position sensor signal voltage is displayed.	• ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2			
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.	
IGNITION SW	ON/OFF	• Indicates [ON/OFF] condition from ignition switch signal.	
HEATER FAN SW	ON/OFF	• Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW	ON/OFF	• Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1	msec	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
IGN TIMING	BTDC	• Indicates the ignition timing computed by ECM according to the input signals.	• When the engine is stopped, a certain value is indicated.
CAL/LD VALUE	%	• “Calculated load value” indicates the value of the current air flow divided by peak air flow.	

Monitored item	Unit	Description	Remarks
MASS AIRFLOW	g/s	• Indicates the mass air flow computed by ECM according to the signal voltage of the mass air flow sensor.	
PURG VOL C/V	%	• Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
INT/V TIM(B1)	°CA	• Indicates [°CA] of intake camshaft advance angle.	
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.	
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.	
COOLING FAN	HI/LOW/OFF	• Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI: High speed operation LOW: Low speed operation OFF: Stop	
HO2S2 HTR (B1)	ON/OFF	• Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
ALT DUTY SIG	ON/OFF	• The control condition of the power generation voltage variable control (determined by ECM according to the input signals) is indicated. ON: Power generation voltage variable control is active. OFF: Power generation voltage variable control is inactive.	
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	• Displays the condition of Idle Air Volume Learning YET: Idle air volume learning has not been performed yet. CMPLT: Idle air volume learning has already been performed successfully.	
TRVL AFTER MIL	km or mile	• Distance traveled while MI is activated.	
ENG OIL TEMP	°C or °F	• The engine oil temperature (determined by the signal voltage of the engine oil temperature sensor) is indicated.	
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.	

Monitored item	Unit	Description	Remarks
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 CUL 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.	
INT/A TEMP SE	°C or °F	• The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
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.	
SET VHCL SPD	km/h or mph	• The preset vehicle speed is displayed.	
MAIN SW	ON/OFF	• Indicates [ON/OFF] condition from MAIN switch signal.	
CANCEL SW	ON/OFF	• Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW	ON/OFF	• Indicates [ON/OFF] condition from RESUME/ACCELERATE switch signal.	
SET SW	ON/OFF	• Indicates [ON/OFF] condition from SET/COAST switch signal.	
BRAKE SW1	ON/OFF	• Indicates [ON/OFF] condition from 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.	
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.	
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.

Monitored item	Unit	Description	Remarks
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.	
KICKDOWN POS	ON/OFF	• Indicates [ON/OFF] condition of kickdown determined by the ECM according to the input signals.	
CLUTCH P/P SW	ON/OFF	• Indicates [ON/OFF] condition clutch pedal position switch signals.	• Models other than M/T models always display OFF.
SL MAIN SW	ON/OFF	• Indicates [ON/OFF] condition from speed limiter MAIN switch signals.	
FPCM	HI/MID/LOW/OFF	• The control condition of the fuel pump control module (FPCM) (determined by ECM according to the input signals) is indicated.	
BAT TEMP SEN	V	• The signal voltage from the battery temperature sensor is displayed.	
THRTL STK CNT B1	—	Not used.	
EOP SENSOR	mV	• The signal voltage of EOP sensor is displayed.	
FUEL PUMP DUTY	%	• The control condition of the fuel pump control module (FPCM) (determined by ECM according to the input signals) is indicated.	

NOTE:

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

ACTIVE TEST MODE

Test Item

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

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
ALTERNATOR DUTY	• Engine: Idel • Change duty ratio using CONSULT-III.	Battery voltage changes.	• Harness and connectors • IPDM E/R • Alternator
EXH V/T ASSIGN ANGLE	• Engine: Return to the original non-standard condition • Change exhaust valve timing using CONSULT-III.	If malfunctioning symptom disappears, see CHECK ITEM.	• Harness and connectors • Exhaust valve timing control solenoid valve
INT V/T ASSIGN ANGLE	• Engine: Return to the original non-standard condition • Change intake valve timing using CONSULT-III.	If malfunctioning symptom disappears, see CHECK ITEM.	• Harness and connectors • Intake valve timing control solenoid valve
FPCM	• Engine: Return to the original trouble condition • Select “LOW”, “MID” and “HI” with CONSULT-III.	Fuel pump speed changes or stops.	• Harness and connectors • Fuel pump control module (FPCM)

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

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

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

SRT WORK SUPPORT Mode

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

DTC WORK SUPPORT Mode

Test mode	Test item	Corresponding DTC No.	Reference page
A/F SEN1	A/F SEN1 (B1) P1278/P1279	P0133	EC-610, "DTC Logic"
	A/F SEN1 (B1) P1276	P0130	EC-600, "DTC Logic"
HO2S2	HO2S2 (B1) P1146	P0138	EC-621, "DTC Logic"
	HO2S2 (B1) P1147	P0137	EC-615, "DTC Logic"
	HO2S2 (B1) P0139	P0139	EC-629, "DTC Logic"

ECU DIAGNOSIS INFORMATION

ECM

Reference Value

INFOID:0000000006496241

VALUES ON THE DIAGNOSIS TOOL

Remarks:

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.

*Specification data may not be directly related to their components signals/values/operations.

i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

Monitor Item	Condition		Values/Status
ENG SPEED	• Run engine and compare CONSULT-III value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-558, "Description".		
B/FUEL SCHDL	See EC-558, "Description".		
A/F ALPHA-B1	See EC-558, "Description".		
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158F)
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
HO2S2 (B1)	• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		0 - 0.3 V ←→ Approx. 0.6 - 1.0 V
HO2S2 MNTR (B1)			LEAN ←→ RICH
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14 V
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9 V
		Accelerator pedal: Fully depressed	4.0 - 4.8 V
ACCEL SEN 2	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9 V
		Accelerator pedal: Fully depressed	3.9 - 4.8 V
TP SEN 1-B1	• Ignition switch: ON (Engine stopped) • Shift lever: 1st	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) • Shift lever:1st	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
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

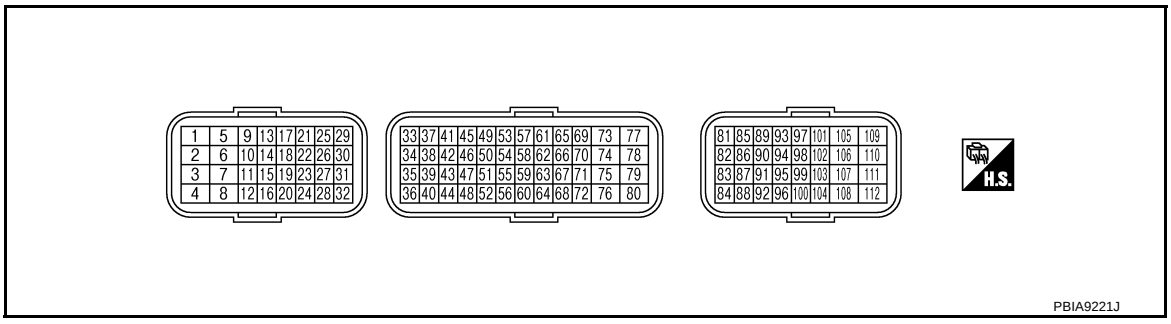
Monitor Item	Condition		Values/Status
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1	• Engine: After warming up • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
IGN TIMING	• Engine: After warming up • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	7°BTDC (CVT) 10°BTDC (M/T)
		2,000 rpm	25° - 45°BTDC
CAL/LD VALUE	• Engine: After warming up • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	• Engine: After warming up • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	1.0 - 4.0 g/s
		2,500 rpm	2.0 - 10.0 g/s
PURG VOL C/V	• Engine: After warming up • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0%
		2,000 rpm	0% - 50%
INT/V TIM (B1)	• Engine: After warming up • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	–5° - 5°CA
		When revving engine up to 2,000rpm Quickly	Approx. 0° - 40°CA
EXH/V TIM (B1)	• Engine: After warming up • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	–5° - 5°CA
		When revving engine up to 2,000rpm Quickly	Approx. 0° - 40°CA
INT/V SOL (B1)	• Engine: After warming up • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0% - 2%
		When revving engine up to 2,000rpm Quickly	Approx. 0% - 90%
AIR COND RLY	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
FUEL PUMP RLY	• For 1 seconds after turning ignition switch: ON • Engine running or cranking		ON
	• Except above		OFF
THRTL RELAY	• Ignition switch: ON		ON
COOLING FAN	• Engine: After warning up, idle the engine • Air conditioner switch: OFF	Engine coolant temperature is 98°C (208°F) or less	OFF
		Engine coolant temperature is between 98°C (208°F) and 99°C (210°F)	LOW
		Engine coolant temperature is 100°C (212°F) or more	HIGH

Monitor Item	Condition		Values/Status
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
ALT DUTY SIG	• Power generation voltage variable control: Operating		ON
	• Power generation voltage variable control: Not operating		OFF
VEHICLE SPEED	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as 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 MI has turned ON.	0 - 65,535 km (0 - 40,723 miles)
ENG OIL TEMP	• Engine: After warming up		More than 70°C (158F)
A/F S1 HTR (B1)	• Engine: After warming up, idle the engine (More than 140 seconds after starting engine)		4 - 100%
ALT DUTY	• Engine: Idle		0 - 80%
BAT CUR SEN	• Engine speed: Idle • Battery: Fully charged* • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load		Approx 2500 - 3500 mV
A/F ADJ-B1	• Engine running		–0.330 - 0.330
INT/A TEMP SE	• Ignition switch: ON		Indicates intake air temperature
P/N POSI SW	• Ignition switch: ON	Selector lever position: P or N (CVT) or Neutral (M/T)	ON
		Shift lever: Except above	OFF
AC PRESS SEN	• Engine: Idle • Both A/C switch and blower fan switch: ON (Compressor operates.)		1.0 - 4.0 V
SET VHCL SPD	• Engine: Running	ASCD: Operating	The preset vehicle speed is displayed
MAIN SW	• Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	• Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	• Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	• Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
BRAKE SW1 (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
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	• MAIN switch: ON • When vehicle speed: Between 40 km/h (25 MPH) and 150 km/h (93 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF
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
KICKDOWN POS	• Ignition switch: ON	Accelerator pedal: Fully released	OFF
		Accelerator pedal: Fully depressed	ON
CLUTCH P/P SW	• Ignition switch: ON	Clutch pedal: Fully released	OFF
		Clutch pedal: Fully depressed	ON
SL MAIN SW	• Ignition switch: ON	Speed limiter MAIN switch: Pressed	ON
		Speed limiter MAIN switch: Released	OFF
FPCM	• Ignition switch: OFF		OFF
	• For 1 seconds after turning ignition switch: ON		LOW
	• Engine: Idle • Engine coolant temperature: More than 10°C (50°F)		MID
	• Engine: Cranking		HI
BAT TEMP SEN	• Engine: After warming up • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	Indicates the temperature around the battery.
THRTL STK CNT B1	Not used.		—
EOP SENSOR	• Engine: After warming up • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	Approx. 1053 mV
		2,000 rpm	Approx. 1802 mV
FUEL PUMP DUTY	• Engine: After warming up • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	XX - XX%

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

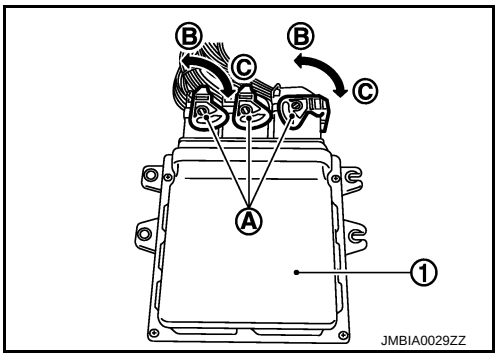
TERMINAL LAYOUT

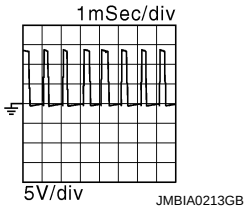
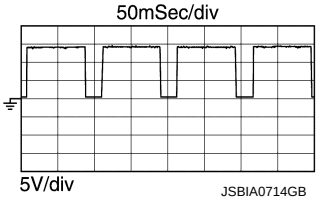
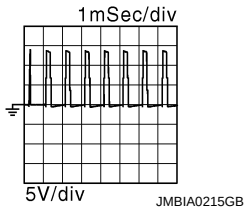
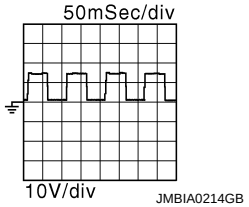


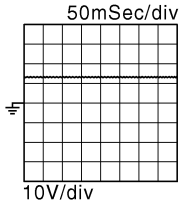
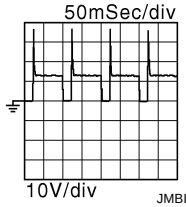
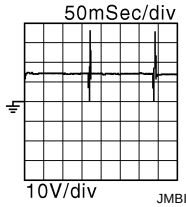
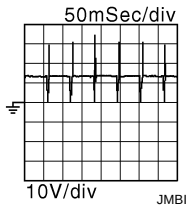
PHYSICAL VALUES

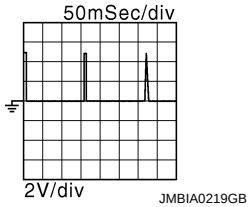
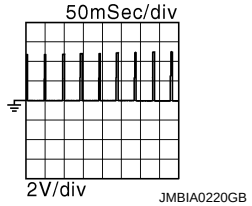
NOTE:

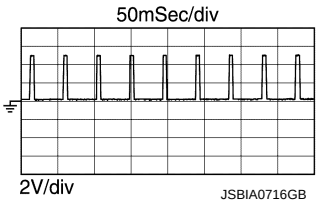
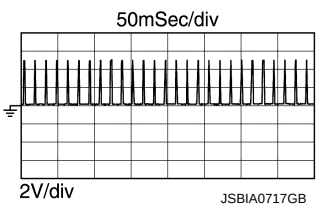
- ECM is located in the engine room left side near battery.
- When disconnecting ECM harness connector (A), loosen (C) it with levers as far as they will go as shown in the figure.
  - ECM (1)
  - Fasten (B)
- Connect a break-out box and harness adapter between the ECM and ECM harness connector.
  - Use extreme care not to touch 2 pins at one time.
  - Data is for comparison and may not be exact.
- Specification data are reference values and are measured between each terminals.
- Pulse signal is measured by CONSULT-III.

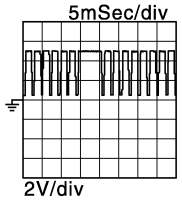
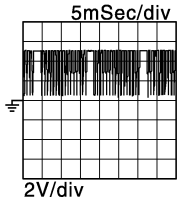


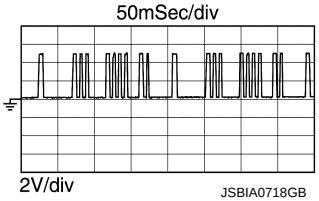
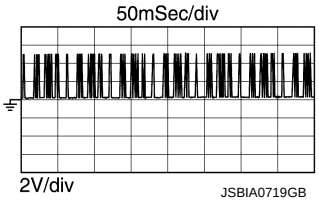
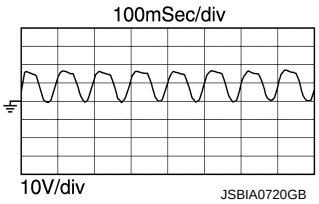
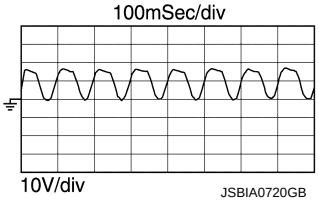
Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
1 (V)	108 (B/Y)	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	2.6 V★  JMBIA0213GB
2 (G)	108 (B/Y)	Throttle control motor power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
3 (G)	108 (B/Y)	A/F sensor 1 heater	Output	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8 V★  JSBIA0714GB
4 (P)	108 (B/Y)	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	1.8 V★  JMBIA0215GB
5 (G)	59 (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★  JMBIA0214GB
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)

Terminal No. +	Terminal No. –	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
9 (L)	108 (B/Y)	EVAP canister purge volume control solenoid valve	Output	[Engine is running] • Idle speed	BATTERY VOLTAGE (11 - 14 V)★  JMBIA0039GB
				[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.)	BATTERY VOLTAGE (11 - 14 V)★  JMBIA0216GB
10 (B)	—	ECM ground	—	—	—
11 (B)	—	ECM ground	—	—	—
12 (G) 16 (LG) 20 (P) 24 (L)	108 (B/Y)	Fuel injector No. 1 (Rear) Fuel injector No. 3 (Rear) Fuel injector No. 2 (Rear) Fuel injector No. 4 (Rear)	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14 V)★  JMBIA0221GB
25 (SB) 29 (SB) 30 (SB) 31 (SB)		Fuel injector No. 4 (Front) Fuel injector No. 3 (Front) Fuel injector No. 2 (Front) Fuel injector No. 1 (Front)		[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V)★  JMBIA0222GB
15 (Y)	108 (B/Y)	Throttle control motor relay	Output	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON]	0 - 1.0 V

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
17 (R) 18 (LG) 21 (W)	108 (B/Y)	Ignition signal No. 1 Ignition signal No. 2 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★  JMBIA0219GB
22 (BG)		Ignition signal No. 3		[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	0.2 - 0.5 V★  JMBIA0220GB
23 (GR)	108 (B/Y)	Fuel pump relay	Output	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.0 V
				[Ignition switch: ON] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14 V)
27 (R)	108 (B/Y)	Fuel pump control module (FPCM) check	Input	[Engine is running] • Warm-up condition • Idle speed	8 - 13.5 V
28 (BR)	108 (B/Y)	Fuel pump control module (FPCM)	Output	[Ignition switch: ON] • For 1 second after turning ignition switch ON	1.3 V
				[When cranking engine]	4.0 V
				[Engine is running] • Warm-up condition • Idle speed	2.7 V
32 (P)	108 (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)
33 (G)	36 (R)	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36 V
				[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75 V

Terminal No. +	Terminal No. –	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
34 (W)	36 (R)	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75 V
				[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36 V
36 (R)	—	Sensor ground (Throttle position sensor)	—	—	—
37 (W)	40 —	Knock sensor	Input	[Engine is running] • Idle speed	2.5 V
38 (LG)	44 (B)	Engine coolant temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.
39 (GR)	68 (BR)	Battery temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with battery temperature.
40 —	—	Sensor ground (Knock sensor shield circuit)	—	—	—
44 (V)	—	Sensor ground (Engine coolant temperature sensor)	—	—	—
45 (G)	52 (W)	Mass air flow sensor	Input	[Ignition switch ON] • Engine stopped	0.4 V
				[Engine is running] • Warm-up condition • Idle speed	0.9 - 1.3 V
				[Engine is running] • Warm-up condition • Engine is revving from idle to about 4,000 rpm	0.9 - 1.3 to 2.4 V (Check for linear voltage rise in response to engine being increased to about 4,000 rpm.)
46 (SB)	52 (W)	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.
47 (G)	60 (W)	Engine oil pressure sensor	Input	[Engine is running]	0.75 - 4.50 V Output voltage varies with engine oil pressure.
48 (Y)	63 (L)	Exhaust camshaft position sensor	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	4.3 V★ 
				[Engine is running] • Engine speed: 2,000 rpm	4.3 V★ 

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
49 (W)	108 (B/Y)	A/F sensor 1	Input	[Ignition switch: ON]	2.2 V
50 (W)	59 (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
52 (W)	—	Sensor ground (Mass air flow sensor/Intake air temperature sensor)	—	—	—
53 (W)	108 (B/Y)	A/F sensor 1	Input	[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	1.8 V Output voltage varies with air fuel ratio.
54 (BG)	—	Sensor ground (Engine oil temperature sensor)	—	—	—
57 (P)	54 (BG)	Engine oil temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine oil temperature.
58 (G)	68 (BR)	Battery current sensor	Input	[Engine is running] • Battery: Fully charged* • Idle speed	1.8 V Output voltage varies with air fuel ratio.
59 (R)	—	Sensor ground (Heated oxygen sensor 2)	—	—	—
60 (W)	—	Sensor ground (Engine oil pressure sensor)	—	—	—
61 (R)	62 (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★  JMBIA2185GB
				[Engine is running] • Engine speed: 2,000 rpm	4.0 V★  JMBIA2186GB
62 (W)	—	Sensor ground (Crankshaft position sensor)	—	—	—
63 (L)	—	Sensor ground (Camshaft position sensor)	—	—	—

Terminal No. +	Terminal No. –	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
65 (G)	63 (BR)	Intake camshaft position sensor	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	4.3 V★ 
				[Engine is running] • Engine speed is 2,000 rpm	4.3 V★ 
68 (BR)	—	Sensor ground (Battery current sensor)	—	—	—
69 (BR)	108 (B/Y)	Park/Neutral position signal	Input	[Ignition switch: ON] • Shift lever: P or N (CVT), Neutral (M/T)	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON] • Shift lever: Except above position	0 V
71 (V)	68 (BR)	Sensor power supply (Battery current sensor)	—	[Ignition switch: ON]	5 V
72 (B)	36 (R)	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5 V
73 (Y)	108 (B/Y)	Intake 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 • When revving engine up to 2,000rpm quickly	7 - 10 V★ 
74 (R)	60 (W)	Sensor power supply (Engine oil pressure sensor)	—	[Ignition switch: ON]	5 V
75 (G)	62 (W)	Sensor power supply (Crankshaft position sensor)	—	[Ignition switch: ON]	5 V
77 (G)	108 (B/Y)	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 • When revving engine up to 2,000rpm quickly	7 - 10 V★ 

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
78 (G)	63 (L)	Sensor power supply (Camshaft position sensor)	—	[Ignition switch: ON]	5 V
81 (Y)	108 (B/Y)	Power supply for ECM (Back-up)	Input	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
82 (SB)	108 (B/Y)	Starter motor relay cut off signal	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Idle speed	BATTERY VOLTAGE (11 - 14 V)
83 (P)	—	CAN-L	Input/ Output	—	—
84 (L)	—	CAN-H	Input/ Output	—	—
85 (P)	98 (V)	Refrigerant pressure sensor	Input	[Engine is running] • Warm-up condition • Both A/C switch and blower fan switch: ON (Compressor operates)	1.0 - 4.0 V
87 (V)	108 (B/Y)	Starter motor relay control signal	Output	[Engine is running] • Warm-up condition • Idle speed • Selector lever: D • Engine speed: Below 1,500 rpm **NOTE:** To decrease engine speed, refer to the DTC detection condition B of P1650.	0 V (While operating the starter motor)
				[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
88 (R)	—	Data link connector	Input/ Output	—	—
91 (L)	108 (B/Y)	Speed limiter main switch	Input	[Ignition switch: OFF] • Speed limiter main switch: OFF	0 V
				[Ignition switch: OFF] • Speed limiter main switch: OFF	BATTERY VOLTAGE (11 - 14 V)
92 (GR)	108 (B/Y)	Clutch pedal position switch	Output	[Ignition switch: ON] • Clutch pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON] • Clutch pedal: Fully depressed	0 V
93 (O)	108 (B/Y)	Ignition switch	Input	[Ignition switch: OFF]	0 V
				[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
94 (P)	95 (B)	ASCD steering switch	Input	[Ignition switch: ON] • ASCD steering switch: OFF	4 V
				[Ignition switch: ON] • CANCEL switch: Pressed	1 V
				[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3 V
				[Ignition switch: ON] • SET/COAST switch: Pressed	2 V
95 (B)	—	Sensor ground (ASCD steering switch)	—	—	—

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
96 (BR)	108 (B/Y)	ASCD main switch	Input	[Ignition switch: OFF] • ASCD main switch: OFF	0 V
				[Ignition switch: OFF] • ASCD main switch: OFF	BATTERY VOLTAGE (11 - 14 V)
98 (V)	—	Sensor ground (Refrigerant pressure sensor)	—	—	—
99 (SB)	108 (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)
100 (G)	108 (B/Y)	Brake pedal position switch	Input	[Ignition switch: ON] • Brake pedal: Slightly depressed	0 V
				[Ignition switch: ON] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)
101 (L)	98 (V)	Sensor power supply (Refrigerant pressure sensor)	—	[Ignition switch: ON]	5 V
102 (O)	104 (Y)	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5 V
103 (W)	104 (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
104 (Y)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
105 (G)	108 (B/Y)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
106 (V)	111 (GR)	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5 V
108 (B/Y)	—	ECM ground	—	—	—
110 (R)	111 (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
111 (GR)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
*: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-111, "How to Handle Battery".

Fail Safe

INFOID:0000000006496242

NON DTC RELATED ITEM

Detected items	Engine operating condition in fail-safe mode	Remarks	Reference page
Malfunction indicator circuit	Engine speed will not rise more than 2,500 rpm due to the fuel cut	When there is an open circuit on MI circuit, the ECM cannot warn the driver by lighting up MI when there is malfunction on engine control system. Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MI circuit is open by means of operating fail safe function. The fail safe function also operates when above diagnoses except MI circuit are detected and demands the driver to repair the malfunction.	EC-789, "Component Function Check"

DTC RELATED ITEM

DTC No.	Detected items	Engine operating condition in fail safe mode	
P0011	Intake valve timing control	The signal is not energized to the intake valve timing control solenoid valve and the valve control does not function.	
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the following conditions. CONSULT-III displays the engine coolant temperature decided by ECM.	
		Condition	Engine coolant temperature decided (CONSULT-III display)
		Just as ignition switch is turned ON or START	40°C (104°F)
		Approx. 4 minutes or more after engine starting	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
		When the fail safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.	
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.	
P0605	ECM	(When ECM calculation function is malfunctioning:) ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
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.	
P1805	Brake switch	ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.	
		Vehicle condition	Driving condition
		When engine is idling	Normal
		When accelerating	Poor acceleration
P2100 P2103	Throttle control motor relay	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P2101	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P2118	Throttle control motor	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	

DTC No.	Detected items	Engine operating condition in fail safe mode
P2119	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
		(When throttle valve opening angle in fail safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in 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:0000000006496243

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	• U1001 CAN communication line • U1010 CAN communication • P0102 P0103 Mass air flow sensor • P0112 P0113 Intake air temperature sensor • P0117 P0118 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor • P0327 P0328 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 Camshaft position sensor (PHASE) • P0500 Vehicle speed sensor • P0605 ECM • P0643 Sensor power supply • P0705 Transmission range switch • P0850 Park/neutral position (PNP) switch • P1610 - P1615 NATS • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor

Priority	Detected items (DTC)
2	• P0031 P0032 Air fuel ratio (A/F) sensor 1 heater • P0075 Intake valve timing control solenoid valve • P0130 P0131 P0132 P0133 P2A00 Air fuel ratio (A/F) sensor 1 • P0137 P0138 P0139 Heated oxygen sensor 2 • P0141 Heated oxygen sensor 2 heater • P0444 EVAP canister purge volume control solenoid valve • P0603 ECM • P0710 P0715 P0720 P0740 P0744 P0745 P0746 P0776 P0778 P0840 P1740 P1777 P1778 CVT related sensors, solenoid valves and switches • P1217 Engine over temperature (OVERHEAT) • P1805 Brake switch • P2100 P2103 Throttle control motor relay • P2101 Electric throttle control function • P2118 Throttle control motor
3	• P0011 Intake valve timing control • P0171 P0172 Fuel injection system function • P0300 - P0304 Misfire • P0420 Three way catalyst function • P1212 TCS communication line • P1564 ASCD steering switch • P1572 ASCD brake switch • P1574 ASCD vehicle speed sensor • P1715 Input speed sensor • P2119 Electric throttle control actuator

DTC Index

INFOID:0000000006496244

×:Applicable —: Not applicable

DTC*1		Items (CONSULT-III screen terms)	SRT code	Trip	MI	Reference page
CONSULT-III GST*2	ECM*3					
U1000	1000	CAN COMM CIRCUIT	—	1	×	EC-569
U1001	1001*4	CAN COMM CIRCUIT	—	2	—	EC-569
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	—	**—**
P0011	0011	INT/V TIM CONT-B1	—	2	×	EC-570
P0014	0014	EXT/V TIM CONT-B1	—	2	×	EC-574
P0031	0031	A/F SEN1 HTR (B1)	—	2	×	EC-577
P0032	0032	A/F SEN1 HTR (B1)	—	2	×	EC-577
P0037	0037	HO2S2 HTR (B1)	—	2	×	EC-580
P0038	0038	HO2S2 HTR (B1)	—	2	×	EC-580
P0075	0075	INT/V TIM V/CIR-B1	—	2	×	EC-583
P0078	0078	EX V/T ACT/CIRC-B1	—	2	×	EC-585
P0102	0102	MAF SEN/CIRCUIT-B1	—	1	×	EC-588
P0103	0103	MAF SEN/CIRCUIT-B1	—	1	×	EC-588
P0112	0112	IAT SEN/CIRCUIT-B1	—	2	×	EC-593
P0113	0113	IAT SEN/CIRCUIT-B1	—	2	×	EC-593
P0117	0117	ECT SEN/CIRC	—	1	×	EC-595
P0118	0118	ECT SEN/CIRC	—	1	×	EC-595
P0122	0122	TP SEN 2/CIRC-B1	—	1	×	EC-597
P0123	0123	TP SEN 2/CIRC-B1	—	1	×	EC-597
P0130	0130	A/F SENSOR1 (B1)	×	2	×	EC-600
P0131	0131	A/F SENSOR1 (B1)	—	2	×	EC-604

DTC*1		Items (CONSULT-III screen terms)	SRT code	Trip	MI	Reference page
CONSULT-III GST*2	ECM*3					
P0132	0132	A/F SENSOR1 (B1)	—	2	×	EC-607
P0133	0133	A/F SENSOR1 (B1)	×	2	×	EC-610
P0137	0137	HO2S2 (B1)	×	2	×	EC-615
P0138	0138	HO2S2 (B1)	×	2	×	EC-621
P0139	0139	HO2S2 (B1)	×	2	×	EC-629
P0171	0171	FUEL SYS-LEAN-B1	—	2	×	EC-635
P0172	0172	FUEL SYS-RICH-B1	—	2	×	EC-639
P0197	0197	EOP SEN/CIRC	—	2	×	EC-643
P0198	0198	EOP SEN/CIRC	—	2	×	EC-643
P0222	0222	TP SEN 1/CIRC-B1	—	1	×	EC-645
P0223	0223	TP SEN 1/CIRC-B1	—	1	×	EC-645
P0300	0300	MULTI CYL MISFIRE	—	1 or 2	× or —	EC-648
P0301	0301	CYL 1 MISFIRE	—	1 or 2	× or —	EC-648
P0302	0302	CYL 2 MISFIRE	—	1 or 2	× or —	EC-648
P0303	0303	CYL 3 MISFIRE	—	1 or 2	× or —	EC-648
P0304	0304	CYL 4 MISFIRE	—	1 or 2	× or —	EC-648
P0327	0327	KNOCK SEN/CIRC-B1	—	2	—	EC-654
P0328	0328	KNOCK SEN/CIRC-B1	—	2	—	EC-654
P0335	0335	CKP SEN/CIRCUIT	—	2	×	EC-656
P0340	0340	CMP SEN/CIRC-B1	—	2	×	EC-660
P0420	0420	TW CATALYST SYS-B1	×	2	×	EC-664
P0444	0444	PURG VOLUME CONT/V	—	2	×	EC-669
P0500	0500	VEHICLE SPEED SEN A*5	—	2	×	EC-672
P0520	0520	EOP SENSOR/SWITCH	—	1	—	EC-674
P0524	0524	ENGINE OIL PRESSURE	—	1	—	EC-678
P0603	0603	ECM BACK UP/CIRCUIT*6	—	2	×	EC-681
P0605	0605	ECM	—	1 or 2	× or —	EC-683
P0607	0607	ECM	—	1	×	EC-685
P0643	0643	SENSOR POWER/CIRC	—	1	×	EC-686
P0850	0850	P-N POS SW/CIRCUIT	—	2	×	EC-688
P1212	1212	TCS/CIRC	—	2	—	EC-691
P1217	1217	ENG OVER TEMP	—	1	×	EC-692
P1220	1220	FUEL PUMP	—	1	—	EC-695
P1225	1225	CTP LEARNING-B1	—	2	—	EC-698
P1226	1226	CTP LEARNING-B1	—	2	—	EC-699
P1550	1550	BAT CURRENT SENSOR	—	2	—	EC-700
P1551	1551	BAT CURRENT SENSOR	—	2	—	EC-703
P1552	1552	BAT CURRENT SENSOR	—	2	—	EC-703
P1553	1553	BAT CURRENT SENSOR	—	2	—	EC-706
P1554	1554	BAT CURRENT SENSOR	—	2	—	EC-709
P1556	1556	BAT TMP SEN/CIRC	—	2	—	EC-712
P1557	1557	BAT TMP SEN/CIRC	—	2	—	EC-712

DTC*1		Items (CONSULT-III screen terms)	SRT code	Trip	MI	Reference page
CONSULT-III GST*2	ECM*3					
P1564	1564	ASCD SW	—	1	—	EC-714
P1572	1572	ASCD BRAKE SW	—	1	—	EC-717
P1574	1574	ASCD VHL SPD SEN	—	1	—	EC-723
P1610	1610	LOCK MODE	—	2	—	SEC-52 SEC-192
P1611	1611	ID DISCORD, IMMU-ECM	—	2	—	SEC-53 SEC-193
P1612	1612	CHAIN OF ECM-IMMU	—	2	—	SEC-54 SEC-194
P1614	1614	CHAIN OF IMMU-KEY	—	2	—	SEC-55 SEC-195
P1615	1615	DIFFERENCE OF KEY	—	2	—	SEC-198
P1650	1650	STR MTR RELAY2	—	2	× or —	EC-725
P1651	1651	STR MTR RELAY	—	2	×	EC-728
P1652	1652	STR MTR SYS COMM	—	1	×	EC-731
P1715	1715	IN PULY SPEED	—	2	—	EC-733
P1720	1720	V/SP SEN (A/T OUT)	—	2	—	TM-209
P1805	1805	BRAKE SW/CIRCUIT	—	2	—	EC-734
P2100	2100	ETC MOT PWR-B1	—	1	×	EC-737
P2101	2101	ETC FNCTN/CIRC-B1	—	1	×	EC-740
P2103	2103	ETC MOT PWR	—	1	×	EC-737
P2118	2118	ETC MOT-B1	—	1	×	EC-744
P2119	2119	ETC ACTR-B1	—	1	×	EC-746
P2122	2122	APP SEN 1/CIRC	—	1	×	EC-748
P2123	2123	APP SEN 1/CIRC	—	1	×	EC-748
P2127	2127	APP SEN 2/CIRC	—	1	×	EC-751
P2128	2128	APP SEN 2/CIRC	—	1	×	EC-751
P2135	2135	TP SENSOR-B1	—	1	×	EC-755
P2138	2138	APP SENSOR	—	1	×	EC-758
P2A00	2A00	A/F SENSOR1 (B1)	—	2	×	EC-762

*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 troubleshooting for this DTC needs CONSULT-III.

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

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

Test Value and Test Limit

INFOID:0000000006496246

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	89H	84H	The amount of shift in air fuel ratio
			P2A00	8AH	84H	The amount of shift in air fuel ratio
			P0130	8BH	0BH	Difference in sensor output voltage
			P0133	8CH	83H	Response gain at the limited frequency
			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
	02H	Heated oxygen sensor 2 (Bank 1)	P0138	07H	0CH	Minimum sensor output voltage for test cycle
			P0137	08H	0CH	Maximum sensor output voltage for test cycle
			P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
	03H	Heated oxygen sensor 3 (Bank 1)	P0143	07H	0CH	Minimum sensor output voltage for test cycle
			P0144	08H	0CH	Maximum sensor output voltage for test cycle
			P0146	80H	0CH	Sensor output voltage
			P0145	81H	0CH	Difference in sensor output voltage

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P0151	83H	0BH	Minimum sensor output voltage for test cycle
			P0151	84H	0BH	Maximum sensor output voltage for test cycle
			P0150	85H	0BH	Minimum sensor output voltage for test cycle
			P0150	86H	0BH	Maximum sensor output voltage for test cycle
			P0153	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0153	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A03	89H	84H	The amount of shift in air fuel ratio
			P2A03	8AH	84H	The amount of shift in air fuel ratio
			P0150	8BH	0BH	Difference in sensor output voltage
			P0153	8CH	83H	Response gain at the limited frequency
			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
			P015D	94H	01H	O2 Sensor Delayed Response - Lean to Rich Bank 2 Sensor 1
	06H	Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for test cycle
			P0157	08H	0CH	Maximum sensor output voltage for test cycle
			P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
	07H	Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for test cycle
			P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage
			P0165	81H	0CH	Difference in sensor output voltage

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
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
VVT SYSTEM	35H	VVT Monitor (Bank1)	P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
	36H	VVT Monitor (Bank2)	P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
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
O2 SENSOR HEATER	41H	A/F sensor 1 heater (Bank 1)	Low Input:P0031 High Input:P0032	81H	0BH	Converted value of Heater electric current to voltage
	42H	Heated oxygen sensor 2 heater (Bank 1)	Low Input:P0037 High Input:P0038	80H	0CH	Converted value of Heater electric current to voltage
	43H	Heated oxygen sensor 3 heater (Bank 1)	P0043	80H	0CH	Converted value of Heater electric current to voltage
	45H	A/F sensor 1 heater (Bank 2)	Low Input:P0051 High Input:P0052	81H	0BH	Converted value of Heater electric current to voltage
	46H	Heated oxygen sensor 2 heater (Bank 2)	Low Input:P0057 High Input:P0058	80H	0CH	Converted value of Heater electric current to voltage
	47H	Heated oxygen sensor 3 heater (Bank 2)	P0063	80H	0CH	Converted value of Heater electric current to voltage
Secondary Air	71H	Secondary Air system	P0411	80H	01H	Secondary Air Injection System Incorrect Flow Detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary Air Injection System Insufficient Flow
			P2445	82H	01H	Secondary Air Injection System Pump Stuck Off
			P2448	83H	01H	Secondary Air Injection System High Airflow
			Bank1: P2440 Bank2: P2442	84H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2440	85H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2444	86H	01H	Secondary Air Injection System Pump Stuck On
FUEL SYSTEM	81H	Fuel injection system function (Bank 1)	P0171 or P0172	80H	2FH	Long term fuel trim
			P0171 or P0172	81H	24H	The number of lambda control clamped
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	80H	2FH	Long term fuel trim
			P0174 or P0175	81H	24H	The number of lambda control clamped

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

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

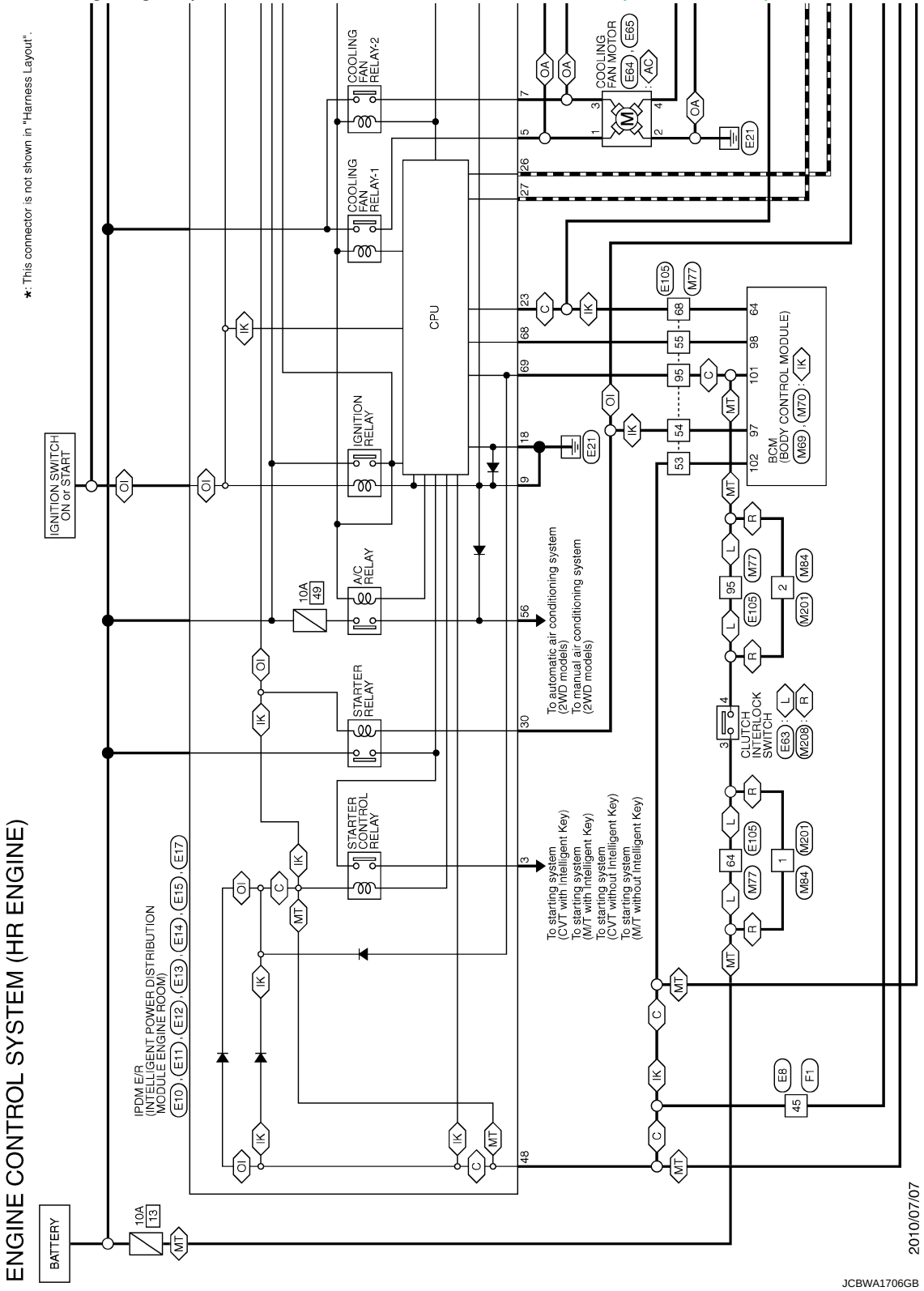
WIRING DIAGRAM

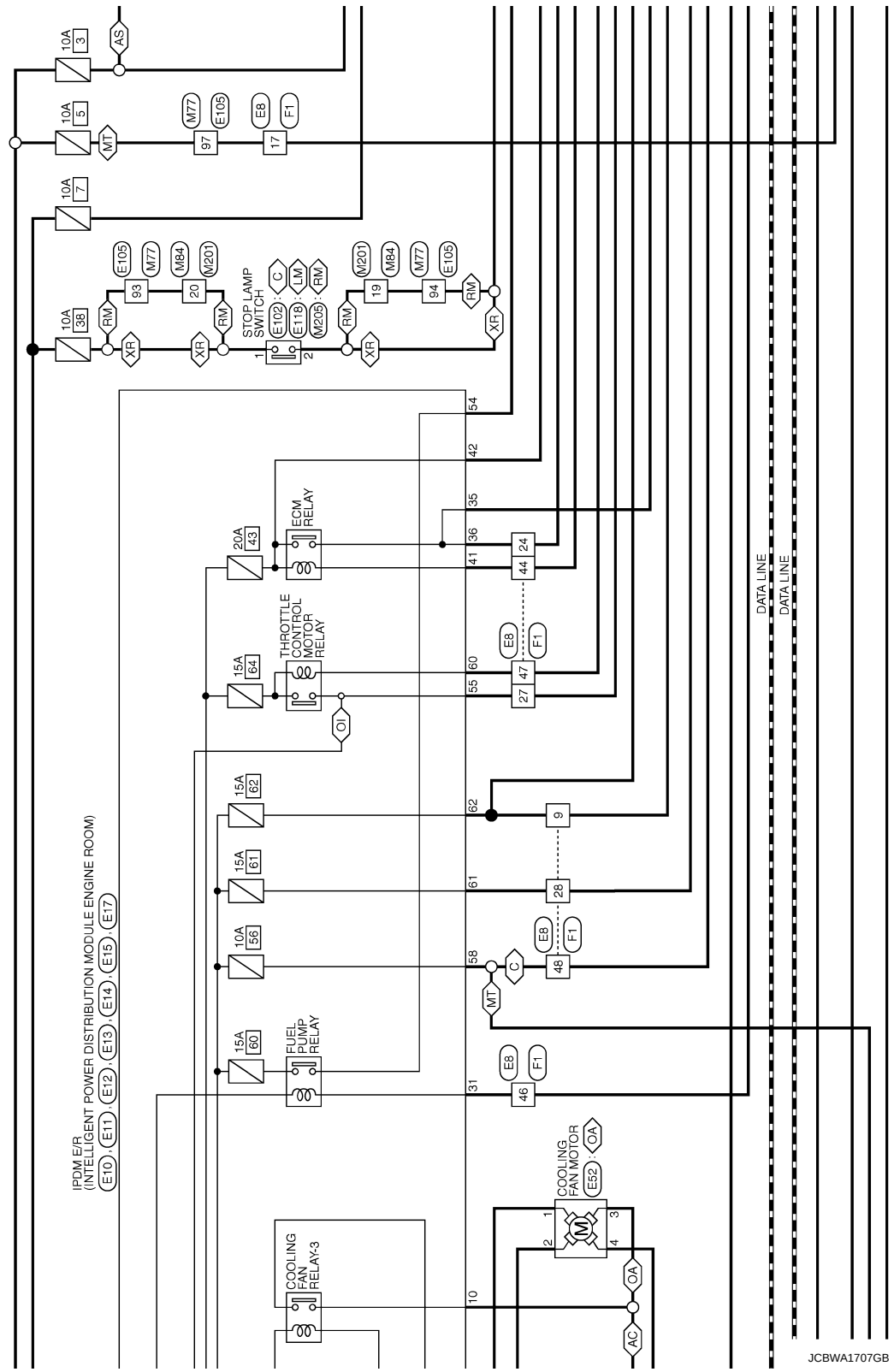
ENGINE CONTROL SYSTEM

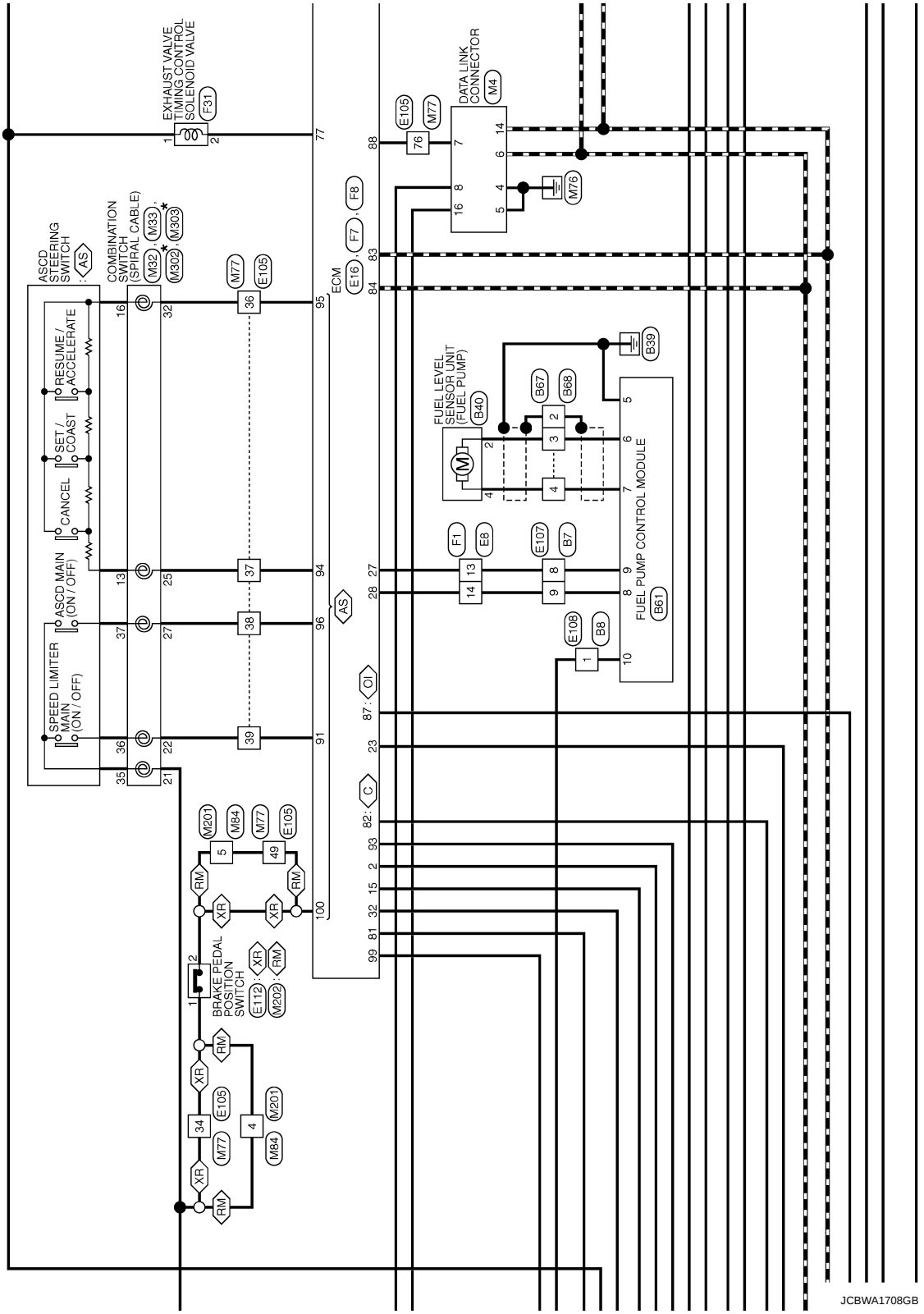
Wiring Diagram

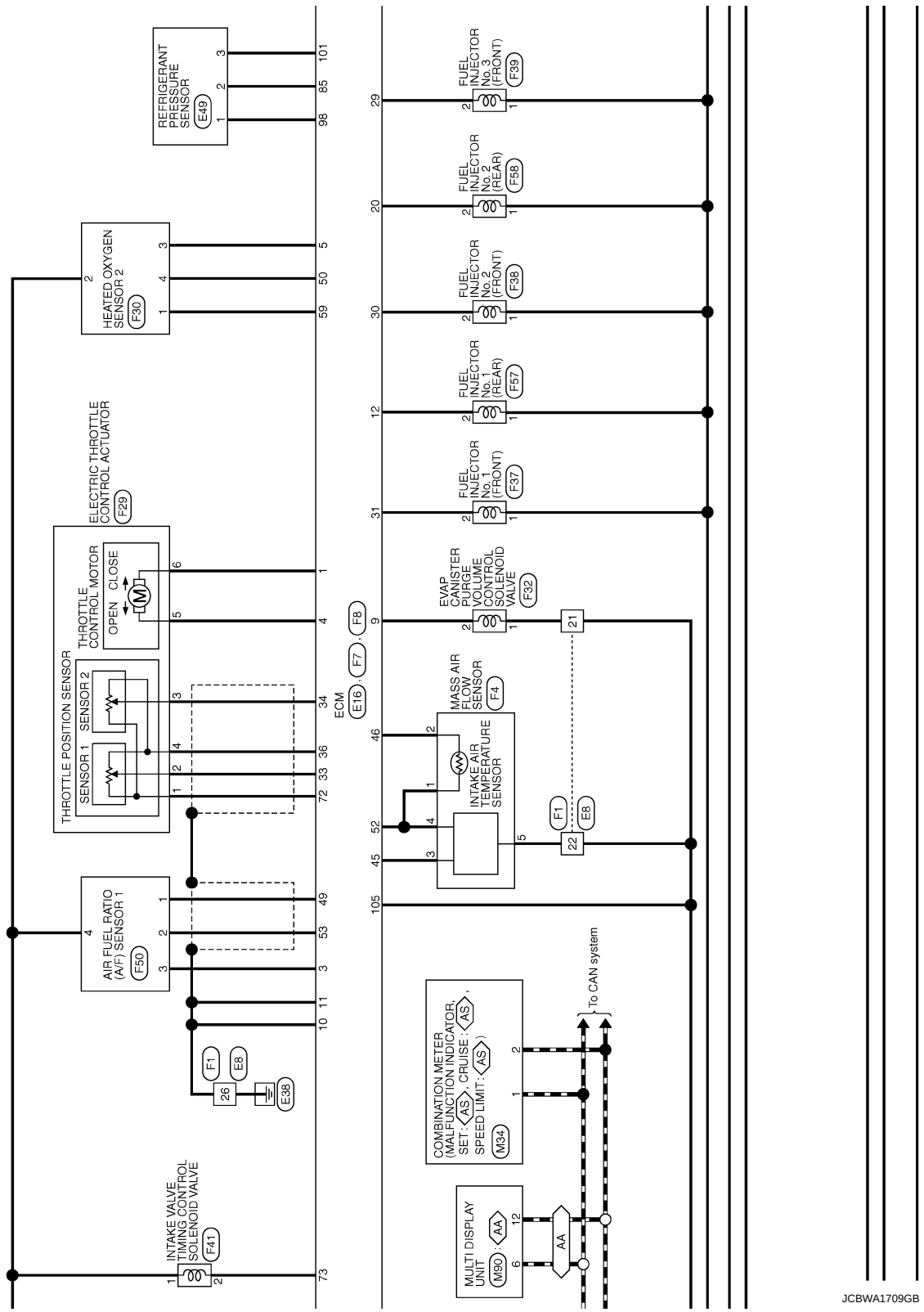
INFOID:0000000006496247

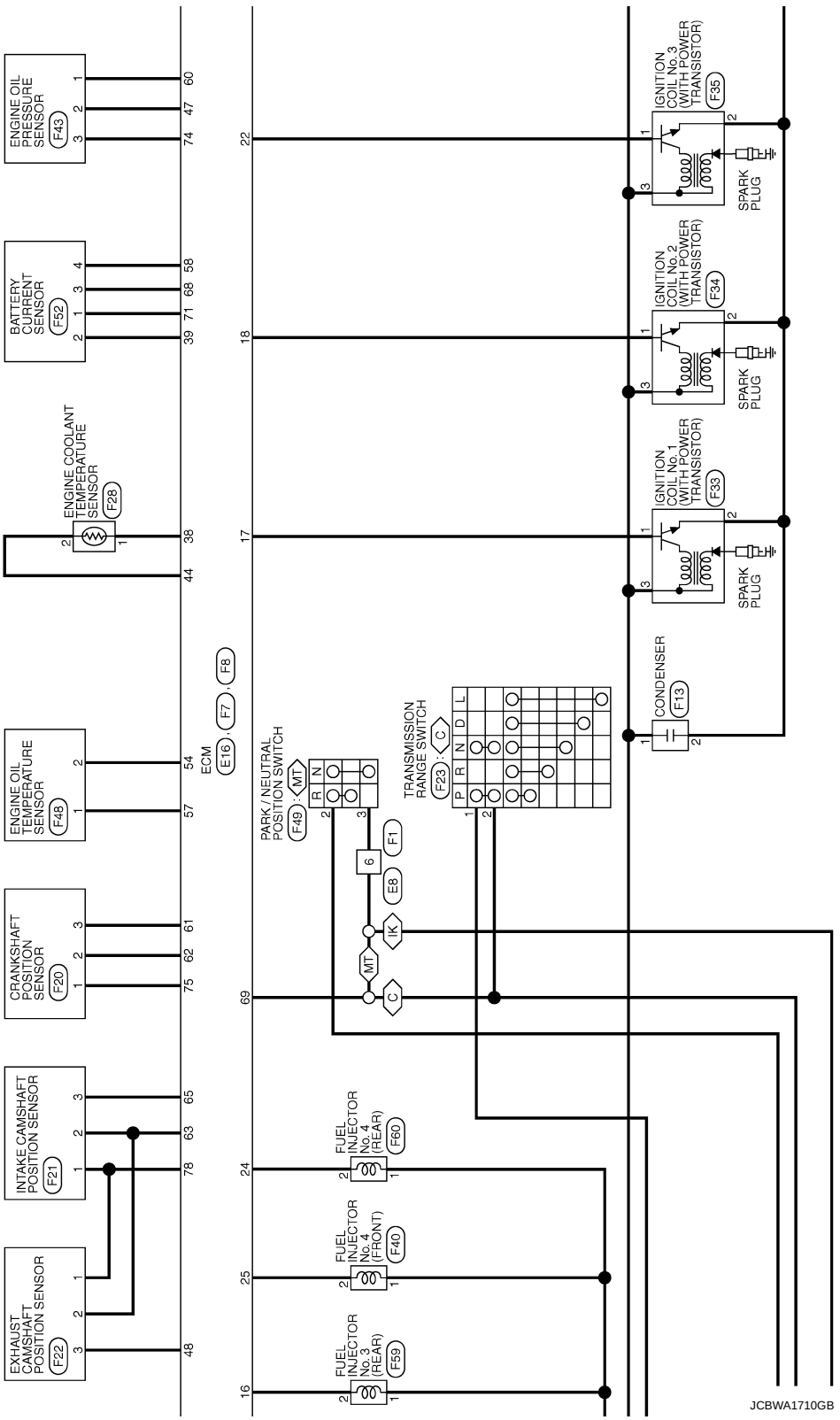
For connector terminal arrangements, harness layouts, and alphabets in a ⬡ (option abbreviation; if not described in wiring diagram), refer to GI-12, "Connector Information/Explanation of Option Abbreviation".

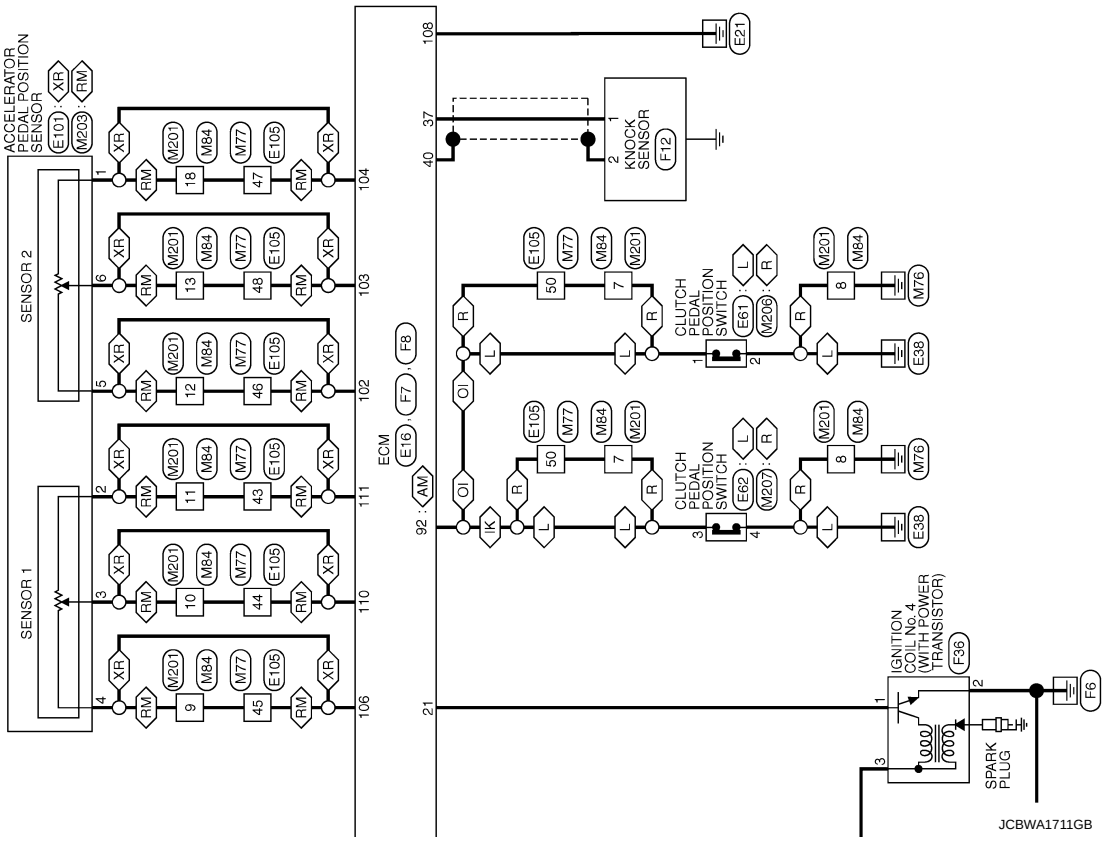



10A 3
AS
10A 5
MT
10A 7
10A 38
RM
XR
M77
E105
97
E8
17
F1
93
20
M84
M201
STOP LAMP SWITCH
C
LM
RM
E102
E118
M205
19
94
54
42
35
36
41
24
44
20A 43
ECM RELAY
15A 64
THROTTLE CONTROL MOTOR RELAY
60
55
47
27
OI
15A 62
15A 61
10A 56
15A 60
FUEL PUMP RELAY
62
61
58
31
9
28
48
46
C
COOLING FAN RELAY-3
10
COOLING FAN MOTOR
E52
OA
AC
DATA LINE
IPDM E/R
(INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
E10, E11, E12, E13, E14, E15, E17
JCBWA1707GB


EXHAUST VALVE TIMING CONTROL SOLENOID VALVE
F31
DATA LINK CONNECTOR
M4
E105
M77
M76
F8
F7
E16
ECM
ASCD STEERING SWITCH
AS
COMBINATION SWITCH (SPIRAL CABLE)
M33
M32
M303
M302
RESUME / ACCELERATE
SET / COAST
CANCEL
ASCD MAIN (ON / OFF)
SPEED LIMITER MAIN (ON / OFF)
FUEL LEVEL SENSOR UNIT (FUEL PUMP)
B40
B39
B67
B68
FUEL PUMP CONTROL MODULE
B61
F1
E8
E107
B7
E108
B8
OI
C
BRAKE PEDAL POSITION SWITCH
E112
M202
M201
M84
JCBWA1708GB


REFRIGERANT PRESSURE SENSOR E49
HEATED OXYGEN SENSOR 2 F30
ELECTRIC THROTTLE CONTROL ACTUATOR F29
THROTTLE CONTROL MOTOR
OPEN CLOSE
THROTTLE POSITION SENSOR
SENSOR 1
SENSOR 2
AIR FUEL RATIO (A/F) SENSOR 1 F50
INTAKE VALVE TIMING CONTROL SOLENOID VALVE F41
ECM E16, F7, F8
FUEL INJECTOR No.3 (FRONT) F39
FUEL INJECTOR No.2 (REAR) F58
FUEL INJECTOR No.2 (FRONT) F38
FUEL INJECTOR No.1 (REAR) F57
FUEL INJECTOR No.1 (FRONT) F37
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE F32
MASS AIR FLOW SENSOR F4
INTAKE AIR TEMPERATURE SENSOR
COMBINATION METER (MALFUNCTION INDICATOR, SET : AS, CRUISE : AS, SPEED LIMIT : AS) M34
MULTI DISPLAY UNIT M90 : AA
To CAN system
JCBWA1709GB


ENGINE OIL PRESSURE SENSOR F43
BATTERY CURRENT SENSOR F52
ENGINE COOLANT TEMPERATURE SENSOR F28
ENGINE OIL TEMPERATURE SENSOR F48
CRANKSHAFT POSITION SENSOR F20
INTAKE CAMSHAFT POSITION SENSOR F21
EXHAUST CAMSHAFT POSITION SENSOR F22
ECM E16 : F7 : F8
PARK / NEUTRAL POSITION SWITCH F49 : MT
TRANSMISSION RANGE SWITCH F23 : C
FUEL INJECTOR No.4 (REAR) F60
FUEL INJECTOR No.4 (FRONT) F40
FUEL INJECTOR No.3 (REAR) F59
IGNITION COIL No.3 (WITH POWER TRANSISTOR) F35
IGNITION COIL No.2 (WITH POWER TRANSISTOR) F34
IGNITION COIL No.1 (WITH POWER TRANSISTOR) F33
SPARK PLUG
CONDENSER F13
JCBWA1710GB


ACCELERATOR PEDAL POSITION SENSOR
E101 : XR
M203 : RM
SENSOR 1
SENSOR 2
ECM
E16 : AM
F7 , F8
KNOCK SENSOR
F12
E21
CLUTCH PEDAL POSITION SWITCH
E61 : L
M206 : R
E62 : L
M207 : R
M76
E38
IGNITION COIL No.4 (WITH POWER TRANSISTOR)
F36
F6
SPARK PLUG
JCBWA1711GB

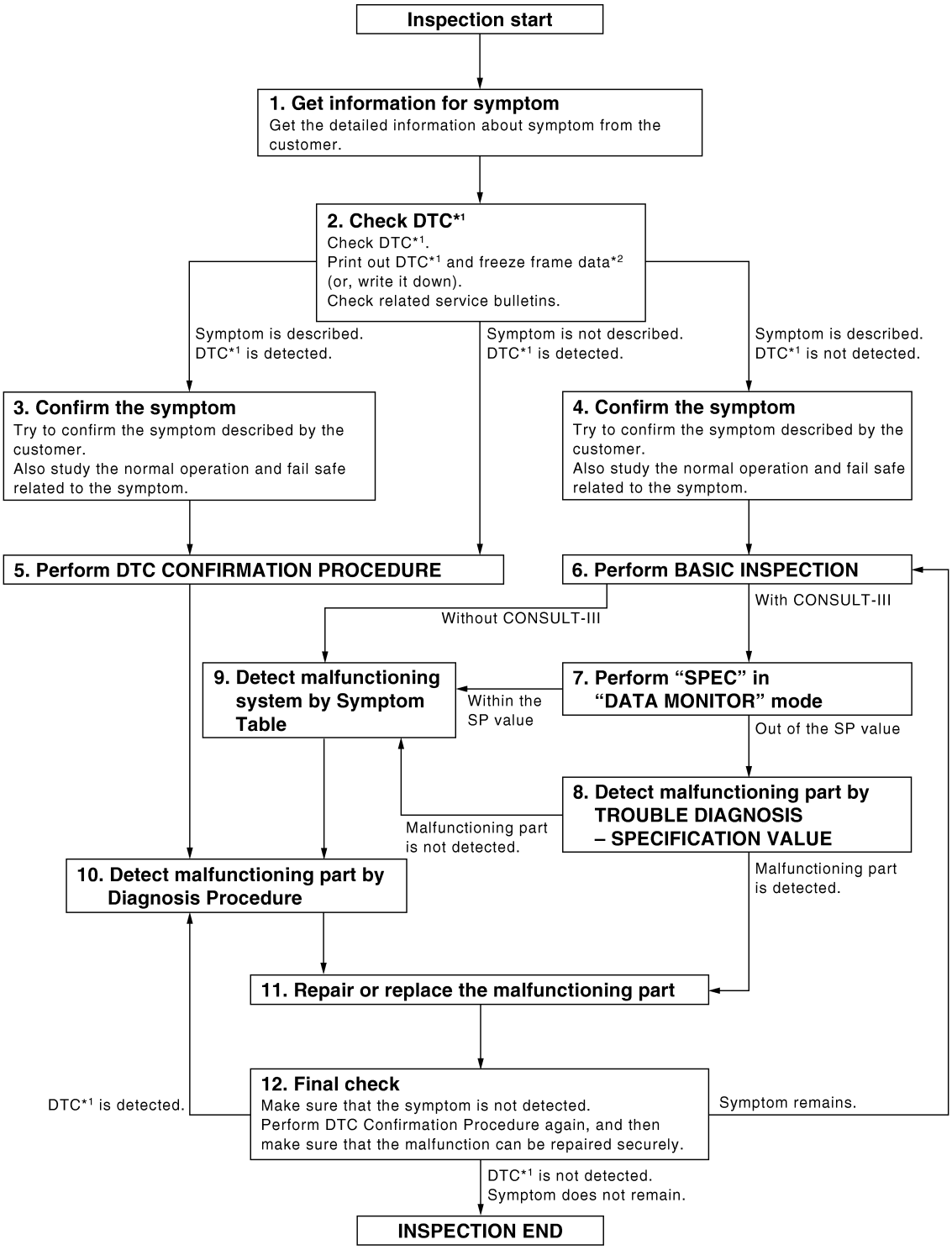
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000006496249

OVERALL SEQUENCE



*1: Include 1st trip DTC.
*2: Include 1st trip freeze frame data.

JMBIA0078GB

DETAILED FLOW

1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the “Diagnostic Work Sheet”. (Refer to EC-539, "Diagnostic Work Sheet".)

>> GO TO 2.

2.CHECK DTC

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

- Record DTC and freeze frame data. (Print them out with CONSULT-III or GST.)
- Erase DTC.
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to EC-795, "Symptom Table".)

3. Check related service bulletins for information.

Is any symptom described and is any DTC detected?

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

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MI ON).
Also study the normal operation and fail safe related to the symptom. Refer to EC-800, "Description" and EC-519, "Fail Safe".
Diagnostic Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
Also study the normal operation and fail safe related to the symptom. Refer to EC-800, "Description" and EC-519, "Fail Safe".
Diagnostic 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-521, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

NOTE:

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

Is DTC detected?

YES >> GO TO 10.
NO >> Check according to GI-42, "Intermittent Incident".

6.PERFORM BASIC INSPECTION

Perform EC-547, "Work Procedure".

Do you have CONSULT-III?

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

7. PERFORM “SPEC” IN DATA MONITOR MODE

With CONSULT-III
Make sure that “MAS A/F SE-B1”, “B/FUEL SCHDL” and “A/F ALPHA-B1” are within the SP value in “SPEC” of “DATA MONITOR” mode with CONSULT-III. Refer to EC-558, "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-559, "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-795, "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 GI-44, "Circuit Inspection".

Is malfunctioning part detected?

YES >> GO TO 11.
NO >> Monitor input data from related sensors or check the voltage of related ECM terminals using CONSULT-III. Refer to EC-508, "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.

>> GO TO 12.

12. FINAL CHECK

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

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 10.
YES-2 >> Symptom remains: GO TO 6.
NO >> Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM. If the completion of SRT is needed, drive vehicle under the specific “DRIVING PATTERN” in EC-554, "SRT Set Driving Pattern".

Diagnostic Work Sheet

INFOID:0000000006496250

DESCRIPTION

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about an incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the WORKSHEET SAMPLE below in order to organize all the information for troubleshooting.
Some conditions may cause the MI to come on steady or blink and DTC to be detected. Examples:
Vehicle ran out of fuel, which caused the engine to misfire.

KEY POINTS

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

SEF907L

WORKSHEET SAMPLE

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

MTBL0017

ADDITIONAL SERVICE WHEN REPLACING ECM

Description

INFOID:0000000006496251

When replacing ECM, this procedure must be performed.

Work Procedure

INFOID:0000000006496252

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

Refer to SEC-50, "BCM : Special Repair Requirement" (With intelligent key system), SEC-190, "BCM : Work Procedure" (Without intelligent key system).

>> GO TO 2.

2. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-542, "Work Procedure".

>> GO TO 3.

3. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-543, "Work Procedure".

>> GO TO 4.

4. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-544, "Work Procedure".

>> END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

Description

INFOID:0000000006496253

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.

Work Procedure

INFOID:0000000006496254

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:0000000006496255

Throttle Valve Closed Position Learning is a function of ECM to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected.

Work Procedure

INFOID:0000000006496256

1.START

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
   Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

>> END

IDLE AIR VOLUME LEARNING

Description

INFOID:0000000006496257

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.

Work Procedure

INFOID:0000000006496258

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)
- **For vehicles equipped with daytime light systems, perform one of the following procedures before starting engine not to illuminate headlamps.**
- Apply parking brake
- Set lighting switch to the 1st position
- Steering wheel: Neutral (Straight-ahead position) position
- Vehicle speed: Stopped
- Transmission: Warmed-up
- CVT models
- With CONSULT-III: Drive vehicle until “FLUID TEMP SE” in “DATA MONITOR” mode of “TRANSMISSION” system indicates less than 0.9 V.
- Without CONSULT-III: Drive vehicle for 10 minutes.
- M/T models
- Drive vehicle for 10 minutes.

Do you have CONSULT-III?

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

2.IDLE AIR VOLUME LEARNING

With CONSULT-III
1. Perform ACCELERATOR PEDAL RELEASED POSITION LEARNING. Refer to EC-542, "Work Procedure".
2. Perform THROTTLE VALVE CLOSED POSITION LEARNING. Refer to EC-543, "Work Procedure".
3. Start engine and warm it up to normal operating temperature.
4. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode with CONSULT-III.
5. Touch “START” and wait 20 seconds.

Is “CMPLT” displayed on CONSULT-III screen?

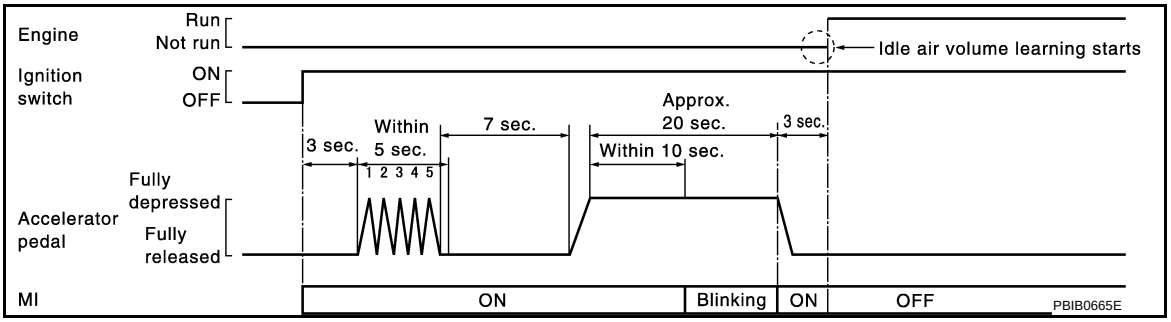
YES >> GO TO 4.
NO >> GO TO 5.

3.IDLE AIR VOLUME LEARNING

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

1. Perform ACCELERATOR PEDAL RELEASED POSITION LEARNING. Refer to EC-542, "Work Procedure".
2. Perform THROTTLE VALVE CLOSED POSITION LEARNING. Refer to EC-543, "Work Procedure".
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 MI stops blinking and turned ON.
8. Fully release the accelerator pedal within 3 seconds after the MI 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-807, "Idle Speed" and EC-807, "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-558, "Description".
If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning all over again:
- Engine stalls.
- Erroneous idle.

>> INSPECTION END

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

Description

INFOID:0000000006496259

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

Work Procedure

INFOID:0000000006496260

1.START

With CONSULT-III

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

With GST

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

>> END

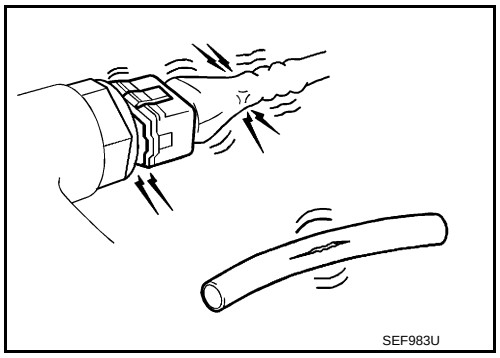
BASIC INSPECTION

Work Procedure

INFOID:0000000006496261

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 to the middle of gauge.
   Ensure engine stays below 1,000 rpm.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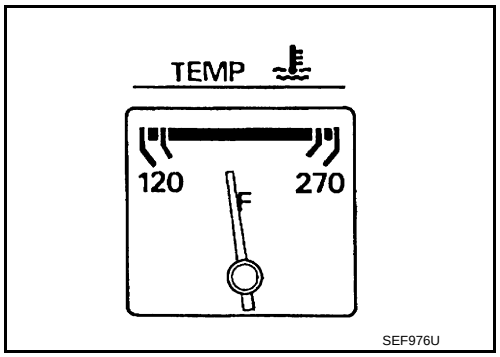
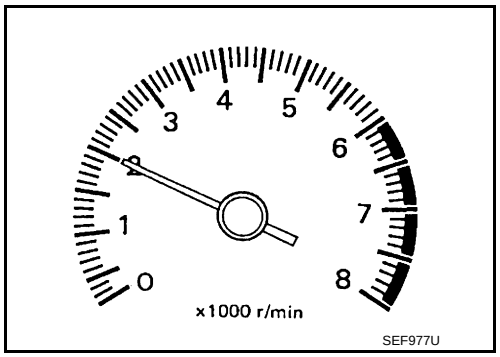


SEF976U

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-III 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

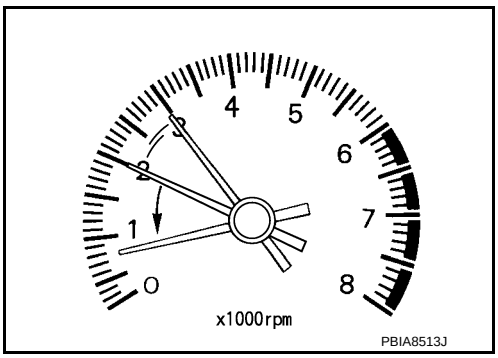
3.CHECK TARGET IDLE SPEED

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-801, "Inspection".
   For specification, refer to EC-807, "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-542, "Work Procedure".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-543, "Work Procedure".

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-544, "Work Procedure".

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-801, "Inspection".
   For specification, refer to EC-807, "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-660, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-656, "DTC Logic".

Is the inspection result normal?

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

9. CHECK ECM FUNCTION

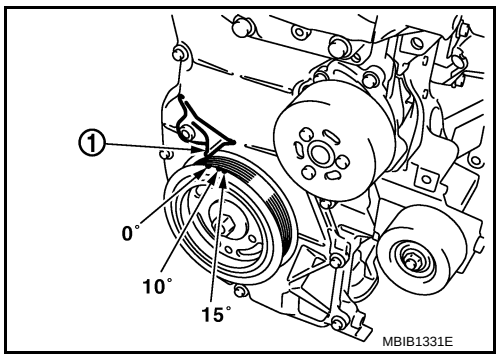
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization and registration of all NATS ignition key IDs. Refer to SEC-50, "BCM : Special Repair Requirement" (With intelligent key system), SEC-190, "BCM : Work Procedure" (Without intelligent key system).

>> 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-802, "Inspection".
For specification, refer to EC-807, "Ignition Timing".
- Timing indicator (1)



Is the inspection result normal?

YES >> GO TO 19.
NO >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-542, "Work Procedure".

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-543, "Work Procedure".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-544, "Work Procedure".

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

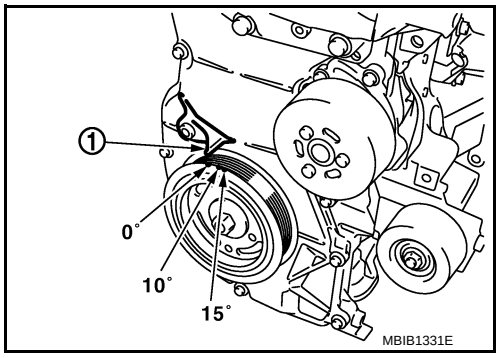
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
For procedure, refer to EC-801, "Inspection".
For specification, refer to EC-807, "Idle Speed".

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-802, "Inspection".
For specification, refer to EC-807, "Ignition Timing".
- Timing indicator (1)



Is the inspection result normal?

YES >> GO TO 19.
NO >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-181, "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-660, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-656, "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-50, "BCM : Special Repair Requirement" (With intelligent key system), SEC-190, "BCM : Work Procedure" (Without intelligent key system).

>> GO TO 4.

19. INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, perform EC-541, "Work Procedure".

>> INSPECTION END

FUEL PRESSURE CHECK

Work Procedure

INFOID:0000000006496263

FUEL PRESSURE RELEASE

1.FUEL PRESSURE RELEASE

With CONSULT-III

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

Without CONSULT-III

1. Remove fuel pump fuse located in IPDM E/R.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.

>> INSPECTION END

FUEL PRESSURE CHECK

1.FUEL PRESSURE CHECK

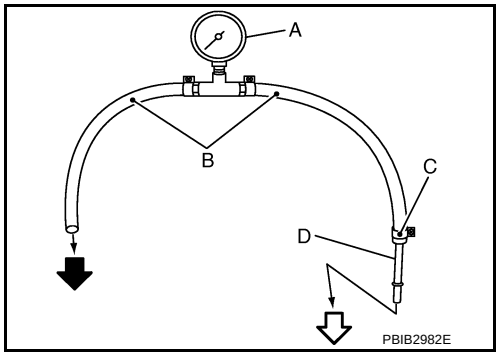
CAUTION:

- **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 seal ability with O-rings inside.**
- **Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.**

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. Release fuel pressure to zero.
2. Prepare fuel hose for fuel pressure check (B) and fuel tube adapter [SST (KV10118400) or (KV10120000)] (D), then connect fuel pressure gauge (A).



⇦ **To quick connector**

⬅ **To fuel tube (engine side)**

C : Hose clamp

CAUTION:

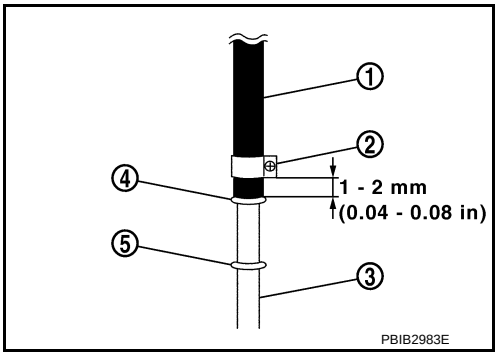
- **Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).**
- **To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.**
- **Do not use the fuel hose for checking fuel pressure with damage or cracks on it.**
- **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 fuel tube (engine side) with clamp (2) as shown in the figure.



5 : No.2 spool

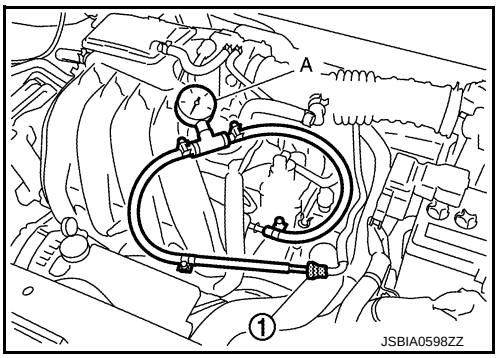
CAUTION:

- **Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.**
- **Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).**
- **Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.**
- **Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).**
- **When reconnecting fuel line, always use new clamps.**
- **Use a torque driver to tighten clamps.**
- **Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).**

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

- **Make sure that clamp screw does not contact adjacent parts.**

5. Connect fuel tube adapter to quick connector (1).



A : Fuel pressure gauge

6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
7. Turn ignition switch ON and check for fuel leakage.
8. Start engine and check for fuel leakage.
9. Read the indication of fuel pressure gauge.

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 350 kPa (3.5 bar, 3.57 kg/cm^2, 51 psi)

Is the inspection result normal?

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

2. CHECK FUEL HOSE AND FUEL TUBE

If result is unsatisfactory, check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”.
NO >> Repair or replace.

HOW TO SET SRT CODE

Description

INFOID:0000000006710149

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

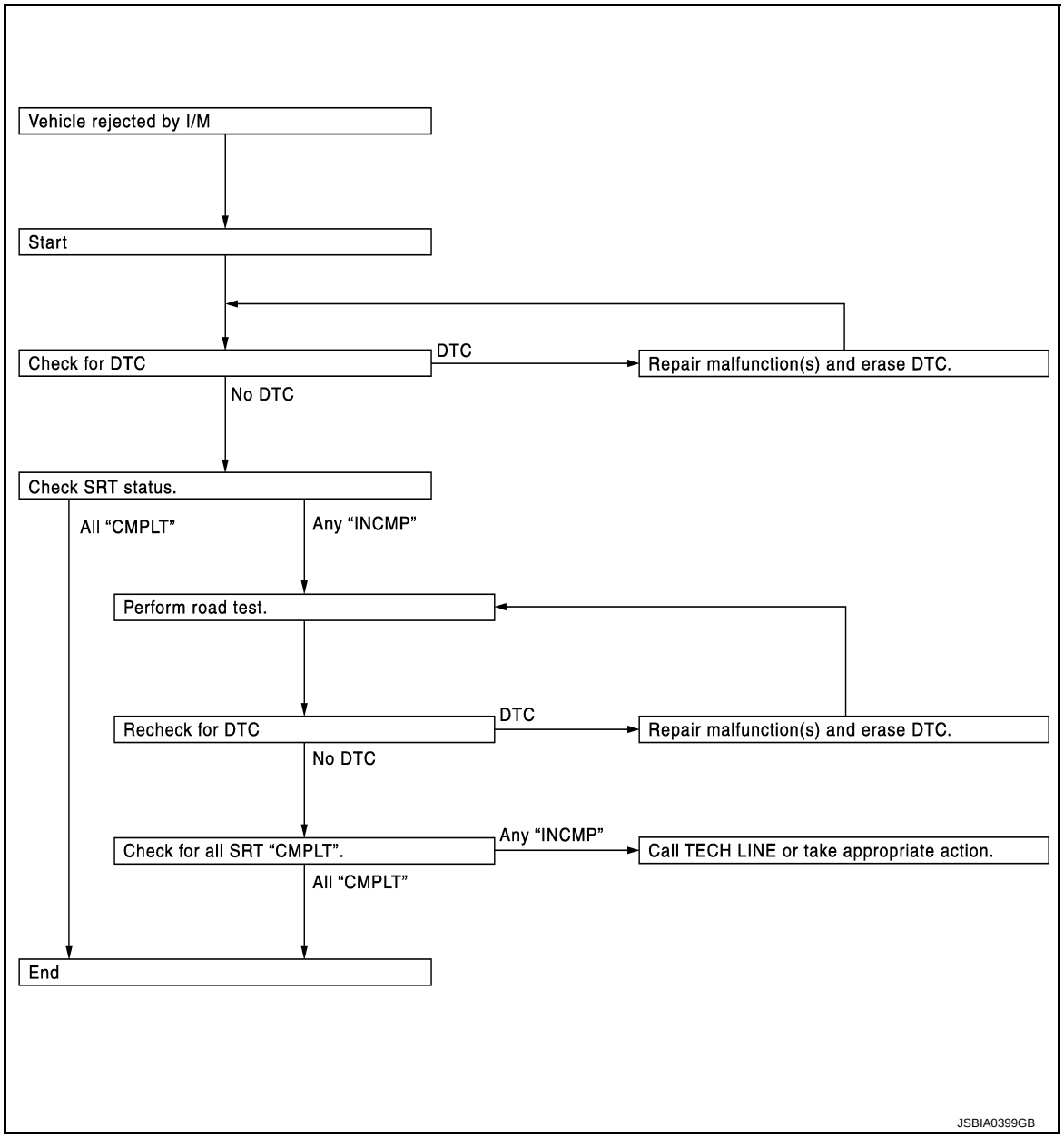
The table below shows required self-diagnostic items to set the SRT to “CMPLT”.

SRT item* (CONSULT-III indication)	Required self-diagnostic items to set the SRT to “CMPLT”	Corresponding DTC No.
CATALYST	Three way catalyst function	P0420
HO2S	Air fuel ratio (A/F) sensor 1	P0130, P0133
	Heated oxygen sensor 2	P0137
	Heated oxygen sensor 2	P0138
	Heated oxygen sensor 2	P0139

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

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.

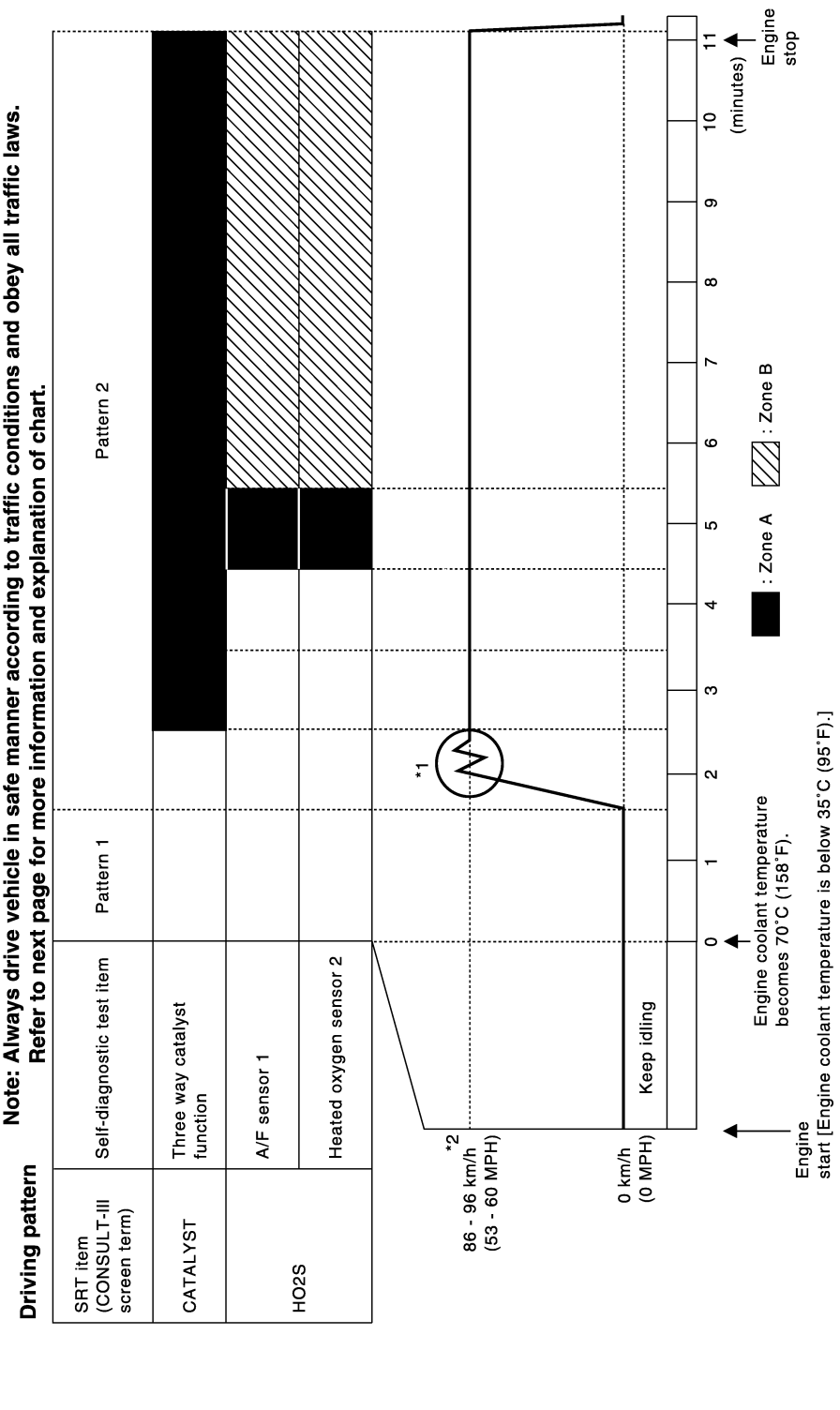


SRT Set Driving Pattern

INFOID:0000000006710150

CAUTION:

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



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NOTE:

*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedaland 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 refers to the range where the time, required for the diagnosis under normal conditions*, is the shortest.
Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.
*: Normal conditions refer to the following:
- Sea level
- Flat road
- Ambient air temperature: 20 - 30°C (68 - 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.
  Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Work Procedure

INFOID:0000000006710151

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-522, "DTC Index".
NO >> GO TO 2.

2.CHECK SRT STATUS

WITH CONSULT-III
Select “SRT STATUS” in “DTC & SRT CONFIRMATION” mode of “ENGINE” using CONSULT-III.
WITHOUT CONSULT-III
Perform “SRT status” mode with EC-497, "On Board Diagnosis Function".
WITH GST
Select Service $01 with GST.

Is SRT code(s) set?

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

3.DTC CONFIRMATION PROCEDURE

1. Select “SRT WORK SUPPORT” in “DTC & SRT CONFIRMATION” mode of “ENGINE” using CONSULT-III.
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-496, "DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code".
3. Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-522, "DTC Index".
NO >> GO TO 7.

4.PERFORM ROAD TEST

- Check the “Performance Priority” in the “SRT ITEM” table. Refer to EC-496, "DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code".
- Perform the most efficient SRT set driving pattern to set the SRT properly. Refer to EC-554, "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
- Fuel tank temperature: Less than 4.1 V

Refer to EC-508, "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. CHECK SRT STATUS

WITH CONSULT-III
Select “SRT STATUS” in “DTC & SRT CONFIRMATION” mode of “ENGINE” using CONSULT-III.
WITHOUT CONSULT-III
Perform “SRT status” mode with EC-497, "On Board Diagnosis Function".
WITH GST
Select Service $01 with GST.

Is SRT(s) set?

YES >> END
NO >> Call TECH LINE or take appropriate action.

DTC/CIRCUIT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:0000000006496264

The specification (SP) value indicates the tolerance of the value that is displayed in “SPEC” of “DATA MONITOR” mode of CONSULT-III during normal operation of the Engine Control System. When the value in “SPEC” of “DATA MONITOR” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “SPEC” of “DATA MONITOR” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.
The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MI.
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:0000000006496265

1. START

Make sure that all of the following conditions are satisfied.
- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (0.983 - 1.043 bar, 1.003 - 1.064 kg/cm^2, 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up
  - 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-III
NOTE:
Perform “SPEC” in “DATA MONITOR” mode in maximum scale display.
1. Perform EC-547, "Work Procedure".
2. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode with CONSULT-III.
3. Make sure that monitor items are within the SP value.

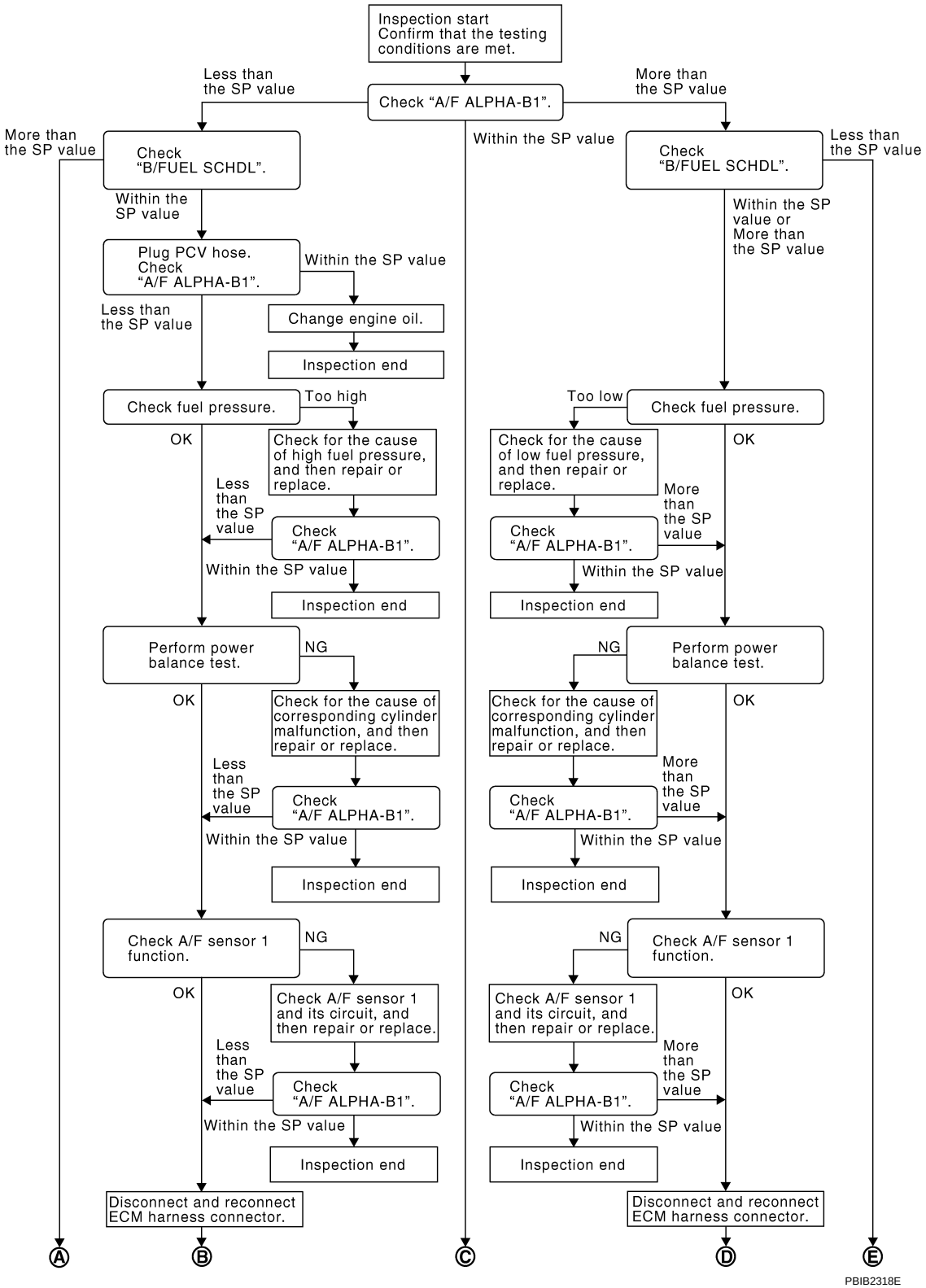
Is the inspection result normal?

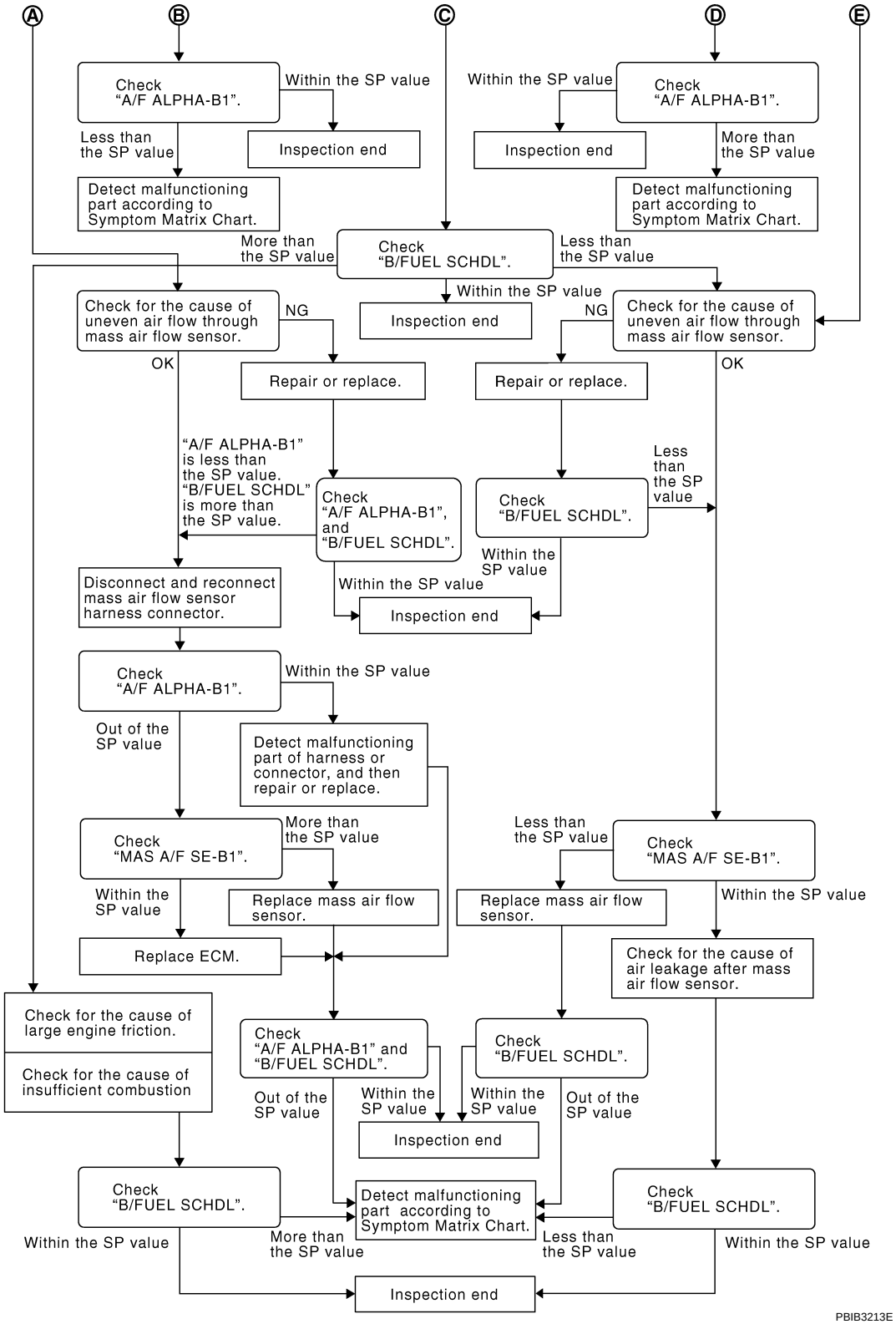
YES >> END
NO >> Go to EC-559, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496266

OVERALL SEQUENCE





DETAILED PROCEDURE

1. CHECK "A/F ALPHA-B1"

With CONSULT-III

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-558, "Component Function Check".
3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

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

Is the measurement value within the SP value?

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

2. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

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

3. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

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

4. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

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

5. CHANGE ENGINE OIL

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

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

>> **INSPECTION END**

6. CHECK FUEL PRESSURE

Check fuel pressure. (Refer to EC-551, "Work Procedure".)

Is the inspection result normal?

YES >> GO TO 9.
NO-1 >> Fuel pressure is too high: Replace “fuel filter and fuel pump assembly” and then GO TO 8.
NO-2 >> Fuel pressure is too low: GO TO 7.

7. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly” and then GO TO 8.
NO >> Repair or replace and then GO TO 8.

8. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

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

9. PERFORM POWER BALANCE TEST

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

Is the inspection result normal?

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

10. DETECT MALFUNCTIONING PART

Check the following.
1. Ignition coil and its circuit (Refer to EC-786, "Component Inspection (Ignition Coil with Power Transistor)".)
2. Fuel injector and its circuit (Refer to EC-779, "Component Inspection".)
3. Intake air leakage
4. Low compression pressure (Refer to EM-151, "Inspection".)

Is the inspection result normal?

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

11. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

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

12. CHECK A/F SENSOR 1 FUNCTION

Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1.
- For DTC P0130, refer to EC-600, "DTC Logic".
- For DTC P0131, refer to EC-604, "DTC Logic".
- For DTC P0132, refer to EC-607, "DTC Logic".
- For DTC P0133, refer to EC-610, "DTC Logic".
- For DTC P2A00, refer to EC-762, "DTC Logic".

Is any DTC detected?

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

13. CHECK A/F SENSOR 1 CIRCUIT

Perform DIAGNOSTIC PROCEDURE according to corresponding DTC.

>> GO TO 14.

14. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> GO TO 15.

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

1. Stop the engine.

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

>> GO TO 16.

16. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-795, "Symptom Table".

17. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

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

18. DETECT MALFUNCTIONING PART

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

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

19. CHECK INTAKE SYSTEM

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

Is the inspection result normal?

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

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

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

Is the measurement value within the SP value?

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

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

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

>> GO TO 22.

22. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-588, "DTC Logic". Then GO TO 29.
NO >> GO TO 23.

23. CHECK “MAS A/F SE-B1”

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

Is the measurement value within the SP value?

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

24. REPLACE ECM

1. Replace ECM.
2. Perform EC-541, "Work Procedure".

>> GO TO 29.

25. CHECK INTAKE SYSTEM

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

Is the inspection result normal?

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

26. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

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

27. CHECK “MAS A/F SE-B1”

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

Is the measurement value within the SP value?

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

28. CHECK INTAKE SYSTEM

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

>> GO TO 30.

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

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-795, "Symptom Table".

30. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-795, "Symptom Table".

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000006496267

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

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

ECM		Ground	Continuity
Connector	Terminal		
F7	10	Ground	Existed
	11		
E16	108		

3. Also check harness for short to power.

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F1
- Harness for open or short between ECM and ground

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

4.CHECK ECM POWER SUPPLY CIRCUIT-I

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

ECM		Ground	Voltage
Connector	Terminal		
E16	93	Ground	Battery voltage

Is the inspection result normal?

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

5.DETECT MALFUNCTIONING PART

Check the following.
- 15 A fuse (No. 62)
- Harness for open or short between ECM and fuse

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

6.CHECK ECM POWER SUPPLY CIRCUIT-II

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

Check the voltage between ECM harness connector and ground.

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

Is the inspection result normal?

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

7. CHECK ECM POWER SUPPLY CIRCUIT-III

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

IPDM E/R		Ground	Voltage
Connector	Terminal		
E14	41	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace IPDM E/R.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

9. CHECK ECM POWER SUPPLY CIRCUIT-IV

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

ECM		Ground	Voltage
Connector	Terminal		
F7	32	Ground	Battery voltage

Is the inspection result normal?

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

10. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E14.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F7	32	E14	41	Existed

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

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F1

- Harness for open or short between ECM and IPDM E/R

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

12. CHECK 20 A FUSE

1. Disconnect 20 A fuse (No. 43) from IPDM E/R.
2. Check 20 A fuse.

Is the inspection result normal?

YES >> GO TO 14.
NO >> Replace 20 A fuse.

13. CHECK ECM POWER SUPPLY CIRCUIT-VI

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E14.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E16	105	E14	35	Existed

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

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair open circuit or short to ground or short power in harness or connectors.

14. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

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

U1000, U1001 CAN COMM CIRCUIT

Description

INFOID:0000000006496268

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:0000000006496269

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> EC-569, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496270

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

P0011 IVT CONTROL

DTC Logic

INFOID:0000000006496274

DTC DETECTION LOGIC

NOTE:
If DTC P0011 is displayed with DTC P0075, first perform the trouble diagnosis for DTC P0075. Refer to EC-583, "DTC Logic".

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10 V and 16 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III
1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Maintain the following conditions for at least 6 consecutive seconds. Hold the accelerator pedal as steady as possible.

ENG SPEED	1,200 - 2,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
Shift 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-III” above.

Is 1st trip DTC detected?

YES >> Go to EC-571, "Diagnosis Procedure"
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT-III
1. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,700 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)

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

CAUTION:
Always drive at a safe speed.

2. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

YES >> Go to EC-571, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

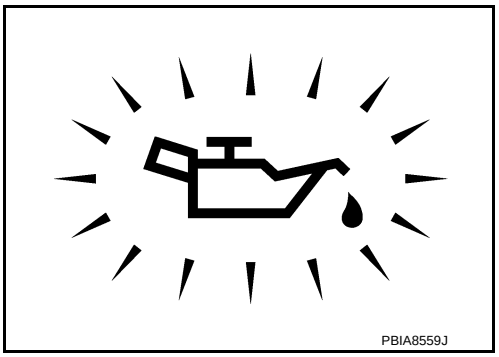
INFOID:0000000006496275

1.CHECK OIL PRESSURE WARNING LAMP

1. Start engine.
2. Check oil pressure warning lamp and confirm it is not illuminated.

Is oil pressure warning lamp illuminated?

YES >> Go to LU-25, "Inspection".
NO >> GO TO 2.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2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-572, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace intake valve timing control solenoid valve.

3.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-658, "Component Inspection".

Is the inspection result normal?

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

4.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-662, "Component Inspection".

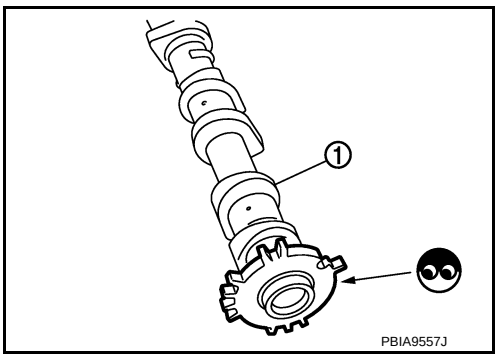
Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace camshaft position sensor (PHASE).

5.CHECK CAMSHAFT (INTAKE)

Check the following.

- Accumulation of debris to the signal plate of camshaft (1) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> GO TO 6.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.

6. CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

Are there any service records that may cause timing chain misaligned?

YES >> Check timing chain installation. Refer to EM-181, "Exploded View".
NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Perform “Inspection of Camshaft Sprocket (INT) Oil Groove”. Refer to EM-200, "Inspection".

Is the inspection result normal?

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

8. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006496276

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

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

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

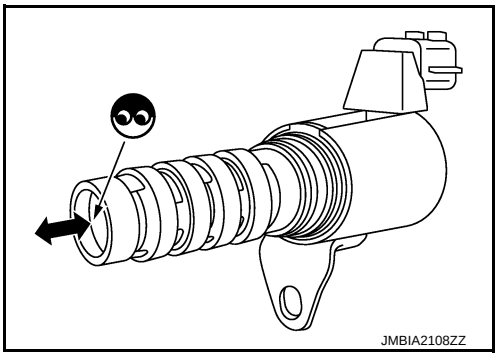
Is the inspection result normal?

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

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve.
2. Apply 12 V 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 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.

P0014 EVT CONTROL

DTC Logic

INFOID:0000000006635697

DTC DETECTION LOGIC

NOTE:
If DTC P0014 is displayed with DTC P0078, first perform trouble diagnosis for DTC P0078. Refer to EC-585, "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 • Exhaust camshaft 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-III

1. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Maintain the following conditions for at least 6 consecutive seconds. Hold the accelerator pedal as steady as possible.

ENG SPEED	1,200 - 2,000 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	D position

4. Let engine idle for 10 seconds.
5. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-575, "Diagnosis Procedure"
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT-III

1. Select “DATA MONITOR” mode of “ENGINE” using CONSULT-III.
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	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:
Always drive at a safe speed.

3. Check 1st trip DTC.

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

Is 1st trip DTC detected?

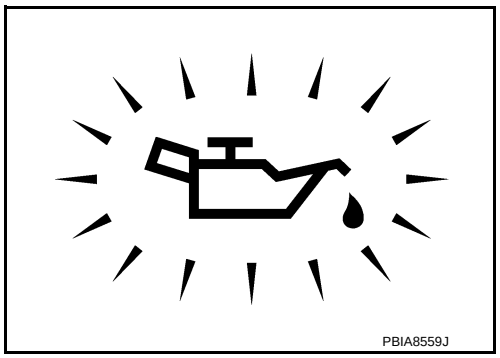
YES >> Proceed to EC-575, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006635698

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-8, "Inspection".
NO >> GO TO 2.

2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE

Check the exhaust valve timing control solenoid valve. Refer to EC-576, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-67, "Exploded View".

3.CHECK CRANKSHAFT POSITION SENSOR

Check the crankshaft position sensor. Refer to EC-658, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace crankshaft position sensor. Refer to EM-103, "Exploded View".

4.CHECK EXHAUST CAMSHAFT POSITION SENSOR

Check the exhaust camshaft position sensor. Refer to EC-662, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace exhaust valve timing control position sensor. Refer to EM-78, "Exploded View".

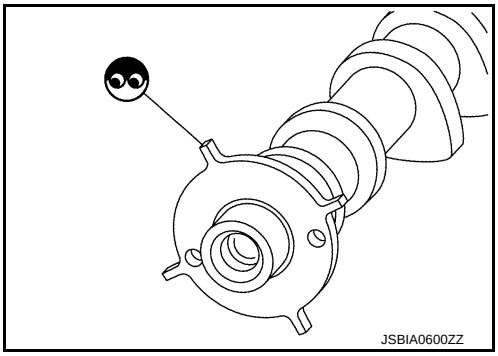
5.CHECK CAMSHAFT (EXHAUST)

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-79, "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-181, "Exploded View".
NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to EM-200, "Inspection", “INSPECTION AFTER INSTALLATION”.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Clean lubrication line.

Component Inspection

INFOID:0000000006635699

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		

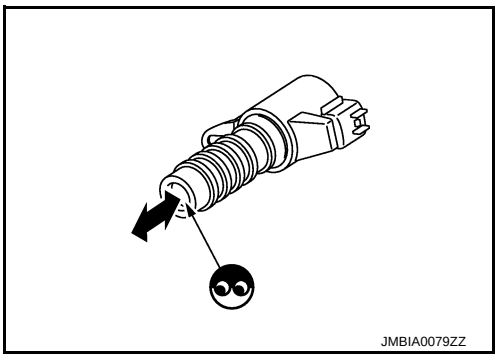
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-67, "Exploded View".

2. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove exhaust valve timing control solenoid valve.
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-67, "Exploded View".

P0031, P0032 A/F SENSOR 1 HEATER

DTC Logic

INFOID:0000000006496277

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10.5 V and 16 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Go to EC-577, "Diagnosis Procedure".
NG >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496278

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

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

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

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage
Connector	Terminal		
F50	4	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- IPDM E/R harness connector E14
- 20A fuse (No. 43)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK A/F SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT

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

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F50	3	F7	3	Existed

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

Is the inspection result normal?

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

5.CHECK A/F SENSOR 1 HEATER

Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

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

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

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

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) and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

>> Repair or replace.

Component Inspection

INFOID:0000000006496279

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

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

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

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

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

CAUTION:

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

>> INSPECTION END

P0037, P0038 HO2S2 HEATER

DTC Logic

INFOID:0000000006682977

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-III

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

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-580, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006682978

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		
F30	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	
F30	3	E7	5	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-581, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "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:0000000006682979

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

P0075 IVT CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000006496280

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Go to EC-583, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496281

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

1. Turn ignition switch OFF.
2. Disconnect intake valve timing (IVT) control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake valve timing control solenoid valve harness connector and ground.

IVT control solenoid valve		Ground	Voltage
Connector	Terminal		
F41	1	Ground	Battery voltage

Is the inspection result normal?

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

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F1
- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R

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

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

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

IVT control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F41	2	F8	73	Existed

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

Is the inspection result normal?

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

4.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-584, "Component Inspection".

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006496282

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

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

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

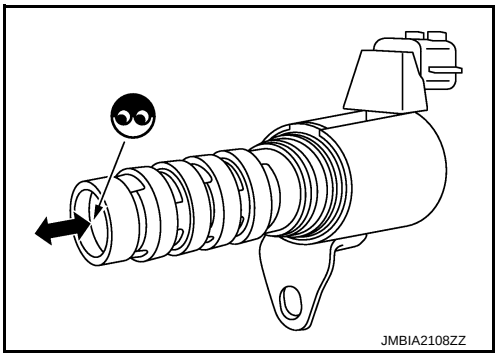
Is the inspection result normal?

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

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve.
2. Apply 12 V 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 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.

P0078 EVT CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000006635700

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-585, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006635701

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		
F31	1	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	
F31	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.

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	
F31	2	F8	77	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-586, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace exhaust valve timing control solenoid valve.

Component Inspection

INFOID:0000000006635702

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-67, "Exploded View".

2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove exhaust valve timing control solenoid valve.

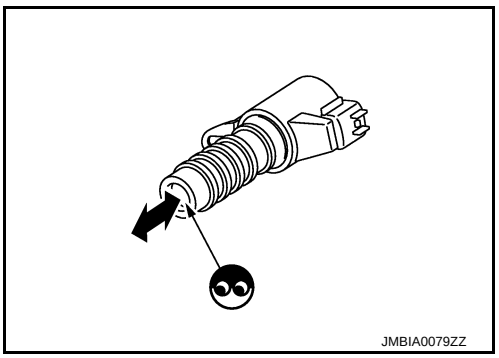
2. Provide 12 V DC between exhaust valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check that the plunger moves as shown in the figure.

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-67, "Exploded View".

P0102, P0103 MAF SENSOR

DTC Logic

INFOID:0000000006496283

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leakage • Mass air flow sensor
P0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

Which DTC is detected?

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

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

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

Is DTC detected?

YES >> Go to EC-588, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-I

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

Is DTC detected?

YES >> Go to EC-588, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-II

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

Is DTC detected?

YES >> Go to EC-588, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496284

1.INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

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

2.CHECK INTAKE SYSTEM

Check the following for connection.
- Air duct
- Vacuum hoses

• Intake air passage between air duct to intake manifold

Is the inspection result normal?

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

3. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

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

4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

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

MAF sensor		Ground	Voltage
Connector	Terminal		
F4	5	Ground	Battery voltage

Is the inspection result normal?

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

5. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F4	4	F8	52	Existed

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

Is the inspection result normal?

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

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

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F4	3	F8	45	Existed

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

Is the inspection result normal?

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

7. CHECK MASS AIR FLOW SENSOR

Refer to EC-590, "Component Inspection".

Is the inspection result normal?

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

8.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006496285

1.CHECK MASS AIR FLOW SENSOR-I

With CONSULT-III

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

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

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

Without CONSULT-III

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

ECM			Condition	Voltage
Connector	Terminal			
	+	–		
F8	45 (MAF sensor signal)	52	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
			Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

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

Is the inspection result normal?

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

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

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

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

Is the inspection result normal?

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

3.CHECK MASS AIR FLOW SENSOR-II

With CONSULT-III

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-III and select “DATA MONITOR” mode.

4. Select “MAS A/F SE-B1” and check indication.

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

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

Without CONSULT-III

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Check the voltage between ECM harness connector and ground.

ECM			Condition	Voltage
Connector	Terminal			
	+	–		
F8	45 (MAF sensor signal)	52	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
			Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

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

Is the inspection result normal?

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

4. CHECK MASS AIR FLOW SENSOR-III

With CONSULT-III

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

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

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

Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector and ground.

ECM			Condition	Voltage
Connector	Terminal			
	+	–		
F8	45 (MAF sensor signal)	52	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
			Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Clean or replace mass air flow sensor.

P0112, P0113 IAT SENSOR

DTC Logic

INFOID:0000000006496286

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air temperature sensor
P0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-593, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496287

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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

MAF sensor		Ground	Voltage
Connector	Terminal		
F4	2	Ground	Approx. 5 V

Is the inspection result normal?

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

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

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F4	1	F8	52	Existed

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

Is the inspection result normal?

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

4.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-594, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace mass air flow sensor (with intake air temperature sensor).

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006496288

1.CHECK INTAKE AIR TEMPERATURE SENSOR

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

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

Is the inspection result normal?

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

P0117, P0118 ECT SENSOR

DTC Logic

INFOID:0000000006496289

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Engine coolant temperature sensor
P0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to EC-595, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496290

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT

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

ECT sensor		Ground	Voltage
Connector	Terminal		
F28	1	Ground	Approx. 5 V

Is the inspection result normal?

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

3.CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

ECT sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F28	2	F8	44	Existed

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

Is the inspection result normal?

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

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

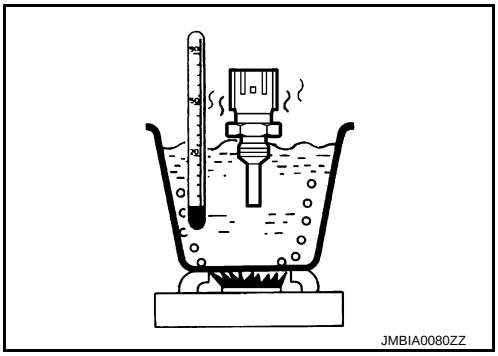
>> INSPECTION END

Component Inspection

INFOID:0000000006496291

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

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



Terminals	Condition		Resistance
1 and 2	Temperature [°C (°F)]	20 (68)	2.35 - 2.73 kΩ
		50 (122)	0.68 - 1.00 kΩ
		90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

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

P0122, P0123 TP SENSOR

DTC Logic

INFOID:0000000006496292

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-686, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	• Harness or connectors (TP sensor 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 2)
P0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-597, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496293

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

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

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5 V

Is the inspection result normal?

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

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

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

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F8	36	Existed

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

Is the inspection result normal?

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

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

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	3	F8	34	Existed

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

Is the inspection result normal?

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

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-598, "Component Inspection".

Is the inspection result normal?

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

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-163, "Exploded View".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006496294

1. CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-543, "Work Procedure".
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 and ground.

ECM			Condition		Voltage
Connector	Terminal				
	+	–			
F8	33 (TP sensor 1 signal)	36	Accelerator pedal	Fully released	More than 0.36 V
				Fully depressed	Less than 4.75 V
	34 (TP sensor 2 signal)			Fully released	Less than 4.75 V
				Fully depressed	More than 0.36 V

Is the inspection result normal?

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

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-163, "Exploded View".

>> INSPECTION END

P0130 A/F SENSOR 1

DTC Logic

INFOID:0000000006496296

DTC DETECTION LOGIC

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

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 6.

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

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

Does the indication fluctuate around 2.2 V?

YES >> GO TO 3.
NO >> Go to EC-601, "Diagnosis Procedure".

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION -I

1. Select “ENGINE” using CONSULT-III.
2. Select “A/F SEN1 (B1) P1276” (for DTC P0130) of “A/F SEN1” in “DTC WORK SUPPORT” mode.
3. Touch “START”.
4. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen.

ENG SPEED	1,600 - 3,200 rpm
VHCL SPEED SE	More than 64 km/h (40 mph)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	D position (A/T models) 4th position (M/T models)

If “TESTING” is not displayed after 20 seconds, retry from step 2.

CAUTION:

Always drive vehicle at a safe speed.

Is “TESTING” displayed on CONSULT-III screen?

YES >> GO TO 4.
NO >> Check A/F sensor 1 function again. GO TO 2.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION -II

Release accelerator pedal fully.

NOTE:

Never apply brake when releasing the accelerator pedal.

Which does “TESTING” change to?

COMPLETED>>GO TO 5.
OUT OF CONDITION>>Retry DTC CONFIRMATION PROCEDURE. GO TO 3.

5. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION -III

Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-601, "Diagnosis Procedure".

6. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION

Perform component function check. Refer to EC-601, "Component Function Check".

NOTE:
Use component function check to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-601, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006496297

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 D position, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).
   CAUTION:
   Always drive vehicle at a safe speed.
   NOTE:
   Never apply brake when releasing the accelerator pedal.
4. Repeat steps 2 and 3 for five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Turn ignition switch ON.
7. Turn ignition switch OFF and wait at least 10 seconds.
8. Restart engine.
9. Repeat steps 2 and 3 for five times.
10. Stop the vehicle and connect GST to the vehicle.
11. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-601, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496298

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

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

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

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage
Connector	Terminal		
F50	4	Ground	Battery voltage

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F1
- IPDM E/R harness connector E14
- 20A fuse (No. 43)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

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

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

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F50	1	F8	49	Existed
	2		53	

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

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F50	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F8	49	Ground	Not existed
	53		

5. Also check harness for short to power.

Is the inspection result normal?

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

5. CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

Is the inspection result normal?

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

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

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

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) and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

P0131 A/F SENSOR 1

DTC Logic

INFOID:0000000006496299

DTC DETECTION LOGIC

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

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

>> GO TO 2.

2.CHECK A/F SENSOR FUNCTION

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

Is the indication constantly approx. 0 V?

YES >> Go to EC-604, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and 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 cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 1, return to step 1.**

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-604, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496300

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

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

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

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage
Connector	Terminal		
F50	4	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F1
- IPDM E/R harness connector E14
- 20A fuse (No. 43)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

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

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

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F50	1	F8	49	Existed
	2		53	

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

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F50	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F8	49	Ground	Not existed
	53		

5. Also check harness for short to power.

Is the inspection result normal?

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

5. CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

Is the inspection result normal?

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

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

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

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) and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

P0132 A/F SENSOR 1

DTC Logic

INFOID:0000000006496301

DTC DETECTION LOGIC

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

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

>> GO TO 2.

2.CHECK A/F SENSOR FUNCTION

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

Is the indication constantly approx. 5 V?

YES >> Go to EC-607, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

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

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

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

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-607, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496302

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

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

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

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage
Connector	Terminal		
F50	4	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F1
- IPDM E/R harness connector E14
- 20A fuse (No. 43)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

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

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

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F50	1	F8	49	Existed
	2		53	

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

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F50	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F8	49	Ground	Not existed
	53		

5. Also check harness for short to power.

Is the inspection result normal?

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

5. CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

Is the inspection result normal?

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

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

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

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) and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

P0133 A/F SENSOR 1

DTC Logic

INFOID:0000000006496303

DTC DETECTION LOGIC

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

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

Do you have CONSULT-III?

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

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
4. Let engine idle for 1 minute.
5. Select “ENGINE” using CONSULT-III.
6. Select “A/F SEN1(B1) P1278/P1279” (for DTC P0133) of “A/F SEN1” in “DTC WORK SUPPORT” mode.
7. Touch “START”.

Is “COMPLETED” displayed on CONSULT-III screen?

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

3.PERFORM DTC CONFIRMATION PROCEDURE-II

Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-611, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. After perform the following procedure, “TESTING” will be displayed on the CONSULT-III screen.

- Increase the engine speed up to between 4,000 and 5,000 rpm and maintain that speed for 10 seconds.
- Fully release accelerator pedal and then let engine idle for about 10 seconds.

If “TESTING” is not displayed after 10 seconds, refer to EC-558, "Component Function Check".

2. Wait for about 20 seconds at idle under the condition that “TESTING” is displayed on the CONSULT-III screen.
3. Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, refer to EC-558, "Component Function Check".
4. Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-611, "Diagnosis Procedure".

5. CHECK AIR-FUEL RATIO SELF-LEARNING VALUE

With GST

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

Is the total percentage within ±15%?

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

6. DETECT MALFUNCTIONING PART

Check the following.

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

>> Repair or replace malfunctioning part.

7. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Restart engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
3. Let engine idle for 1 minute.
4. Increase the engine speed up to between 4,000 and 5,000 rpm and maintain that speed for 10 seconds.
5. Fully release accelerator pedal and then let engine idle for about 1 minute.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-611, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496304

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

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

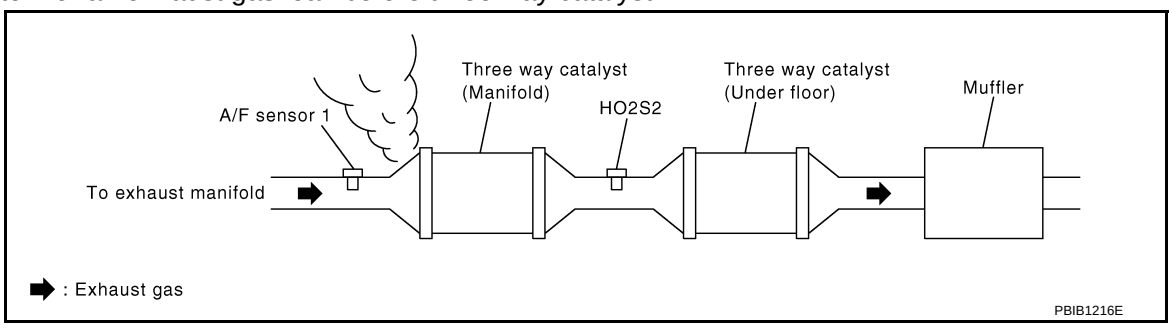
2. RETIGHTEN A/F SENSOR 1

Loosen and retighten the A/F sensor 1. Refer to EM-166, "Exploded View".

>> GO TO 3.

3. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst 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-546, "Work Procedure".
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-635, "DTC Logic" or EC-639, "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		
F50	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
- 20A 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	
F50	1	F8	49	Existed
	2		53	

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

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F50	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F8	49	Ground	Not existed
	53		

5. Also check harness for short to power.

Is the inspection result normal?

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

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

Refer to EC-578, "Component Inspection".

Is the inspection result normal?

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

10. CHECK MASS AIR FLOW SENSOR

Check both mass air flow sensor.
Refer to EC-590, "Component Inspection".

Is the inspection result normal?

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

11. CHECK PCV VALVE

Refer to EC-804, "Inspection".

Is the inspection result normal?

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

12. CHECK INTERMITTENT INCIDENT

Perform GI-42, "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.

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) and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

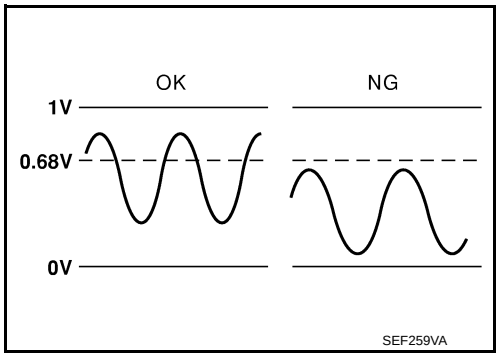
P0137 HO2S2

DTC Logic

INFOID:0000000006496305

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 maximum voltage of the sensor is sufficiently high during various driving conditions such as fuel-cut.



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

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 11.

2.PRECONDITIONING

- If DTC confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- "COMPLETED" will appear on CONSULT-III screen when all tests "COND1", "COND2" and "COND3" are completed.

TESTING CONDITION:

- **For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30 °C (32 to 86 °F).**
- **Never stop engine during this procedure. If the engine is stopped, retry procedure from PERFORM PROCEDURE FOR COND1-II.**

>> GO TO 3.

3.PERFORM PROCEDURE FOR COND1-I

Start engine and warm it up to the normal operating temperature.

>> GO TO 4.

4.PERFORM PROCEDURE FOR COND1-II

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 5.

5.PERFORM PROCEDURE FOR COND1-III

1. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.

2. Let engine idle for 1 minute.
3. Select “ENGINE” using CONSULT-III.
4. Select “HO2S2 (B1) P1147” (for DTC P0137) of “HO2S2” in “DTC WORK SUPPORT” mode.
5. Touch “START”.
6. Let engine idle for at least 30 seconds.
7. Rev engine up to 2,000 rpm two or three times quickly under no load.

Is “COMPLETED” appears on CONSULT-III screen?

YES >> GO TO 9.
NO >> GO TO 6.

6. PERFORM PROCEDURE FOR COND1-IV

When the following conditions are met, “TESTING” will be displayed at “COND1” on the CONSULT-III screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”

ENG SPEED	More than 1,000 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	70 - 105°C
Selector lever	Suitable position

CAUTION:
Always drive vehicle at a safe speed.

Which displayed on CONSULT-III screen?

“COND1: OUT OF CONDITION”>>GO TO 4.
“COND1: COMPLETED”, “COND2: INCOMPLETE”>>GO TO 7.
“COND1: COMPLETED”, “COND2: COMPLETED”>>GO TO 8.

7. PERFORM PROCEDURE FOR COND2

While driving, release accelerator pedal completed from the above condition (PERFORM PROCEDURE FOR COND1-III) until “INCOMPLETE” at “COND2” on CONSULT-III screen has turned to “COMPLETED” (It will take approximately 4 seconds).

CAUTION:
Always drive vehicle at a safe speed.

Which displayed on CONSULT-III screen?

“COND2: COMPLETED”, “COND3: INCOMPLETE”>>GO TO 8.
“COND2: COMPLETED”, “COND3: COMPLETED”>>GO TO 9.

8. PERFORM PROCEDURE FOR COND3-I

Stop vehicle and let it idle until “INCOMPLETE” of “COND3” on CONSULT-III screen has turned to “COMPLETED”

>> GO TO 9.

9. PERFORM PROCEDURE FOR COND3-II

Touch SELF-DIAG RESULTS”.

Which displayed on CONSULT-III screen?

“OK” >> INSPECTION END.
“NG” >> Go to EC-618, "Diagnosis Procedure".
“CAN NOT BE DIAGNOSED”>>GO TO 10.

10. PERFORM PROCEDURE FOR COND3-III

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Turn ignition switch ON and select “ENGINE” using CONSULT-III.
3. Select “COOLAN TEMP/S” in “DATA MONITOR” mode.
4. Start engine and warm it up while monitoring “COOLAN TEMP/S” indication on CONSULT-III.
5. When “COOLAN TEMP/S” indication reaches 70°C (158°F).

>> GO TO 5.

11. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-617, "Component Function Check".

NOTE:

Use component function check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-618, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006496306

1. PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. 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. Check the voltage between ECM harness connector terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F8	50 (HO2S2)	59	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 terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F8	50 (HO2S2)	59	Keeping engine 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 terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F8	50 (HO2S2)	59	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 >> Go to EC-618, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496307

1.HECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

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

2.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-546, "Work Procedure".
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-635, "DTC Logic".
NO >> GO TO 3.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F8	59	Existed

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

Is the inspection result normal?

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

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	4	F8	50	Existed

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

HO2S2		Ground	Continuity
Connector	Terminal		
F30	4	Ground	Not existed

ECM		Ground	Continuity
Connector	Terminal		
F8	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-619, "Component Inspection".

Is the inspection result normal?

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

6. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2.

CAUTION:

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

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006496308

1. INSPECTION START

Do you have CONSULT-III?

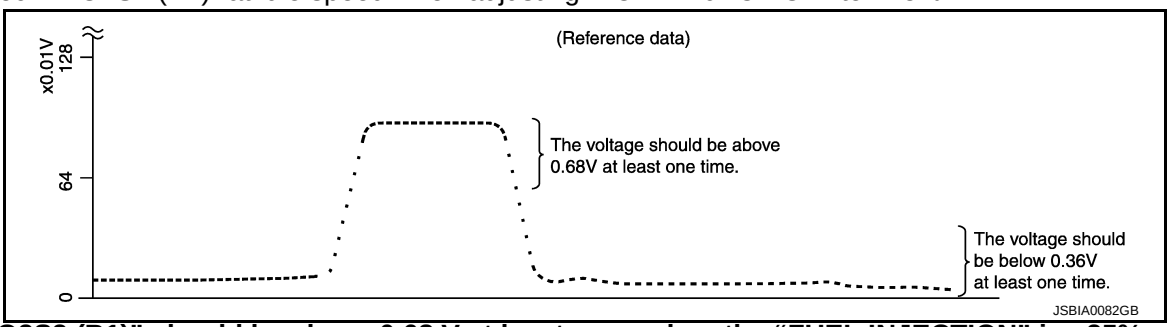
Do you have CONSULT-III?

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

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select “ENGINE” using CONSULT-III.
2. Select “DATA MONITOR” mode.
3. Start engine and warm it up to the normal operating temperature.
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 “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
8. 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 0.36 V at least once when the “FUEL INJECTION” is –25%.

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.

3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F8	50 (HO2S2)	59	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 0.36 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 terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F8	50 (HO2S2)	59	Keeping engine at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.36 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 terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F8	50 (HO2S2)	59	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 0.36 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 malfunctioning heated oxygen sensor 2.

CAUTION:

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

>> INSPECTION END

P0138 HO2S2

DTC Logic

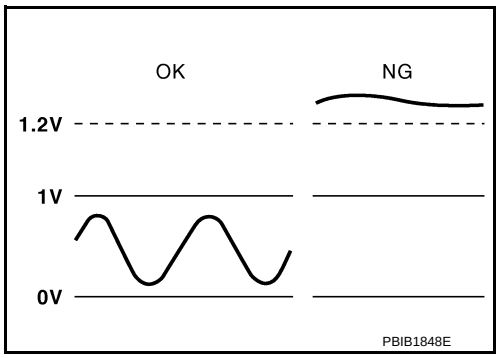
INFOID:0000000006496309

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.

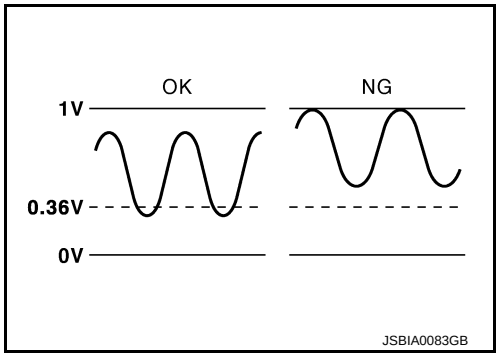
MALFUNCTION A

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



DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0138	Heated oxygen sensor 2 circuit high voltage	A)	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2
		B)	The minimum voltage from the sensor is not reached to the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING OF DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

1. Start engine and warm it up to 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. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-624, "Diagnosis Procedure".
NO-1 >> With CONSULT-III: GO TO 3.
NO-2 >> Without CONSULT-III: GO TO 12.

3. PRECONDITIONING OF DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

"COMPLETED" will appear on CONSULT-III screen when all tests "COND1", "COND2" and "COND3" are completed.

TESTING CONDITION:

- **For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30 °C (32 to 86 °F).**
- **Never stop engine during this procedure. If the engine is stopped, retry procedure from PERFORM PROCEDURE FOR COND1-II.**

>> GO TO 4.

4. PERFORM PROCEDURE FOR COND1-I

Start engine and warm it up to the normal operating temperature.

>> GO TO 5.

5. PERFORM PROCEDURE FOR COND1-II

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 6.

6. PERFORM PROCEDURE FOR COND1-III

1. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
2. Let engine idle for 1 minute.
3. Select "ENGINE" using CONSULT-III.
4. Select "HO2S2 (B1) P1146" of "HO2S2" in "DTC WORK SUPPORT" mode.
5. Touch "START".
6. Let engine idle for at least 30 seconds.
7. Rev engine up to 2,000 rpm two or three times quickly under no load.

Is "COMPLETED" appears on CONSULT-III screen?

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

7. PERFORM PROCEDURE FOR COND1-IV

When the following conditions are met, "TESTING" will be displayed at "COND1" on the CONSULT-III screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED"

ENG SPEED	More than 1,000 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	70 - 105°C
Selector lever	Suitable position

CAUTION:

Always drive vehicle at a safe speed.

Which displayed on CONSULT-III screen?

"COND1: OUT OF CONDITION">>GO TO 5.
"COND1: COMPLETED", "COND2: INCOMPLETE">>GO TO 8.
"COND1: COMPLETED", "COND2: COMPLETED">>GO TO 9.

8. PERFORM PROCEDURE FOR COND2

While driving, release accelerator pedal completed from the above condition (PERFORM PROCEDURE FOR COND1-III) until "INCOMPLETE" at "COND2" on CONSULT-III screen has turned to "COMPLETED" (It will take approximately 4 seconds).

CAUTION:
Always drive vehicle at a safe speed.

Which displayed on CONSULT-III screen?

"COND2: COMPLETED", "COND3: INCOMPLETE">>GO TO 9.
"COND2: COMPLETED", "COND3: COMPLETED">>GO TO 10.

9. PERFORM PROCEDURE FOR COND3-I

Stop vehicle and let it idle until "INCOMPLETE" of "COND3" on CONSULT-III screen has turned to "COMPLETED"

>> GO TO 10.

10. PERFORM PROCEDURE FOR COND3-II

Touch SELF-DIAG RESULTS".

Which displayed on CONSULT-III screen?

"OK" >> INSPECTION END.
"NG" >> Go to EC-624, "Diagnosis Procedure".
"CAN NOT BE DIAGNOSED">>GO TO 11.

11. PERFORM PROCEDURE FOR COND3-III

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Turn ignition switch ON and select ENGINE using CONSULT-III.
3. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-III
4. Start engine and warm it up while monitoring "COOLAN TEMP/S" indication on CONSULT-III.
5. When "COOLAN TEMP/S" indication reaches 70°C (158°F).

>> GO TO 6.

12. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-623, "Component Function Check".

NOTE:
Use component function check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-624, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006496310

1. PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. 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. Check the voltage between ECM harness connector terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F8	50 (HO2S2 signal)	59	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be below 0.36 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 terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F8	50 (HO2S2 signal)	59	Keeping engine at idle for 10 minutes	The voltage should be below 0.36 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 terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F8	50 (HO2S2 signal)	59	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be below 0.36 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-624, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496311

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-621, "DTC Logic".

Which malfunction is detected?

A >> GO TO 2.
B >> GO TO 9.

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

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

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F8	59	Existed

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

Is the inspection result normal?

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

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	4	F8	50	Existed

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

HO2S2		Ground	Continuity
Connector	Terminal		
F30	4	Ground	Not existed

ECM		Ground	Continuity
Connector	Terminal		
F8	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

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

5. CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace harness or connectors.

6. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-627, "Component Inspection".

Is the inspection result normal?

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

7. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2.

CAUTION:

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

>> INSPECTION END

8. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

9. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace ground connection.

10. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-546, "Work Procedure".
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-639, "DTC Logic".
NO >> GO TO 11.

11. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F8	59	Existed

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

Is the inspection result normal?

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

12. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	4	F8	50	Existed

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

HO2S2		Ground	Continuity
Connector	Terminal		
F30	4	Ground	Not existed

ECM		Ground	Continuity
Connector	Terminal		
F8	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

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

13. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-627, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> GO TO 14.

14. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2.

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

>> INSPECTION END

15. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006496312

1. INSPECTION START

Do you have CONSULT-III?

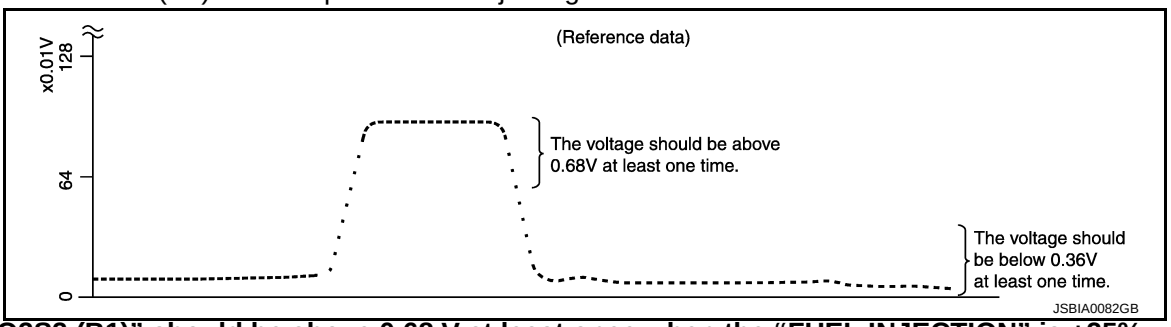
Do you have CONSULT-III?

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

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select “ENGINE” using CONSULT-III.
2. Select “DATA MONITOR” mode.
3. Start engine and warm it up to the normal operating temperature.
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 “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
8. 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 0.36 V at least once when the “FUEL INJECTION” is −25%.

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F8	50 (HO2S2)	59	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 0.36 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 terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F8	50 (HO2S2)	59	Keeping engine at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.36 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 terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F8	50 (HO2S2)	59	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 0.36 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 malfunctioning heated oxygen sensor 2.

CAUTION:

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

>> INSPECTION END

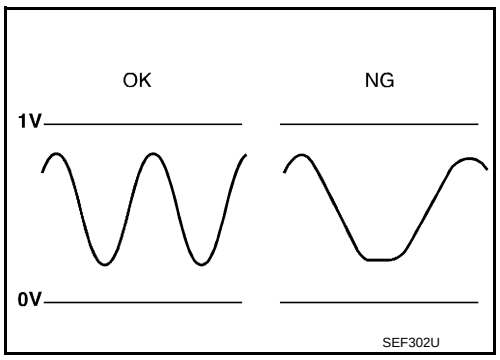
P0139 HO2S2

DTC Logic

INFOID:0000000006496313

DTC DETECTION LOGIC

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



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond between rich and lean than the specified time.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 11.

2.PRECONDITIONING

NOTE:
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds.
- **For the best results, perform DTC WORK SUPPORT at a temperature of 0 to 30°C (32 to 86°F)**
- **"COMPLETED" will appear on CONSULT-III screen when all tests "COND1", "COND2" and "COND3" are completed.**

TESTING CONDITION:
Never stop engine during this procedure. If the engine is stopped, retry this procedure from PERFORM PROCEDURE FOR COND1-II.

>> GO TO 3.

3.PERFORM PROCEDURE FOR COND1-I

Start engine and warm it up to normal operating temperature.

>> GO TO 4.

4.PERFORM PROCEDURE FOR COND1-II

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 5.

5.PERFORM PROCEDURE FOR COND1-III

1. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
2. Let engine idle for 1 minute.
3. Select “HO2S2 (B1) P0139” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Rev engine up to 2,000 rpm two or three times quickly under no load.

Is “COMPLETED” appears on CONSULT-III screen?

YES >> GO TO 9.
NO >> GO TO 6.

6.PERFORM PROCEDURE FOR COND1-IV

When the following conditions are met, “TESTING” will be displayed at “COND1” on the CONSULT-III screen. Maintain the condition continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 60 seconds.)

ENG SPEED	More than 1,000 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	More than 70°C (158°F)
Shift lever	Suitable position

Which is displayed on CONSULT-III screen?

COND1: OUT OF CONDITION>>GO TO 4.
COND1: COMPLETED, COND2: INCOMPLETED>>GO TO 7.
COND1: COMPLETED, COND2: COMPLETED>>GO TO 8.

7.PERFORM PROCEDURE FOR COND2

While driving, release accelerator pedal completely from the above condition until “INCOMPLETED” at “COND2” on CONSULT-III screen has turned to “COMPLETED”. (It will take approximately 4 seconds.)

Which is displayed on CONSULT-III screen?

COND2: COMPLETED, COND3: INCOMPLETED>>GO TO 8.
COND2: COMPLETED, COND3: COMPLETED>>GO TO 9.

8.PERFORM PROCEDURE FOR COND3-I

Stop vehicle and let it idle until “INCOMPLETED” of “COND3” on CONSULT-III screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)

>> GO TO 9.

9.PERFORM PROCEDURE FOR COND3-II

Touch “SELF DIAGRESULTS”.

Which is displayed on CONSULT-III screen?

YES >> INSPECTION END
NO >> Go to EC-631, "Diagnosis Procedure".
CAN NOT BE DIAGNOSED>>GO TO 10.

10.PERFORM PROCEDURE FOR COND3-III

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-III.
3. Start engine and warm it up until “COOLAN TEMP/S” indication reaches to 70°C (158°F).

>> GO TO 5.

11.PREFORM COMPONENT FUNCTION CHECK

Perform Component Function Check. Refer to EC-631, "Component Function Check".

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-631, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006496314

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

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

ECM			Condition	Voltage
Connector	Terminal			
	+	–		
F8	50 (HO2S2 signal)	59	Revving up to 4,000 rpm under no load at least 10 times	A change of voltage should be more than 0.12 V for 1 second during this procedure.

Is the inspection result normal?

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

2.PERFORM COMPONENT FUNCTION CHECK-II

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

ECM			Condition	Voltage
Connector	Terminal			
	+	–		
F8	50 (HO2S2 signal)	59	Keeping engine speed at idle for 10 minutes	A change of voltage should be more than 0.12 V for 1 second during this procedure.

Is the inspection result normal?

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

3.PERFORM COMPONENT FUNCTION CHECK-III

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

ECM			Condition	Voltage
Connector	Terminal			
	+	–		
F8	50 (HO2S2 signal)	59	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	A change of voltage should be more than 0.12 V for 1 second during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-631, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496315

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-546, "Work Procedure".
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-635, "DTC Logic" or EC-639, "DTC Logic".
NO >> GO TO 3.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F8	59	Existed

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

Is the inspection result normal?

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

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	4	F8	50	Existed

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

HO2S2		Ground	Continuity
Connector	Terminal		
F30	4	Ground	Not existed

ECM		Ground	Continuity
Connector	Terminal		
F8	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-633, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace heated oxygen sensor 2.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006496316

1. INSPECTION START

Do you have CONSULT-III?

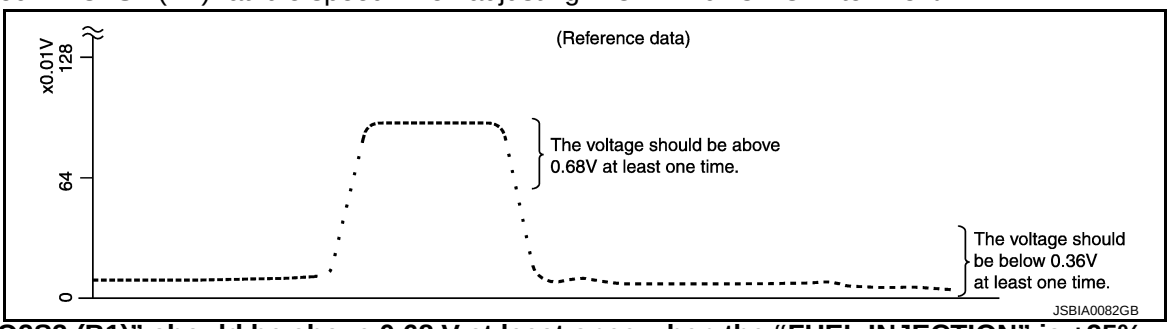
Do you have CONSULT-III?

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

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select “ENGINE” using CONSULT-III.
2. Select “DATA MONITOR” mode.
3. Start engine and warm it up to the normal operating temperature.
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 “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
8. 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 0.36 V at least once when the “FUEL INJECTION” is −25%.

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F8	50 (HO2S2)	59	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 0.36 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 terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F8	50 (HO2S2)	59	Keeping engine at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.36 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 terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F8	50 (HO2S2)	59	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 0.36 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 malfunctioning heated oxygen sensor 2.

CAUTION:

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

>> INSPECTION END

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000006496320

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 sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MI (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171	Fuel injection system too lean	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	• Intake air leaks • A/F sensor 1 • Fuel injector • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor • Incorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to EC-546, "Work Procedure".
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 may not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Go to EC-636, "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 10 minutes.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-636, "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 and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
   Hold the accelerator pedal as steady as possible.
   The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).
	When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).

CAUTION:
Always drive at a safe speed.

3. Check 1st trip DTC.

Is 1st trip DTC detected?

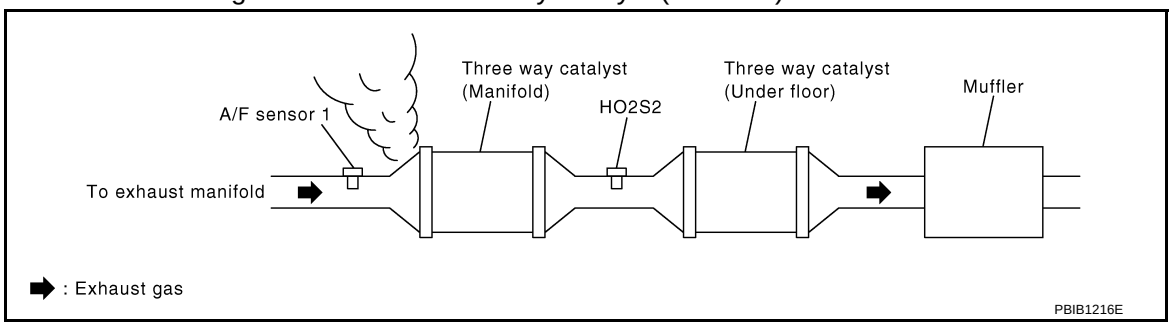
YES >> Go to EC-636, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496321

1.CHECK EXHAUST GAS LEAK

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



Is exhaust gas leak detected?

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

2.CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

Intake air leak detected?

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

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

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

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F50	1	F8	49	Existed

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

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F50	1	Ground	Not existed

ECM		Ground	Continuity
Connector	Terminal		
F8	49	Ground	Not existed

6. Also check harness for short to power.

Is the inspection result normal?

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

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-551, "Work Procedure".
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-551, "Work Procedure".

At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2, 51 psi)

Is the inspection result normal?

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

5. CHECK FUEL HOSES AND FUEL TUBES

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”.
NO >> Repair or replace

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

1. Install all removed parts.
2. Check “MASS AIRFLOW” in “DATA MONITOR” mode with CONSULT-III.

1.0 - 4.0 g·m/sec: at idling
2.0 - 10.0 g·m/sec: at 2,500 rpm

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.

1.0 - 4.0 g·m/sec: at idling
2.0 - 10.0 g·m/sec: at 2,500 rpm

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-588, "DTC Logic".

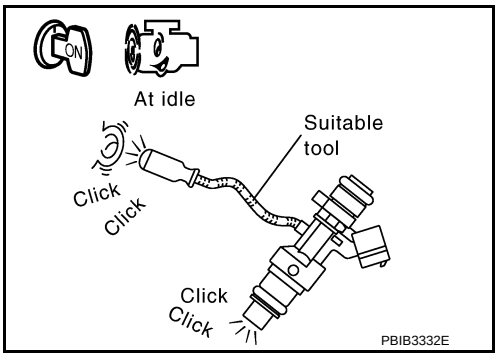
7. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT-III

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-III

1. Let engine idle.
2. Listen to each fuel injector operating sound.



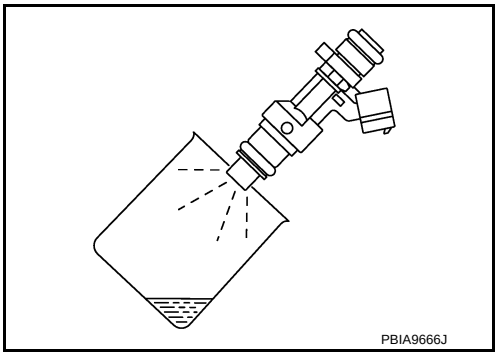
Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for FUEL INJECTOR. Refer to EC-778, "Component Function Check".

8. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all fuel injector harness connectors.
4. Remove fuel tube assembly. Refer to EM-173, "Exploded View".
   Keep fuel hose and all fuel injectors connected to fuel tube.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each fuel injector.
7. Crank engine for about 3 seconds.



Fuel should be sprayed evenly for each fuel injector.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000006496322

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 sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MI (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172	Fuel injection system too rich	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	• A/F sensor 1 • Fuel injector • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to EC-546, "Work Procedure".
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 may not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Go to EC-640, "Diagnosis Procedure".
NO >> Remove spark plugs and check for fouling, etc.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

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

Is 1st trip DTC detected?

YES >> Go to EC-640, "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 and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.

Hold the accelerator pedal as steady as possible.
The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).
	When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).

CAUTION:
Always drive at a safe speed.

3. Check 1st trip DTC.

Is 1st trip DTC detected?

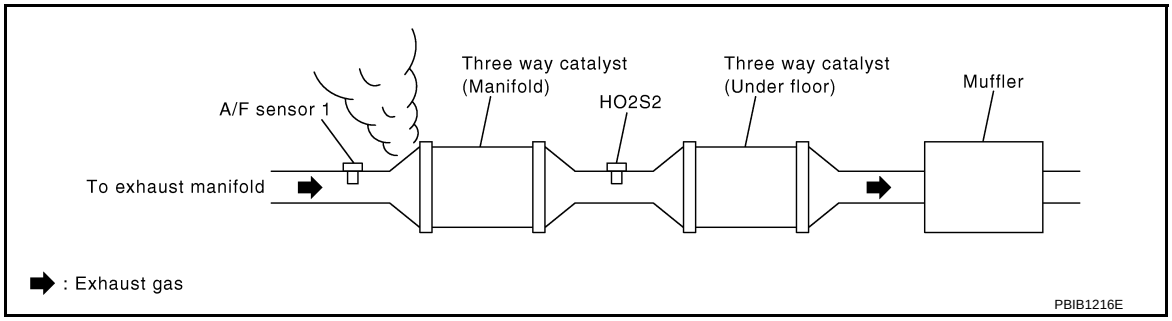
YES >> Go to EC-640, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496323

1.CHECK EXHAUST GAS LEAK

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



Is exhaust gas leak detected?

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

2.CHECK FOR INTAKE AIR LEAK

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

Is intake air leak detected?

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

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

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

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F50	1	F8	49	Existed

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

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F50	1	Ground	Not existed

ECM		Ground	Continuity
Connector	Terminal		
F8	49	Ground	Not existed

6. Also check harness for short to power.

Is the inspection result normal?

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

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-551, "Work Procedure".
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-551, "Work Procedure".

At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2, 51 psi)

Is the inspection result normal?

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

5. CHECK FUEL HOSES AND FUEL TUBES

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”.
NO >> Repair or replace

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

1. Install all removed parts.
2. Check “MASS AIRFLOW” in “DATA MONITOR” mode with CONSULT-III.

1.0 - 4.0 g·m/sec: at idling
2.0 - 10.0 g·m/sec: at 2,500 rpm

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in “Service $01” with GST.

1.0 - 4.0 g·m/sec: at idling
2.0 - 10.0 g·m/sec: at 2,500 rpm

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-588, "DTC Logic".

7. CHECK FUNCTION OF FUEL INJECTOR

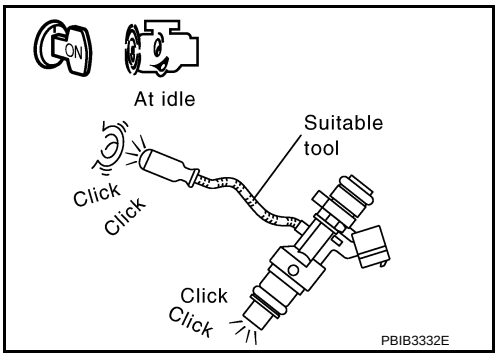
With CONSULT-III

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-III

1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for FUEL INJECTOR. Refer to EC-778, "Component Function Check".

8. CHECK FUELINJECTOR

1. Remove fuel injector assembly. Refer to EM-173, "Exploded View".
   Keep fuel hose and all fuel injectors connected to fuel tube.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all fuel injector harness connectors.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each fuel injectors.
6. Crank engine for about 3 seconds.
   Make sure fuel does not drip from fuel injector.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace the fuel injectors from which fuel is dripping. Always replace O-ring with new one.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

P0197, P0198 EOT SENSOR

DTC Logic

INFOID:0000000006635703

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-643, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006635704

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	F8	57	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	F8	54	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-644, "Component Inspection".

Is the inspection result normal?

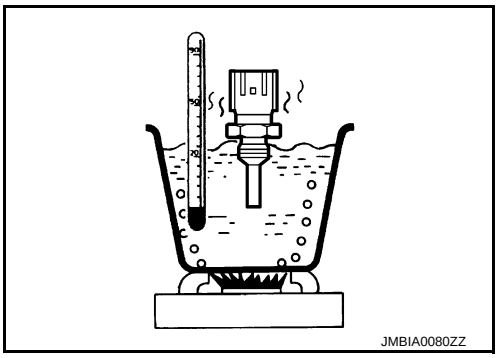
YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace engine oil temperature sensor. Refer to EM-222, "Exploded View".

Component Inspection

INFOID:0000000006635705

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)	2.1 - 2.9
			50 (122)	0.68 - 1.00
			90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine oil temperature sensor. Refer to EM-103, "Exploded View".

P0222, P0223 TP SENSOR

DTC Logic

INFOID:0000000006496324

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-686, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	• Harness or connectors (TP sensor 1 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1)
P0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-645, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496325

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

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

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5 V

Is the inspection result normal?

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

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

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

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F8	36	Existed

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

Is the inspection result normal?

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

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

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	2	F8	33	Existed

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

Is the inspection result normal?

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

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-646, "Component Inspection".

Is the inspection result normal?

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

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-163, "Exploded View".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006496326

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-543, "Work Procedure".
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 and ground.

ECM			Condition		Voltage
Connector	Terminal				
	+	–			
F8	33 (TP sensor 1 signal)	36	Accelerator pedal	Fully released	More than 0.36 V
				Fully depressed	Less than 4.75 V
	34 (TP sensor 2 signal)			Fully released	Less than 4.75 V
				Fully depressed	More than 0.36 V

Is the inspection result normal?

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

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-163, "Exploded View".

>> INSPECTION END

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Logic

INFOID:0000000006496328

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 MI 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 MI will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MI will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MI will remain on.
   If another misfire condition occurs that can damage the TWC, the MI 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 MI will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	• Improper spark plug • Insufficient compression • Incorrect fuel pressure • The fuel injector circuit is open or shorted • Fuel injector • Intake air leak • The ignition signal circuit is open or shorted • Lack of fuel • Signal plate • A/F sensor 1 • Incorrect PCV hose connection
P0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	
P0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	
P0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for about 15 minutes.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-649, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

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

2. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
Hold the accelerator pedal as steady as possible.
The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.
CAUTION:
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).
	When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).

The time to driving varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-649, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496329

1. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Start engine and run it at idle speed.
2. Listen for the sound of the intake air leak.
3. Check PCV hose connection.

Is intake air leak detected?

YES >> Discover air leak location and repair.
NO >> GO TO 2.

2. CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 3.
YES-2 >> Without CONSULT-III: GO TO 4.
NO >> Repair or replace it.

3. PERFORM POWER BALANCE TEST

With CONSULT-III
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

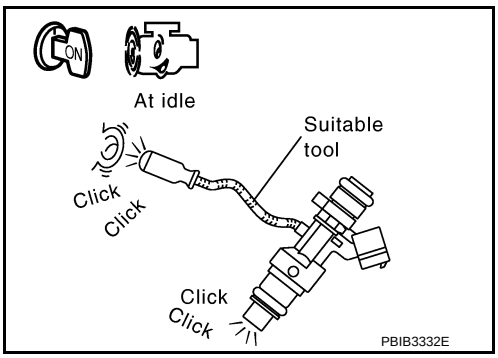
Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 4.

4. CHECK FUNCTION OF FUEL INJECTOR

1. Start engine and let engine idle.

2. Listen to each fuel injector operating sound.



Clicking noise should be heard.

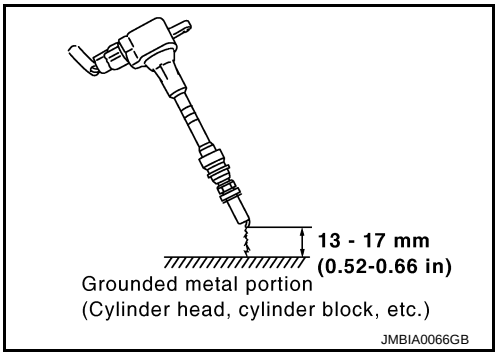
Is the inspection result normal?

YES >> GO TO 5.
NO >> Perform trouble diagnosis for FUEL INJECTOR. Refer to EC-778, "Component Function Check".

5. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **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 9.
NO >> GO TO 6.

6. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

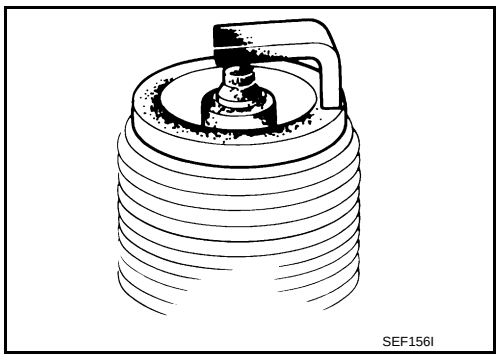
YES >> GO TO 7.
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-783, "Component Function Check".

7. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-251, "Spark Plug".
NO >> Repair or clean spark plug. Then GO TO 8.



8. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-251, "Spark Plug".

9. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-151, "Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

10. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to EC-551, "Work Procedure".
3. Install fuel pressure gauge and check fuel pressure. Refer to EC-551, "Work Procedure".

At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2, 51 psi)

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”.
NO >> Repair or replace.

12. CHECK IGNITION TIMING

Check the following items.
For procedure, refer to EC-802, "Inspection".
For specification, refer to EC-807, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Follow the EC-547, "Work Procedure".

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

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 sennsor 1 harness connector and ECM harness connector.

A/F sennsor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F50	1	F8	49	Existed

5. Check the continuity between A/F sennsor 1 harness connector or ECM harness connector and ground.

A/F sennsor 1		Ground	Continuity
Connector	Terminal		
F50	1	Ground	Not existed

ECM		Ground	Continuity
Connector	Terminal		
F8	49	Ground	Not existed

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK A/F SENSOR 1 HEATER

Refer to EC-578, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace A/F sensor 1.

15. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

Check “MASS AIRFLOW” in “DATA MONITOR” mode with CONSULT-III.

1.0 - 4.0 g·m/sec : at idling
2.0 - 10.0 g·m/sec : at 2,500 rpm

With GST

Check mass air flow sensor signal in Service $01 with GST.

1.0 - 4.0 g·m/sec : at idling
2.0 - 10.0 g·m/sec : at 2,500 rpm

Is the measurement value within the specification?

YES >> GO TO 16.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-588, "DTC Logic".

16. CHECK SYMPTOM TABLE

Check items on the rough idle symptom in EC-795, "Symptom Table".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair or replace.

17. ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.
Erase the 1st trip DTC from the ECM memory after performing the tests.

>> GO TO 18.

18. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

P0327, P0328 KS

DTC Logic

INFOID:0000000006496330

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detected condition	Possible cause
P0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Knock sensor
P0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Go to EC-654, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496331

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect knock sensor harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	2	F8	40	Existed

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

Is the inspection result normal?

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

3.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Knock sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F8	37	Existed

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

Is the inspection result normal?

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

4. CHECK KNOCK SENSOR

Refer to EC-655, "Component Inspection".

Is the inspection result normal?

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

5. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006496332

1. CHECK KNOCK SENSOR

1. Turn ignition switch OFF.
2. Disconnect knock sensor harness connector.
3. Check resistance between knock sensor terminals as follows.

NOTE:
It is necessary to use an ohmmeter which can measure more than 10 MΩ.

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

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

Is the inspection result normal?

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

P0335 CKP SENSOR (POS)

DTC Logic

INFOID:0000000006496333

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor (POS) circuit	• The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. • The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. • The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	• Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] (Refrigerant pressure sensor circuit is shorted.) (Accelerator pedal position sensor 2 circuit is shorted.) • Crankshaft position sensor (POS) • Refrigerant pressure sensor • Accelerator pedal position sensor • Accelerator pedal position sensor 2 • Signal plate

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-656, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496334

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

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

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

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

CKP sensor (POS)		Ground	Voltage
Connector	Terminal		
F20	1	Ground	Approx. 5 V

Is the inspection result normal?

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

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

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

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F20	1	F8	75	Existed

Is the inspection result normal?

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

4. CHECK SENSOR POWER SUPPLY CIRCUIT

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F8	101	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
E16	102	APP sensor	E101*1 M203*2	5

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

Is the inspection result normal?

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

5. CHECK REFRIGERANT PRESSURE SENSOR

Check the refrigerant pressure sensor. Refer to EC-790, "Component Function Check".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace refrigerant pressure sensor.

6. CHECK APP SENSOR

Refer to EC-749, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 7.

7. REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Exploded View".

>> INSPECTION END

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

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

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F20	2	F8	62	Existed

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

Is the inspection result normal?

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

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

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

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F20	3	F8	61	Existed

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

Is the inspection result normal?

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

10.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-658, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace crankshaft position sensor (POS).

11.CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace the signal plate.

12.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006496335

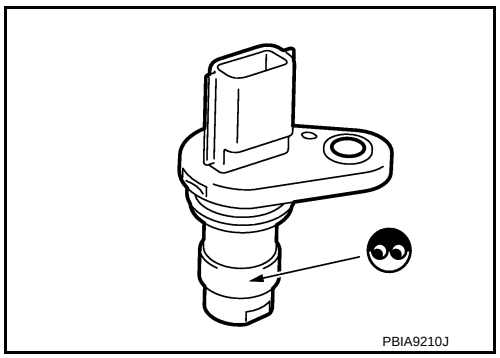
1.CHECK CRANKSHAFT POSITION SENSOR (POS)-I

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

5. Visually check the sensor for chipping.

Is the inspection result normal?

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



2. CHECK CRANKSHAFT POSITION SENSOR (POS)-II

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

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

Is the inspection result normal?

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

P0340 CMP SENSOR (PHASE)

DTC Logic

INFOID:0000000006496336

DTC DETECTION LOGIC

NOTE:
If DTC P0340 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-686, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340	Camshaft position sensor (PHASE) circuit	• The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. • The cylinder No. signal is not sent to ECM during engine running. • The cylinder No. signal is not in the normal pattern during engine running.	• Harness or connectors (The sensor circuit is open or shorted) • Intake camshaft position sensor • Exhaust camshaft position sensor • Intake camshaft • Exhaust camshaft • Starter motor • Starting system circuit • Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-660, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Keep engine speed at more than 800 rpm for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-660, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496337

1.CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

YES >> GO TO 2.
NO >> Check starting system.

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

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

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

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

CMP sensor (PHASE)			Ground	Voltage
Camshaft	Connector	Terminal		
Intake	F21	1	Ground	Approx. 5 V
Exhaust	F22	1		

Is the inspection result normal?

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

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

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

CMP sensor (PHASE)			ECM		Continuity
Camshaft	Connector	Terminal	Connector	Terminal	
Intake	F21	2	F8	63	Existed
Exhaust	F22	2			

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

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

CMP sensor (PHASE)			ECM		Continuity
Camshaft	Connector	Terminal	Connector	Terminal	
Intake	F21	3	F8	65	Existed
Exhaust	F22	3		48	

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 CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-662, "Component Inspection".

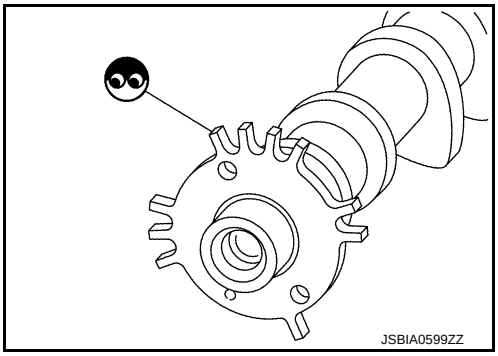
Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace camshaft position sensor (PHASE).

7. CHECK CAMSHAFT (INT)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

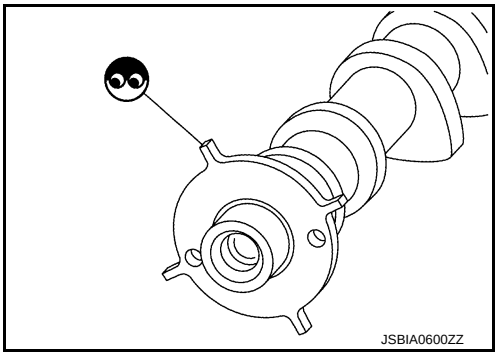


Is the inspection result normal?

YES >> GO TO 8.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.

8. CHECK 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 9.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

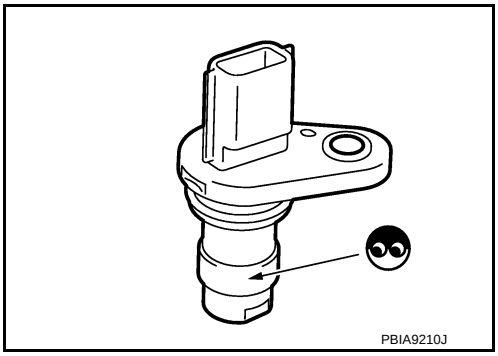
>> INSPECTION END

Component Inspection

INFOID:0000000006496338

1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-I

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



Is the inspection result normal?

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

2. CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

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

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

Is the inspection result normal?

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

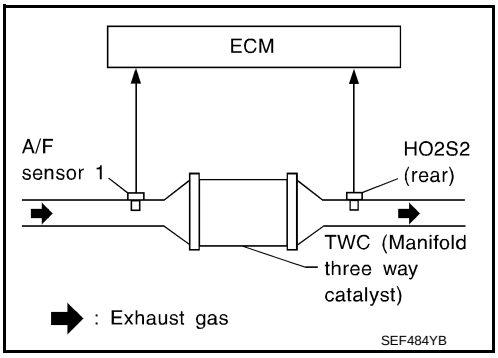
P0420 THREE WAY CATALYST FUNCTION

DTC Logic

INFOID:0000000006496339

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	DTC detecting condition	Possible cause
P0420	Catalyst system efficiency below threshold	• Three way catalyst (manifold) does not operate properly. • Three way catalyst (manifold) does not have enough oxygen storage capacity.	• Three way catalyst (manifold) • Exhaust tube • Intake air leaks • Fuel injector • Fuel injector leaks • Spark plug • Improper ignition timing

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 7.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Do not hold engine speed for more than the specified minutes below.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-III.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).
7. Open engine hood.
8. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-III.
9. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
10. Check the indication of “CATALYST”.

Which is displayed on CONSULT-III screen?

CMPLT >> GO TO 6.
INCMP >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Wait 5 seconds at idle.
2. Rev engine up to 2,000 to 3,000 rpm and maintain it until “INCMP” of “CATALYST” changes to “CMPLT” (It will take approximately 5 minutes).

Does the indication change to “CMPLT”?

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

5. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Stop engine and cool it down to less than 70°C (158°F).
2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

6. PERFORM DTC CONFIRMATION PROCEDURE-III

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-666, "Diagnosis Procedure".
NO >> INSPECTION END

7. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-665, "Component Function Check".

NOTE:
Use component function check to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-666, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006496340

1. PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. 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 under the following condition.

ECM			Condition	Voltage (V)
Connector	+	–		
	Terminal	Terminal		
F8	50 (HO2S2)	59	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 >> Go to EC-666, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496341

1.CHECK EXHAUST SYSTEM

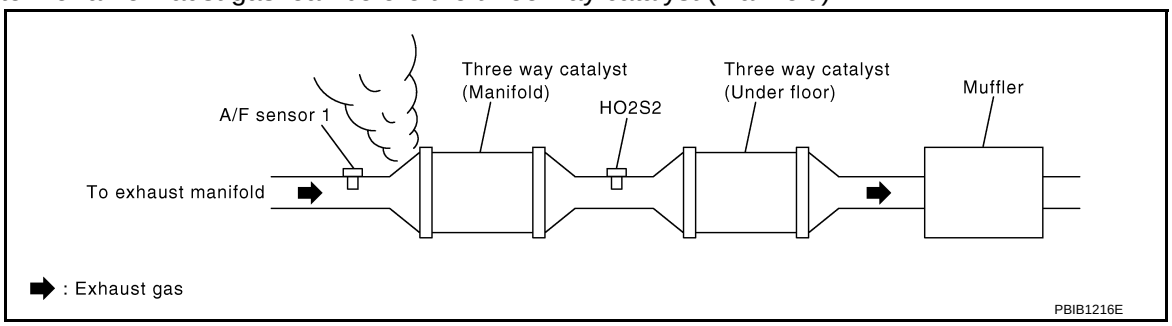
Visually check exhaust tubes and muffler for dent.

Is the inspection result normal?

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

2.CHECK EXHAUST GAS LEAK

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



Is exhaust gas leak detected?

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

3.CHECK INTAKE AIR LEAK

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

Is intake air leak detected?

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

4.CHECK IGNITION TIMING AND IDLE SPEED

Check the following items. Refer to EC-547, "Work Procedure".
For specification, refer to EC-807, "Ignition Timing"
For specification, refer to EC-807, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Follow the EC-547, "Work Procedure".

5.CHECK FUEL INJECTOR

1. Stop engine and then turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

Cylinder		ECM			Voltage
No.	Front / Rear	Connector	Terminal		
			+	–	
1	Front	F7	31	108	Battery voltage
2			12		
3			30		
4			20		
1	Rear		29		
2			16		
3			25		
4			24		

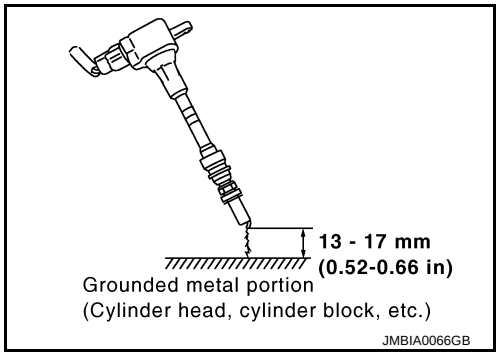
Is the inspection result normal?

YES >> GO TO 6.
NO >> Perform EC-778, "Diagnosis Procedure".

6. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **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.

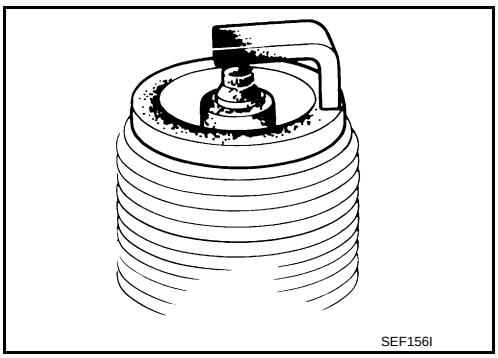
Spark should be generated.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-783, "Diagnosis Procedure".

8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc. Refer to EM-159, "Inspection".



Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-251, "Spark Plug".
NO >> Repair or clean spark plug. Then GO TO 9

9. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 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-251, "Spark Plug".

10. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Remove fuel injector assembly.
   Refer to EM-173, "Exploded View".
   Keep fuel hose and all fuel injectors connected to fuel tube.
3. Disconnect all ignition coil harness connectors.
4. Reconnect all fuel injector harness connectors disconnected.
5. Turn ignition switch ON.

Does fuel drip from fuel injector?

YES >> GO TO 11.
NO >> Replace the fuel injector(s) from which fuel is dripping.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the trouble fixed?

YES >> INSPECTION END
NO >> Replace three way catalyst assembly.

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000006496342

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	• Harness or connectors (The solenoid valve circuit is open or shorted.) • EVAP canister purge volume control solenoid valve

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

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

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 13 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-669, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496343

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

EVAP canister purge volume control solenoid valve		Ground	Voltage
Connector	Terminal		
F32	1	Ground	Battery voltage

Is the inspection result normal?

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

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

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

3.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F32	2	F7	9	Existed

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

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 4.
YES-2 >> Without CONSULT-III: GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

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

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-670, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP canister purge volume control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

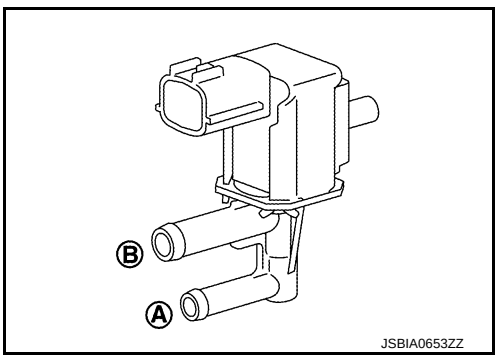
INFOID:0000000006496344

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Turn ignition switch ON.
5. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III.
6. Touch “Qd” and “Qu” on CONSULT-III screen to adjust “PURG VOL C/V” opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed

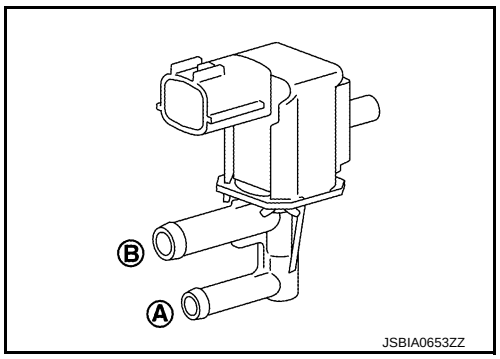


Without CONSULT-III

1. Turn ignition switch OFF.

2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Existed
No supply	Not existed



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP canister purge volume control solenoid valve

P0500 VSS

Description

INFOID:0000000006496345

The vehicle speed signal is sent to the combination meter from the “ABS actuator and electric unit (control unit)” by CAN communication line. The combination meter then sends a signal to the ECM by CAN communication line.

DTC Logic

INFOID:0000000006496346

DTC DETECTION LOGIC

NOTE:

- **If DTC P0500 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-569, "DTC Logic".**
- **If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-685, "DTC Logic".**

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

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

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

2.PRECONDITIONING

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

>> GO TO 3.

3.CHECK VEHICLE SPEED SENSOR FUNCTION

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

With CONSULT-III

1. Start engine.
2. Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-III. The vehicle speed on CONSULT-III should exceed 10 km/h (6 mph) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Go to EC-673, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select “DATA MONITOR” mode with CONSULT-III.
2. Warm engine up to normal operating temperature.
3. Maintain the following conditions for at least 60 consecutive seconds.
   CAUTION:
   Always drive vehicle at a safe speed.

ENG SPEED	1,600 - 6,000 rpm (CVT) 1,900 - 6,000 rpm (M/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	6.2 - 31.8 msec (CVT) 4.5 - 31.8 msec (M/T)
Shift lever	Except P or N position (CVT) Except Neutral position (M/T)
PW/ST SIGNAL	OFF

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-673, "Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-673, "Component Function Check".
Use component function check to check the overall function of the vehicle speed signal circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-673, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006496347

1.PERFORM COMPONENT FUNCTION CHECK

With GST

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed signal in Service $01 with GST.
   The vehicle speed signal on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-673, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496348

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

Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-31, "DTC Index" (Without EPS) or BRC-142, "DTC Index" (With EPS).

Is the inspection result normal?

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

2.CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to MWI-36, "DTC Index".

>> INSPECTION END

P0520 EOP SENSOR

DTC Logic

INFOID:0000000006635712

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (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.) (Atmospheric pressure sensor 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 • Atmospheric pressure sensor • 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-674, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006635713

1.CHECK ENGINE OIL

1. Turn ignition switch OFF.
2. Check engine oil level and pressure. Refer to LU-8, "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
F8	72	TP sensor 1	F29	1
	74	EOP sensor	F43	3
	78	INT CMP sensor	F21	1
		EXH CMP sensor	F22	
E16	106	APP sensor 1	E101*1 M203*2	4

*1: LHD models or RHD with CVT models

*2: RHD with M/T models

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	F8	60	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		
F7	10	Ground	Existed
	11		
E16	108		

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "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	F8	47	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-676, "Component Inspection".

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection

INFOID:0000000006635714

1.CHECK EOP SENSOR

1. Turn ignition switch OFF.
2. Disconnect EOP sensor harness connector.
3. Check resistance between EOP sensor connector terminals.

+	–	Condition	Resistance (kΩ)
EOP sensor			
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-103, "Exploded View".

P0524 ENGINE OIL PRESSURE

DTC Logic

INFOID:0000000006635715

DTC DETECTION LOGIC

NOTE:
If DTC P0524 is displayed with DTC P0520 or P0075, perform trouble diagnosis for DTC P0520 or P0075 first. Refer to EC-674, "DTC Logic" or EC-583, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	Detecting condition	Possible cause
P0524	ENGINE OIL PRESSURE (Engine oil pressure too low)	Engine oil pressure is low because there is a gap between angle of target and phase-control angle.	• Engine oil pressure or level too low • Crankshaft position sensor • Camshaft position sensor • Intake valve timing control solenoid valve • Accumulation of debris to the signal pick-up portion of the camshaft • Timing chain installation • Foreign matter caught in the oil groove for intake valve timing control

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.PRECONDITIONING-II

Check oil level and oil pressure. Refer to LU-25, "Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Proceed to LU-25, "Inspection".

3.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT-III

1. Select “DATA MONITOR” mode of “ENGINE” using CONSULT-III.
2. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	More than 1,700 rpm
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:
Always drive at a safe speed.

3. Check 1st trip DTC.

WITH GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

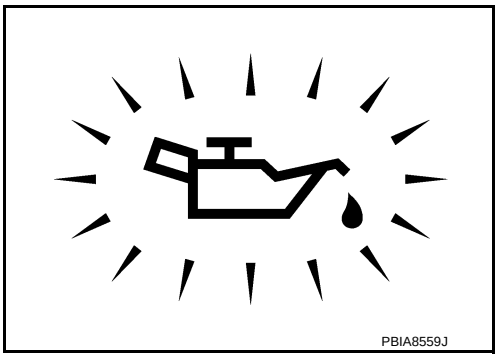
YES >> Proceed to EC-679, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006635716

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 >> Proceed to LU-25, "Inspection".
NO >> GO TO 2.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-584, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-181, "Exploded View".

3. CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-658, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace crankshaft position sensor. Refer to EM-169, "Exploded View".

4. CHECK CAMSHAFT POSITION SENSOR

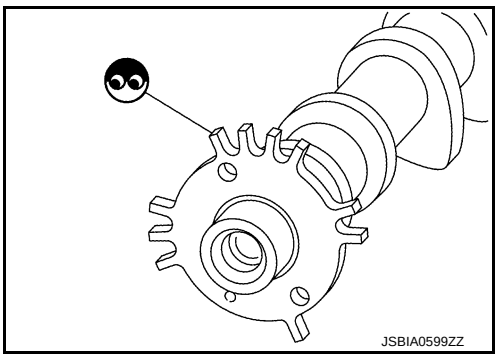
Refer to EC-662, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning camshaft position sensor. Refer to EM-178, "Exploded View".

5. CHECK CAMSHAFT (INT)

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



Is the inspection result normal?

YES >> GO TO 6.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-191, "Exploded View".

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-181, "Exploded View".
NO >> GO TO 7.

7.CHECK LUBRICATION CIRCUIT

Perform “Inspection of Camshaft Sprocket (INT) Oil Groove”. Refer to EM-200, "Inspection".

Is the inspection result normal?

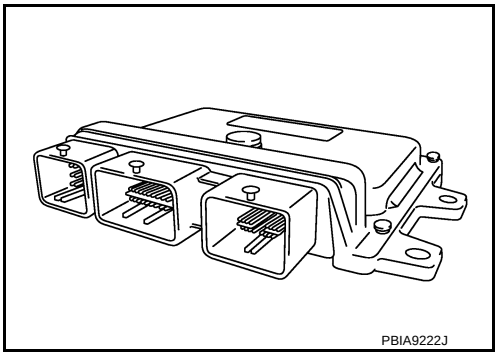
YES >> Check intermittent incident. refer to GI-42, "Intermittent Incident".
NO >> Clean lubrication line.

P0603 ECM

Description

INFOID:0000000006496349

ECM has the memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the Idle Air Volume Learning value memory, etc. even when the ignition switch is turned OFF.


PBIA9222J

DTC Logic

INFOID:0000000006496350

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0603*	Engine control module	ECM back-up RAM system does not function properly.	• ECM

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON wait at least 10 seconds.
2. Turn ignition switch OFF and wait at least 5 minutes
3. Turn ignition switch ON, wait at least 10 seconds.
4. Repeat step 2 and 3 for five times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-681, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496351

1.INSPECTION START

1. Erase DTC.
2. Perform DTC CONFIRMATION PROCEDURE.
   See EC-681, "DTC Logic".

Is the 1st trip DTC P0603 displayed again?

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

2.REPLACE ECM

1. Replace ECM.
2. Perform EC-541, "Work Procedure".

>> INSPECTION END

P0605 ECM

DTC Logic

INFOID:0000000006496352

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605	Engine control module	A)	ECM calculation function is malfunctioning.	• ECM
		B)	ECM EEP-ROM system is malfunctioning.	
		C)	ECM self shut-off function is malfunctioning.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

1. Turn ignition switch ON.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-683, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-683, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
3. Repeat step 2 for 32 times.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-683, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496353

1.INSPECTION START

1. Erase DTC.
2. Perform DTC CONFIRMATION PROCEDURE.
   See EC-683, "DTC Logic".

Is the 1st trip DTC P0605 displayed again?

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

2.REPLACE ECM

1. Replace ECM.
2. Perform EC-541, "Work Procedure".

>> INSPECTION END

P0607 ECM

DTC Logic

INFOID:0000000006635717

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0607	ECM (CAN communication bus)	When detecting error during the initial diagnosis of CAN controller of ECM.	ECM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to EC-685, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006635718

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to EC-685, "DTC Logic".
4. Check DTC.

Is the DTC P0607 displayed again?

YES >> Replace ECM. Refer to EC-805, "Removal and Installation".
NO >> INSPECTION END

P0643 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000006496354

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-686, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496355

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

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

APP sensor		Ground	Voltage
Connector	Terminal		
E101*1 M203*1	4	Ground	Approx. 5 V

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

Is the inspection result normal?

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

3.CHECK SENSOR POWER SUPPLY CIRCUIT

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

ECM		Sensor		
Connector	Terminal	Item	Connector	Terminal
F8	72	TP sensor 1	F29	1
	74	EOP sensor	F43	3
	78	INT CMP sensor	F21	1
		EXH CMP sensor	F22	
E16	106	APP sensor 1	E101*1 M203*1	4

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

Is the inspection result normal?

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

4.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-662, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace camshaft position sensor (PHASE).

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-646, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-163, "Exploded View".

>> INSPECTION END

7.CHECK APP SENSOR

Refer to EC-749, "Component Inspection".

Is the inspection result normal?

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

8.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Exploded View".

>> INSPECTION END

9.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

P0850 PNP SWITCH

Description

INFOID:0000000006496356

When the selector lever position is P or N (CVT), Neutral position (M/T), park/neutral position (PNP) signal is ON.

DTC Logic

INFOID:0000000006496357

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

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

2.PRECONDITIONING

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

>> GO TO 3.

3.CHECK PNP SIGNAL FUNCTION

With CONSULT-III

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

Shift 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 >> Go to EC-689, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

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

CAUTION:
Always drive vehicle at a safe speed.

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

B/FUEL SCHDL	4.2 (CVT) or 3.0 (M/T) - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 mph)
Shift lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-689, "Diagnosis Procedure".
NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-689, "Component Function Check".

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-689, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006496358

1. PERFORM COMPONENT FUNCTION CHECK

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

ECM			Condition		Voltage
Connector	Terminal +	Terminal –			
F8	69 (PNP signal)	108	Shift lever	P or N (CVT) Neutral (M/T)	Battery voltage
				Except above	Approx. 0 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-689, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496359

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

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

Transmission range switch (CVT) / PNP switch (M/T)		Ground	Voltage
Connector	Terminal		
F23 (CVT)	1	Ground	Battery voltage
F49 (M/T)	2		

Is the inspection result normal?

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

2. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F1
- Harness connectors E105, M77 (M/T)
- IPDM E/R harness connector E15 (CVT)
- 10 A fuse (No. 5) (M/T)
- 10 A fuse (No. 56) (CVT)
- Harness for open or short between transmission range switch (CVT) or PNP switch (M/T) and fuse

Is the inspection result normal?

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

3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Transmission range switch (CVT) / PNP switch (M/T)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F23 (CVT)	2	F8	69	Existed
F49 (M/T)	3			

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

Is the inspection result normal?

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

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

Refer to TM-201, "Component Inspection" (CVT) or TM-20, "PARK/NEUTRAL POSITION (PNP) SWITCH : Component Inspection" (M/T).

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace transmission range switch (CVT) or PNP switch (M/T).

5. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

P1212 TCS COMMUNICATION LINE

Description

INFOID:0000000006496360

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:0000000006496361

DTC DETECTION LOGIC

NOTE:
- **If DTC P1212 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-569, "DTC Logic".**
- **If DTC P1212 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-685, "DTC Logic".**

Freeze frame data is not stored in the ECM for this self-diagnosis.

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Go to EC-691, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496362

Perform trouble diagnosis of ABS actuator and electric unit (control unit). Refer to BRC-145, "Work Flow".

P1217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000006496363

DTC DETECTION LOGIC

NOTE:

- **If DTC P1217 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-569, "DTC Logic".**
- **If DTC P1217 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-685, "DTC Logic".**

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217	Engine over temperature (Overheat)	• Cooling fan does not operate properly (Overheat). • Cooling fan system does not operate properly (Overheat). • Engine coolant was not added to the system using the proper filling method. • Engine coolant is not within the specified range.	• Harness or connectors (The cooling fan circuit is open or shorted.) • IPDM E/R (Cooling fan relays -1, -2 and -3) • Cooling fan motor • Radiator hose • Radiator • Radiator cap • Reservoir tank • Water pump • Thermostat

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to CO-38, "Refilling". Also, replace the engine oil. Refer to LU-26, "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-14, "Engine 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-692, "Component Function Check".

NOTE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-693, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006496364

1.PERFORM COMPONENT FUNCTION CHECK-I

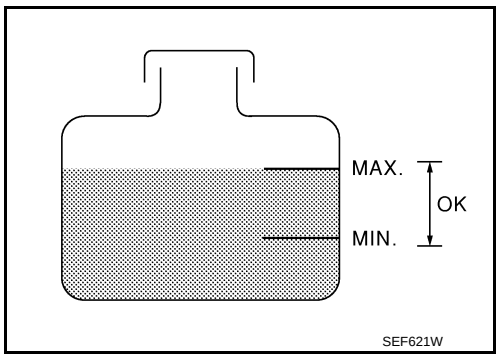
WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.

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

YES >> Go to EC-693, "Diagnosis Procedure".
NO >> GO TO 2



2. PERFORM COMPONENT FUNCTION CHECK-II

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

YES >> Go to EC-693, "Diagnosis Procedure".
NO >> GO TO 3.

3. PERFORM COMPONENT FUNCTION CHECK-III

With CONSULT-III
1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III and touch “LOW” on the CONSULT-III screen.
3. Make sure that cooling fan operates at low speed.

Without CONSULT-III
1. Start engine and let it idle.
2. Turn air conditioner switch and blower fan switch ON.
3. Make sure that cooling fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Go to EC-693, "Diagnosis Procedure".

4. PERFORM COMPONENT FUNCTION CHECK-IV

With CONSULT-III
1. Touch “HI” on the CONSULT-III screen.
2. Make sure that cooling fan operates at higher speed than low speed.

Without CONSULT-III
1. Turn ignition switch OFF.
2. Turn air conditioner switch and blower fan switch OFF.
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
5. Restart engine and make sure that cooling fan operates at higher speed than low speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-693, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496365

1. CHECK COOLING FAN OPERATION

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

Without CONSULT-III
1. Perform IPDM E/R auto active test and check cooling fan motor operation. Refer to PCS-12, "Diagnosis Description" (WITH I-KEY) or PCS-43, "Diagnosis Description" (WITHOUT I-KEY).
2. Make sure that cooling fan motor operate at each speed (Low/High).

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-774, "Diagnosis Procedure".

2. CHECK COOLING SYSTEM FOR LEAK-I

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

Is leakage detected?

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

3. CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak.
- Hose (Refer to CO-27, "Inspection".)
- Radiator (Refer to CO-19, "Inspection".)
- Water pump (Refer to CO-22, "Inspection".)

>> Repair or replace malfunctioning part.

4. CHECK RADIATOR CAP

Check radiator cap. Refer to CO-15, "RADIATOR CAP : Inspection".

Is the inspection result normal?

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

5. CHECK THERMOSTAT

Check thermostat. Refer to CO-25, "Inspection".

Is the inspection result normal?

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

6. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-596, "Component Inspection".

Is the inspection result normal?

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

7. OVERHEATING CAUSE ANALYSIS

If the cause cannot be isolated, check CO-35, "Troubleshooting Chart".

>> INSPECTION END

P1220 FUEL PUMP CONTROL MODULE (FPCM)

DTC Logic

INFOID:0000000006683000

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1220	FPCM (Fuel pump control module)	During engine cranking, the signal voltage of the FPCM to the ECM is too low.	• Harness or connectors (FPCM circuit is open or shorted) (Fuel pump circuit is open or shorted) • FPCM

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 between 12 - 15 V at idle.**
- **Before performing the following procedure, check that the engine coolant temperature is –10°C (14°F) or more.**

>> 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 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-695, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006683001

1.CHECK FPCM POWER SUPPLY

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

+		–	Voltage
FPCM			
Connector	Terminal		
B61	10	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK FPCM POWER SUPPLY CIRCUIT

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

+		–		Continuity
FPCM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
B61	10	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.

3.CHECK FPCM GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between FPCM harness connector and ground.

+		–	Continuity
FPCM			
Connector	Terminal		
B61	5	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 FPCM INPUT AND OUTPUT CIRCUITS

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

FPCM		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B61	8	F7	28	Existed
	9		27	

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 FUEL PUMP CONTROL CIRCUIT

1. Disconnect fuel level sensor unit (fuel pump) harness connector.
2. Check the continuity between FPCM harness connector and fuel level sensor unit (fuel pump) harness connector.

FPCM		Fuel level sensor unit (fuel pump)		Continuity
Connector	Terminal	Connector	Terminal	
B61	6	B40	2	Existed
	7		4	

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 FPCM

Check the FPCM. Refer to EC-325, "Component Inspection (FPCM)".

Is the inspection result normal?

YES >> Check intermittent incident .Refer to GI-42, "Intermittent Incident".
NO >> Replace FPCM. Refer to EC-806, "Removal and Installation".

Component Inspection (FPCM)

INFOID:0000000006683002

1. CHECK FUEL PUMP CONTROL MODULE (FPCM)

Check the voltage between FPCM terminals as per the following conditions.

FPCM			Condition	Voltage (Approx.)
Connector	+	–		
	Terminal			
B61	7	6	For 1 second after turning ignition switch ON	10 V
			More than 1 second after turning ignition switch ON	0 V
			Idle speed	10 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace FPCM. Refer to EC-806, "Removal and Installation".

P1225 TP SENSOR

DTC Logic

INFOID:0000000006496366

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225	Closed throttle position learning performance	Closed throttle position learning value is excessively low.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-698, "Diagnosis Procedure".
NO >> INSPECTION END

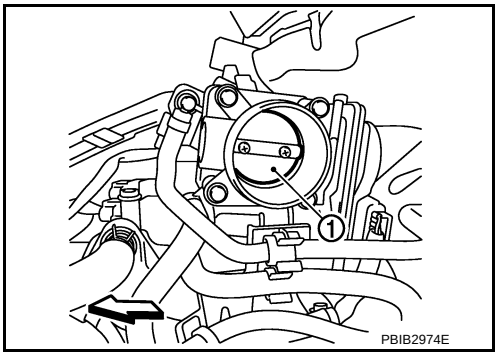
Diagnosis Procedure

INFOID:0000000006496367

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

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

- ⇦: Vehicle front



Is the inspection result normal?

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

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-163, "Exploded View".

>> INSPECTION END

P1226 TP SENSOR

DTC Logic

INFOID:0000000006496369

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 2 and 3 for 32 times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-699, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496370

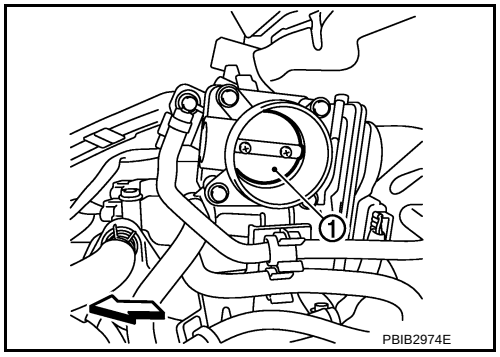
1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

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

- ⇦: Vehicle front

Is the inspection result normal?

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



2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-163, "Exploded View".

>> INSPECTION END

P1550 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000006635719

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.) (Atmospheric pressure sensor 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 • Atmospheric pressure sensor • 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-701, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006635720

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
F8	74	EOP sensor	F43	3
	71	Battery current sensor	F52	1
	72	IN CMP sensor	F21	1
		EX CMP sensor	F22	1
E16	102	APP sensor	E101*1 M203*2	5

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

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	F8	68	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	F8	58	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-702, "Component Inspection".

Is the inspection result normal?

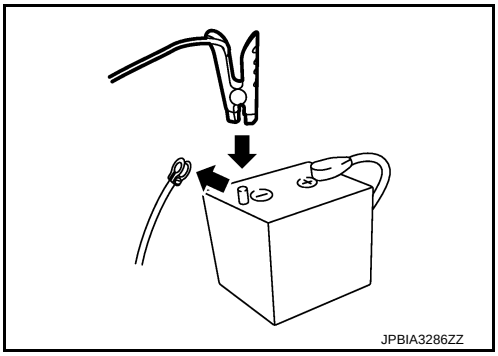
YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace battery negative cable assembly. Refer to PG-125, "Exploded View".

Component Inspection

INFOID:0000000006635721

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		
F8	58 (Battery current sensor signal)	68	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-111, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly. Refer to PG-125, "Exploded View".

P1551, P1552 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000006635722

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.) (Atmospheric pressure sensor 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 • Atmospheric pressure sensor • 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-704, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006635723

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
F8	74	EOP sensor	F43	3
	71	Battery current sensor	F52	1
	72	IN CMP sensor	F21	1
		EX CMP sensor	F22	1
E16	102	APP sensor	E101*1 M203*2	5

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

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	F8	68	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	F8	58	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-702, "Component Inspection".

Is the inspection result normal?

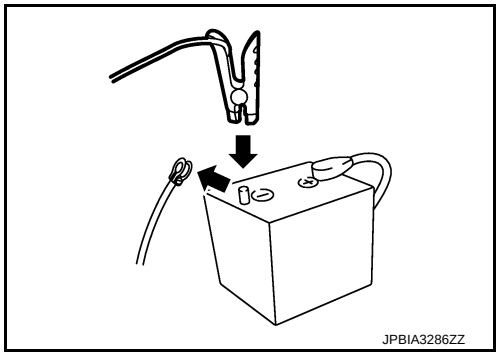
YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace battery negative cable assembly. Refer to PG-125, "Exploded View".

Component Inspection

INFOID:0000000006635724

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		
F8	58 (Battery current sensor signal)	68	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-111, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly. Refer to PG-125, "Exploded View".

P1553 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000006635725

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.) (Atmospheric pressure sensor 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 • Atmospheric pressure sensor • 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-707, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006635726

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
F8	74	EOP sensor	F43	3
	71	Battery current sensor	F52	1
	72	IN CMP sensor	F21	1
		EX CMP sensor	F22	1
E16	102	APP sensor	E101*1 M203*2	5

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

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	F8	68	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	F8	58	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-702, "Component Inspection".

Is the inspection result normal?

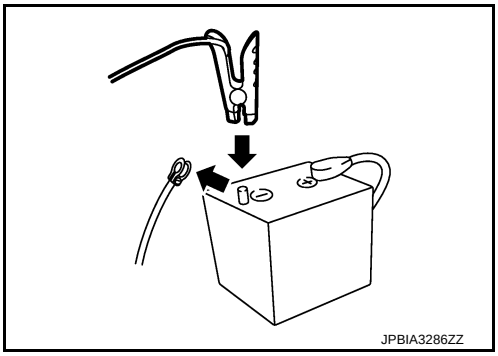
YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace battery negative cable assembly. Refer to PG-125, "Exploded View".

Component Inspection

INFOID:0000000006635727

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		
F8	58 (Battery current sensor signal)	68	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-111, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly. Refer to PG-125, "Exploded View".

P1554 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000006635728

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1554	Battery current sensor performance	The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough.	• Harness or connectors (Battery current sensor circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Power steering pressure sensor circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Battery current sensor • Crankshaft position sensor (POS) • Power steering pressure sensor • Accelerator pedal position sensor • Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-709, "Component Function Check".

NOTE:

Use component function check to check the overall function of the battery current sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-710, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006635729

1.PRECONDITIONING

TESTING CONDITION:

- **Before performing the following procedure, confirm that battery voltage is more than 12.8 V at idle.**
- **Before performing the following procedure, confirm that all load switches and A/C switch are turned OFF.**

>> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK

With CONSULT-III

1. Start engine and let it idle.
2. Select “BAT CUR SEN” in “DATA MONITOR” mode with CONSULT-III.
3. Check “BAT CUR SEN” indication for 10 seconds.
   “BAT CUR SEN” should be above 2,300 mV at least once.

Without CONSULT-III

1. Start engine and let it idle.
2. Check the voltage between ECM harness connector and ground.

ECM			Voltage
Connector	+	-	
	Terminal	Terminal	
F8	58 (Battery current sensor signal)	68	Above 2.3 V at least once

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-710, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006635730

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
F8	74	EOP sensor	F43	3
	71	Battery current sensor	F52	1
	72	IN CMP sensor	F21	1
		EX CMP sensor	F22	1
E16	102	APP sensor	E101*1 M203*2	5

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

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	F8	68	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	F8	58	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-702, "Component Inspection".

Is the inspection result normal?

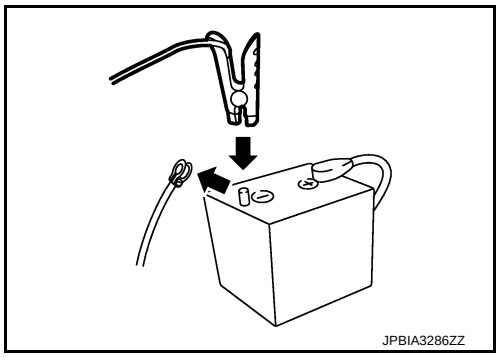
YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace battery negative cable assembly. Refer to PG-125, "Exploded View".

Component Inspection

INFOID:0000000006635731

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		
F8	58 (Battery current sensor signal)	68	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-111, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly. Refer to PG-125, "Exploded View".

P1556, P1557 BATTERY TEMPERATURE SENSOR

DTC Logic

INFOID:0000000006635732

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.] (Crankshaft position sensor circuit is open or shorted.) [Camshaft position sensor (bank 1) circuit is shorted.] (Accelerator pedal position sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Battery current sensor (Battery temperature sensor) • Crankshaft position sensor • Camshaft position sensor (bank 1) • Accelerator pedal position sensor 2 • Refrigerant pressure 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-712, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006635733

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-713, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-42, "Intermittent Incident".
NO >> Replace battery negative cable assembly. Refer to PG-125, "Exploded View".

Component Inspection

INFOID:0000000006635734

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-125, "Exploded View".

P1564 ASCD STEERING SWITCH

DTC Logic

INFOID:0000000006496372

DTC DETECTION LOGIC

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-683, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1564	ASCD steering switch	• An excessively high voltage signal from the ASCD steering switch is sent to ECM. • ECM detects that input signal from the ASCD steering switch is out of the specified range. • ECM detects that the ASCD steering switch is stuck ON.	• Harness or connectors (The switch circuit is open or shorted.) • ASCD steering switch • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
3. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Check DTC.

Is DTC detected?

YES >> Go to EC-714, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496373

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-III

1. Turn ignition switch ON.
2. Select “ENGINE” using CONSULT-III.
3. Select “CANCEL SW”, “RESUME/ACC SW” and “SET SW” in “DATA MONITOR” mode.
4. Check each item indication under the following conditions.

Monitor item	Condition		Indication
CANCEL SW	CANCEL switch	Pressed	ON
		Released	OFF
RESUME/ACC SW	RESUME/ACCELERATE switch	Pressed	ON
		Released	OFF

Monitor item	Condition		Indication
SET SW	SET/COAST switch	Pressed	ON
		Released	OFF

Without CONSULT-III

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

ECM			Condition	Voltage (V)
Connector	+	–		
	Terminal	Terminal		
E16	94 (ASCD steering switch signal)	95	CANCEL switch: Pressed	Approx. 1
			SET/COAST switch: Pressed	Approx. 2
			RESUME/ACCELERATE switch: Pressed	Approx. 3
			All ASCD steering switches: Released	Approx. 4

Is the inspection result normal?

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

3. CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect combination switch harness connector.
4. Check the continuity between combination switch and ECM harness connector.

Combination switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M302	16	E16	95	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

>> Repair open circuit, short to ground or short to power in harness or connectors.

5. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between combination switch and ECM harness connector.

Combination switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M302	13	E16	94	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

>> Repair open circuit, short to ground or short to power in harness or connectors.

7.CHECK ASCD STEERING SWITCH

Refer to EC-716, "Component Inspection (ASCD STEERING SWITCH)".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace ASCD steering switch.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD STEERING SWITCH)

INFOID:0000000006496374

1.CHECK ASCD STEERING SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Check the continuity between combination switch harness connector terminals under the following condition.

Combination switch		Condition		Continuity
Connector	Terminals			
M303	35 and 36	Speed limiter MAIN switch	Pressed	Existed
			Released	Not existed
	35 and 37	ASCD MAIN switch	Pressed	Existed
			Released	Not existed

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace ASCD steering switch.

2.CHECK ASCD STEERING SWITCH-II

Check resistance between combination switch (spiral cable) harness connector terminals under the following conditions.

Combination switch		Condition	Resistance (Ω)
Connector	Terminals		
M302	13 and 16	CANCEL switch: Pressed	Approx. 250
		SET/COAST switch: Pressed	Approx. 660
		RESUME/ACCELERATE switch: Pressed	Approx. 1,480
		All ASCD steering switches: Released	Approx. 4,000

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD steering switch.

P1572 ASCD BRAKE SWITCH

DTC Logic

INFOID:0000000006496375

DTC DETECTION LOGIC

NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-683, "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 is turned OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.**

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1572	ASCD brake switch	A)	When the vehicle speed is above 30 km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to the ECM at the same time.	• Harness or connectors (The stop lamp switch circuit is shorted.) • Harness or connectors (The ASCD brake switch circuit is shorted.) • Stop lamp switch • ASCD brake switch • Incorrect stop lamp switch installation • Incorrect ASCD brake switch installation • ECM
		B)	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is being driven.	

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 page.

NOTE:

The procedure for malfunction B is not described. It takes an extremely long time to complete the procedure for malfunction B. By performing the procedure for malfunction A, the condition that causes malfunction B can be detected.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine (ESP switch OFF).
2. Select “ENGINE” using CONSULT-III.
3. Select “DATA MONITOR” mode.
4. Press MAIN switch and make sure that CRUISE lamp illuminates.
5. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

   CAUTION:

   Always drive vehicle at a safe speed.

   NOTE:

   This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

VHCL SPEED SE	More than 30 km/h (19 mph)
Selector lever	Suitable position

6. Check DTC.

Is DTC detected?

YES >> Go to EC-718, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

   CAUTION:

Always drive vehicle at a safe speed.
NOTE:
This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

VHCL SPEED SE	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than 5 seconds so as not to come off from the above-mentioned vehicle speed.

2. Check DTC.

Is DTC detected?

YES >> Go to EC-718, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496376

1. CHECK OVERALL FUNCTION-I

With CONSULT-III
1. Turn ignition switch ON.
2. Select “ENGINE” using CONSULT-III.
3. Select “BRAKE SW1” in “DATA MONITOR” mode.
4. Check “BRAKE SW1” indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT-III
1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as follows.

ECM			Condition		Voltage (V)
Connector	+	–			
	Terminal	Terminal			
E16	100 (ASCD brake switch signal)	108	Brake pedal	Slightly depressed	Approx. 0
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-III
Select “BRAKE SW2” and check indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW2	Brake pedal	Slightly depressed	ON
		Fully released	OFF

Without CONSULT-III
Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition		Voltage (V)
Connector	+	–			
	Terminal	Terminal			
E16	99 (Stop lamp switch signal)	108	Brake pedal	Slightly depressed	Battery voltage
				Fully released	Approx. 0

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 7.

3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Voltage
Connector	Terminal		
E112*1 M202*2	1	Ground	Battery voltage

*1: LHD models or RHD models with CVT
*2: RHD models with M/T

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E105, M77 (LHD models or RHD models with CVT)
- Harness connectors M84, M201 (RHD models with M/T)
- 10 A fuse (No. 3)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit, short to ground or short to power in harness or connectors.

5. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E112*1 M202*2	2	E16	100	Existed

*1: LHD models or RHD models with CVT
*2: RHD models with M/T

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

6. CHECK ASCD BRAKE SWITCH

Refer to EC-721, "Component Inspection (ASCD Brake Switch)"

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace ASCD brake switch.

7. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

LHD models

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E118 (M/T) E102 (CVT)	1	Ground	Battery voltage

RHD models

Stop lamp switch		Ground	Voltage
Connector	Terminal		
M205 (M/T) E102 (CVT)	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E105, M77, M84, M201 (RHD models with M/T)
- 10 A fuse (No. 38)
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit, short to ground or short to power in harness or connectors.

9. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between stop lamp switch harness connector and ECM harness connector.

LHD models

Stop lamp switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E118 (M/T) E102 (CVT)	2	E16	99	Existed

RHD models

Stop lamp switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M205 (M/T) E102 (CVT)	2	E16	99	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

10. CHECK STOP LAMP SWITCH

Refer to EC-721, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace stop lamp switch.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000006496377

1. CHECK ASCD BRAKE SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-22, "Inspection and Adjustment" (LHD models) or BR-90, "Inspection and Adjustment" (RHD models).
2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD brake switch.

Component Inspection (Stop Lamp Switch)

INFOID:0000000006496378

1. CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-22, "Inspection and Adjustment" (LHD models) or BR-90, "Inspection and Adjustment" (RHD models).
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch.

P1574 ASCD VEHICLE SPEED SENSOR

Description

INFOID:0000000006496379

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-477, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description" for ASCD functions.

DTC Logic

INFOID:0000000006496380

DTC DETECTION LOGIC

NOTE:

- **If DTC P1574 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-569, "DTC Logic".**
- **If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-685, "DTC Logic".**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-672, "DTC Logic".**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-683, "DTC Logic".**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1574	ASCD vehicle speed sensor	The difference between the two vehicle speed signals is out of the specified range.	• Harness or connectors (The CAN communication line is open or shorted.) • Combination meter • ABS actuator and electric unit (control unit) • Wheel sensor • TCM • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine (ESP switch OFF).
2. Drive the vehicle at more than 40 km/h (25 MPH).
   CAUTION:
   Always drive vehicle at a safe speed.
   NOTE:
   This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-723, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496381

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-171, "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-142, "DTC Index".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to MWI-36, "DTC Index".

>> INSPECTION END

P1650 STARTER MOTOR RELAY 2

Description

INFOID:0000000006751815

ECM controls ON/OFF state of the starter relay, according to the engine and vehicle condition. Models with no Intelligent Key System transmit a control signal directly to IPDM E/R. 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:0000000006635736

DTC DETECTION LOGIC

NOTE:

- If DTC P1650 is displayed with DTC U1001, perform the trouble diagnosis for DTC U1001. Refer to EC-569, "DTC Logic".
- If DTC P1650 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to EC-685, "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-134, "DTC Logic" or SEC-136, "DTC Logic".
- If DTC P1650 is displayed with B26F9 or B26FA of BCM, perform the trouble diagnosis for B209F or B20A0. Refer to SEC-128, "DTC Logic" or SEC-130, "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.

>> 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-726, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

With CONSULT-III

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-III.
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-III

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-726, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006635737

1.CHECK STARTER RELAY POWER SUPPLY CIRCUIT

Check the starter motor relay power supply circuit. Refer to PCS-33, "Diagnosis Procedure" (With Intelligent Key system) or PCS-62, "Diagnosis Procedure" (Without Intelligent Key system).

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK STARTER RELAY CONTROL SIGNAL CIRCUIT

With Intelligent Key system

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	M69	97	Existed

5. Also check harness for short to ground to power.

Without Intelligent Key system
1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

+		–		Continuity
IPDM E/R		ECM		
Connector	Terminal	Connector	Terminal	
E13	30	E16	87	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-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-34, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P1651 STARTER MOTOR RELAY

Description

INFOID:0000000006751816

ECM controls ON/OFF state of the starter relay, according to the engine and vehicle condition. Models with no Intelligent Key System transmit a control signal directly to IPDM E/R. 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:0000000006635739

DTC DETECTION LOGIC

NOTE:
- If DTC P1650 is displayed with DTC U1001, perform the trouble diagnosis for DTC U1001. Refer to EC-569, "DTC Logic".
- If DTC P1650 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to EC-685, "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-134, "DTC Logic" or SEC-136, "DTC Logic".
- If DTC P1650 is displayed with B26F9 or B26FA of BCM, perform the trouble diagnosis for B209F or B20A0. Refer to SEC-128, "DTC Logic" or SEC-130, "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.

>> 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-728, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006635740

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-III Function (IPDM E/R)".

Is the starter motor operated?

YES-1 >> With Intelligent Key system: GO TO 3.
YES-2 >> Without Intelligent Key system: GO TO 4.
NO >> Perform trouble diagnosis for DTC indicated.

3. CHECK DTC WITH BCM

Check DTC with BCM. Refer to BCS-36, "BCM : CONSULT-III Function (BCM - BCM)".

Is the starter motor operated?

YES >> GO TO 4.
NO >> Perform trouble diagnosis for DTC indicated.

4. CHECK CRANKING REQUEST SIGNAL CIRCUIT

With Intelligent Key system

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	
E16	82	E13	23	Existed

5. Also check harness for short to ground to power.
6. Disconnect BCM harness connector.
7. Check the continuity between ECM harness connector and BCM harness connector.

+		–		Continuity
ECM		BCM		
Connector	Terminal	Connector	Terminal	
E16	82	M69	64	Existed

8. Also check harness for short to ground to power.

With Intelligent Key system

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	
E16	82	E13	23	Existed

5. Also check harness for short to ground to power.

Is the starter motor operated?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-34, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P1652 STARTER MOTOR SYSTEM COMM

Description

INFOID:0000000006751817

ECM controls ON/OFF state of the starter relay, according to the engine and vehicle condition. Models with no Intelligent Key System transmit a control signal directly to IPDM E/R. 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:0000000006635742

DTC DETECTION LOGIC

NOTE:

- If DTC P1650 is displayed with DTC U1001, perform the trouble diagnosis for DTC U1001. Refer to EC-569, "DTC Logic".
- If DTC P1650 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to EC-685, "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-134, "DTC Logic" or SEC-136, "DTC Logic".
- If DTC P1650 is displayed with B26F9 or B26FA of BCM, perform the trouble diagnosis for B209F or B20A0. Refer to SEC-128, "DTC Logic" or SEC-130, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	
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. Turn ignition switch ON and wait at least 5 minutes.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EC-731, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006635743

1.INSPECTION START

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to EC-731, "DTC Logic".
3. Check DTC.

Is the P1652 displayed again?

YES >> GO TO 2.

NO >> INSPECTION END

2.CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-34, "Removal and Installation".
NG >> Repair or replace error-detected parts.

P1715 INPUT SPEED SENSOR

Description

INFOID:0000000006496382

ECM receives input speed sensor signal from TCM via the CAN communication line. ECM uses this signal for engine control.

DTC Logic

INFOID:0000000006496383

DTC DETECTION LOGIC

NOTE:

- **If DTC P1715 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to EC-656, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer to EC-660, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-683, "DTC Logic".**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715	Input speed sensor (TCM output)	Input speed sensor signal is different from the theoretical value calculated by ECM from output speed sensor signal and engine rpm signal.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (Input speed sensor circuit is open or shorted) • TCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and drive the vehicle at more than 50 km/h (31 MPH) for at least 5 seconds.
   CAUTION:
   Always drive vehicle at a safe speed.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-733, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496384

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-171, "DTC Index".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM. Refer to TM-280, "Exploded View".

>> INSPECTION END

P1805 BRAKE SWITCH

DTC Logic

INFOID:0000000006496385

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	• Harness or connectors (Stop lamp switch circuit is open or shorted.) • Stop lamp switch

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase DTC.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-734, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496386

1.CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

LHD models

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E118 (M/T) E102 (CVT)	1	Ground	Battery voltage

RHD models

Stop lamp switch		Ground	Voltage
Connector	Terminal		
M205 (M/T) E102 (CVT)	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E105, M77, M84, M201 (RHD models with M/T)
- 10 A fuse (No. 38)
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect stop lamp switch harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and stop lamp switch harness connector.

LHD models

ECM		Stop lamp switch		Continuity
Connector	Terminal	Connector	Terminal	
E16	99	E118 (M/T) E102 (CVT)	2	Existed

RHD models

ECM		Stop lamp switch		Continuity
Connector	Terminal	Connector	Terminal	
E16	99	M205 (M/T) E102 (CVT)	2	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK STOP LAMP SWITCH

Refer to EC-735, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace brake pedal assembly.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006496387

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-22, "Inspection and Adjustment" (LHD models), BR-90, "Inspection and Adjustment" (RHD models).

2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace brake pedal assembly. Refer to BR-89, "Removal and Installation".

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

DTC Logic

INFOID:0000000006496388

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2100	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	• Harness or connectors (Throttle control motor relay circuit is open) • Throttle control motor relay
P2103	Throttle control motor relay circuit short	ECM detect the throttle control motor relay is stuck ON.	• Harness or connectors (Throttle control motor relay circuit is shorted) • Throttle control motor relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V.

Witch DTC is detected?

P2100 >> GO TO 2.
P2103 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-737, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-737, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496389

1.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Check voltage between ECM harness connector and ground.

ECM			Voltage
Connector	Terminal		
	+	–	
F7	15	108	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 2.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E15.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F7	15	E15	60	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F1
- IPDM E/R connector E15
- Harness for open or short between IPDM E/R and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUSE

1. Disconnect 15 A fuse (No. 64) from IPDM E/R.
2. Check 15 A fuse for blown.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace 15 A fuse.

5.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check voltage between ECM harness connector and ground under the following conditions.

ECM			Conditions	Voltage
Connector	Terminal			
	+	–		
F7	2	108	Ignition switch: OFF	Approx. 0 V
			Ignition switch: ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 6.

6.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector E15.
4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F7	2	E15	55	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F1
- IPDM E/R connector E15
- Harness for open or short between IPDM E/R and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

DTC Logic

INFOID:0000000006496390

DTC DETECTION LOGIC

NOTE:

- **If DTC P2101 is displayed with DTC P2100, first perform the trouble diagnosis for DTC P2100. Refer to EC-737, "DTC Logic".**
- **If DTC P2101 is displayed with DTC P2119, first perform the trouble diagnosis for DTC P2119. Refer to EC-746, "DTC Logic".**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2101	Electric throttle control performance	Electric throttle control function does not operate properly.	• Harness or connectors (Throttle control motor circuit is open or shorted) • Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when engine is running.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-740, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496391

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM			Condition	Voltage
Connector	Terminal			
	+	–		
F7	2	108	Ignition switch OFF	Approx. 0 V
			Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 3.

3. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Check voltage between ECM harness connector and ground.

ECM			Voltage
Connector	Terminal		
	+	–	
F7	15	108	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 4.

4. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E15.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E15	60	F7	15	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F1
- IPDM E/R connector E15
- Harness for open or short between IPDM E/R and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK FUSE

1. Disconnect 15 A fuse (No. 64) from IPDM E/R.
2. Check 15 A fuse for blown.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace 15 A fuse.

7. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-III

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E15.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E15	55	F7	2	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F1
- IPDM E/R connector E15
- Harness for open or short between IPDM E/R and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

10. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	5	F7	1	Not existed
			4	Existed
F29	6	F7	1	Existed
			4	Not existed

5. Also check harness for short to ground and short to power.

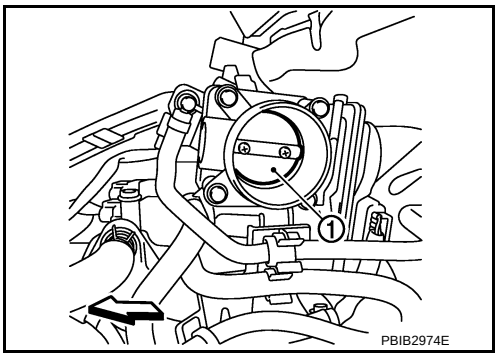
Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace harness or connectors.

11. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve (1) and the housing.

- ⇦: Vehicle front



Is the inspection result normal?

YES >> GO TO 12.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

12. CHECK THROTTLE CONTROL MOTOR

Refer to EC-743, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 14.

13. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair or replace harness or connectors.

14. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace malfunction electric throttle control actuator. Refer to EM-163, "Exploded View".

>> INSPECTION END

Component Inspection

INFOID:0000000006496392

1. CHECK THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between electric throttle control actuator terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
5 and 6	Approx. 1 - 15 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-163, "Exploded View".

>> INSPECTION END

P2118 THROTTLE CONTROL MOTOR

DTC Logic

INFOID:0000000006496394

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2118	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	• Harness or connectors (Throttle control motor circuit is shorted.) • Electric throttle control actuator (Throttle control motor)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-744, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496395

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect electric throttle control actuator harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	5	F7	1	Not existed
			4	Existed
F29	6	F7	1	Existed
			4	Not existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connectors.

3.CHECK THROTTLE CONTROL MOTOR

Refer to EC-745, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 5.

4. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connectors.

5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-163, "Exploded View".

>> INSPECTION END

Component Inspection

INFOID:0000000006496396

1. CHECK THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between electric throttle control actuator terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
5 and 6	Approx. 1 - 15 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-163, "Exploded View".

>> INSPECTION END

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Logic

INFOID:0000000006496398

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P2119	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	• Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detect the throttle valve is stuck open.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND B

1. Turn ignition switch ON and wait at least 1 second.
2. Set selector lever to D (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 >> Go to EC-746, "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 >> Go to EC-746, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

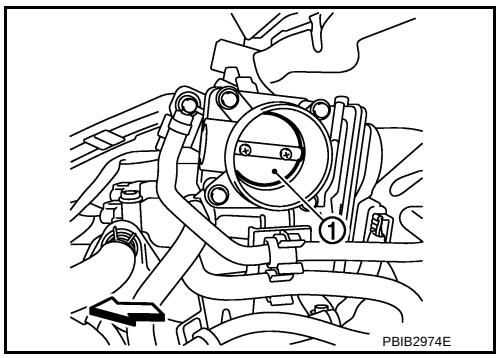
INFOID:0000000006496399

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

3. Check if foreign matter is caught between the throttle valve (1) and the housing.

- ⇦: Vehicle front



Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-163, "Exploded View".

>> INSPECTION END

P2122, P2123 APP SENSOR

DTC Logic

INFOID:0000000006496401

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-686, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	• Harness or connectors (APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1)
P2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-748, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496402

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E101*1 M203*2	4	Ground	Approx. 5 V

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E101*1 M203*2	2	E16	111	Existed

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E101*1 M203*2	3	E16	110	Existed

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-749, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Exploded View".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006496403

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM			Condition		Voltage
Connector	Terminal				
	+	–			
E16	110 (APP sensor 1 signal)	111	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	103 (APP sensor 2 signal)	104		Fully released	0.3 - 0.6 V
				Fully depressed	1.95 - 2.4 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Exploded View".

>> INSPECTION END

P2127, P2128 APP SENSOR

DTC Logic

INFOID:0000000006496405

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	• Harness or connectors (APP sensor 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor
P2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-751, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496406

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E101*1 M203*2	5	Ground	Approx. 5 V

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E101*1 M203*2	5	E16	102	Existed

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Item	Connector	Terminal
F8	75	CKP sensor (POS)	F20	1
E16	101	Refrigerant pressure sensor	E49	3
	102	APP sensor	E101*1 M203*2	5

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair short to ground or short to power in harness or connectors.

5.CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-658, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-790, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace malfunctioning component.

6.CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E101*1 M203*2	1	E16	104	Existed

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E101*1 M203*2	6	E16	103	Existed

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK APP SENSOR

Refer to EC-753, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Exploded View".

>> INSPECTION END

10. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006496407

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM			Condition		Voltage
Connector	Terminal				
	+	–			
E16	110 (APP sensor 1 signal)	111	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	103 (APP sensor 2 signal)	104		Fully released	0.3 - 0.6 V
				Fully depressed	1.95 - 2.4 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Exploded View".

>> INSPECTION END

P2135 TP SENSOR

DTC Logic

INFOID:0000000006496409

DTC DETECTION LOGIC

NOTE:
If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-686, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135	Throttle position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	• Harness or connector (TP sensor 1 and 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-755, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496410

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.
3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

3. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F8	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	2	F8	33	Existed
	3		34	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-756, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-163, "Exploded View".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006496411

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-543, "Work Procedure".
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 and ground.

ECM			Condition		Voltage
Connector	Terminal				
	+	–			
F8	33 (TP sensor 1 signal)	36	Accelerator pedal	Fully released	More than 0.36 V
				Fully depressed	Less than 4.75 V
	34 (TP sensor 2 signal)			Fully released	Less than 4.75 V
				Fully depressed	More than 0.36 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-163, "Exploded View".

>> INSPECTION END

P2138 APP SENSOR

DTC Logic

INFOID:0000000006496413

DTC DETECTION LOGIC

NOTE:
If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-686, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138	Accelerator pedal position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	• Harness or connector (APP sensor 1 and 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1 and 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-758, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496414

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E101*1 M203*2	4	Ground	Approx. 5 V

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

3. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E101*1 M203*2	5	Ground	Approx. 5 V

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 4.

4. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E101*1 M203*2	5	E16	102	Existed

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

5. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Item	Connector	Terminal
F8	75	CKP sensor (POS)	F20	1
E16	101	Refrigerant pressure sensor	E49	3
	102	APP sensor	E101*1 M203*2	5

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair short to ground or short to power in harness or connectors.

6. CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-658, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-790, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace malfunctioning component.

7.CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector as follows.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E101*1	1	E16	104	Existed
M203*2	2		111	

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

8.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector as follows.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E101*1	3	E16	110	Existed
M203*2	6		103	

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

9.CHECK APP SENSOR

Refer to EC-760, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 10.

10.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Exploded View".

>> INSPECTION END

11.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006496415

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.

3. Check the voltage between ECM harness connector and ground.

ECM			Condition		Voltage
Connector	Terminal				
	+	–			
E16	110 (APP sensor 1 signal)	111	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	103 (APP sensor 2 signal)	104		Fully released	0.3 - 0.6 V
				Fully depressed	1.95 - 2.4 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Exploded View".

>> INSPECTION END

P2A00 A/F SENSOR 1

DTC Logic

INFOID:0000000006496417

DTC DETECTION LOGIC

To judge the malfunction, the A/F signal computed by ECM from the A/F sensor 1 signal is monitored so it will not shift to LEAN side or RICH side.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P2A00	Air fuel ratio (A/F) sensor 1 (bank 1) circuit range/performance	• The output voltage computed by ECM from the A/F sensor 1 signal shifts to the lean side for a specified period. • The A/F signal computed by ECM from the A/F sensor 1 signal shifts to the rich side for a specified period.	• A/F sensor 1 • A/F sensor 1 heater • Fuel pressure • Fuel injector • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Clear the mixture ratio self-learning value. Refer to EC-546, "Work Procedure".
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 1 minute under no load.
4. Let engine idle for 1 minute.
5. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-762, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006496418

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.RETIGHTEN A/F SENSOR 1

1. Loosen and retighten the A/F sensor 1. Refer to EM-166, "Exploded View".

>> GO TO 3.

3.CHECK FOR INTAKE AIR LEAK

1. Start engine and run it at idle.
2. Listen for an intake air leak after the mass air flow sensor.

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-546, "Work Procedure".
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-636, "Diagnosis Procedure" or EC-640, "Diagnosis Procedure".
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 A/F SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage
Connector	Terminal		
F50	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
- 20A 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	
F50	1	F8	49	Existed
	2		53	

4. Check the continuity between A/F sensor 1 harness connector and ground or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F50	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F8	49	Ground	Not existed
	53		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

9. CHECK A/F SENSOR 1 HEATER

Refer to EC-578, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 11.

10. CHECK INTERMITTENT INCIDENT

Perform GI-42, "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.

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) and approved anti-seize lubricant (commercial service tool).**

>> GO TO 12.

12. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

Clear the mixture ratio self-learning value. Refer to EC-546, "Work Procedure".

>> INSPECTION END

ASCD BRAKE SWITCH

Component Function Check

INFOID:0000000006496419

1. CHECK ASCD BRAKE SWITCH FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select “ENGINE” using CONSULT-III.
3. Select “BRAKE SW1” in “DATA MONITOR” mode.
4. Check “BRAKE SW1” indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition		Voltage (V)
Connector	+	–			
	Terminal	Terminal			
E16	100 (ASCD brake switch signal)	108	Brake pedal	Slightly depressed	Approx. 0
				Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-765, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496420

1. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Voltage
Connector	Terminal		
E112*1 M202*2	1	Ground	Battery voltage

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector E105, M77 (LHD models or RHD models with CVT)
- Harness connector M84, M201 (RHD models with M/T)
- 10A fuse (No. 3)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground in harness or connectors.

3.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E112*1 M202*2	2	E16	100	Existed

*1: LHD models or RHD models with CVT

*2: RHD models with M/T

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Harness for open or short between ECM and ASCD brake switch

4.CHECK ASCD BRAKE SWITCH

Refer to EC-766, "Component Inspection (ASCD Brake Switch)"

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace ASCD brake switch.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000006496421

1.CHECK ASCD BRAKE SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-22, "Inspection and Adjustment" (LHD) or BR-90, "Inspection and Adjustment" (RHD).
2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD brake switch. Refer to BR-88, "Exploded View".

ASCD INDICATOR

Component Function Check

INFOID:0000000006496422

1.CHECK ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	• Ignition switch: ON	• MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON • When vehicle speed is between 40 km/h (25 MPH) and 225 km/h (140 MPH)	• ASCD: Operating	ON
		• ASCD: Not operating	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-767, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496423

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 COMBINATION METER

Check DTC with combination meter. Refer to MWI-36, "DTC Index".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-69, "Exploded View".
NO >> Repair or replace.

ASCD MAIN SWITCH

Component Function Check

INFOID:0000000006496424

1.CHECK ASCD MAIN SWITCH FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select “ENGINE” using CONSULT-III.
3. Select “MAIN SW” in “DATA MONITOR” mode.
4. Check “MAIN SW” indication under the following condition.

Monitor item	Condition		Indication
MAIN SW	ASCD MAIN switch	Pressed	ON
		Released	OFF

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground under the following conditions.

ECM			Condition		Voltage (V)
Connector	+	–			
	Terminal	Terminal			
E16	96	108	ASCD MAIN switch	Pressed	Battery voltage
				Released	Approx. 0

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-768, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496425

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ASCD MAIN SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between combination switch harness connector and ground.

Combination switch		Ground	Voltage
Connector	Terminal		
M32	21	Ground	Battery voltage

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- 10 A fuse (No. 3)

- Combination switch (spiral cable)
- Harness for open and short between combination switch and fuse

>> Repair open circuit, short to ground or short to power in harness or connectors.

4. CHECK ASCD MAIN SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and combination switch harness connector.

ECM		Combination switch		Continuity
Connector	Terminal	Connector	Terminal	
E16	96	M303	37	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E105, M77
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

>> Repair open circuit, short to ground or short to power in harness or connectors.

6. CHECK ASCD STEERING SWITCH

Refer to EC-769, "Component Inspection (ASCD STEERING SWITCH)".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace ASCD steering switch.

7. CHECK INTERMITTENT INCIDENT

1. Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

Component Inspection (ASCD STEERING SWITCH)

INFOID:0000000006496426

1. CHECK ASCD STEERING SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Check the continuity between combination switch harness connector terminals under the following condition.

Combination switch		Condition		Continuity
Connector	Terminals			
M303	35 and 36	Speed limiter MAIN switch	Pressed	Existed
			Released	Not existed
	35 and 37	ASCD MAIN switch	Pressed	Existed
			Released	Not existed

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace ASCD steering switch.

2.CHECK ASCD STEERING SWITCH-II

Check resistance between combination switch (spiral cable) harness connector terminals under the following conditions.

Combination switch		Condition	Resistance (Ω)
Connector	Terminals		
M302	13 and 16	CANCEL switch: Pressed	Approx. 250
		SET/COAST switch: Pressed	Approx. 660
		RESUME/ACCELERATE switch: Pressed	Approx. 1,500
		All ASCD steering switches: Released	Approx. 4,000

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD steering switch.

CLUTCH PEDAL POSITION SWITCH

Component Function Check

INFOID:0000000006496427

1. CHECK CLUTCH PEDAL POSITION SWITCH FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select “ENGINE” using CONSULT-III.
3. Select “CLUTCH P/P SW” in “DATA MONITOR” mode.
4. Check “CLUTCH P/P SW” indication under the following conditions.

Monitor item	Condition		Indication
CLUTCH P/P SW	Clutch pedal	Fully released	OFF
		Fully depressed	ON

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM				Condition		Voltage
+		–				
Connector	Terminal	Connector	Terminal			
E16	92 (Clutch pedal position switch signal)	E16	108	Clutch pedal	Fully released	Approx. 0V
					Fully depressed	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-771, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496428

1. CHECK CLUTCH PEDAL POSITION SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect clutch pedal position switch harness connector.
3. Check the continuity between clutch pedal position switch harness connector and ground.

With intelligent key

Clutch pedal position switch		Ground	Continuity
Connector	Terminal		
E62 (LHD models) M207 (RHD models)	4	Ground	Existed

Without intelligent key

Clutch pedal position switch		Ground	Continuity
Connector	Terminal		
E61 (LHD models) M206 (RHD models)	2	Ground	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to power in harness or connectors.

2. CHECK CLUTCH PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between clutch pedal position switch harness connector and ECM harness connector.

With intelligent key

Clutch pedal position switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E62 (LHD models) M207 (RHD models)	3	E16	92	Existed

Without intelligent key

Clutch pedal position switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E61 (LHD models) M206 (RHD models)	1	E16	92	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK CLUTCH PEDAL POSITION SWITCH

Refer to EC-772, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace clutch pedal position switch.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006496429

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 under the following conditions.

With intelligent key

Clutch pedal position switch		Condition		Continuity
Connector	Terminals			
E62 (LHD models) M207 (RHD models)	3 and 4	Clutch pedal	Fully released	Existed
			Fully depressed	Not existed

Without intelligent key

Clutch pedal position switch		Condition		Continuity
Connector	Terminals			
E61 (LHD models) M206 (RHD models)	1 and 2	Clutch pedal	Fully released	Existed
			Fully 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-7, "Inspection and Adjustment".
2. Check the continuity between clutch pedal position switch terminals under the following conditions.

With intelligent key

Clutch pedal position switch		Condition		Continuity
Connector	Terminals			
E62 (LHD models) M207 (RHD models)	3 and 4	Clutch pedal	Fully released	Existed
			Fully depressed	Not existed

Without intelligent key

Clutch pedal position switch		Condition		Continuity
Connector	Terminals			
E61 (LHD models) M206 (RHD models)	1 and 2	Clutch pedal	Fully released	Existed
			Fully depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace clutch pedal position switch.

COOLING FAN

Component Function Check

INFOID:0000000006496430

1.CHECK COOLING FAN FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III.
3. Touch “LOW” and “Hi” on the CONSULT-III screen.
4. Check that cooling fan operates at each speed.

Without CONSULT-III

1. Perform IPDM E/R auto active test and check cooling fan motor operation. Refer to PCS-12, "Diagnosis Description" (WITH I-KEY) or PCS-43, "Diagnosis Description" (WITHOUT I-KEY).
2. Check that cooling fan operates at each speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Refer to EC-774, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496431

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK COOLING FAN MOTOR CIRCUIT

1. Disconnect cooling fan motor harness connector.
2. Check the continuity between IPDM E/R harness connector and cooling fan motor harness connector.

With A/C

IPDM E/R		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E10	5	E64	1	Existed
	7		3	
E11	10	E65	4	

Without A/C

IPDM E/R		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E10	5	E52	1	Existed
	7		2	
E11	10		3	

3. Check the continuity between cooling fan motor harness connector and ground.

With A/C

Cooling fan motor		Ground	Continuity
Connector	Terminal		
E65	2	Ground	Existed

Without A/C

Cooling fan motor		Ground	Continuity
Connector	Terminal		
E52	4	Ground	Existed

4. Also check harness for short to ground and short to power.

YES or NO

YES >> GO TO 4.
NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and ground

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR

Refer to EC-775, "Component Inspection".

YES or NO

YES >> GO TO 5.
NO >> Replace cooling fan motor.

5. CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

YES or NO

YES >> Replace IPDM E/R. Refer to PCS-34, "Exploded View" (WITH I-KEY) or PCS-63, "Exploded View" (WITHOUT I-KEY).
NO >> Repair or replace harness or connector.

Component Inspection

INFOID:0000000006496432

1. CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector E62.
3. Supply cooling fan motor terminals with battery voltage and check operation.

	Speed	terminals	
		(+)	(–)
Cooling fan motor	Low	1	4
		2	3
	High	1 and 2	3 and 4

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan motor.

ELECTRICAL LOAD SIGNAL

Description

INFOID:0000000006496433

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred to ECM through the CAN communication line.

Component Function Check

INFOID:0000000006496434

1.CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Select “LOAD SIGNAL” and check indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Rear window defogger switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-776, "Diagnosis Procedure".

2.CHECK LIGHTING SWITCH FUNCTION

Check “LOAD SIGNAL” indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Lighting switch	ON at 2nd position	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.
NO >> Go to EC-776, "Diagnosis Procedure".

3.CHECK HEATER FAN CONTROL SWITCH FUNCTION

Select “HEATER FAN SW” and check indication under the following conditions.

Monitor item	Condition		Indication
HEATER FAN SW	Heater fan control switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-776, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496435

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to EC-776, "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

Perform trouble diagnosis of rear window defogger system. Refer to DEF-25, "Work Flow".

>> INSPECTION END

3. CHECK HEADLAMP SYSTEM

Perform trouble diagnosis of headlamp system. Refer to EXL-43, "Work Flow".

>> INSPECTION END

4. CHECK AIR CONDITIONING SYSTEM

Perform trouble diagnosis of air conditioning system. Check type of air conditioning system HAC-10, "Information" and refer to the follows.

- TYPE1: HAC-44, "Work Flow"
- TYPE2: HAC-135, "Work Flow"
- TYPE3: HAC-216, "Work Flow"
- TYPE4: HAC-271, "Work Flow"
- TYPE5: HAC-322, "Work Flow"

>> INSPECTION END

FUEL INJECTOR

Component Function Check

INFOID:0000000006496436

1.INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.
NO >> Go to EC-778, "Diagnosis Procedure".

2.CHECK FUEL INJECTOR FUNCTION

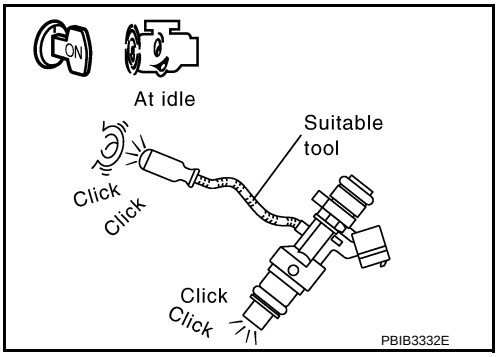
With CONSULT-III

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-III

1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-778, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496437

1.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel injector harness connector and ground.

Fuel injector				Ground	Voltage
Cylinder	Connector	Front / Rear	Terminal		
1	F37	Front	1	Ground	Battery voltage
	F57	Rear			
2	F38	Front	1		
	F58	Rear			
3	F39	Front	1		
	F59	Rear			
4	F40	Front	1		
	F60	Rear			

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1

- IPDM E/R connector E15
- 15 A fuse (No. 62)
- Harness for open or short between fuel injector and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector				ECM		Continuity
Cylinder	Connector	Front / Rear	Terminal	Connector	Terminal	
1	F37	Front	2	F7	31	Existed
	F57	Rear			12	
2	F38	Front	2		30	
	F58	Rear			20	
3	F39	Front	2		29	
	F59	Rear			16	
4	F40	Front	2		25	
	F60	Rear			24	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL INJECTOR

Refer to EC-779, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning fuel injector.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

Component Inspection

INFOID:0000000006496438

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as follows.

Terminals	Resistance
1 and 2	11.1 - 14.5 Ω [at 10 - 60°C (50 - 140°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning fuel injector.

FUEL PUMP

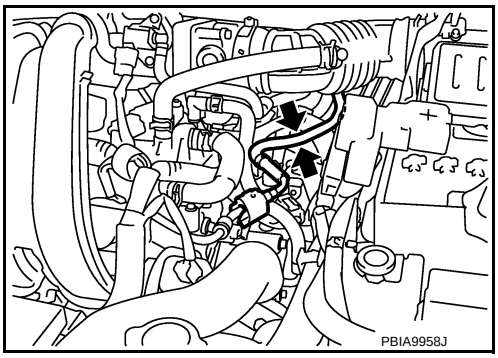
Component Function Check

INFOID:0000000006496439

1.CHECK FUEL PUMP FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.



Is the inspection result normal?

YES >> INSPECTION END
NO >> EC-780, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496440

1.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ECM harness connector and ground.

ECM			Voltage
Connector	Terminal		
	+	–	
F7	23	108	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and ECM harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F7	23	E13	31	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E8, F1
- IPDM E/R connector E13
- Harness for open or short to ground and short power

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect “fuel level sensor unit and fuel pump” harness connector.
4. Turn ignition switch ON.
5. Check voltage between “fuel level sensor unit and fuel pump” harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage
Connector	Terminal		
B40	4	Ground	Battery voltage should for exist 1 second after ignition switch is turn ON.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 5.

5.CHECK 15 A FUSE

1. Turn ignition switch OFF.
2. Disconnect 15 A fuse (No. 60) from IPDM E/R.
3. Check 15 A fuse.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace fuse.

6.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between IPDM E/R harness connector and “fuel level sensor unit and fuel pump” harness connector.

IPDM E/R		Fuel level sensor unit and fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E15	55	B40	4	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E105, M77
- Harness connectors B1, M18
- Harness for open or short between IPDM E/R and “fuel level sensor unit and fuel pump”

>> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK FUEL PUMP GROUND CIRCUIT

1. Check the continuity between “fuel level sensor unit and fuel pump” and ground.

Fuel level sensor unit and fuel pump		Ground	Continuity
Connector	Terminal		
B40	2	Ground	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to power in harness or connectors.

9.CHECK FUEL PUMP

Refer to EC-782, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace “fuel level sensor unit and fuel pump”.

10.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

Component Inspection

INFOID:0000000006496441

1.CHECK FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.
3. Check resistance between “fuel level sensor unit and fuel pump” terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
2 and 4	0.2 - 5.0 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace “fuel level sensor unit and fuel pump”.

IGNITION SIGNAL

Component Function Check

INFOID:0000000006496442

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES-1 >> With CONSULT-III: GO TO 2.
YES-2 >> Without CONSULT-III: GO TO 3.
NO >> Go to EC-783, "Diagnosis Procedure".

2.IGNITION SIGNAL FUNCTION

With CONSULT-III

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
2. Make sure that each circuit produces a momentary engine speed drop.

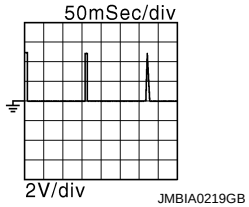
Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-783, "Diagnosis Procedure".

3.IGNITION SIGNAL FUNCTION

Without CONSULT-III

1. Let engine idle.
2. Check the voltage signal between ECM harness connector and ground with an oscilloscope.

ECM			Voltage signal
Connector	Terminal		
	+	–	
F7	17	108	
	18		
	21		
	22		

NOTE:
The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-783, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496443

1.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
2. Check the voltage between ECM harness connector and ground.

ECM			Voltage
Connector	Terminal		
	+	–	
E16	105	108	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-566, "Diagnosis Procedure".

2.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

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.

Condenser		Ground	Voltage
Connector	Terminal		
F13	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 3.

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E15.
3. Check the continuity between IPDM E/R harness connector and condenser harness connector.

IPDM E/R		Condenser		Continuity
Connector	Terminal	Connector	Terminal	
E15	61	F13	1	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F1
- Harness for open or short between IPDM E/R and condenser

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between condenser harness connector and ground.

Condenser		Ground	Continuity
Connector	Terminal		
F13	2	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK CONDENSER

Refer to EC-787, "Component Inspection (Condenser)"

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace condenser.

7.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Reconnect all harness connectors disconnected.

2. Disconnect ignition coil harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ignition coil harness connector and ground.

Ignition coil			Ground	Voltage
Cylinder	Connector	Terminal		
1	F33	3	Ground	Battery voltage
2	F34	3		
3	F35	3		
4	F36	3		

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

Ignition coil			Ground	Continuity
Cylinder	Connector	Terminal		
1	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 9.
NO >> Repair open circuit or short to power in harness or connectors.

9. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ignition coil harness connector.

Ignition coil			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F33	1	F7	17	Existed
2	F34	1		18	
3	F35	1		22	
4	F36	1		21	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-786, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace malfunctioning ignition coil with power transistor.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000006496444

1. CHECK IGNITION COIL WITH POWER TRANSISTOR-I

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

Terminals	Resistance
1 and 2	Except 0 or ∞ Ω [at 25°C (77°F)]
1 and 3	Except 0 Ω [at 25°C (77°F)]
2 and 3	

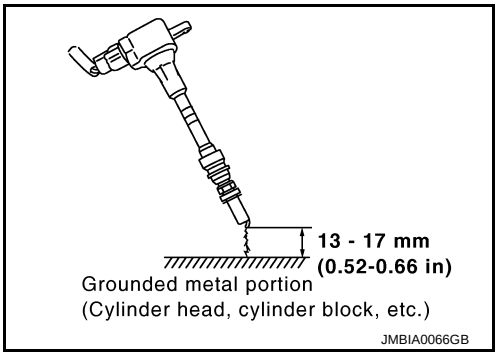
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace malfunctioning ignition coil with power transistor.

2. CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
4. Start engine.
5. After engine stalls, crank it two or three times to release all fuel pressure.
6. Turn ignition switch OFF.
7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
8. Remove ignition coil and spark plug of the cylinder to be checked.
9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
10. Connect spark plug and harness connector to ignition coil.
11. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.**

NOTE:
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning ignition coil with power transistor.

Component Inspection (Condenser)

INFOID:0000000006496445

1. CHECK CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check resistance between condenser terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
1 and 2	Above 1 MΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace condenser.

INFORMATION DISPLAY (SPEED LIMITER)

Component Function Check

INFOID:0000000006496446

1.CHECK INFORMATION DISPLAY (SPEED LIMITER) FUNCTION

1. Start engine.
2. Press speed limiter MAIN switch.
3. Drive the vehicle at more than 30 km/h (20 MPH).
   CAUTION:
   Always drive vehicle at a safe speed.
4. Press SET/COAST switch.
5. Perform a test drive on a flat road conditions. Check that the speedometer indicated the same value as the set speed indicator on the information display while depressing the accelerator pedal until just before a kickdown occurs.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-788, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496447

1.CHECK DTC

Check that DTC UXXXX, P0500 or P1574 is not display.

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-673, "Diagnosis Procedure".
NO-3 >> Perform trouble diagnosis for DTC P1574. Refer to EC-723, "Diagnosis Procedure".

2.CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to EC-522, "DTC Index".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis relevant to DTC indicated.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter.
NO >> Repair or replace.

MALFUNCTION INDICATOR

Component Function Check

INFOID:0000000006496448

1.CHECK MI FUNCTION

1. Turn ignition switch ON.
2. Make sure that MI lights up.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-789, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496449

1.CHECK DTC

Check that DTC U1001 is not displayed.

Is DTC detected?

YES >> Perform trouble diagnosis for DTC U1001. Refer to EC-569, "Diagnosis Procedure".
NO >> GO TO 2.

2.CHECK COMBINATION METER

Check DTC with combination meter. Refer to MWI-36, "DTC Index".

Is DTC detected?

YES >> Perform troubleshooting relevant to DTC indicated.
NO >> GO TO 3.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-69, "Exploded View".
NO >> Repair or replace harness or connectors.

REFRIGERANT PRESSURE SENSOR

Component Function Check

INFOID:0000000006496450

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		
	+	–	
F16	101 (Refrigerant pressure sensor signal)	98	1.0 - 4.0V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-790, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496451

1.CHECK GROUND CONNECTION

1. Turn A/C switch and blower fan switch OFF.
2. Stop engine.
3. Turn ignition switch OFF.
4. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between refrigerant pressure sensor harness connector and ground.

Refrigerant pressure sensor		Ground	Voltage
Connector	Terminal		
E49	3	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E49	1	E16	98	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and refrigerant pressure sensor harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E49	2	E16	85	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.
NO >> Repair or replace.

SPEED LIMITER MAIN SWITCH

Component Function Check

INFOID:0000000006496452

1.CHECK SPEED LIMITER MAIN SWITCH FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select “ENGINE” using CONSULT-III.
3. Select “SL MAIN SW” in “DATA MONITOR” mode.
4. Check “SL MAIN SW” indication under the following condition.

Monitor item	Condition		Indication
SL MAIN SW	Speed limiter MAIN switch	Pressed	ON
		Released	OFF

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground under the following conditions.

ECM			Condition		Voltage (V)
Connector	+	–			
	Terminal	Terminal			
E16	91	108	Speed limiter MAIN switch	Pressed	Battery voltage
				Released	Approx. 0

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-792, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496453

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK SPEED LIMITER MAIN SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between combination switch harness connector and ground.

Combination switch		Ground	Voltage
Connector	Terminal		
M32	21	Ground	Battery voltage

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- 10 A fuse (No. 3)

- Combination switch (spiral cable)
- Harness for open and short between combination switch and fuse

>> Repair open circuit, short to ground or short to power in harness or connectors.

4. CHECK SPEED LIMITER MAIN SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and combination switch harness connector.

ECM		Combination switch		Continuity
Connector	Terminal	Connector	Terminal	
E16	91	M303	36	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E105, M77
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

>> Repair open circuit, short to ground or short to power in harness or connectors.

6. CHECK STEERING SWITCH

Refer to EC-769, "Component Inspection (ASCD STEERING SWITCH)".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace ASCD steering switch.

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

Component Inspection (ASCD STEERING SWITCH)

INFOID:0000000006496454

1. CHECK ASCD STEERING SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Check the continuity between combination switch harness connector terminals under the following condition.

Combination switch		Condition		Continuity
Connector	Terminals			
M303	35 and 36	Speed limiter MAIN switch	Pressed	Existed
			Released	Not existed
	35 and 37	ASCD MAIN switch	Pressed	Existed
			Released	Not existed

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace ASCD steering switch.

2.CHECK ASCD STEERING SWITCH-II

Check resistance between combination switch (spiral cable) harness connector terminals under the following conditions.

Combination switch		Condition	Resistance (Ω)
Connector	Terminals		
M302	13 and 16	CANCEL switch: Pressed	Approx. 250
		SET/COAST switch: Pressed	Approx. 660
		RESUME/ACCELERATE switch: Pressed	Approx. 1,480
		All ASCD steering switches: Released	Approx. 4,000

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD steering switch.

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:0000000006496455

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-780, "Component Function Check"
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-551, "Work Procedure"
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-778, "Component Function Check"
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-481, "EVAPORATIVE EMISSION SYSTEM : System Description"
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-804, "Inspection"
	Incorrect idle speed adjustment						1	1	1	1		1			EC-547, "Work Procedure"
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-740, "DTC Logic" EC-744, "DTC Logic" EC-746, "DTC Logic"
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-802, "Inspection"
	Ignition signal circuit	1	1	2	2	2		2	2			2			EC-783, "Diagnosis Procedure"
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-566, "Diagnosis Procedure"

	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	
Mass air flow sensor circuit	1	1	2	2	2		2	2			2			EC-588, "DTC Logic"
Engine coolant temperature sensor circuit						3			3					EC-595, "DTC Logic"
Air fuel ratio (A/F) sensor 1 circuit				3										EC-600, "DTC Logic" EC-604, "DTC Logic" EC-607, "DTC Logic" EC-610, "DTC Logic" EC-762, "DTC Logic"
Throttle position sensor circuit						2			2					EC-597, "DTC Logic" EC-645, "DTC Logic" EC-698, "DTC Logic" EC-699, "DTC Logic" EC-755, "DTC Logic"
Accelerator pedal position sensor circuit			3	2	1									EC-748, "DTC Logic" EC-751, "DTC Logic" EC-758, "DTC Logic"
Knock sensor circuit			2								3			EC-654, "DTC Logic"
Engine oil pressure sensor circuit			4		2						3			EC-674, "DTC Logic"
Crankshaft position sensor circuit	2	2												EC-656, "DTC Logic"
Camshaft position sensor circuit	3	2												EC-660, "DTC Logic"
Vehicle speed signal circuit		2	3		3						3			EC-672, "DTC Logic"

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-681, "DTC Logic" EC-683, "DTC Logic"
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-570, "DTC Logic"
Exhaust valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-574, "DTC Logic"
PNP signal circuit			3		3		3	3			3			EC-688, "DTC Logic"
Refrigerant pressure sensor circuit		2				3			3		4			EC-790, "Diagnosis Procedure"
Electrical load signal circuit							3							EC-776, "Diagnosis Procedure"
Starter motor relay 2 circuit	3													EC-725, "DTC Logic"
Starter motor relay circuit	3													EC-731, "DTC Logic"
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	Check A/C type:HAC-10, "Information" • TYPE1:HAC-44, "Work Flow" • TYPE2:HAC-135, "Work Flow" • TYPE3:HAC-216, "Work Flow" • TYPE4:HAC-271, "Work Flow" • TYPE5:HAC-322, "Work Flow"
ABS actuator and electric unit (control unit)			4											BRC-33, "Work Flow" (Without EPS) BRC-145, "Work Flow" (With EPS)

1 - 6: The numbers refer to the order of inspection.

(continued on next table)

SYSTEM — ENGINE MECHANICAL & OTHER

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FL-41, "Inspection"
	Fuel piping			5	5	5		5	5			5			FL-32, "Inspection"
	Vapor lock														—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—
Air	Air duct	5	5	5	5	5	5	5	5	5		5			EM-162, "Inspection"
	Air cleaner														EM-162, "Inspection"
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)														EM-162, "Inspection"
	Electric throttle control actuator														EM-163, "Exploded View"
	Air leakage from intake manifold/Collector/Gasket														EM-163, "Exploded View"
Cranking	Battery	1	1	1		1		1	1			1		1	PG-113, "Work Flow"
	Generator circuit														CHG-12, "GASOLINE ENGINE MODELS : Work Flow"
	Starter circuit	3													STR-14, "Work Flow"
	Signal plate	6													EM-236, "Inspection"
	PNP signal	4													EC-689, "Diagnosis Procedure"
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-212, "Inspection"
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-236, "Inspection"
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5			EM-189, "Inspection"
	Camshaft														EM-200, "Inspection"
	Intake valve timing control														EM-189, "Inspection"
	Exhaust valve timing control														EM-189, "Inspection"
	Intake valve												3		EM-212, "Inspection"
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EM-167, "Inspection"
	Three way catalyst														EM-167, "Inspection"
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			LU-28, "Inspection"
	Oil level (Low)/Filthy oil														LU-25, "Inspection"
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-15, "RADIATOR : Inspection" CO-15, "RADIATOR CAP : Inspection"
	Thermostat									5					CO-25, "Inspection"
	Water pump														CO-22, "Inspection"
	Water gallery														CO-27, "Inspection"
	Cooling fan									5					CO-21, "Inspection"
	Coolant level (Low)/Contaminated coolant														CO-11, "Inspection"
NATS (NISSAN Vehicle Immobilizer System)		1	1												SEC-47, "Work Flow" (With I-Key) SEC-187, "Work Flow" (Without I-Key)

1 - 6: The numbers refer to the order of inspection.

NORMAL OPERATING CONDITION

Description

INFOID:0000000006496462

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 2,400 rpm under no load (for example, the shift lever position is neutral and engine speed is over 2,400 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 2,000 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, EC-471, "MULTIPORT FUEL INJECTION SYSTEM : System Description".

PERIODIC MAINTENANCE

IDLE SPEED

Inspection

INFOID:0000000006496463

1.CHECK IDLE SPEED

With CONSULT-III
Check idle speed in “DATA MONITOR” mode with CONSULT-III.

With GST
Check idle speed with Service $01 of GST.

Without CONSULT-III
Check idle speed by installing the pulse type tachometer clamp on the loop wire or on suitable high-tension wire which installed between No.1 ignition coil and No.1 spark plug.

>> INSPECTION END

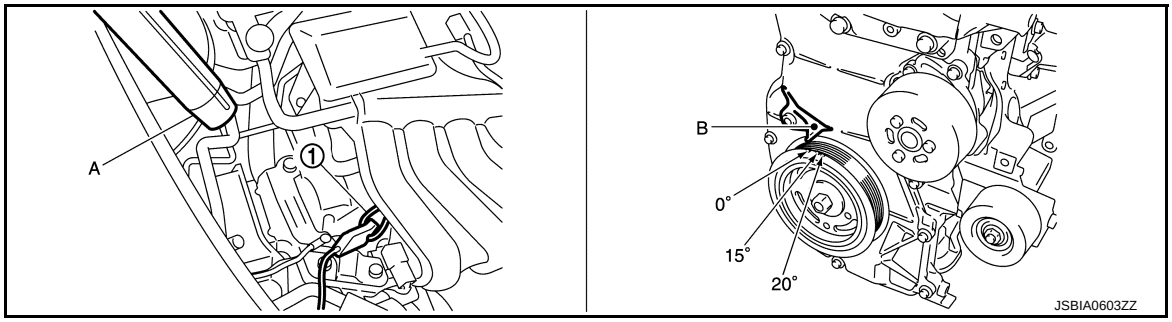
IGNITION TIMING

Inspection

INFOID:0000000006496464

1.CHECK IGNITION TIMING

1. Attach timing light to loop wire as shown.



1. Loop wire
A. Timing light
B. Timing indicator

2. Check ignition timing.

>> INSPECTION END

EVAPORATIVE EMISSION SYSTEM

Inspection

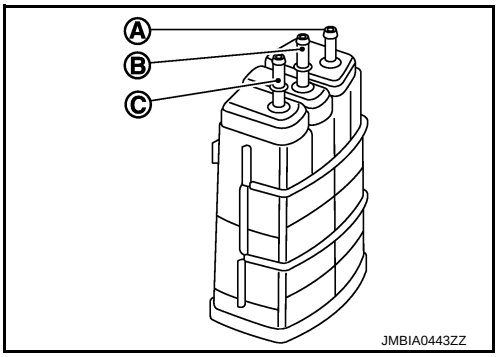
INFOID:0000000006496465

1. Visually inspect EVAP vapor lines for improper attachment and for cracks, damage, loose connections, chafing and deterioration.
2. Check EVAP canister as follows:

a. Block port (A). Orally blow air through port (B).
Check that air flows freely through port (C).

b. Block port (B). Orally blow air through port (A).
Check that air flows freely through port (C).

3. Visually inspect the fuel check valve for cracks, damage, loose connections chafing and deterioration.

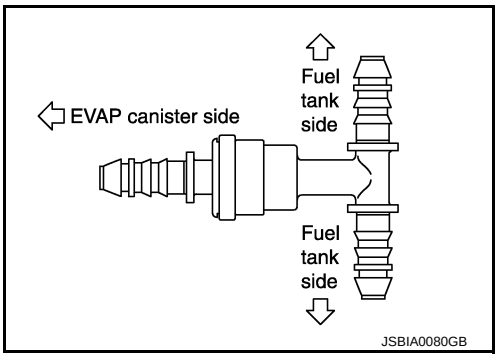


4. Check fuel check valve as follows:

a. Blow air through connector on the fuel tank side. A considerable resistance should be felt and a portion of air flow should be directed toward the EVAP canister side.

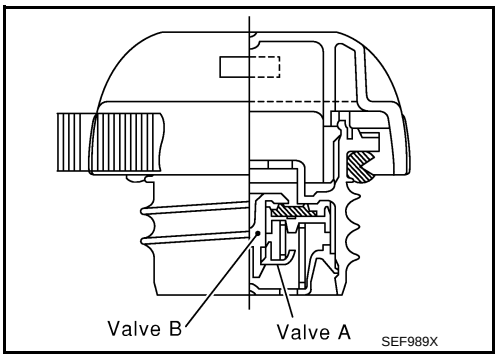
b. Blow air through connector on EVAP canister side. Air flow should be smoothly directed toward fuel tank side.

c. If fuel check valve is suspected or not properly functioning in step 1 and 2 above, replace it.



5. Inspect fuel tank filler cap vacuum relief valve for clogging, sticking, etc.

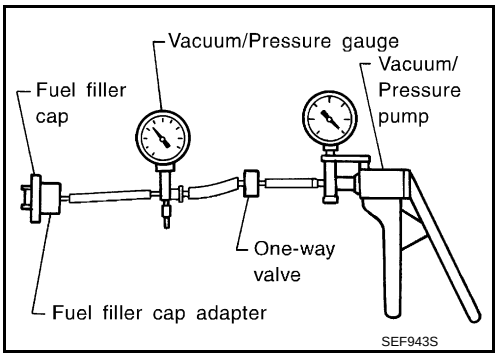
a. Wipe clean valve housing.



b. Check valve opening pressure and vacuum.

Pressure:	15.3 - 20.0 kPa (0.153 - 0.200 bar, 0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:	–6.0 to –3.4 kPa (–0.06 bar to –-0.034bar, –0.061 to –0.035 kg/cm^2, –0.87 to –0.49 psi)

c. If out of specification, replace fuel filler cap as an assembly.



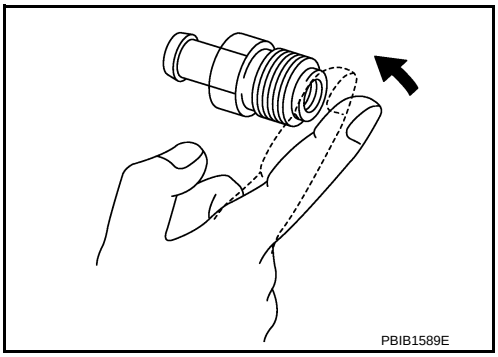
POSITIVE CRANKCASE VENTILATION

Inspection

INFOID:0000000006496466

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:0000000006635240

REMOVAL

1. Remove fusible link bracket. Keep a service area.
2. Disconnect ECM harness connectors. Refer to PG-4, "Harness Connector".
3. Remove ECM mounting nuts,and then remove ECM.

INSTALLATION

Install in the reverse order of removal.

CAUTION:

Must be perform additional service when replacing ECM. Refer to EC-541, "Work Procedure".

FUEL PUMP CONTROL MODULE (FPCM)

Removal and Installation

INFOID:0000000006635241

REMOVAL

1. Remove Luggage side lower finisher LH. Refer to INT-31, "LUGGAGE SIDE LOWER FINISHER : Removal and Installation".
2. Disconnect fuel pump control module (FPCM) connector.
3. Remove mounting bolts and then remove fuel pump control module (FPCM).

INSTALLATION

Install in the reverse order of removal.

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:0000000006496467

Transmission	Condition	Specification
CVT	No load* (in P or N position)	650 ± 50 rpm
M/T	No load* (in Neutral position)	650 ± 50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Timing

INFOID:0000000006496468

Transmission	Condition	Specification
CVT	No load* (in P or N position)	7 ± 5°BTDC
M/T	No load* (in Neutral position)	10 ± 5°BTDC

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

INFOID:0000000006496469

Condition	Specification (Using CONSULT-III or GST)
At idle	10 – 35%
At 2,500 rpm	10 – 35%

Mass Air Flow Sensor

INFOID:0000000006496470

Supply voltage	Battery voltage (11 – 14 V)
Output voltage at idle	0.9 – 1.3 V*
Mass air flow (Using CONSULT-III 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:0000000006496471

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the “SRS AIR BAG” and “SEAT BELT” of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see “SRS AIR BAG”.**
- **Never use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

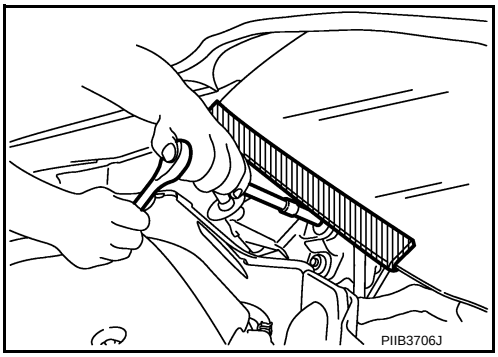
WARNING:

- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.**

Precaution for Procedure without Cowl Top Cover

INFOID:0000000006496472

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



On Board Diagnostic (OBD) System of Engine

INFOID:0000000006496473

The ECM has an on board diagnostic system. It will light up the malfunction indicator (MI) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

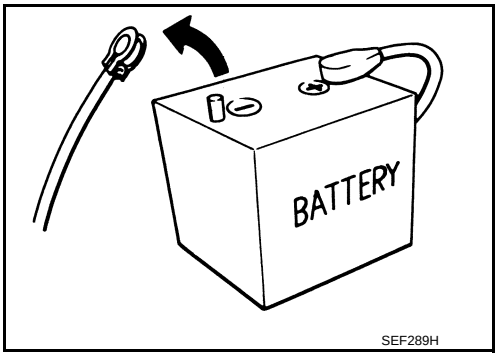
- **Be sure to turn the ignition switch OFF and disconnect the battery negative cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MI to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MI 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-4, "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 MI 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 MI to light up due to the malfunction of the fuel system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.**

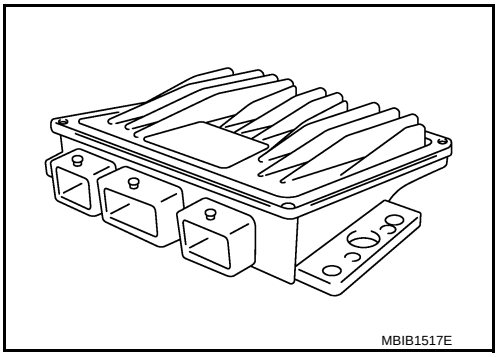
General Precautions

INFOID:0000000006496474

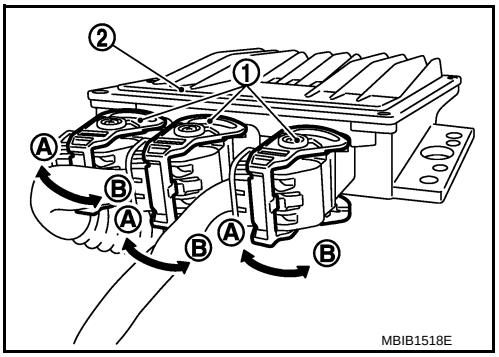
- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF, wait 3 minutes and disconnect battery negative cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect battery negative cable.**



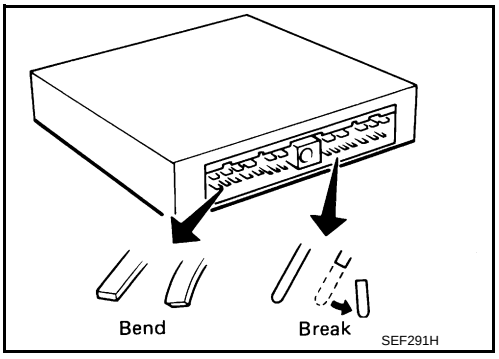
- **Do not disassemble ECM.**



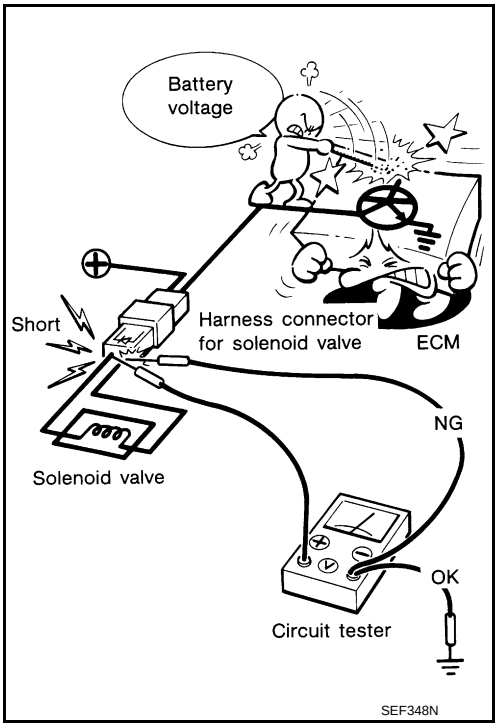
- **When connecting ECM harness connector, fasten (A) it securely with levers (1) as far as they will go as shown in the figure.**
- **ECM (2)**
- **Loosen (B)**



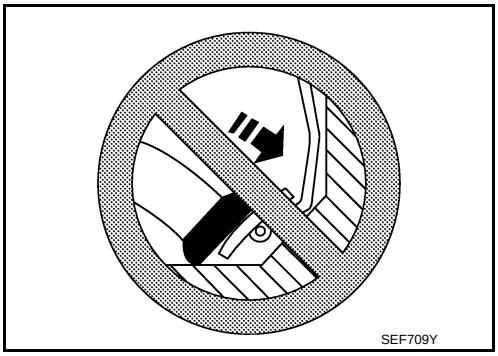
- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to IC's.



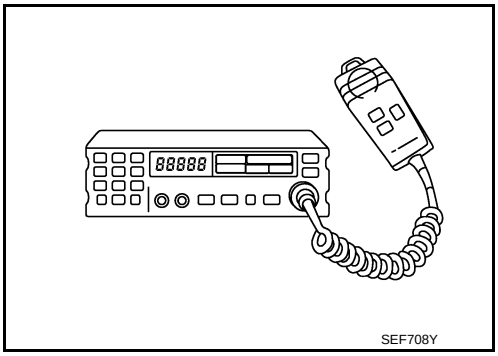
- **Keep engine control system harness at least 10cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of IC's, etc.**
- **Keep engine control system parts and harness dry.**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Do not shock or jar the camshaft position sensor, crankshaft position sensor.**
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**
- **Do not disassemble fuel pump.**
  If NG, take proper action.
- **Do not disassemble fuel injector.**
  If NG, replace fuel injector.



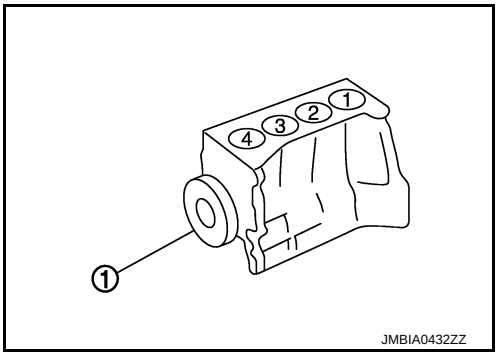
- **Do not depress accelerator pedal when staring.**
- **Immediately after staring, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**



- **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 standingwave radio can be kept smaller.**
- **Be sure to ground the radio to vehicle body.**



- **Cylinder NO.1 is at the flywheel end.**
  -1: Crankshaft pulley



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ENGINE RUNNING

- **No work should be carried out on the hydraulic system while engine is running.**
- **Remember that fuel pressure values in hydraulic circuit can reach up to 1,600 bar.**
- **Keep hands or face (particularly eyes) out of any high pressure leak.**
- **Recall that fuel is dangerous for health.**

FUEL RAIL PRESSURE SENSOR

- **Under warranty, do not remove the fuel rail pressure sensor from the rail.**
- **Do not try to measure the resistance of the fuel rail pressure sensor. This test is destructive for the internal components.**

FUEL INJECTOR

- **Fuel injectors are driven by over 100V.**
- **FUEL injector electronics are polarised. In case of intervention on wiring harness, do not invertwires. It is destructive for the piezo components.**
- **Do not drive the fuel injectors if their body is not connected to the battery ground (risk ofelectro-static discharge). For instance, fuel injector body have to be in contact with cylinder.**
- **Piezo fuel injector connector must not be unplugged while engine is running. Risk of majordamage to the engine (fuel injector could stay opened).**

Cleanliness

INFOID:0000000006496475

Cleanliness

RISKS ASSOCIATED WITH CONTAMINATION

The high pressure direct injection system is highly sensitive to contamination. The risks associated with contamination are:

- damage to or destruction of the high pressure injection system,
- components jamming,
- components losing seal integrity.

All After-Sales operations must be performed under very clean conditions. This means that no impurities (particles a few microns in size) should have entered the system during dismantling.

The cleanliness principle must be applied from the filter to the fuel injectors.

What are the sources of contamination?

- metal or plastic chips,
- paint,
- fibres:
  - from cardboard,
  - from brushes,
  - from paper,
  - from clothing,
  - from cloths,
- foreign bodies such as hair,
- ambient air
- etc.

NOTE:

Cleaning the engine using a high pressure washer is prohibited because of the risk of damaging connections. In addition, moisture may collect in the connectors and create electrical connection malfunction.

INSTRUCTIONS TO BE FOLLOWED BEFORE CARRYING OUT ANY WORK

NOTE:
Before any work is carried out on the high pressure injection system, protect:
- the accessories and timing belts,
- the electrical accessories, (starter, alternator, electric power assisted steering pump),
- the flywheel surface, to prevent any diesel from running onto the clutch friction plate.

- Check that you have plugs for the unions to be opened (set of plugs available from the Parts Department). The plugs are single-use only. After use, they must be discarded (once used they are soiled and cleaning is not sufficient to make them reusable). Unused plugs must be discarded.
- Check that you have hermetically resealable plastic bags for storing removed parts. Stored parts will therefore be less subject to the risk of impurities. The bags are to be used once only, and discarded after use.
- Use lint-free cleaning cloths. Using normal cloth or paper is prohibited. They are not lint-free and could contaminate the fuel circuit. Each cloth should only be used once.
- Use fresh cleaning agent for each operation (used cleaning agent is contaminated). Pour it into an uncontaminated container.
- For each operation, use a clean brush in good condition (the brush must not shed its bristles).
- Use a brush and cleaning agent to clean the unions to be opened.
- Blast compressed air over the cleaned parts (tools, workbench, the parts, unions and injection system zones). Check that no bristles remain.
- Wash your hands before and during the operation if necessary.
- When wearing leather protective gloves cover them with latex gloves to prevent contamination.

INSTRUCTIONS TO BE FOLLOWED WHEN CARRYING OUT ANY WORK
- As soon as the circuit is open, all openings must be plugged to prevent impurities from entering the system. The plugs to be used are available from the Parts Department. The plugs must not be reused under any circumstances.
- Seal the pouch shut, even if it has to be opened shortly afterwards. Ambient air carries contamination.
- All components removed from the injection system must be stored in a hermetically sealed plastic bag once they have been plugged.
- Using a brush, cleaning agent, air gun, sponge or normal cloth is strictly prohibited once the circuit has been opened. These items could allow contamination to enter the system.
- A new component replacing an old one must not be removed from its packaging until it is to be fitted to the vehicle.

SYSTEM DESCRIPTION

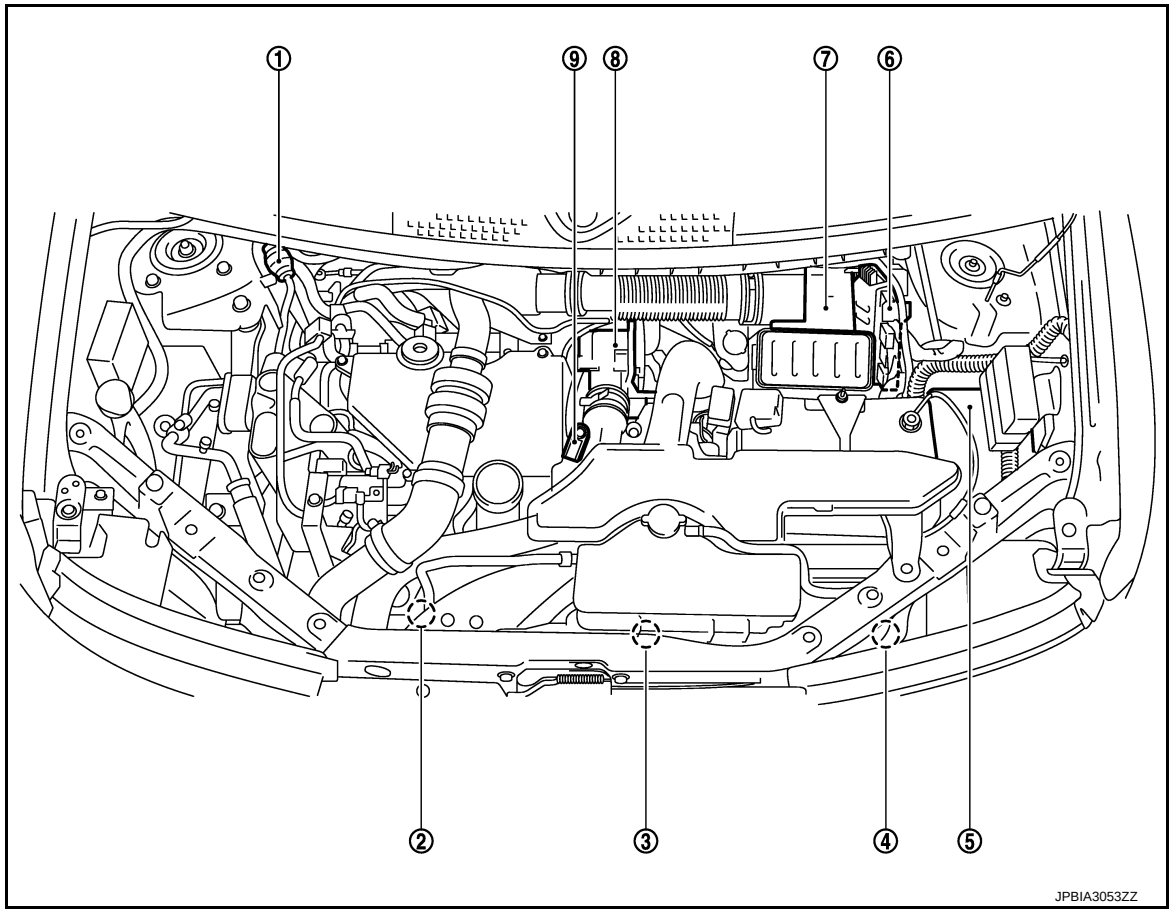
COMPONENT PARTS

Component Parts Location

INFOID:0000000006496476

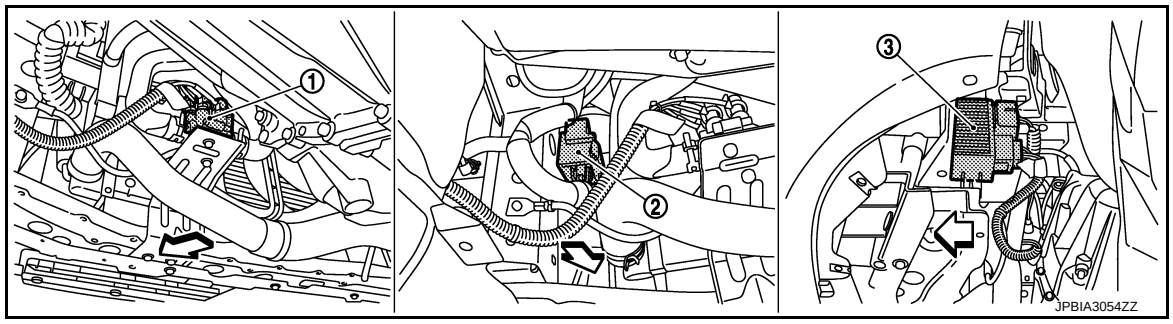
ENGINE ROOM COMPARTMENT

Top View



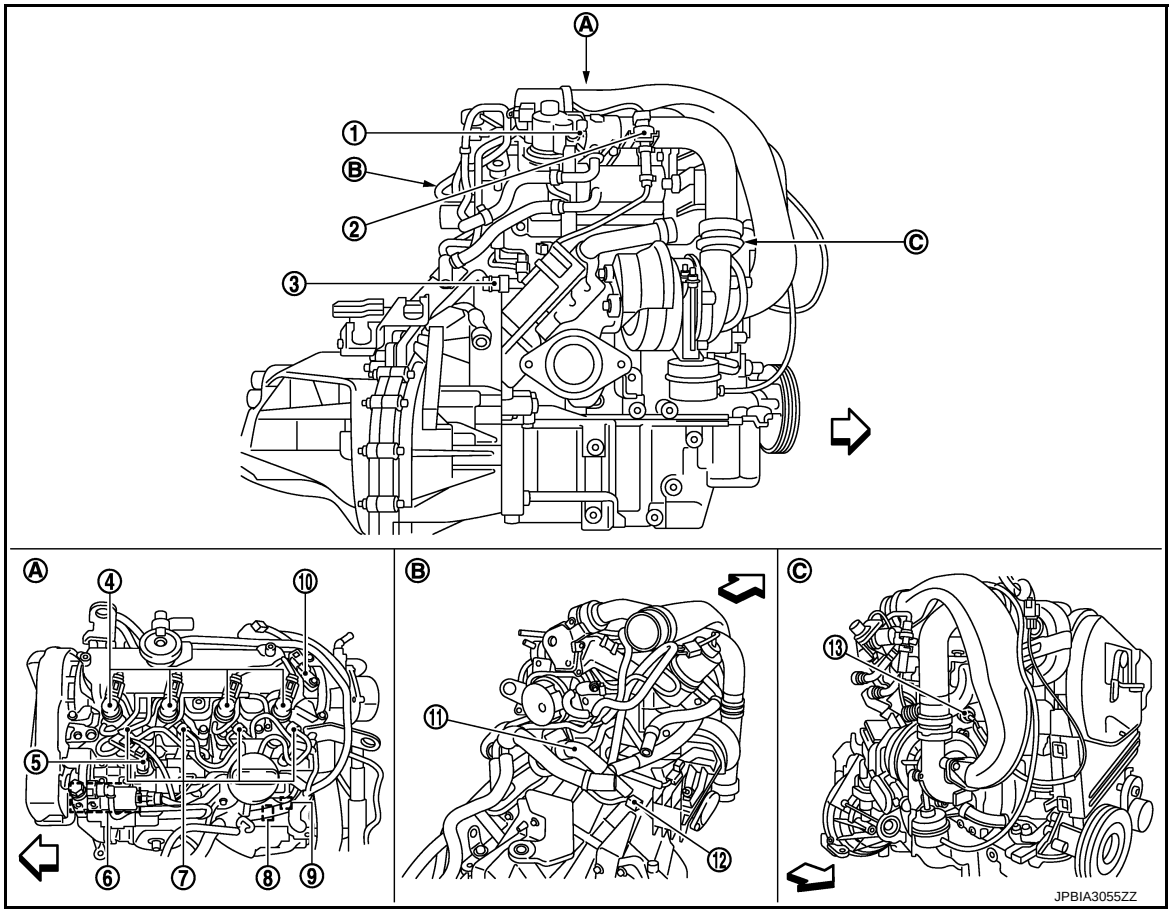
1. Priming pump
2. Turbocharger boost control solenoid valve
3. Cooling fan motor
4. Refrigerant pressure sensor
5. IPDM E/R
6. ECM
7. Mass air flow sensor (with intake air temperature sensor)
8. Electric throttle control actuator
9. Turbocharger boost sensor

Bottom View



1. Thermoplunger
2. Glow relay
3. Thermoplunger control unit

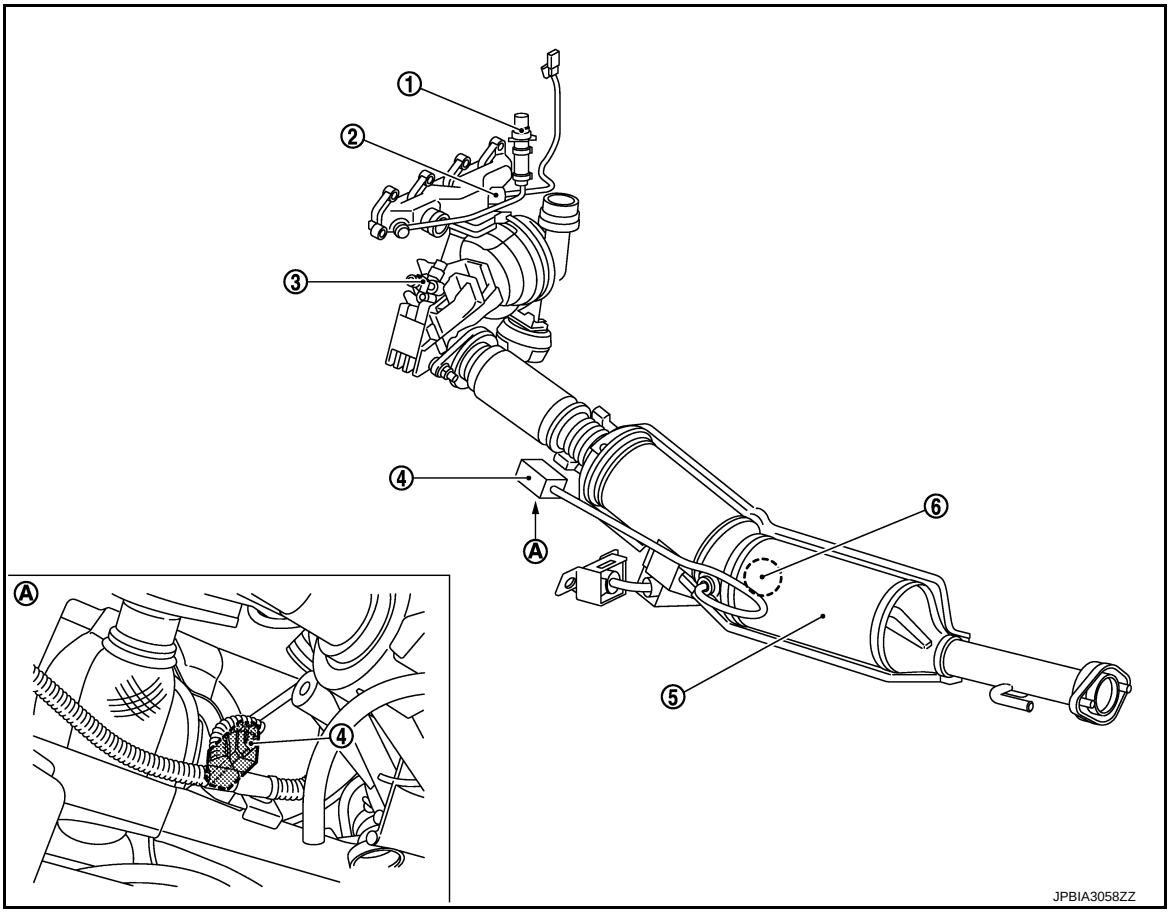
ENGINE COMPARTMENT



1. EGR volume control valve
2. Exhaust gas pressure sensor 1
3. Exhaust fuel injector
4. Fuel injector
5. Fuel temperature sensor
6. High pressure supply pump
7. Glow plug
8. Fuel rail pressure sensor
9. Fuel cut off valve
10. Camshaft position sensor
11. Engine coolant temperature sensor
12. Crankshaft position sensor
13. Exhaust gas temperature sensor 1

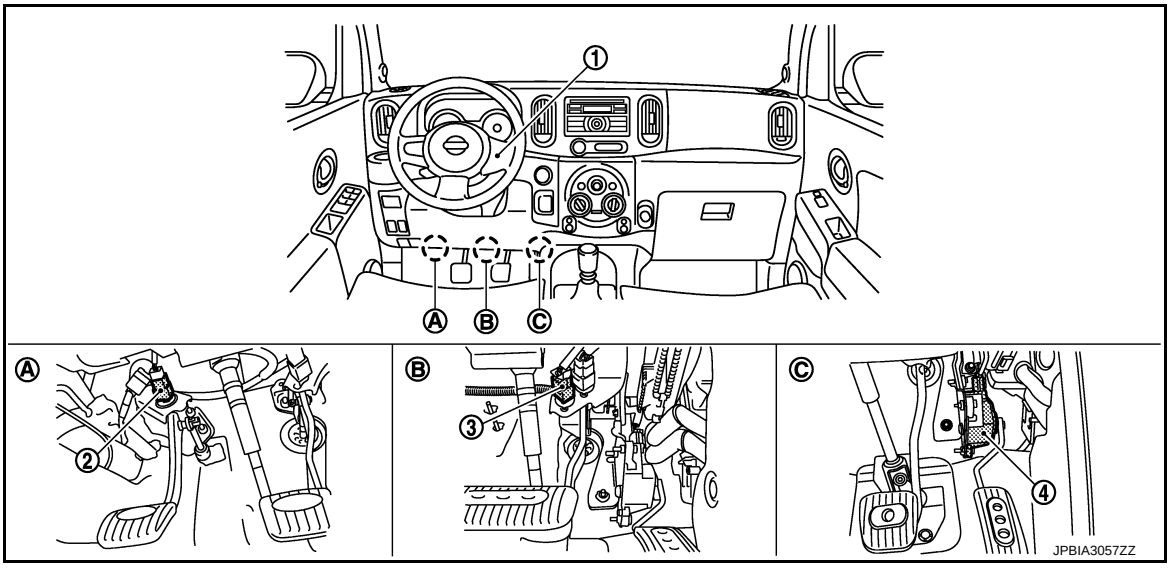
⇦ :Engine front

EXHAUST COMPARTMENT



1. Exhaust gas pressure sensor 1
2. Exhaust gas temperature sensor 1
3. Exhaust fuel injector
4. Exhaust gas pressure sensor 2
5. DPF (Diesel particulate filter)
6. Exhaust gas temperature sensor 2

BODY COMPARTMENT



1. ASCD steering switch
2. Clutch pedal position switch
3. ASCD brake switch
4. Accelerator pedal position sensor

Component Description

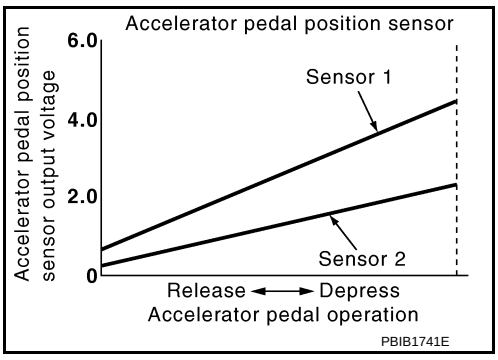
INFOID:0000000006496477

Component	Reference
Accelerator pedal position sensor	EC-816, "Accelerator Pedal Position Sensor"
ASCD steering switch	EC-817, "ASCD Steering Switch"
Camshaft position sensor	EC-817, "Camshaft Position Sensor"
Clutch pedal position switch	EC-817, "Clutch Pedal Position Switch"
Cooling fan motor	EC-817, "Cooling Fan"
Crankshaft position sensor	EC-817, "Crankshaft Position Sensor"
EGR cooler bypass control solenoid valve	EC-818, "EGR Cooler Bypass Control Solenoid Valve"
EGR volume control valve	EC-825, "EGR SYSTEM : System Description"
Electric throttle control actuator	EC-818, "Electric Throttle Control Actuator"
Engine coolant temperature sensor	EC-819, "Engine Coolant Temperature Sensor"
Exhaust fuel injector	EC-819, "Exhaust Fuel Injector"
Exhaust gas pressure sensor 1	EC-819, "Exhaust Gas Pressure Sensor 1"
Exhaust gas pressure sensor 2	EC-819, "Exhaust Gas Pressure Sensor 2"
Exhaust gas temperature sensor 1	EC-819, "Exhaust Gas Temperature Sensor 1"
Exhaust gas temperature sensor 2	EC-819, "Exhaust Gas Temperature Sensor 2"
Fuel cut off valve	EC-820, "Fuel Cut OFF Valve"
Fuel injector	EC-823, "FUEL INJECTION CONTROL SYSTEM : System Description"
Fuel rail pressure sensor	EC-820, "Fuel Rail Pressure Sensor"
Fuel temperature sensor	EC-820, "Fuel Temperature Sensor"
Glow relay	EC-820, "Glow Relay"
High pressure supply pump	EC-823, "FUEL INJECTION CONTROL SYSTEM : System Description"
Intake air temperature sensor	EC-820, "Intake Air Temperature Sensor"
Mass air flow sensor	EC-820, "Mass Air Flow sensor"
Refrigerant pressure sensor	EC-821, "Refrigerant Pressure Sensor"
Thermoplunger control unit	EC-821, "Thermoplunger Control Unit"
Turbocharger boost control solenoid valve	EC-825, "TURBOCHARGER BOOST CONTROL : System Description"
Turbocharger boost sensor	EC-821, "Turbocharger Boost Sensor"

Accelerator Pedal Position Sensor

INFOID:0000000006496478

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.



ASCD Main Switch

INFOID:0000000006496479

When turning ON the ASCD MAIN switch, CRUISE is indicated on the information display and the operation mode turns to standby mode. When the ASCD MAIN switch turns OFF, the cruise control is released.

ASCD Steering Switch

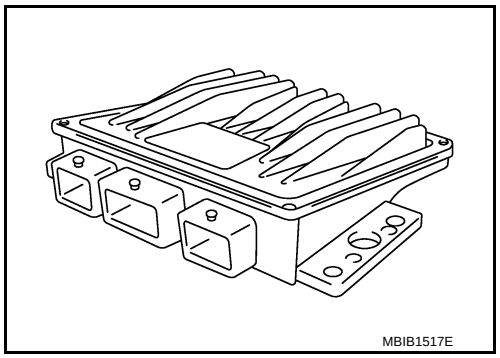
INFOID:0000000006496480

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.

Barometric Pessure Sensor

INFOID:0000000006496481

The barometric pressure sensor is built into ECM. The sensor detects ambient barometric pressure and sends the voltage signal to the microcomputer.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Camshaft Position Sensor

INFOID:0000000006496482

The camshaft position (CMP) sensor senses the retraction with camshaft (left side) to identify a particular cylinder. The camshaft position (CMP) sensor senses the piston position. When the crankshaft position (CKP) sensor system becomes inoperative, the camshaft position (CMP) sensor provides various controls of engine parts instead, utilizing timing of cylinder identification signals. The sensor consists of a permanent magnet and Hall IC.

Clutch Pedal Position Switch

INFOID:0000000006496483

Clutch switch signal is applied to the ECM through the clutch pedal position switch when the clutch pedal is depressed.

Cooling Fan

INFOID:0000000006496484

Cooling fan operates at each speed when the current flows in the cooling fan motor as follows.
Refer to EC-827, "COOLING FAN CONTROL : System Description" for cooling fan operation.

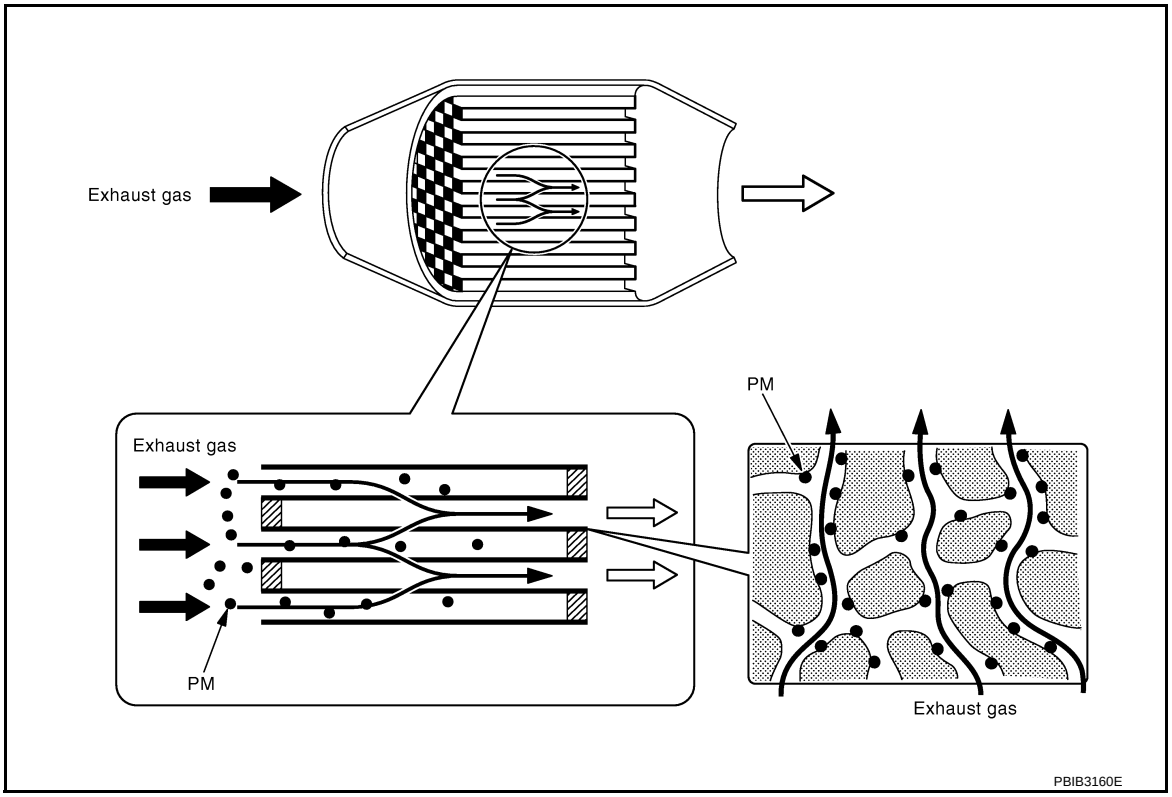
Crankshaft Position Sensor

INFOID:0000000006496485

The crankshaft position (CKP) sensor is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate.The ECM receives the voltage signal and detects the function of the engine revolution.

DPF (Diesel Particulate Filter)

INFOID:0000000006496486

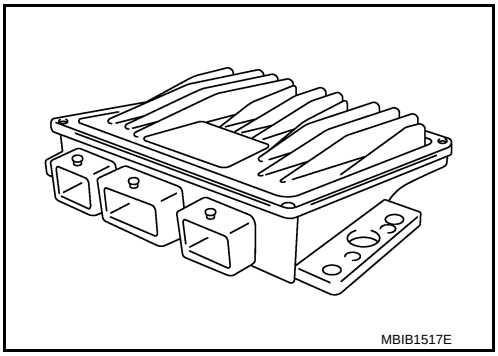


Diesel particulate filter is placed after oxidation catalyst and traps PM (Particulate Matter) in exhaust gas. Diesel particulate filter is a silicon carbide (SiC) gas permeable monolith in which ducts are alternately blocked. This structure facilitates to trap particulate matter.
When the amount of particulate matter in the diesel particulate filter reaches the specified level, the particulate matter needs to be reduced through burning to maintain the diesel particulate filter function. This reducing of particulate matter is called Regeneration and should be performed periodically. Diesel particulate filter can be effective for a long time through the cycle of trapping particulate matter and regeneration.

ECM

INFOID:0000000006496487

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



EGR Cooler Bypass Control Solenoid Valve

INFOID:0000000006496488

EGR cooler bypass control solenoid valve controls vacuum signal to the EGR cooler bypass valve control actuator. ERG amount is controlled by changing the EGR cooler bypass valve opening using the rod. EGR cooler bypass valve control solenoid valve is operated by ON/OFF signals (pulse signals) sent from ECM. Thelonger is the ON pulse duration, the larger becomes the bypass gas volume.

Electric Throttle Control Actuator

INFOID:0000000006496489

By default the valve is open when in the rest position and is actuated only when the engine is stopped; this has a damping effect and helps to stop the engine.

Engine Coolant Temperature Sensor

INFOID:0000000006496490

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.

Exhaust Fuel Injector

INFOID:0000000006496491

The exhaust fuel injector is installed before oxidation catalyst.
During diesel particulate filter regeneration, the ECM controls the exhaust fuel injector to inject the fuel and rises the exhaust gas temperature.

Exhaust Gas Pressure Sensor 1

INFOID:0000000006496492

Exhaust gas pressure sensor 1 is conected to exhaust manifold with exhasut pressure tube. Exhaust gas pressure sensor 1 measures the exhaust gas pressure and convers the pressure into a voltage signal.

Exhaust Gas Pressure Sensor 2

INFOID:0000000006496493

Exhaust gas pressure sensor 2 is connected to diesel particulate filter with exhaust pressure tube. Exhaust gas pressure sensor 2 measures the exhaust back pressure before the filter. It converts into a voltage signal. ECM receives the signal and estimates the amount of particulate matter in diesel particulate filter.

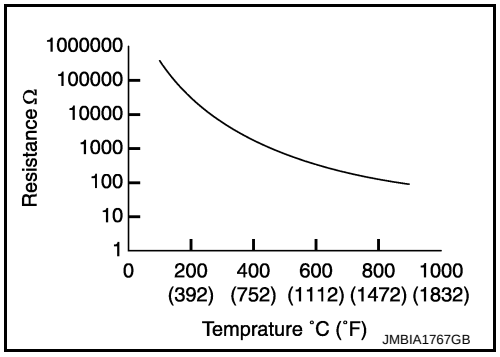
Exhaust Gas Temperature Sensor 1

INFOID:0000000006496494

The exhaust gas temperature sensor 1 is used to detect the exhaust gas temperature before turbocharger. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the exhaust gas 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>

Exhaust gas temperature °C (°F)	Voltage* V	Resistance Ω
100 (212)	4.990	371254
600 (1112)	1.328	362.6
700 (1292)	0.859	207.4
800 (1472)	0.581	131.4
900 (1652)	0.410	89.3



*: This data is reference value and is measured between ECM terminal 64 (Exhaust gas temperature sensor 1) and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

Exhaust Gas Temperature Sensor 2

INFOID:0000000006496495

The exhaust gas temperature sensor 2 is used to detect the exhaust gas temperature after oxidation catalyst. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the exhaust gas 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>

Exhaust gas temperature °C (°F)	Resistance kΩ
100 (212)	22.96 - 51.16
300 (572)	2.261 - 2.975
500 (932)	0.640 - 0.709

Exhaust gas temperature °C (°F)	Resistance kΩ
600 (1112)	0.406 - 0.442
750 (1382)	0.230 - 0.254

Fuel Cut OFF Valve

INFOID:0000000006496496

The fuel cut off valve is in front of the exhaust fuel injector line. This valve is used to cut off the exhaust fuel injection line for the purpose of preventing fuel leakage when the injector is not being used or when a malfunction is detected in the injector.

Fuel Rail Pressure Sensor

INFOID:0000000006496497

The fuel rail pressure (FRP) sensor is placed to the fuel rail. It measures the fuel pressure in the fuel rail. The sensor sends voltage signal to the ECM. As the pressure increases, the voltage rises. The ECM controls the fuel pressure in the fuel rail. The ECM uses the signal from fuel rail pressure sensor as a feedback signal.

Fuel Temperature Sensor

INFOID:0000000006496498

Fuel temperature sensor is built in the fuel pump. The sensor detects the fuel temperature in the fuel pump and calibrates the fuel injection amount change by fuel temperature.

Glow Relay

INFOID:0000000006496499

When ignition switch is turned ON while cooling temperature is lower than the specified value, ECM actuates glow plug through glow relay. Because of this, combustion chamber is warmed and stabilized combustion at starting can be obtained under low cooling temperature. The preheating time is determined according to cooling temperature, inlet air temperature and battery voltage.

Intake Air Temperature Sensor

INFOID:0000000006496500

The intake air temperature sensor 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.

Malfunction Indicator

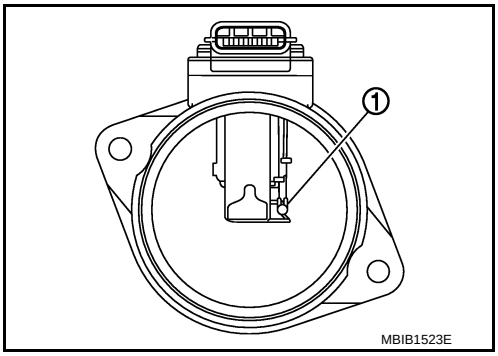
INFOID:0000000006496501

The OBD malfunction indicator [MI (Yellow)] is used to alert the driver to the existence of engine control system malfunctions involving excessive pollution or if the EOBD system is deactivated.
The ECM makes a request for lighting of the MI (Yellow) only where there is a malfunction present at the end of three consecutive cycles.
In the event of an engine malfunction, the ECM may request the display of an engine warning light [MI (Red)].

Mass Air Flow sensor

INFOID:0000000006496502

The mass air flow sensor is placed in the stream of intake air.
- Intake air temperature sensor (1)



Refrigerant Pressure Sensor

INFOID:0000000006496503

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.

Speed Limiter Main Switch

INFOID:0000000006496504

When turning ON the speed limiter MAIN switch, LIMIT is indicated on the information display and the operation mode turns to standby mode. When the speed limiter MAIN switch is turns OFF, the speed limiter control is released.

Thermoplunger Control Unit

INFOID:0000000006496505

Thermoplunger function to increase exhaust gas temperature as requirement for regeneration process.
It′s basically four glow plugs, it demands high power to alternator and engine compensate this strong demand increasing engine load, when engine load is increased then exhaust gas temperature is higher. These electrical glow plugs are cooled by flow water through pipe of device plungers.

Turbocharger Boost Sensor

INFOID:0000000006496506

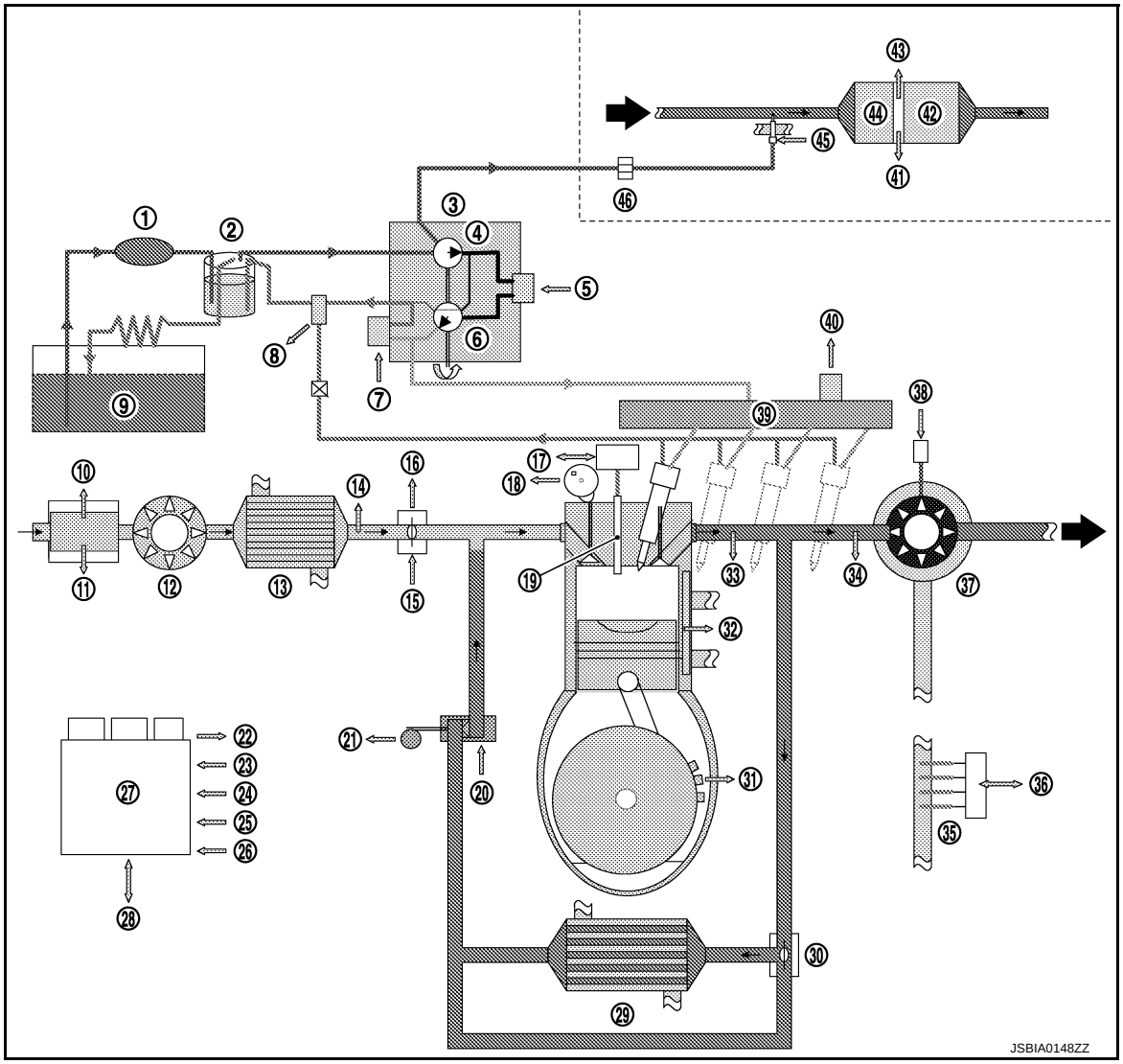
The turbocharger boost sensor detects pressure in the exit side of the charge air cooler. The sensor output voltage to the ECM increases as pressure increases.

SYSTEM

ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : System Diagram

INFOID:0000000006496507



1. Priming pump
2. Fuel filter
3. High pressure supply pump
4. High pressure supply pump (internal transfer pump)
5. High pressure supply pump (volumetric control valve)
6. High pressure supply pump (high pressure pump)
7. High pressure supply pump (pressure control valve)
8. Fuel temperature sensor
9. Fuel tank
10. Mass air flow sensor
11. Intake air temperature sensor
12. Compressor
13. Charge air cooler
14. Turbocharger boost sensor
15. Electric throttle control actuator
16. Throttle position sensor
17. Glow relay
18. Camshaft position sensor
19. Glow plug
20. EGR volume control valve
21. EGR volume control valve control position sensor
22. Barometric pressure sensor
23. Refrigerant pressure sensor
24. Accelerator pedal position sensor
25. Clutch pedal position switch
26. ASCD brake switch
27. ECM
28. CAN communication
29. EGR cooler
30. EGR cooler bypass control solenoid valve
31. Crankshaft position sensor
32. Engine coolant temperature sensor
33. Exhaust gas pressure sensor 1
34. Exhaust gas temperature sensor 1
35. Thermoplunger
36. Thermoplunger control unit

37. Turbine
38. Turbocharger boost control solenoid valve
39. Fuel rail
40. Fuel rail pressure sensor
41. Exhaust gas pressure sensor 2
42. DPF (Diesel particulate filter)
43. Exhaust gas temperature sensor 2
44. Three way catalyst
45. Exhaust fuel injector
46. Fuel cut off valve

ENGINE CONTROL SYSTEM : System Description

INFOID:0000000006496508

ECM performs various controls such as fuel injection control and furl pressure control.

FUEL INJECTION CONTROL SYSTEM

FUEL INJECTION CONTROL SYSTEM : System Description

INFOID:0000000006496509

SYSTEM DESCRIPTION

The high pressure injection system is designed to deliver a precise quantity of diesel fuel to the engine at a set moment. The Siemens VDO piezo Common Rail system used on the K9K Step 4 engine is a second generation Common Rail injection system. Fuel pressure in the rail can reach a maximum of 1,600 bar. It uses fuel injectors controlled by piezoelectric actuators. The fuel is pressurised by means of a high pressure pump then sent to a rail which supplies the four fuel injectors.

- The circuit comprises two subsystems, which are distinguished by the fuel pressure level:
  - the low pressure circuit comprises the tank, the diesel fuel filter, the transfer pump and the fuel injector return lines,
  - the high-pressure circuit comprises the high-pressure (HP) pump, the rail, the fuel injectors and the high-pressure (HP) pipes.

Finally, there are a number of control sensors and actuators which enable the entire system to be controlled and monitored.

- The system comprises:
  - Priming bulb
  - Fuel filter
  - High pressure supply pump
  - Fuel rail
  - Fuel rail pressure sensor
  - Fuel injector
  - Fuel temperature sensor
  - Engine coolant temperature sensor
  - Camshaft position sensor
  - Crankshaft position sensor
  - Turbocharger boost sensor
  - EGR volume control valve control position sensor
  - EGR volume control valve
  - Barometric pressure sensor (built in ECM)
  - Mass air flow sensor
  - Intake air temperature sensor
  - Electric throttle control actuator

High Pressure Supply Pump

The high pressure supply pump consists of the following components:

- Internal fuel transfer pump:
  - This pump is a vane-type rotary pump. It draws in fuel from the fuel tank through a fuel filter and supplies the high pressure pump with fuel.
- Volumetric control valve:
  - This solenoid valve regulates the flow of fuel entering the high pressure pump and enables an optimum quantity of fuel to be pressurised according to operating phase; this improves the output of the high pressure supply pump and thereby the output of the engine as well.
- High pressure pump:
  - This pump is a 3-piston radial pump, it generates the required pressure in the rail.
- Pressure control valve:
  - This solenoid valve regulates the output pressure of the high pressure pump.

Fuel Injector (Piezo Type)

CAUTION:
The fuel injector voltage is very high (much higher than that of conventional fuel injectors). This voltage can be as much as 150 V.
The piezo fuel injectors enable rapid, precise metering of the quantity of fuel injected, with excellent injection process repetitivity.
The piezo actuator operates like a capacitor. To control the fuel injector, the computer sends, at the correct time, a quantity of energy which is sufficient to enable the actuator to deform and the fuel injector to open.
During the injection period, the piezo actuator stores this energy.
At the end of the injection period, the computer recovers the energy sent at the start of the control operation. The piezo actuator discharges and returns to its original shape. The fuel injector closes. To improve output, the energy returned by the piezo actuator is reused, which keeps down the amount of energy that has to be supplied for the next injection process.

Engine Synchronisation
One of the determining factors for fuel injection control is knowing the position of each of the pistons in their respective cylinders at all times.
The angular position is measured by means of a magneto-inductive sensor which is excited by the teeth machined onto the flywheel; this is known as the crankshaft position sensor. The flywheel has 60 teeth, each 6 degrees apart; 2 of these teeth are missing to form a notch.
A second sensor (Hall-effect sensor), stimulated by a tooth machined onto the camshaft, which turns at half the engine speed, provides a signal relating to the progress of the injection cycle. Indeed, when the piston of cylinder 1 is at top dead centre (TDC), either at the end of the compression stroke or at the end of the exhaust stroke, the camshaft position sensor enables a distinction to be made between these two states.
By comparing the signals from these two sensors, the computer is able to provide all its systems with synchronisation parameters, namely: the angular position of the flywheel, engine speed, the number of the active fuel injector and the progress of the injection cycle.
This module also supplies the system with the rotation speed signal.
The camshaft position sensor is only used when starting the engine. As soon as the engine is running by itself (not being cranked by the starter), the signal provided by the crankshaft position sensor is sufficient. If the camshaft position sensor should fail while the engine is running, this will not affect the operation of the engine.

Quantity of Fuel Injected and Control of Start of Injection
• The parameters for controlling injection are, for each cylinder, the quantity to be injected and the start of injection. These are calculated by the ECM from the following information:
- Engine speed.
- Accelerator pedal position.
- Turbocharge air pressure.
- Engine coolant temperature.
- Intake air temperature.
- Fuel temperature.
- Mass air flow.
- Pressure of fuel in the rail.

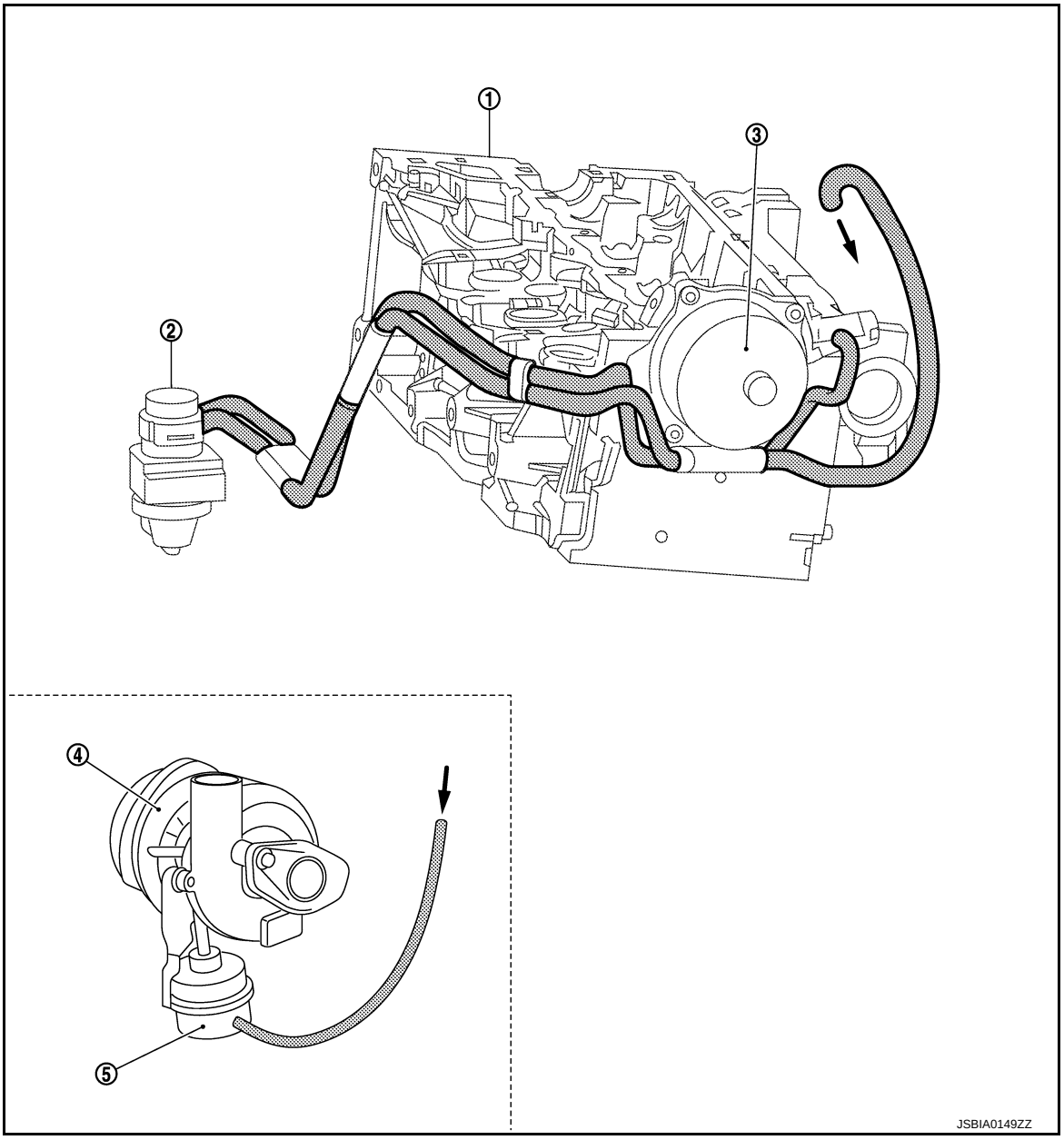
Station to Station Flow Regulation
The aim of this regulation process is to facilitate smooth engine operation by compensating for the system variations (fuel injectors, compression rate, etc.) which affect the torque generated by each cylinder during combustion.
The regulation process is only active at idle speed, with a warm engine and on condition that the engine speed is sufficiently stable. An injection timing correction coefficient is assigned to each cylinder; this is "learning" all the time the regulation process is active and remains fixed at the last value that was learned when the regulation is inactive.
At each new cycle, the coefficients are initialised to 1.

Cylinder Balancing Control
This controller allows smooth behavior of running engine, reduction of noise and oscillations in the drivetrain by compensating for system dispersions (fuel injectors, compression ratio, manufacturing tolerances of cylinders or valves...) having an influence on the torque generated by each cylinder during combustion.
The controller is only activated if engine is in idle, warm and not too rough. Corrective coefficient on the injection time is associated with each cylinder that is learnt as soon as the regulation is active. Otherwise it remains with its last memorized value.
At each new driving cycle, coefficients are initialized to 1.

TURBOCHARGER BOOST CONTROL

TURBOCHARGER BOOST CONTROL : Vacuum Hose Drawing

INFOID:0000000006496510



1. Cylinder head
2. Turbocharger boost control solenoid valve
3. Vacuum pump
4. Turbocharger
5. Turbocharger boost control actuator

NOTE: Do not use soapy water or any type of solvent while installing vacuum hose.

TURBOCHARGER BOOST CONTROL : System Description

INFOID:0000000006496511

TURBOCHARGER BOOST CONTROL

The turbocharger system consists of a solenoid valve connected to the vacuum pump circuit; this enables the vanes to be controlled by a diaphragm so as to adjust the overpressure in the air inlet circuit.

EGR SYSTEM

EGR SYSTEM : System Description

INFOID:0000000006496512

EGR SYSTEM

EGR Valve Control
The EGR (exhaust gas recirculation) system consists of a direct current EGR volume control valve fitted with a EGR volume control valve control position sensor. The EGR volume control valve is controlled in a closed-loop via the EGR volume control valve control position sensor. Up to a certain rate, exhaust gas recirculation enables nitrogen oxide (NOx) emissions to be reduced significantly.

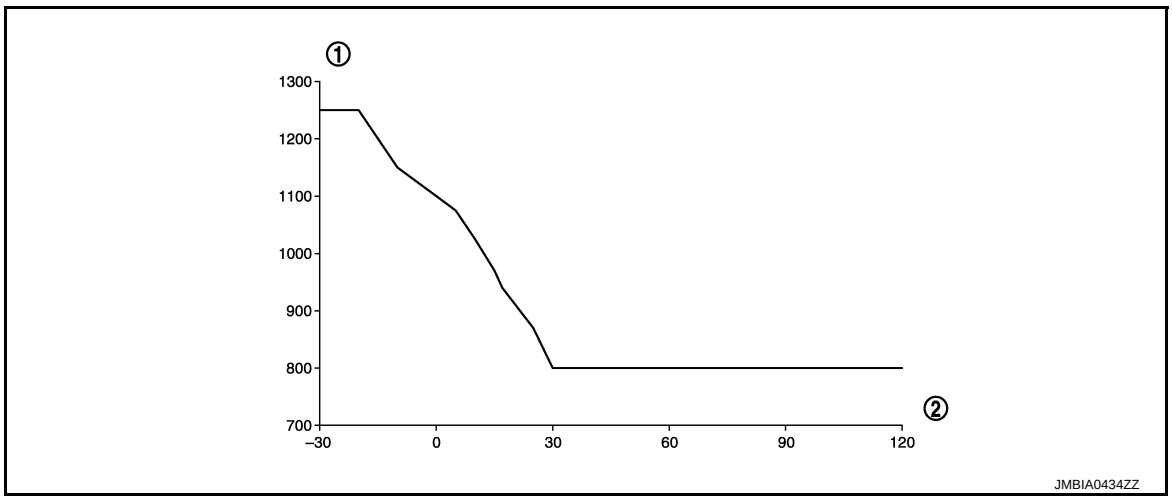
EGR Cooler
The EGR cooler reduces the volume of the EGR gas. As this volume is reduced, the quantity of EGR introduced in the cylinder increases and Nox emissions can be reduced more.

Measurement of the Fresh Air Flow
The flow of fresh air entering the engine is calculated by a mass air flow sensor (ratiometric hot-wire sensor). An intake air temperature sensor is integrated into the mass air flow sensor.
The mass air flow sensor facilitates control of the quantity of exhaust gas sent for recirculation, thus ensuring the best possible recirculation rates. Air flow measurement allows closed-loop control via the EGR valve.

IDLE SPEED CONTROL

IDLE SPEED CONTROL : System Diagram

INFOID:0000000006496513



1. Engine speed in rpm
2. Engine coolant temperature °C

IDLE SPEED CONTROL : System Description

INFOID:0000000006496514

The ECM is responsible for regulating the idle speed as a function of the idle speed set point which it calculates.
• The idle speed set point is dependent on:
- Engine coolant temperature
- Emission control program
- Air conditioning requirement
- Gear engaged
- Electrical load
- Battery voltage

ENGINE TORQUE CONTROL

ENGINE TORQUE CONTROL : System Description

INFOID:0000000006496515

The torque structure is the system which translates the driver's request into a torque supplied by the engine. It is required for certain functions such as the electronic stability program (ESP), the automatic gearbox or the sequential gearbox if fitted).
Each inter-system (ESP, automatic gearbox, sequential gearbox) sends the ECM a torque request via the CAN communication. The computer arbitrates between the inter-system torque requests and the driver's request (comprised of the accelerator pedal or the cruise control/speed limiter function). The result of the arbitration gives the torque set point.

From this torque set point, the computer determines the quantity of fuel to be injected (injection duration and number of injections) and the amount of air required (turbocharging pressure and EGR rate) so that the engine is able to provide the torque required in the best possible conditions (in terms of smooth running performance, pollutantemissions, etc.).

GLOW CONTROL

GLOW CONTROL : System Description

INFOID:0000000006496516

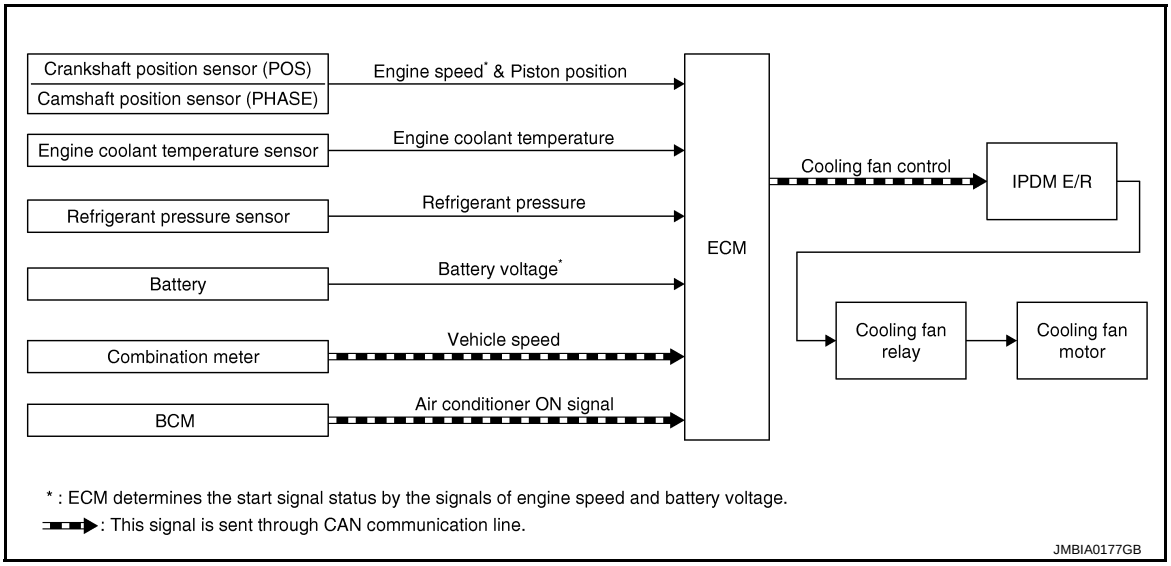
Glow control involves controlling the glow plugs and the glow plugs "on" indicator light on the instrument panel (via the can communication). The glow plugs are activated by a relay box and the power is provided by the battery.

After the ignition is switched on. Preheating is activated for a period of time. The indicator light comes on for the activation period which is dependent on the battery voltage, barometric pressure and engine coolant temperature. When the engine coolant temperature is below a certain threshold, a postheating function enables combustion stability, and thereby engine operation, to be improved (reduction in unburnt fuel and pollutant emissions).

COOLING FAN CONTROL

COOLING FAN CONTROL : System Diagram

INFOID:0000000006496517



COOLING FAN CONTROL : System Description

INFOID:0000000006496518

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	Cooling fan control	IPDM E/R ↓ Cooling fan relay ↓ Cooling fan motor
Engine coolant temperature sensor	Engine coolant temperature		
Refrigerant pressure sensor	Refrigerant pressure		
Battery	Battery voltage*1		
Combination meter	Vehicle speed*2		
BCM	Air conditioner ON signal*2		

*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to ECM through CAN communication line.

SYSTEM DESCRIPTION

ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, refrigerant pressure, air conditioner ON signal. Then control system has 3-step control [HIGH/LOW/OFF].

Cooling Fan Operation With The Engine Running

Cooling fan operate is guaranteed by a 2-speed fan assembly (LOW speed and HIGH speed).The ECM requests the IPDM E/R to actuate them via the can communication. To provide cooling:

- Engine running
  - LOW speed is actuated when the engine coolant temperature exceeds 99°C (210°F) and is deactivated when it drops below 96 °C (205°F).
  - HIGH speed is actuated when the engine coolant temperature exceeds 102°C (216°F) and is deactivated when it drops below 99°C (210°F).
- If the engine coolant temperature exceeds the threshold of 115°C (239°F), the ECM requests the IPDM E/R, via the CAN communication, to switch off the air conditioning compressor so as to reduce the load on the engine and attempt to limit the rise in temperature. The cut-off request is cancelled if the engine coolant temperature drops below 110°C (230°F).
- If a malfunction in the engine coolant temperature sensor circuit is detected, the ECM requests that HIGH speed operation.

Cooling Fan Relay Operation

The ECM controls cooling fan relays through CAN communication line.

Cooling fan speed	Cooling fan relay		
	1	2	3
Stop (OFF)	OFF	OFF	OFF
Low (LOW)	ON	OFF	OFF
High (HI)	ON	ON	ON

DPF (DIESEL PARTICULATE FILTER)

DPF (DIESEL PARTICULATE FILTER) : System Description

INFOID:0000000006496519

SYSTEM DESCRIPTION

ECM estimates the amount of particulate matter in diesel particulate filter based on the mileage and the exhaust back pressure before it. ECM automatically performs regeneration when the amount of particulate matter in diesel particulate filter reaches the specified level. When performing regeneration, ECM raise the exhaust gas temperature to activate Oxidation Catalyst. ECM performs the followings to raise exhaust gas temperature.

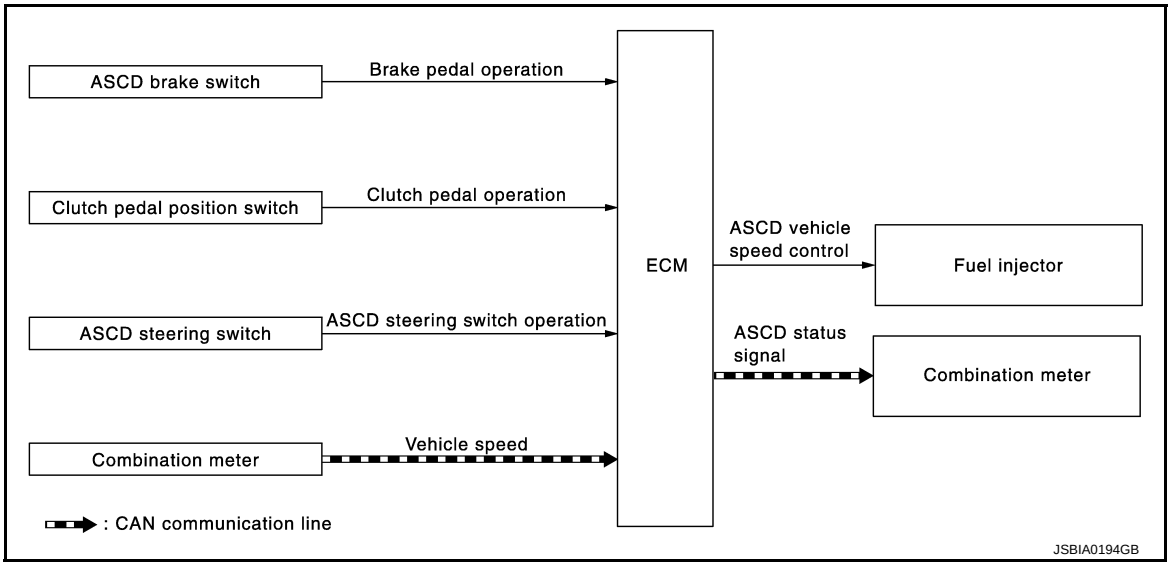
- Closing throttle valve to reduce intake air volume
- Retarding fuel injection timing
- Injecting additional fuel into combustion chamber during exhaust stroke (post injection)
- Performing EGR control
- Performing exhaust fuel injector control
- Performing thermoplunger control unit

When exhaust gas temperature reaches the specified value, oxidation catalyst is activated. The trapped particulate matter is burned through a catalytic reaction using exhaust gas heat at 650 °C.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Diagram

INFOID:0000000006496520



AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description

INFOID:0000000006496521

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD steering switch	ASCD steering switch operation	ASCD vehicle speed control	• Electric throttle control actuator • Combination meter
ASCD brake switch	Brake pedal operation		
Clutch pedal position switch	Clutch pedal operation		
Combination meter	Vehicle speed*		

*: This signal is sent to the ECM via the CAN communication line

BASIC ASCD SYSTEM

- Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can be set the vehicle speed in the set speed range.
- ECM controls throttle angle of electric throttle control actuator to regulate engine speed.
- Operation status of ASCD is indicated in combination meter.
- If any malfunction occurs in the ASCD system, it automatically deactivates the ASCD control.

Refer to EC-832, "AUTMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function" for ASCD operating instructions.

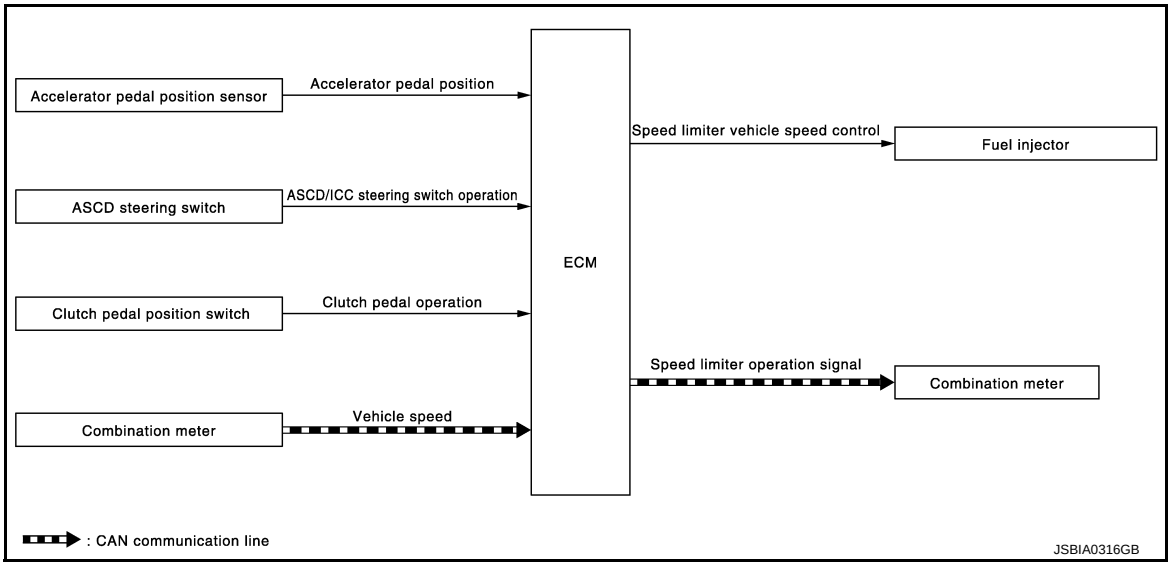
CAUTION:

Always drive vehicle in a safe manner according to traffic conditions and obey all traffic laws.

SPEED LIMITER

SPEED LIMITER : System Diagram

INFOID:0000000006496522



SPEED LIMITER : System Description

INFOID:0000000006496523

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Accelerator pedal position sensor	Accelerator pedal position	• Speed limiter vehicle speed control • Speed limiter operation signal*	• Electric throttle control actuator • Combination meter (Information display)
ASCD steering switch	ASCD steering switch operation		
Clutch pedal position switch	Clutch pedal operation		
Combination meter	Vehicle speed*		

*: This signal is sent to the ECM through CAN communication line

BASIC SPEED LIMITER SYSTEM

- Speed limiter is a system that enables to restrict the vehicle speed within the set speed that is selected by the driver. Driver can be set the vehicle speed in the set speed range.
- ECM controls throttle angle of electric throttle control actuator to regulate vehicle speed.
- Operation status of speed limiter is indicated on the information display in the combination meter.
- Unlike cancel conditions for ASCD, the speed limiter is not cancelled even when the clutch pedal is depressed. ECM detects a clutch pedal position switch signal and controls engine revolutions to maintain a set speed when shifting gears.
- If any malfunction occurs in speed limiter system, it automatically deactivates the speed limiter control.

Refer to EC-833, "SPEED LIMITER : Switch Name and Function" for speed limiter operating instructions.

CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

NOTE:

Since the speed limiter is controlled by the electric throttle control actuator, vehicle speed may exceed a set speed during downhill driving.

CAN COMMUNICATION

CAN COMMUNICATION : System Description

INFOID:0000000006496524

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-31, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart", about CAN communication for detail.

OPERATION

AUTMATIC SPEED CONTROL DEVICE (ASCD)

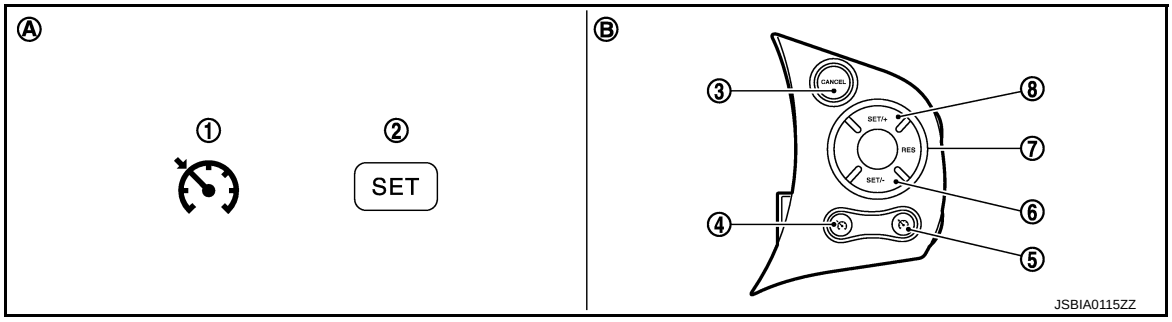
AUTMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function

INFOID:0000000006496525

SWITCHES AND INDICATORS

NOTE:

Shared with speed limiter switch.



1. CRUISE indicator lamp
2. SET indicator lamp
3. CANCEL switch
4. Speed limiter MAIN switch
5. ASCD MAIN switch
6. SET / – switch (SET / COAST)
7. RES switch (RESUME)
8. SET / + switch (SET / ACCELERATE)

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.)
30 km/h (20 MPH)	170 km/h (105 MPH)

SWITCH OPERATION

Item	Function
CANCEL switch	Cancels the cruise control driving.
SET / – switch (SET/COAST)	• Sets desired cruise speed. • Decreases speed incrementally during cruise control driving.
RES switch (RESUME)	Resumes the set speed.
SET / + switch (SET/ACCELERATE)	• Sets desired cruise speed. • Increases speed incrementally during cruise control driving.
ASCD MAIN switch	Master switch to activate the ASCD system.

CANCEL CONDITION

• When any of following conditions exist, the cruise operation is canceled.
- CANCEL switch is pressed.
- ASCD MAIN switch is pressed. (Set speed is cleared.)
- Speed limiter MAIN switch is pressed. (Set speed is cleared.)
- More than two switches at ASCD steering switch are pressed at the same time.
- Brake pedal is depressed.
- Shift lever position is changed to neutral or reverse.
- Clutch pedal is depressed.
- TCS system is operated.
- Parking brake lever 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.
- Malfunction for some self-diagnoses regarding ASCD system. SET indicator lamp is blinked quickly.

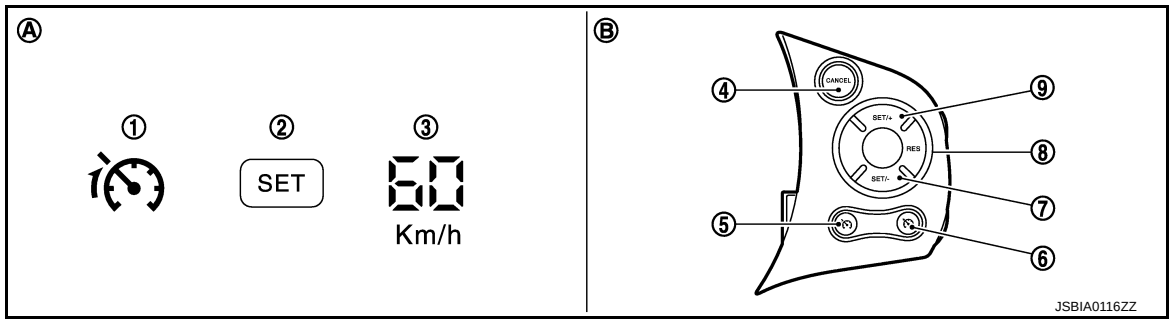
SPEED LIMITER

SPEED LIMITER : Switch Name and Function

INFOID:0000000006496526

SWITCHES AND INDICATORS

NOTE:
Shared with ASCD switch.



1. Speed limiter indicator lamp
2. SET indicator lamp
3. Set speed indicator (On the information display)
4. Speed limiter MAIN switch
5. Speed limiter MAIN switch
6. ASCD MAIN switch
7. SET / – switch (SET / COAST)
8. RES switch (RESUME)
9. SET / + switch (SET / ACCELERATE)

A. On the combination meter
B. On the steering wheel

SET SPEED RANGE

Speed limiter system can be set the following vehicle speed.

Minimum speed (Approx.)	Maximum speed (Approx.)
30 km/h (20 MPH)	170 km/h (105 MPH)

SWITCH OPERATION

Item	Function
CANCEL switch	Cancels the speed limiter control.
SET / – switch (SET/COAST)	• Sets desired speed. • Decreases the set speed incrementally.
RES switch (RESUME)	Resumes the set speed.
SET / + switch (SET/ACCELERATE)	• Sets desired speed. • Increases the set speed incrementally.
Speed limiter MAIN switch	Master switch to activate the speed limiter system.

CANCEL CONDITION

- When any of following conditions exist, speed limiter control is canceled.
- Speed limiter MAIN switch is pressed. (Set speed is cleared.)
- ASCD MAIN switch is pressed. (Set speed is cleared.)
- CANCEL switch is pressed.
- When accelerator pedal is fully depressed (Kickdown), speed limiter control is temporarily released. And driver can be driven above set speed (Set speed indicator is blinked).
- When the ECM detects any of the following conditions, the ECM cancels the speed limiter operation and informs the driver by blinking speed limiter indicator lamp and SET indicator lamp.
- Malfunction for some self-diagnosis regarding ASCD system.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000006496527

The ECM controls the display on the instrument panel of certain information relating to the operation of the engine.
Four functions are involved here: The OBD malfunction indicator [MI (Yellow)] for the EOBD (European On Board Diagnostics), the pre/post heating, the engine coolant temperature and engine malfunction [MI (Red)]. These four functions are represented by four lights given out by the ECM

GLOW LAMP

This lamp indicates that the glow control system has been activated.

ENGINE COOLANT TEMPERATURE LIGHT

This light is used as an indicator of engine overheating.
- In the event of overheating, it is up to the driver whether to stop the vehicle or not.

MALFUNCTION INDICATOR

The OBD malfunction indicator [MI (Yellow)] is used to alert the driver to the existence of engine control system malfunctions involving excessive pollution or if the EOBD system is deactivated.
The ECM makes a request for lighting of the MI (Yellow) only where there is a malfunction present at the end of three consecutive cycles.
The 3-second visual check upon powering up (automatic test procedure controlled by the IPDM E/R) is performed by the ECM.
In the event of a confirmed OBD malfunction by lighting of the MI, no flashing of the light must be observed following the lighting test.

DTCs Causing MI to Light

DTC	Description	Reference page
P0201	Cylinder 1 fuel injector control circuit	EC-921
P0202	Cylinder 2 fuel injector control circuit	EC-921
P0203	Cylinder 3 fuel injector control circuit	EC-921
P0204	Cylinder 4 fuel injector control circuit	EC-921
P0409	EGR Volume control valve control position sensor circuit	EC-942

ENGINE WARNING LIGHT

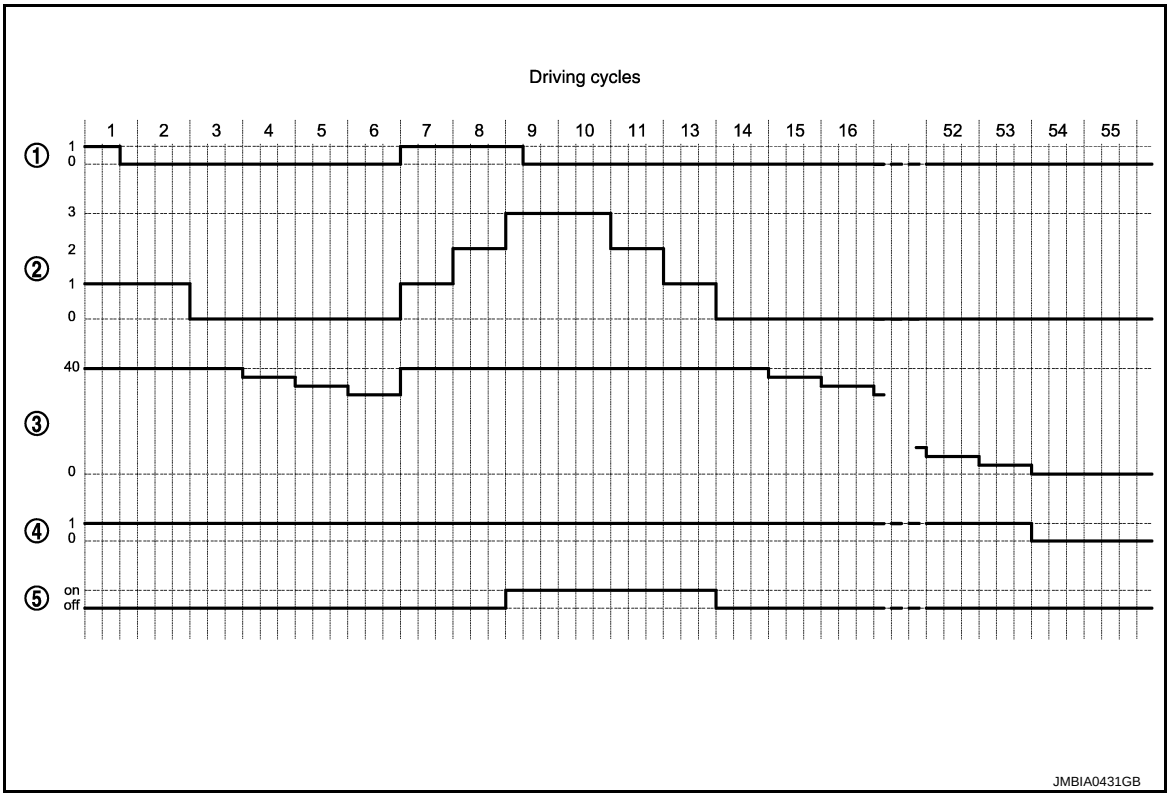
In the event of an engine malfunction, the ECM may request the display of an engine warning light [MI (Red)].

HOW TO ERASE DTC, 1ST TRIP DTC AND 2ND TRIP DTC

With CONSULT-III
NOTE:
If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
1. Select “ENGINE” with CONSULT-III.
2. Select “SELF-DIAG RESULTS”.
3. Touch “ERASE”. (DTC in ECM will be erased)

MI OPERATION CHART

Some malfunction must switch on MI to warn driver, that his engine emissions exceed OBD thresholds (Euro 3 x 2.5).
The rule is to switch on MI after 3 consecutive driving cycles (engine start + engine stop + power latch) with a present OBD malfunction.
To switch off the MI (without CONSULT-III), vehicle has to drive 3 consecutive cycles without present OBD malfunction.
Ignition switch OFF → ON transition, MI remains switched on in pre-drive check mode until engine start. If MI does not switch off whereas engine is running, there is at least one present OBD malfunction.



1. Present malfunction
2. Driving cycle counter
3. Warm up cycle counter
4. Memorised malfunction
5. MI state

NOTE: Driving cycle and warm up cycle are both detected in the same cycle.

CONSULT-III Function

INFOID:0000000006496528

FUNCTION

Diagnostic test mode	Function
Ecu Identification	ECM part number and homologation number can be read.
Self-diagnostic results	Self-diagnostic results such as DTC can be read and erased quickly.*
Data monitor	Input/Output data in the ECM can be read.
Active test	Diagnostic Test Mode in which CONSULT-III drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-III unit.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes

SELF-DIAGNOSTIC MODE

Self Diagnostic Item

Regarding items detected in “SELF-DIAG RESULTS” mode, refer to EC-855, "DTC Index".

DATA MONITOR MODE

MONITORED ITEM	UNIT	DESCRIPTION	REMARKS
STATIC REGENE	STAT1/STAT2/STAT3/ STAT4/STAT5/STAT6	• DPF regeneration status is displayed. STAT1:Waiting state STAT2:Heating state STAT3:Regeneration state STAT4:Cooling state STAT5:Successful regeneration state STAT6:Failure state	
MOTOR	Running/Off/STALLED/ CRANKING	• Engine status is displayed.	
REGENERATION COM	STAT1/STAT2/STAT3/ STAT4/STAT5/ STAT6STAT7/STAT8/ STAT9/STAT10	• DPF regeneration status is displayed. STAT1:Wait of status STAT2:Success of regeneration STAT3:Failure on threshold of minimal DPF upstream temperature during regeneration state STAT4:Failure on threshold of minimal temperature before turbine during regeneration State STAT5:Failure on threshold of maximal DPF temperature reached during regeneration state (thermal shock) STAT6: Threshold of engine cooling temperature not reached STAT7:Threshold of differential pressure not reached STAT8:Engine speed deviation STAT9:Engine in stalled state STAT10:Engine in stopped state	
REGENE AUTHO	No/Yes	• External controls safety authorization flag	
1ST IN VAL OPEN PR	NOT DONE/DONE	• Inlet throttle valve offset - first opened learning running	
1ST IN VAL CLOS PR	NOT DONE/DONE	• Inlet throttle valve offset - first closed learning running	
EX FUEL INJ SV COM	Inactive/ACTIVE	• Exhaust fuel injector solenoid valve command	
PRHT RLY CTRL	DEACT/ACTIVE	• State of glow relay	
PREHEATER LIGHT	EXTING/ILLUMI	• Glow indicator lamp status is displayed.	
THERMOPLUNGER	DEACT/ACTIVE	• Thermoplunger No.1 status is displayed.	
THERMOPLNGR 2	DEACT/ACTIVE	• Thermoplunger No.2 status is displayed.	
THERMOPLNGR 3	DEACT/ACTIVE	• Thermoplunger No.3 status is displayed.	
RE EX GS COOL	Inactive/ACTIVE	• EGR cooler bypass valve status is displayed.	
EGR FUN PROG	NOT DONE/DONE	• EGR volume control valve offset - first learning running	
CAM TDC SYNC	NOT DONE/DONE	• Camshaft/crankshaft synchronization status is displayed.	
C/U+AFTR IGN	MISSING/PRESENT	• Ignition switch status is displayed.	
CLUTCH PEDAL SWITCH	Inactive/ACTIVE	• Clutch pedal position switch status is displayed.	
CCS LMT BTN	Inactive/INVALID/INVALID/CO.1/SUSPD/MINUS/PLUS/RSTRT	• ASCD steering switch status is displayed. Inactive:unpressed INVALID:invalid voltage CO.1:open circuit SUSPD:suspend switch pressed MINUS:SET/– switch pressed PLUS:SET/– switch pressed RSTRT:RES switch pressed	

MONITORED ITEM	UNIT	DESCRIPTION	REMARKS
CRS CN/SPD LMT OP	OFF/SL ON/SL SUSPENDED/SL INHIBITED/CC ON/CC SUSPENDED/CC INHIBITED/CC SL ABSENT	• ASCD and speed limiter status is displayed. OFF:ASCD and speed limiter is no activated. SL ON:speed limiter is activated. (active or over speed) SL SUSPENDED:speed limiter is activated. (awaiting or suspended) SL INHIBITED:speed limiter requested and in failure CC ON:ASCD is activated. (active) CC SUSPENDED:ASCD is activated. (awaiting or suspended) CC INHIBITED:ASCD requested and in failure CC SL ABSENT:ASCD and speed limiter not present	
FIRST START	DONE/NOT DONE	• First start status is displayed.	
CC/SL CONNECTION AFTER CC BUTTON PRESSED	Not detected/DETCT	• When ASCD MAIN switch is pressed, it displays actual ASCD operating condition detected by ECM.	
CC/SL CONNECTION AFTER SL BUTTON PRESSED	Not detected/DETCT	• When speed limiter MAIN switch is pressed, it displays actual speed limiter operating condition detected by ECM.	
CRS C/SPD LIM	Inactive/REGUL/LIMIT/Incoherence	• Speed limiter MAIN switch status is displayed.	
CC/SL ACT DR	STAT1/STAT2/STAT3/STAT4/STAT5	• Cancellation condition of ASCD/speed limiter is displayed. STAT1:ASCD/speed limiter main switch changed STAT2:Suspend button is pressed. STAT3:ASCD brake switch is ON. STAT4:Clutch pedal position switch is ON. STAT5:Shift the selector lever to “N” position.	
STARTER BUTTON	RELES/PRESSED	• Ignition switch status is displayed.	
ENGAGE REVERSE GEAR	No/Yes	• Selector lever “R” position status is displayed.	
TRC/ANTI-YAW CNT	No/Yes	• Anti ski regulation or anti yaw control in regulation.	
CRUISE CONTROL	Incoherence/CORRECT	• Speed/set point ratio too small.	
PARKING BRAKE	RELES/APPLIED	• Parking brake status is displayed.	
CRS CONT INHI INJ	No/Yes	• ASCD system engine control inhibition	
SL INHI INJECTION	No/Yes	• Speed limiter system engine control inhibition	
MANUAL OR ASSISTED PARKING BRAKE	RELES/APPLIED	• Parking brake status is displayed.	
INJEC PROTEC	INACT/INDETERMINATE/STAT1/STAT2/STAT3/STAT4	—	
AUTOMATIC GEARBOX IN DEFECT MODE	Not detected/DETCT	• Transaxle in limp home mode is detected.	
CLUTCH INFO UNAV	Not detected/DETCT	• Clutch information unavailable is detected.	
CLUTCH INFO ABSE	Not detected/DETCT	• Clutch information absent is detected.	
BRAKE INFO UNAVAI	Not detected/DETCT	• Brake information unavailable is detected.	
BRAKE INFO ABSENT	Not detected/DETCT	• Brake information absent is detected.	
DECELE W/O BRAKE	Not detected/DETCT	• Sudden braking detected without brake information	
SHA DEC W/O BRAK	Not detected/DETCT	• Braking detected without brake information	
CC INHI INJECTION	Not detected/DETCT	• ASCD inhibition is detected.	
ACT SP INFO UNAV	Not detected/DETCT	• Real vehicle speed unavailable is detected.	
DISP VEHI SP UNAV	Not detected/DETCT	• Displayed vehicle speed unavailable is detected.	

MONITORED ITEM	UNIT	DESCRIPTION	REMARKS
ACT SP INFO ABSE	Not detected/DETCT	• Real vehicle speed absence is detected.	
DISP SP INFO ABSE	Not detected/DETCT	• Display vehicle speed absence is detected.	
CHANGE SP UNIT	Not detected/DETCT	• Change of the displayed speed unit is detected.	
SL INHI INJECTION	Not detected/DETCT	• Speed limiter inhibition is detected.	
VEHICLE SPEED UNIT	km/h/mph	• Vehicle speed is displayed.	
WIRED BRAK CONTA	Inactive/ACTIVE	• ASCD brake switch state is displayed.	
CLUTCH CONTACT WIRING - START OF TRAVEL	Inactive/ACTIVE	• Authorization to connect ASCD and speed limiter options status is displayed.	
CC OPERATING RELIABLY	STAT1/STAT2/STAT3	• State of the failures which cause irreversible ASCD safety failure is displayed. STAT1:Presence of ASCD force request despite the ASCD deactivation STAT2:Activation of the open brake switch without ASCD deactivation STAT3:Activation of the minimum travel clutch switch without ASCD deactivation	
CRANK SYNC	INCORR/CORRECT	• Crankshaft synchronization state is displayed.	
ACC PEDAL DETECT	No/Yes	• Counter of inconsistencies between accelerator pedal and brake	
TURBO REGULATION	Inactive/REGUL/INTM/ DIAG MODE/PRTCT/MAX	• Boost regulation state is displayed.	
CC/SL CONN AUTH	Inactive/ACTIVE	• Authorization to connect ASCD and speed limiter options status is displayed.	
LOW FUEL LEVEL INFORMATION	OK/LOW	• LOW FUEL LEVEL INFORMATION is displayed.	
CAMSHAFT SIGNAL	Not detected/DETCT	• Camshaft signal is detected.	
WTR DIESEL DETECTR	Not detected/DETCT	• This item is not used.	
MOTOR FAN REQ	Inactive/ACTIVE	• Cooling fan request status is displayed.	
CC/SL SPEED SIGNAL MONITORING	STAT1/STAT2/STAT3/ STAT4/STAT5/STAT6	• State of the reversible failures not due to ASCD/speed limiter which cause ASCD/speed limiter failure STAT1:Real vehicle speed unavailable is detected. STAT2:Displayed vehicle speed unavailable is detected. STAT3:Real vehicle speed absence is detected. STAT4:Display vehicle speed absence is detected. STAT5:Change of the displayed speed unit is detected. STAT6:Speed limiter inhibition is detected.	
CRUISE CONTROL INFO MONITORING	STAT1/STAT2/STAT3/ STAT4/STAT5/STAT6/ STAT7/STAT8	• State of the reversible failures not due to ASCD which cause ASCD failure STAT1:Clutch information unavailable is detected. STAT2:Clutch information absence is detected. STAT3:Brake information unavailable is detected. STAT4:Brake information absence is detected. STAT5:Braking detected without brake information STAT6:Sudden braking detected without brake information STAT7:Transaxle in limp home mode is detected. STAT8:ASCD inhibition is detected.	

MONITORED ITEM	UNIT	DESCRIPTION	REMARKS
GEARBOX RATIO	DECLTC/1/2/3/4/5/6/ RVRS	• Current gear engaged DECLTC:Declutched at rest 1:1st gear 2:2nd gear 3:3rd gear 4:4th gear 5:5th gear 6:6th gear RVRS:Reverse	
BRAKING DETECTED MULTIPLEX SIGNAL	MISSING/PRESENT/ INTM	• The status of a brake switch signal received via CAN communication is displayed. MISSING:not pressed PRESENT:pressed INTM:confirmed pressed	
MANUAL GEARBOX LEVER IN NEUTRAL	Not detected/DETCT	• Selector lever “N” position status is displayed.	
COMBU MODE SET	NRML/STAT1/STAT2/ STAT3/STAT4	• REQUIREMENT VALUE OF COMBUSTION MODE is displayed.	
COMBUSTION MODE	NORMAL/STAT1/STAT2/ STAT3/STAT4	• REQUIREMENT VALUE OF COMBUSTION MODE is displayed.	
A/C COMMAND	Not detected/DETCT	• Air conditioning request status is displayed.	
A/C AUTHOR.	NOT DONE/DONE	• Air conditioning request status is displayed.	
FAN LO REQ INJEC	ACTIVE/Inactive	—	
FAN HI REQ INJEC	ACTIVE/Inactive	—	
FAN LO REQ	ACTIVE/Inactive	—	
FAN HI REQ	ACTIVE/Inactive	—	
FAN LO REQ GEAR	ACTIVE/Inactive	—	
FAN HI REQ GEAR	ACTIVE/Inactive	—	
FAN LO FINAL REQ	ACTIVE/Inactive	—	
FAN HI FINAL REQ	ACTIVE/Inactive	—	
INLET AIR TEMPERATURE	°C or °F	• The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is displayed.	
ROUGH TURB PRES	mbar	• The turbocharger boost pressure (determined by the signal voltage of the turbocharger boost sensor) is displayed.	
BOOST PRESSURE	mbar	• The turbocharger boost pressure (determined by the signal voltage of the turbocharger boost sensor) is displayed.	
TEMP upstream turbine	°C or °F	• The exhaust gas temperature (determined by the signal voltage of the exhaust gas temperature sensor 1) is displayed.	
ATOMOS PRESS	mbar	• The atmospheric pressure (determined by the signal voltage of the atmospheric pressure sensor) is displayed.	
WATER TEMP	°C or °F	• The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	
COMP SUP VOLT	V	• The power supply voltage of ECM is displayed.	
ENGINE SPEED	rpm	• Engine speed computed from crankshaft position sensor is displayed.	
VEHICLE SPEED	km/h	• The vehicle speed computed from the vehicle speed-signal sent from combination meter is displayed.	
ENG TORQUE	Nm	• Engine torque is displayed.	

MONITORED ITEM	UNIT	DESCRIPTION	REMARKS
DPF PROG LEV REGE	%	• Diesel particle filter progress level of the after sales regeneration is displayed.	
MEASURE AIR FLOW	kg/h	• Indicates the mass air flow computed by ECM accordingto the signal voltage of the mass air flow sensor.	
RAIL PRESSURE	bar	• The fuel rail pressure (determined by the signal voltage of the fuel rail pressure sensor) is displayed.	
RAIL PRES SET	bar	• The fuel rail pressure (determined by the signal voltage of the fuel rail pressure sensor) is displayed.	
UPS PRTCL FLTR TMP	°C or °F	• The exhaust gas temperature (determined by the signal voltage of the exhaust gas temperature sensor 2) is displayed.	
Fuel flow S/V current	mA	• Fuel flow cut off valve current is displayed.	
LAST OFF/V CLOSE	%	—	
IN FLAP ABSO POSI	%	—	
FIRST OFF/V OPEN	%	—	
FIRST OFF/V CLOSE	%	—	
LAST OFF/V OPEN	%	—	
REGENERATION FAIL	—	• Indicates the number of DPF regeneration failures since the last success.	
AFTER REPLAC DPF	Km	• The kilometer after the DPF replacing is displayed.	
TIM LST REGE	h	• Time since last DPF regeneration is displayed.	
FLOW GAS IN DPF	m3/h	• Flow of gas inside the DPF is displayed.	
DPF INJEC RC COM	%	—	
DURA LAST REGENE	min	• Duration of last regeneration is displayed.	
DPF TEMP REF VAL	°C or °F	• DPF upstream temperature reference value is displayed.	
POST INJEC FLOW 1	mg/cp	• Post injection quantity is displayed.	
SOOT IN P/FLT	g	• Soot mass in the DPF is displayed.	
EX SYSTEM FLW	g/s	—	
NULL DTC	mbar	• The exhaust gas pressure (determined by the signal voltage of the exhaust gas pressure sensor 2) is displayed.	
ROU DPF RELA PRES	mbar	—	
PART.FILTER UP-STREAM TEMP SENSOR VOLTAGE	V	• Exhaust gas temperature sensor 2 voltage is displayed.	
LAST SUCCE REGE	Km	• Km since last successful regeneration is displayed. The kilometer after the DPF last successful regeneration is displayed.	
EGR valve first offset	%	—	
Last egr valve offset	%	—	
POSI EGR V CLOSE	%	—	
PRESS UPST TURB	mbar	• The exhaust gas pressure (determined by the signal voltage of the exhaust gas pressure sensor 1) is displayed.	
FUEL TEMP	°C or °F	• Fuel temperature is displayed. The fuel temperature (determined by the signal voltage of the fuel temperature sensor) is displayed.	
R/PRS REG CRR	mA	—	

MONITORED ITEM	UNIT	DESCRIPTION	REMARKS
RAIL PRESSURE	V	• Fuel rail pressure sensor voltage is displayed.	
FU FW CR CYL1	—	—	
FU FW CR CYL2	—	—	
FU FW CR CYL3	—	—	
FU FW CR CYL4	—	—	
PL PTNMR T1 V	V	• Accelerator pedal position sensor (sensor 1) voltage is displayed.	
PL PTNMR T2 V	V	• Accelerator pedal position sensor (sensor 2) voltage is displayed.	
ACCEL/PDL POS	%	• Accelerator pedal position is displayed.	
PARAMETRE PRIVE 1	—	—	
PARAMETRE PRIVE 2	—	—	
GAL/PRS LOP D	bar	• The fuel rail pressure (determined by the signal voltage of the fuel rail pressure sensor) is displayed.	
EGR POSI VOL	V	• EGR volume control valve control position sensor voltage is displayed.	
DPF PRESS SEN VOL	V	• Exhaust gas pressure sensor 2 voltage is displayed.	
RV/LV BUTTON VOLTAGE	V	• ASCD steering switch voltage is displayed.	
DURATION OF RESUME BUTTON PRESS	s	• Duration of resume button press is displayed.	
DURATION OF + BUTTON PRESS	s	• Duration of SET/+ button press is displayed.	
DURATION OF - BUTTON PRESS	s	• Duration of SET/- button press is displayed.	
DURATION OF SUSPEND BUTTON PRESS	s	• Duration of suspend button press is displayed.	
NUMBER OF ABNORMAL CC/SL TRANSITIONS	—	—	
Cruise control setting	km/h	• ASCD control setting is displayed.	
FUEL FLOW	mg/cp	• Total fuel flow is displayed.	
MILEAGE	Km	• The kilometer is displayed.	
SEN 1 FEED V	V	• Sensors power supply voltage is displayed.	Related DTC:refer to EC-974, "DTC Logic".
SEN 2 FEED V	V	• Sensors power supply voltage is displayed.	Related DTC:refer to EC-975, "DTC Logic".
SEN SUPPLY N-3 VOL	V	• Sensors power supply voltage is displayed.	Related DTC:refer to EC-978, "DTC Logic".
VEHICLE SPEED DISPLAYED	km/h	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BOOST PRESSUR	mbar	• The boost pressure (determined by the signal voltage of the turbocharger boost sensor) is displayed.	

MONITORED ITEM	UNIT	DESCRIPTION	REMARKS
TURBOCHARGING SOLENOID VALVE OCR	%	• Turbocharger boost control solenoid valve open is displayed.	
IN AIR TEMP VOL	V	• Intake air temperature sensor voltage is displayed.	
B/PRS SEN VLT	V	• Turbocharger boost sensor voltage is displayed.	
FUEL TEMPERAT	V	• Fuel temperature sensor voltage is displayed.	
ATMOSPHERIC P	V	• Atmospheric pressure sensor voltage is displayed.	
GLOW PLUG CONT	%	• Glow plug control PWM command is displayed.	
THROTTLE POSI	%	• Throttle position is displayed.	
SET FUEL FLOW SV	mA	—	
EGR/V OPN REF	%	• EGR volume control valve opening reference is displayed.	
EGR VALVE CONT	%	• EGR volume control valve PWM command is displayed.	
DMP V SET POS	%	• Throttle position is displayed.	
GAL PRS REG/V	%	• High pressure supply pump PWM command is displayed.	
EST. AIR FLOW	mg/cp	• Estimated air flow is displayed	
COOLANT TEMPE	V	• Coolant temperature sensor voltage is displayed.	
TURB PRE SEN VOL	V	• Exhaust gas pressure sensor 1 voltage is displayed.	
TBN UPS TP SE	V	• Exhaust gas temperature sensor 1 voltage is displayed.	
ALTERNATOR LO	%	• Alternator load is displayed.	
INLET AIR/FLW	mg/cp	• The inlet air flow (determined by the signal voltage of the mass air flow sensor) is displayed.	
FAULT 1ST OCCURR	Km	—	
NUMBER OF OCCURRENCES OF FAULT	—	—	
RAIL FLOW RE V OC	%	• High pressure supply pump (Volumetric control valve) opening is displayed.	
IN/FLAP CTRL	%	• Inlet throttle PWM command is displayed.	
CON VOL DIAG IN FL	V	—	
DPF PRESS OFFSET	mbar	• Diesel particle filter pressure offset is displayed.	
THRO POS SEN VOL	V	• Throttle position sensor voltage is displayed.	
AVE PERI FLOW SIG	µs	• Average period of mass air flow sensor signal is displayed.	
IN AIR TEMP	°C or °F	• The Intake air temperature (determined by the signal voltage of the Intake air temperature sensor) is displayed.	
THRO CON SEN VOL	V	• Throttle position sensor power supply voltage is displayed.	
PREHEATING MODE	%	—	
EGR COOL BYPASS	%	• EGR cooler bypass valve control solenoid valve PWM command is displayed.	
DMP V SET POS	%	—	
CRAN SYN LOSS CO	—	• Counter of loose of crankshaft synchronization is displayed.	
EGR POSITION	%	• EGR volume control valve position is displayed.	
FINAL INDICATED	Nm	—	

MONITORED ITEM	UNIT	DESCRIPTION	REMARKS
EGR/V CONT VOL	mV	• EGR volume control valve control position sensor voltage is displayed.	
INJECTION QUANT	mg/cp	• Injection quantity of injector is displayed.	
ERR DET MONI INJ	—	—	
STAT ADAPT CYL 1	—	—	
STAT ADAPT CYL 2	—	—	
STAT ADAPT CYL 3	—	—	
STAT ADAPT CYL 4	—	—	
TURB TEMP SET	°C or °F	• Exhaust gas temperature set point is displayed.	
VALUE OF ROM FAIL	—	—	
PIEZO GAP CYL 1	—	—	
PIEZO GAP CYL 2	—	—	
PIEZO GAP CYL 3	—	—	
PIEZO GAP CYL 4	—	—	
MEMORIZ CARRIER 1	—	—	
MEMORIZ PRINCIPAL	—	—	
RFRGERNT PRSS	bar	• Refrigerant pressure is displayed.	
SUCC REGE COUNT	—	• Successful DPF regeneration counter is displayed.	
ENG OIL DILU RATIO	%	• Engine oil dilution ratio is displayed.	

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
TURBOCHARGING SOLENOID VALVE	• Ignition switch: ON • Turn turbocharger boost control solenoid valve ON and OFF with the CONSULT-III and listen to operation sound.	Turbocharger boost control solenoid valve makes an operating sound.	• Harness and connector • Turbocharger boost control solenoid valve
AIR INLET FLAP	• Ignition switch: ON • Turn throttle control motor ON and OFF with the CONSULT-III and confirm the operation.	Throttle valve is operated.	• Harness and connector • Electric throttle control actuator
COMMANDE PRIVEE 1	—	—	—
THERMOPLNGER 3 RLY	—	—	—
EGR VALVE	—	—	—
PREHEATER RLY	—	—	—
THERMOPLNGR RLY N1	—	—	—
THERMOPLNGR RLY N2	—	—	—
EGR BYPASS	• Ignition switch: ON • Turn EGR cooler bypass valve control solenoid valve ON and OFF with the CONSULT-III and listen to operation sound.	EGR cooler bypass valve control solenoid valve makes an operating sound.	• Harness and connector • EGR cooler bypass valve control solenoid valve

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
DPF INJECTOR	• Ignition switch: ON • Turn exhaust fuel injector ON and OFF with the CONSULT-III and listen to operation sound.	Exhaust fuel injector makes an operating sound.	• Harness and connector • Exhaust fuel injector
DPF INJECTOR SOLENOID VALVE	• Ignition switch: ON • Turn fuel cut off valve ON and OFF with the CONSULT-III and listen to operation sound.	Fuel cut off valve makes an operating sound.	• Harness and connector • Fuel cut off valve
INJECTION SOL/V OPENING PF	—	—	—
INJECTION SOL/V CLOSING PF	—	—	—
FAULT MEMORY	—	—	—
ENGINE ADAPTIVES	—	—	—
PRESSURE REGULATION ADAPTIVES	—	—	—
EGR VALVE PROGRAMMING	—	—	—
ADAPT AFTER RPLC CABIN FILTER	—	—	—
AIR PATH PROGRAMMING	—	—	—
AVERAGE AIR TEMPERATURE	—	—	—
DPF RELATIVE PRESSURE SENSOR	—	—	—
EXHAUST FUEL INJECTOR CIRCUIT	—	—	—
AIR DAMPER VALVE PROGRAMMING	—	—	—
INJECTOR ADAPTIVES	—	—	—
CRS CONT/SPD LMT PRGRM	—	—	—
E/O CRS CONT/SPD LMT PRGRM	—	—	—
ADAPT AFTER REGENERATING PF	—	—	—
INJECTOR ADAPTIVES	—	—	—
INJECTOR ADAPTIVES NO. 1	—	—	—
INJECTOR ADAPTIVES NO. 2	—	—	—
INJECTOR ADAPTIVES NO. 3	—	—	—
INJECTOR ADAPTIVES NO. 4	—	—	—
FUEL SPLY PREV	—	—	—

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
STP FUEL SPLY PREV	—	—	—
CABIN FILTER RE-GENERATION	—	—	—

WORK SUPPORT MODE

Work Item

WORK ITEM	DESCRIPTION	USAGE
SERVC REGENERATION	• In this mode, service regeneration is performed.	• When ECM is replaced.* • ECM enter fail-safe mode because the amount of particulate matter in DPF reaches the specified level. • Component Inspection for DPF is performed.
ENTER INJECTOR CODES	• In this mode, fuel injector adjustment value is registered.	When ECM or fuel injector(s) is replaced.
AFTER DPF REPLACEMENT	• In this mode, estimated PM amount in DPF is cleared.	When DPF is replaced.
AFTER DPF REGENERATION	• In this mode, estimated PM amount in DPF is cleared.	When DPF is regenerated.
VIN REGISTRATION	• In this mode, VIN is registered in ECM.	When registering VIN in ECM.
SAVE DATA FOR CPU REPLACE	• In this mode, save data that is in ECM.	When ECM is replaced.*
WRT DATA AFTR REPLC CPU	• In this mode, write data stored by “SAVE DATA FOR CPU REPLACE” in work support mode to ECM.	When ECM is replaced.*

*: The necessary operation is different depending on the operation result of ECM data save or write. Always perform the operation according to procedures. Refer to EC-879, "Work Procedure".

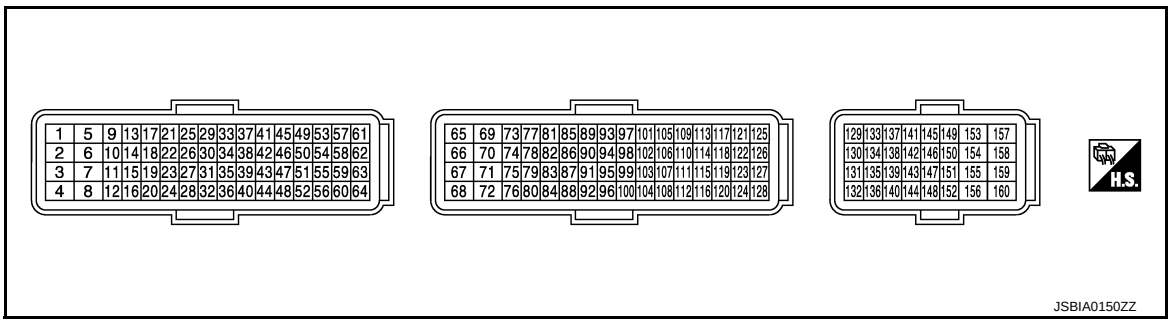
ECU DIAGNOSIS INFORMATION

ECM

Reference Value

INFOID:0000000006496529

TERMINAL LAYOUT

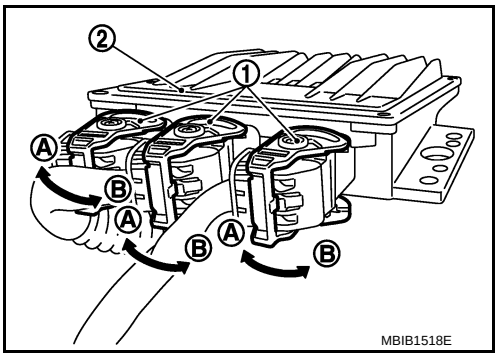


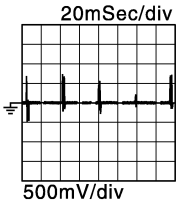
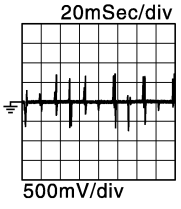
PHYSICAL VALUES

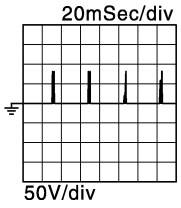
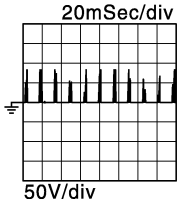
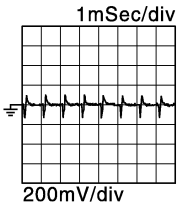
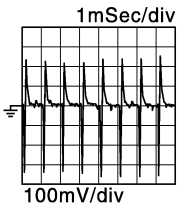
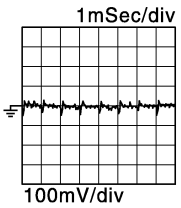
NOTE:
- ECM is located in the engine room left side near battery.
- When disconnecting ECM harness connector (1), loosen (B) it with levers as far as they will go as shown in the figure.

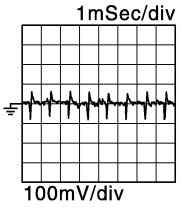
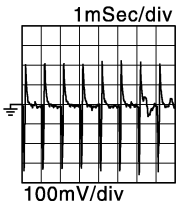
2	: ECM
A	: Fasten

- Pulse signal is measured by CONSULT-III.

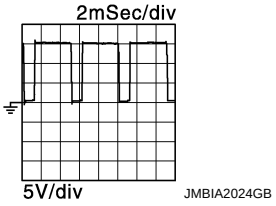
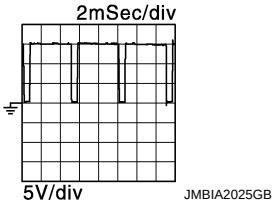
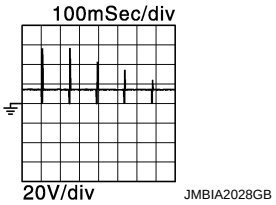


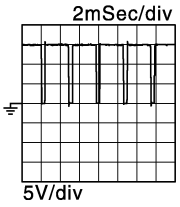
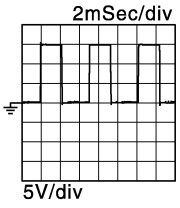
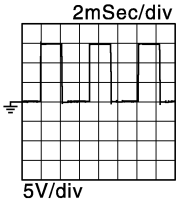
Terminal No.		Description		Condition	Value (Approx.)
+	-–	Signal name	Input/ Output		
1 (L)	160 (B/R)	Fuel injector No. 4	Output	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	 JSBIA0124GB
2 (G)		Fuel injector No. 3			
3 (P)		Fuel injector No. 2		**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	 JSBIA0125GB
4 (L)		Fuel injector No. 1			

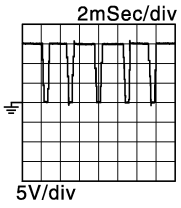
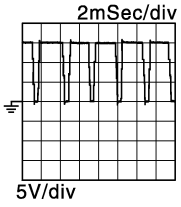
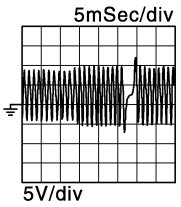
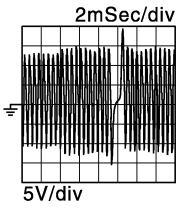
Terminal No. +	Terminal No. –	Description Signal name	Description Input/ Output	Condition	Value (Approx.)
5 (V)	160 (B/R)	Fuel injector power supply No. 4	Output	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	 JSBIA0126GB
6 (R)		Fuel injector power supply No. 3			
7 (O)		Fuel injector power supply No. 2		**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	 JSBIA0127GB
8 (P)		Fuel injector power supply No. 1			
9 (W)	160 (B/R)	Throttle control motor (–)	—	**[Engine is running]** • **Warm-up condition** • Idle speed	0 V
10 (SB)	160 (B/R)	Throttle control motor (+)	Output	**[Engine is running]** • **Warm-up condition** • Idle speed	 JSBIA0128GB
				[Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 V
13 (W)	160 (B/R)	EGR volume control valve (DC motor +)	Output	**[Engine is running]** • **Warm-up condition** • Idle speed	 JSBIA0129GB
				[Engine is running] • **Warm-up condition** • Depress the accelerator for asecond and then release it.	 JSBIA0130GB

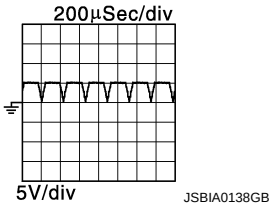
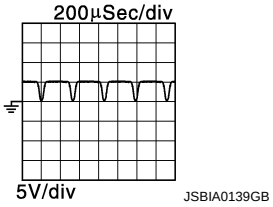
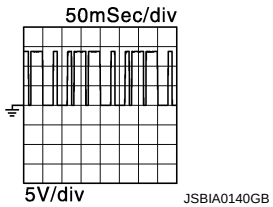
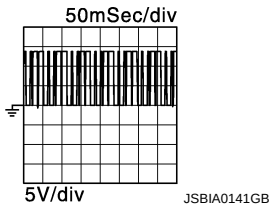
Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
14 (B)	13 (W)	EGR volume control valve (DC motor –)	Output	**[Engine is running]** • **Warm-up condition** • Engine speed: Idle	 JSBIA0131GB
				[Engine is running] • **Warm-up condition** • Depress the accelerator for asecond and then release it.	 JSBIA0132GB
16 (L)	19 (GR)	Sensor power supply (Throttle position sensor)	—	**[Ignition switch: ON]**	5 V
19 (GR)	—	Sensor ground (Throttle position sensor)	—	—	—
20 (O)	31 (B)	Sensor power supply (Exhaust gas pressure sensor 2)	—	**[Ignition switch: ON]**	5 V
23 (B)	—	Sensor ground (Exhaust gas pressure sensor 1)	—	—	—
27 (B)	—	Sensor ground (Fuel rail pressure sensor)	—	—	—
31 (B)	—	Sensor ground (Exhaust gas pressure sensor 2)	—	—	—
32 (R)	59 (B)	Sensor power supply (EGR volume control valve control position sensor)	—	**[Ignition switch: ON]**	5 V
35 (BR)	—	Sensor ground (Refrigerant pressure sensor)	—	—	—
37 (Y)	19 (GR)	Throttle position sensor	Input	**[Engine is running]** • **Warm-up condition** • Engine speed: Idle	5 V
				[Ignition switch: OFF] • For approx. 20 seconds after turning ignition switch OFF.	0.5 - 5 V Output voltage fluctuates between 0.5 V and 5 V.
				[Ignition switch: OFF] • More than approx. 20 seconds after turning ignition switch OFF.	0 V

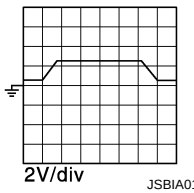
Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
38 (L)	59 (B)	EGR volume control valve (EGR volume control valve control position sensor)	Input	**[Engine is running]** • **Warm-up condition** • Idle speed (Less than 60 seconds idle time)	4.0 V
				[Engine is running] • **Warm-up condition** • Idle speed (More than 60 seconds idle time)	3.4 V
40 (W)	35 (BR)	Sensor power supply (Refrigerant pressure sensor)	—	**[Ignition switch: ON]**	5 V
42 (G)	23 (B)	Exhaust gas pressure sensor 1	Input	**[Engine is running]** • **Warm-up condition** • Idle speed	1.0 V
46 (GR)	35 (BR)	Refrigerant pressure sensor	Input	**[Engine is running]** • **Warm-up condition** • Both A/C switch and blower fan switch: ON (Compressor operates)	1.5 V
47 (G)	—	Sensor ground (Turbocharger boost sensor)	—	—	—
48 (R)	23 (B)	Sensor power supply (Exhaust gas pressure sensor 1)	—	**[Ignition switch: ON]**	5 V
49 (O)	47 (G)	Turbocharger boost sensor	Input	**[Engine is running]** • **Warm-up condition** • Idle speed	1.6 V
				[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	2.0 V
52 (V)	47 (G)	Sensor power supply (Turbocharger boost sensor)	—	**[Ignition switch: ON]**	5 V
53 (LG)	31 (B)	Exhaust gas pressure sensor 2	Input	**[Engine is running]** • **Warm-up condition** • Idle speed	0.5 V
				[Engine is running] • **Warm-up condition** • Engine speed: 2000rpm	0.6 V
54 (R)	27 (B)	Fuel rail pressure sensor	Input	**[Engine is running]** • **Warm-up condition** • Idle speed	1.0 V
				[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	1.4 V
56 (L)	27 (B)	Sensor power supply (Fuel rail pressure sensor)	—	**[Ignition switch: ON]**	5 V
59 (B)	—	Sensor ground (EGR volume control valve control position sensor)	—	—	—
63 (Y)	—	Sensor ground (Exhaust gas temperature sensor 1)	—	—	—

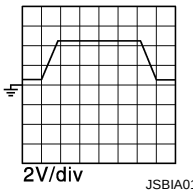
Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
64 (G)	63 (Y)	Exhaust gas temperature sensor 1	Input	**[Engine is running]** • **Warm-up condition** • Idle speed	0.410 – 4.990 V Output voltage varies with exhaust gas temperature.
65 (R)	160 (B/R)	High pressure supply pump (Volumetric control valve)	Output	**[Engine is running]** • Idle speed	
				[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	
66 (BR)	160 (B/R)	Fuel cutoff valve	Output	Diesel particulate filter regeneration mode	0 V
				Diesel particulate filter No regeneration mode	11 – 14 V
67 (LHD: V) (RHD: G) 68 (G) 153 (V)	160 (B/R)	Power supply for ECM	Input	**[Ignition switch: OFF]**	0 V
				[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
73 (R)	125 (G)	Intake air temperature sensor	Input	**[Engine is running]** • **Warm-up condition**	0.13 – 4.70 V Output voltage varies with intake air temperature.
75 (GR)	—	Sensor ground (Exhaust gas temperature sensor 2)	—	—	—
76 (R)	160 (B/R)	Sensor power supply (Camshaft position sensor)	—	[Ignition switch: ON]	5 V
77 (P)	87 (B)	Engine coolant temperature sensor	Input	**[Engine is running]** • **Warm-up condition**	0.142 – 4.951 V Output voltage varies with engine coolant temperature.
82 (P)	95 (G)	Fuel temperature sensor	Input	**[Engine is running]** • **Warm-up condition**	0.17 – 4.84 V Output voltage varies with fuel pump temperature.
85 (O)	160 (B/R)	Exhaust fuel injector	Output	Diesel particulate filter regeneration mode	
				Diesel particulate filter No regeneration mode	14 V

Terminal No. +	Terminal No. –	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
86 (O)	160 (B/R)	EGR cooler bypass control solenoid valve	Output	**[Engine is running]** • **Not warm-up condition** • Idle speed	0.1 V
				[Engine is running] • **Warm-up condition** • Idle speed	BATTERY VOLTAGE (11 - 14 V)
87 (B)	—	Sensor ground (Engine coolant temperature sensor)	—	—	—
88 (GR)	75 (GR)	Exhaust gas temperature sensor 2	Input	**[Engine is running]** • **Warm-up condition** • Idle speed	 JSBIA0133GB
89 (R)	160 (B/R)	Turbocharger boost control solenoid valve	Output	**[Ignition switch: ON]** • **Warm-up condition** • Idle speed	 JSBIA0134GB
				[Ignition switch: ON] • **Warm-up condition** • Engine speed: 2,000 rpm	 JSBIA0135GB
93 (SB)	160 (B/R)	Thermoplunger control unit (Heater 1 drive)	Output	Diesel particulate filter regeneration mode	0 V
				Diesel particulate filter No regeneration mode	14 V
95 (G)	—	Sensor ground (Fuel temperature sensor)	—	—	—
99 (L)	—	Sensor ground (Camshaft position sensor)	—	—	—

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
100 (G)	160 (B/R)	High pressure supply pump (Pressure control valve)	Output	**[Engine is running]** • Idle speed	 JSBIA0136GB
				[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	 JSBIA0137GB
104 (O)	160 (B/R)	Thermoplunger control unit (Heater PWM signal)	Output	Diesel particulate filter regeneration mode	0 V
				Diesel particulate filter No regeneration mode	14 V
105 (BR)	160 (B/R)	ECM relay (self shut-off)	Output	**[Ignition switch: ON]** **[Ignition switch: OFF]** • For a few seconds after turning ignition switch OFF	0.8 V
				[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
108 (R)	160 (B/R)	Thermoplunger control unit (Heater 2 drive)	Output	Diesel particulate filter regeneration mode	0 V
				Diesel particulate filter No regeneration mode	14 V
110 (R)	160 (B/R)	Glow relay	Output	**[Ignition sw OFF goes to ON]** • Glow ON	0 – 1 V
				• Glow OFF	11 – 14 V
113 (R)	160 (B/R)	Crankshaft position sensor	Input	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	 JMBIA2033GB
				[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	 JMBIA2034GB
114 (B)	—	Sensor ground (Crankshaft position sensor)	—	—	—

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
118 (Y)	125 (G)	Mass air flow sensor	Input	**[Engine is running]** • **Warm-up condition** • Idle speed	 JSBIA0138GB
				[Engine is running] • **Warm-up condition** • Engine speed: 2,500 rpm	 JSBIA0139GB
120 (Y)	160 (B/R)	Thermoplunger control unit (Heater feedback 2)	Input	Diesel particulate filter regeneration mode	0 – 1 V
				Diesel particulate filter No regeneration mode	14 V
122 (G)	160 (B/R)	Glow relay	Input	**[Ignition sw OFF goes to ON]** • Glow ON	0 – 1 V
				• Glow OFF	11 – 14 V
123 (LG)	160 (B/R)	Thermoplunger control unit (Heater feedback 1)	Input	Diesel particulate filter regeneration mode	0 – 1 V
				Diesel particulate filter No regeneration mode	14 V
125 (G)	—	Sensor ground (Mass air flow sensor/ Intake air temperature sensor)	—	—	—
126 (Y)	160 (B/R)	Camshaft position sensor	Input	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	 JSBIA0140GB
				[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	 JSBIA0141GB
130 (BR)	160 (B/R)	ASCD main switch	Input	**[Ignition switch: ON]** • ASCD main switch: ON	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON] • ASCD main switch: OFF	0 V
131 (P)	—	CAN communication line (low)	Input/ Output	—	—
132 (L)	—	CAN communication line (high)	Input/ Output	—	—

Terminal No.		Description		Condition	Value (Approx.)
+	-–	Signal name	Input/ Output		
136 (W)	—	Data link connector	Input/ Output	—	—
139 (R)	160 (B/R)	Speed limiter main switch	Input	**[Ignition switch: ON]** • Speed limiter main switch: ON	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON] • Speed limiter main switch: OFF	0 V
140 (GR)	160 (B/R)	Clutch pedal position switch	Input	**[Ignition switch: ON]** • Clutch pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON] • Clutch pedal: Fully released	0 V
141 (SB)	160 (B/R)	Ignition switch	Input	**[Ignition switch: OFF]**	BATTERY VOLTAGE. (11 – 14 V)
142 (Y)	143 (B)	ASCD steering switch	Input	**[Ignition switch: ON]** • ASCD steering switch: OFF	5 V
				[Ignition switch: ON] • RESUME switch: Pressed	2.2 V
				[Ignition switch: ON] • SET/+: Pressed	1.1 V
				[Ignition switch: ON] • SET/–: Pressed	0.5 V
				[Ignition switch: ON] • CANCEL switch: Pressed	0 V
143 (B)	—	ASCD steering switch ground	—	—	—
148 (O)	160 (B/R)	ASCD brake switch	Input	**[Ignition switch: ON]** • Brake pedal: Slightly depressed	0 V
				[Ignition switch: ON] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)
150 (V)	152 (G)	Sensor power supply (Accelerator pedal position sensor 2)	—	**[Ignition switch: ON]**	5 V
151 (LG)	152 (G)	Accelerator pedal position sensor 2	Input	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.40 V (Fully released) 2.25 V (Fully depressed)  JSBIA0142GB
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	
152 (G)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
154 (R)	159 (B)	Sensor power supply (Accelerator pedal position sensor 1)	—	**[Ignition switch: ON]**	5 V

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
155 (B/R) 156 (B/R) 157 (B/R)	—	ECM ground	—	—	—
158 (W)	159 (B)	Accelerator pedal position sensor 1	Input	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released **[Ignition switch ON]** • Engine stopped • Accelerator pedal: Fully depressed	0.77 V (Fully released) 4.44 V (Fully depressed)  JSBIA0143GB
159 (B)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—
160 (B/R)	—	ECM ground	—	—	—

DTC Index

INFOID:0000000006496530

X: Applicable —: Not applicable

DTC*	Items (CONSULT-III screen item)	Trip	MI lighting up		Reference page
			Yellow	Red	
P0001	FUEL SYSTEM	3	× or –	×	EC-888
P0002	FUEL SYSTEM	3	×	× or –	EC-890
P0016	COHERENCE CMSFT/SN	3	–	×	EC-892
P0045	TURBO ACT CIRC	3	–	×	EC-893
P0087	LOW FUEL PRESS	3	–	×	EC-895
P0089	RAIL PRESS REGULTN	1 or 3	×	× or –	EC-897
P0090	FUEL SYSTEM	3	× or –	×	EC-899
P0100	AIR FLOW SEN CIRC	3	×	×	EC-901
P0101	AIR FLOW SEN CIRC	3	–	×	EC-903
P0110	IN-AIR TMP SEN CIR	3	×	×	EC-905
P0115	WATER TMP SEN	3	×	×	EC-907
P0120	TP SEN CIRC	3	×	×	EC-909
P012A	TURBO PRES SEN CIR	1 or 3	–	×	EC-911
P012B	TC BOOST SENSOR	1 or 3	–	×	EC-913
P0180	FUEL TEMP SEN CIRC	3	–	×	EC-915
P0190	RAIL/PRESS SEN CIR	3	×	×	EC-917
P0200	INJECTOR CTRL CIRC	3	×	×	EC-919
P0201	CYL 1 INJ CTRL CIR	3	×	× or –	EC-921
P0202	CYL 2 INJ CTRL CIR	3	×	× or –	EC-921
P0203	CYL 3 INJ CTRL CIR	3	×	× or –	EC-921
P0204	CYL 4 INJ CTRL CIR	3	×	× or –	EC-921
P0217	ENGINE OVERHEATING	1 or 3	–	–	EC-923
P0225	PDL POTEN CIRC TK1	3	–	×	EC-925

DTC*	Items (CONSULT-III screen item)	Trip	MI lighting up		Reference page
			Yellow	Red	
P0226	BRAKE/ACCELERATOR PEDAL POSITIONS	1 or 3	–	× or –	EC-928
P0263	FUEL INJECTION CALIBRATION FOR CYLINDER No. 1	1 or 3	–	–	EC-931
P0266	FUEL INJECTION CALIBRATION FOR CYLINDER No. 2	1 or 3	–	–	EC-931
P0269	FUEL INJECTION CALIBRATION FOR CYLINDER No. 3	1 or 3	–	–	EC-931
P0272	FUEL INJECTION CALIBRATION FOR CYLINDER No. 4	1 or 3	–	–	EC-931
P0335	ENGNE SPD SEN CIRC	1	×	×	EC-932
P0340	CAMSHAFT SEN CIRC	3	–	×	EC-934
P0380	PRHT UNIT CTRL CIR	3	–	–	EC-936
P0402	EGR SYSTEM	1 or 3	×	×	EC-938
P0403	EGR VLV CMD CIRC	1 or 3	–	–	EC-940
P0409	EGR POSITN OFFSET	3	×	×	EC-942
P0470	EXH GAS PRESS SEN 1	1 or 3	–	×	EC-944
P0471	EXH GAS PRESS SEN 1	1 or 3	–	×	EC-946
P047A	EXH GAS PRESS SEN 2	1 or 3	×	×	EC-948
P047B	EXH GAS PRESS SEN 2	1 or 3	× or –	×	EC-950
P0487	EGR COMMAND CIRC	3	×	×	EC-952
P0488	EGR/V POSITN CTRL	3	×	×	EC-954
P0504	BRAKE SWITCH SIGNAL CONSISTENCY	1 or 3	–	× or –	EC-956
P0525	CRUISE CONTROL DATA MONITORING	1 or 3	–	–	EC-958
P0530	REFRGRT PRESS SEN	1	–	–	EC-960
P0544	EXGAS T/SEN BE TBN	3	–	×	EC-962
P0560	CPU SUPPLY VOLTAGE	1	× or –	× or –	EC-963
P0564	SPD LMT/CRSE CTRL FUNC	1 or 3	–	–	EC-965
P0574	VEHICLE SPEED CONSISTENCY	1 or 3	–	–	EC-966
P0575	CCS LMT BTN	1 or 3	–	–	EC-967
P0606	COMPUTER(C/U)	1 or 3	×	×	EC-968
P060A	COMPUTER(C/U)	1 or 3	×	×	EC-969
P060B	COMPUTER(C/U)	1 or 3	×	×	EC-970
P061A	ECM	1 or 3	× or –	× or –	EC-971
P062B	ECM	1 or 3	× or –	× or –	EC-972
P0638	Inlet air flap position CTRL	1 or 3	–	×	EC-973
P0641	SEN SUPPLY N-1 VOL	3	×	×	EC-974
P0651	SEN SUPPLY N-2 VOL	3	×	×	EC-975
P0657	MAIN RELAY CONTROL CIRCUIT	1 or 3	–	–	EC-976
P0697	SEN SUPPLY N-3 VOL	1 or 3	×	×	EC-978
P0833	CLUTCH SWITCH SIGNAL CONSISTENCY	1 or 3	–	–	EC-980
P1205	EXH FUEL INJECTOR	3	×	×	EC-982
P1525	CONSISTENT MULTIPLEX SIGNALS FOR CC/SL	1 or 3	–	–	EC-984
P1544	EGT SENSOR 2	3	×	×	EC-985

DTC*	Items (CONSULT-III screen item)	Trip	MI lighting up		Reference page
			Yellow	Red	
P1545	EGT SENSOR 2	1 or 3	–	×	EC-986
P160C	COMP	1 or 3	×	×	EC-987
P1632	EXH FUEL CUT/V	1 or 3	×	×	EC-988
P1641	ENG CLN HT1 RLY/C	1 or 3	–	–	EC-990
P1642	ENG CLN HT2 RLY/C	1 or 3	–	–	EC-991
P1643	ENG CL H3/4 RLY/C	1 or 3	–	–	EC-992
P1650	THERMOPLUNGER C/U	1 or 3	–	–	EC-993
P2002	DPF EFFIC BELOW TH	3	–	×	EC-995
P2080	EGT SENSOR 1	3	–	×	EC-996
P2100	ETC FUNCTION	1 or 3	–	×	EC-997
P2119	AIR INLET FLAP	1 or 3	–	×	EC-999
P2120	PDL POTEN CIRC TK2	3	–	×	EC-1000
P2226	ATMOS PRES SE CIR	3	×	×	EC-1002
P2263	T/C SYSTEM	3	–	×	EC-1003
P245A	EGR BYPASS CIRCUIT	1 or 3	–	×	EC-1006
PC415	MLTPLX TRC C/CNCTN	1 or 3	–	–	EC-1008

*: This number is prescribed by ISO 15031-6.

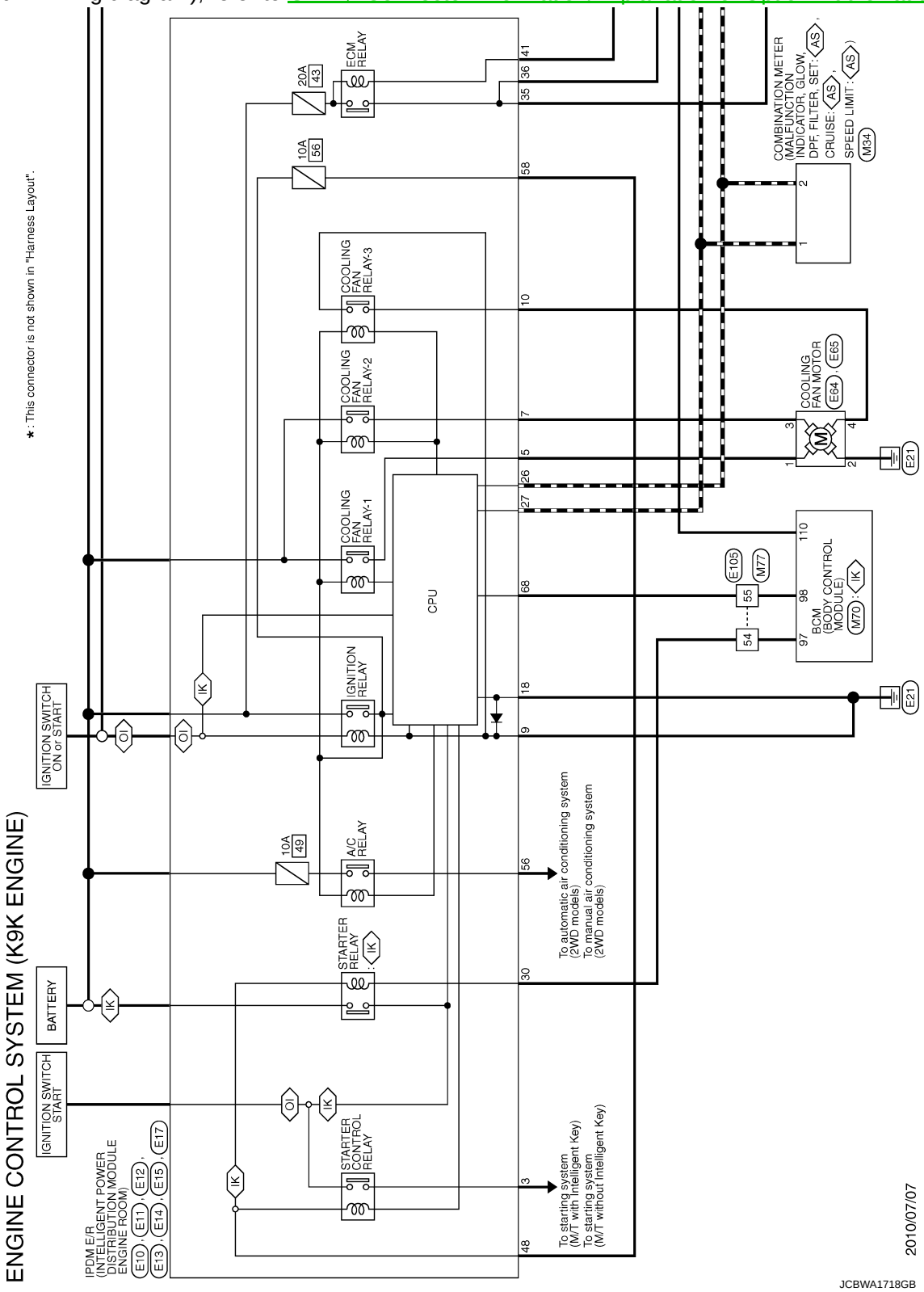
WIRING DIAGRAM

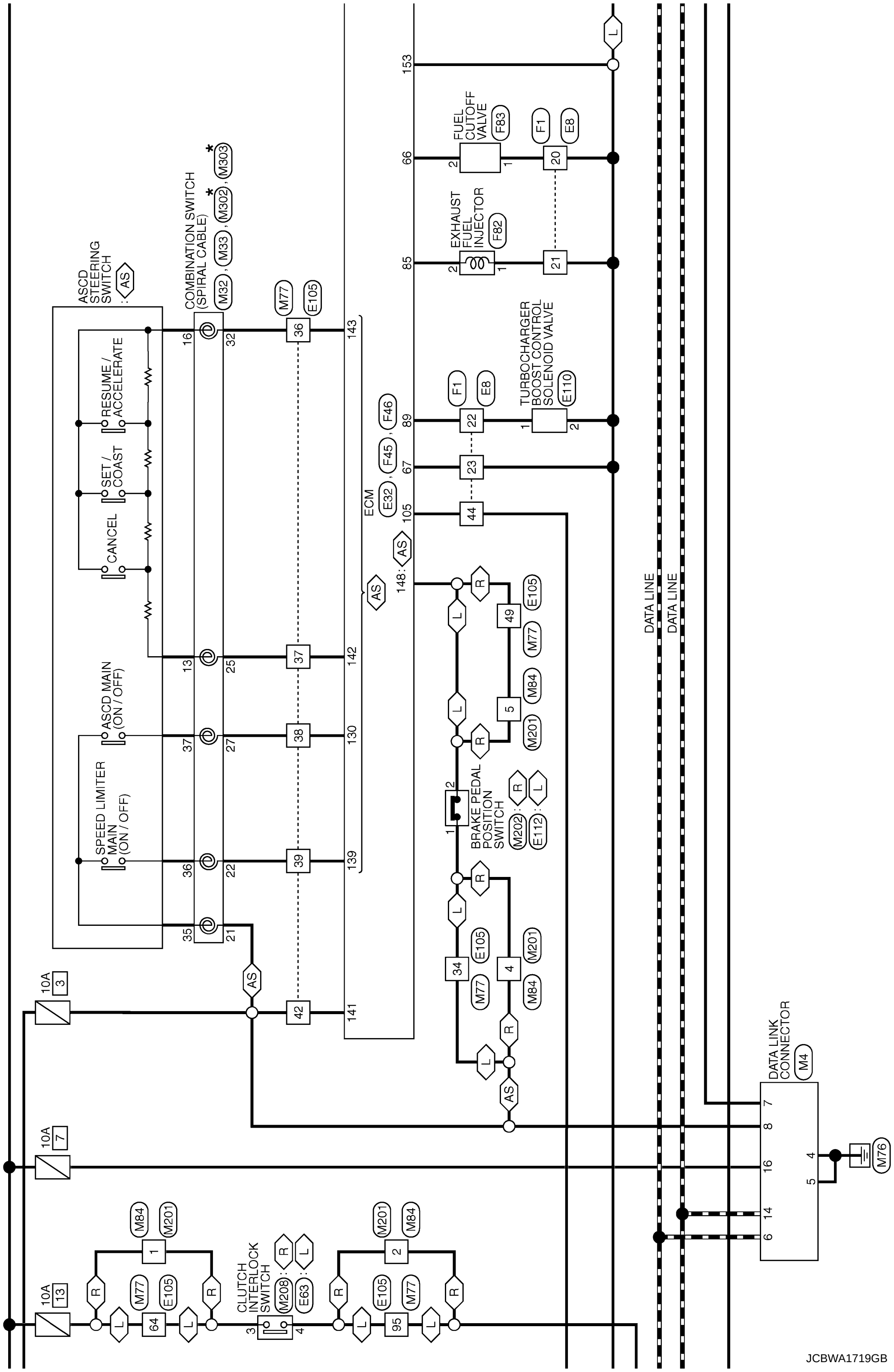
ENGINE CONTROL SYSTEM

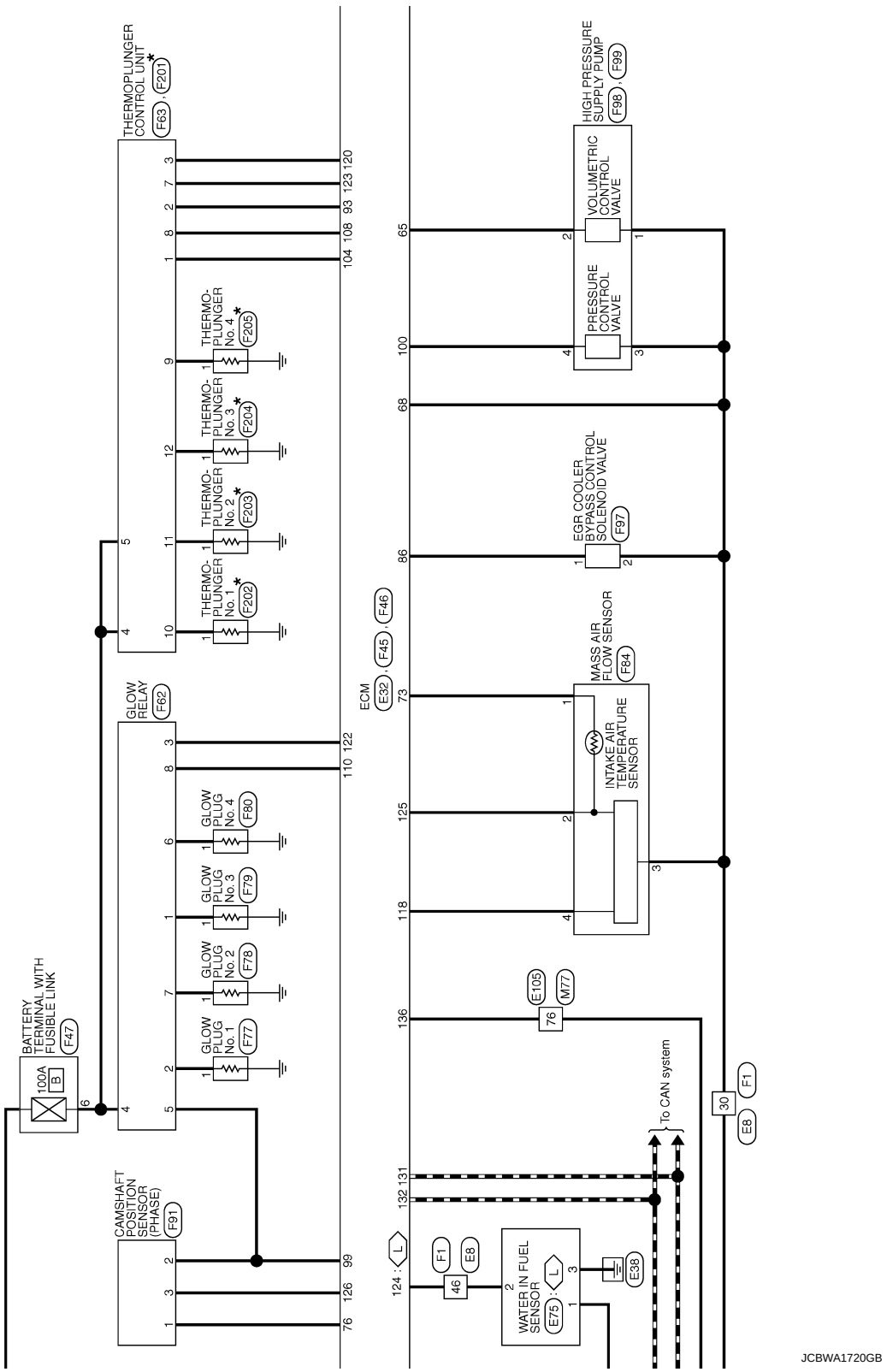
Wiring Diagram

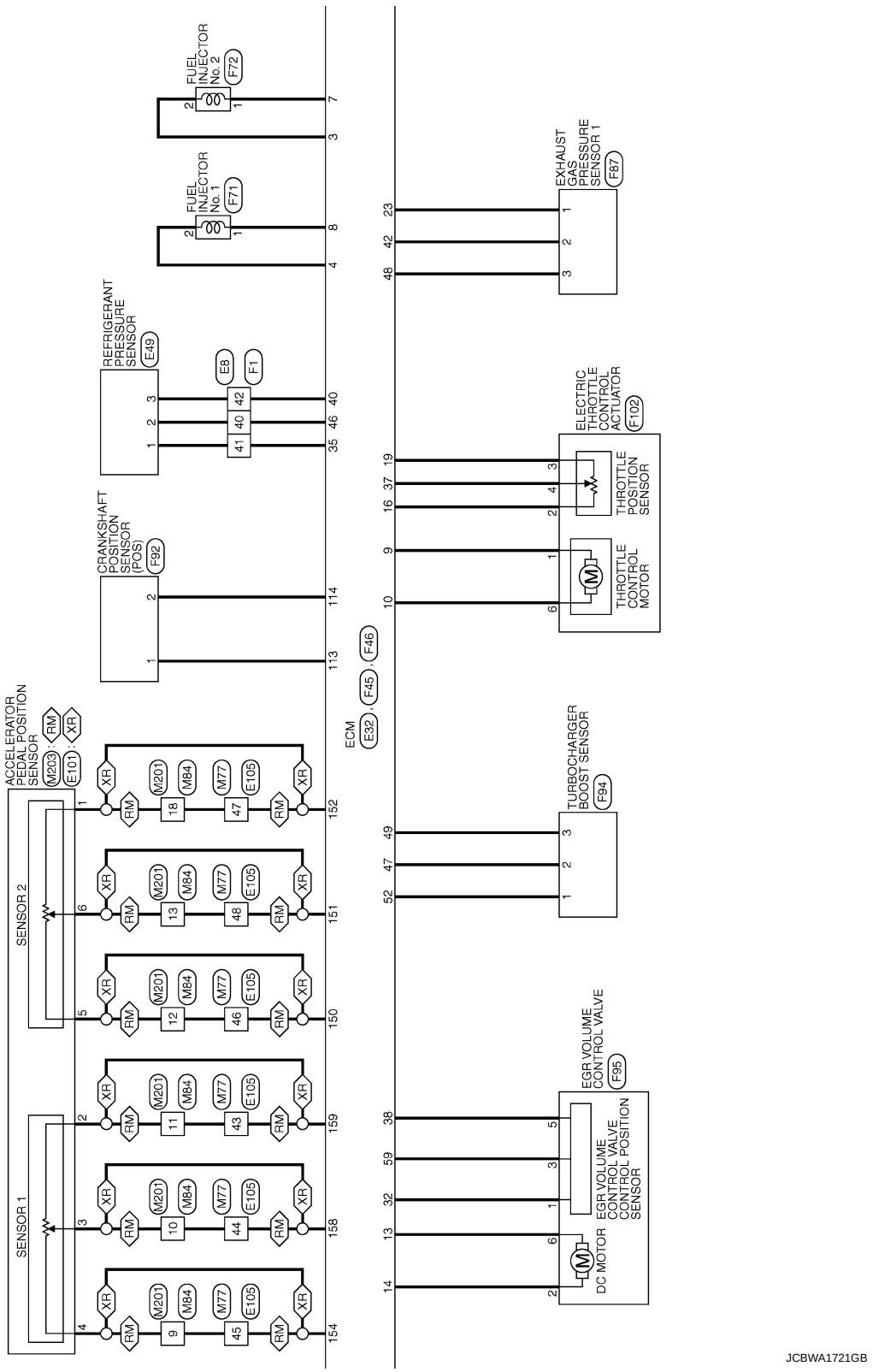
INFOID:0000000006496531

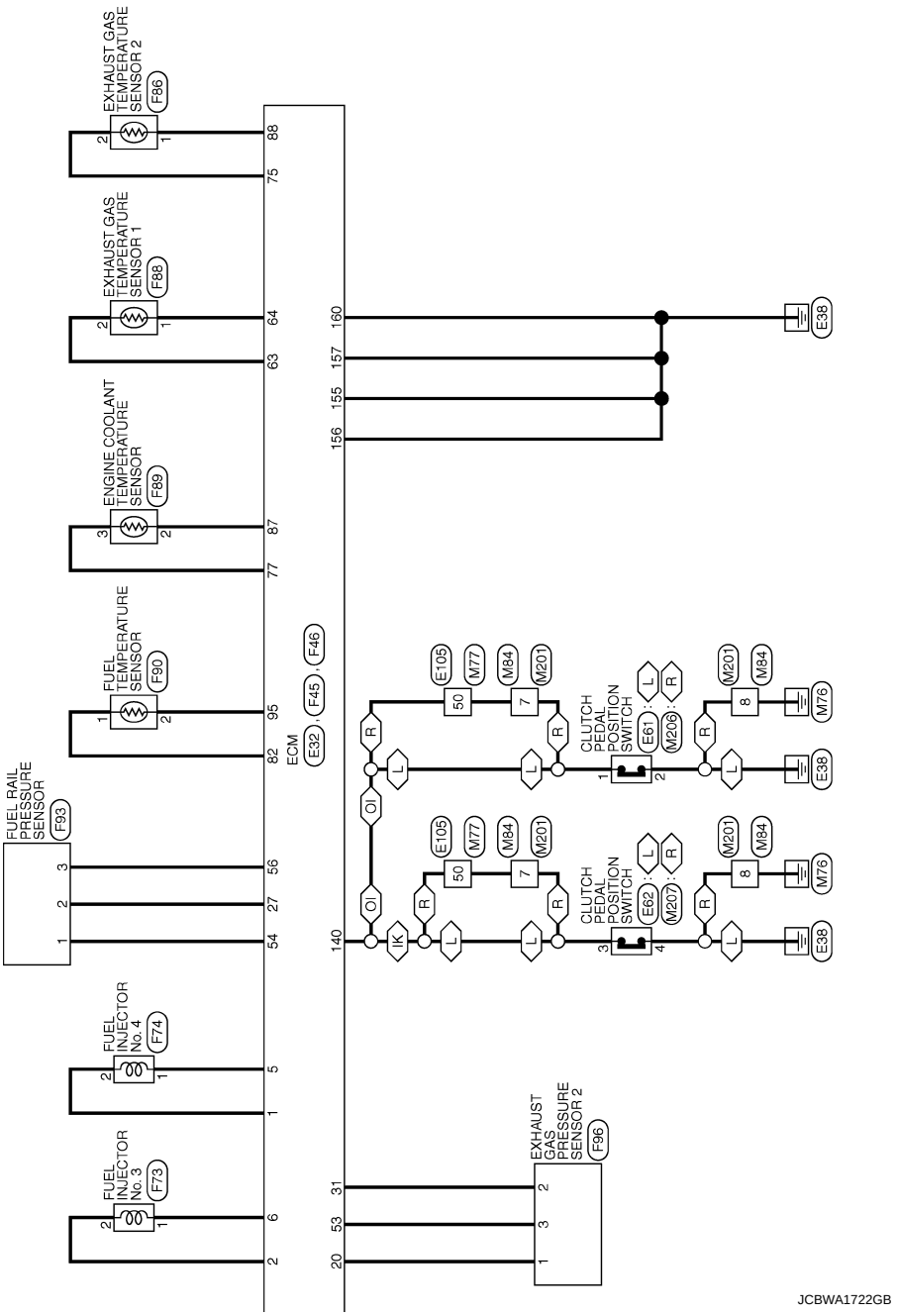
For connector terminal arrangements, harness layouts, and alphabets in a ⬡ (option abbreviation; if not described in wiring diagram), refer to GI-12, "Connector Information/Explanation of Option Abbreviation".




ASCD STEERING SWITCH
RESUME / ACCELERATE
SET / COAST
CANCEL
ASCD MAIN (ON / OFF)
SPEED LIMITER MAIN (ON / OFF)
COMBINATION SWITCH (SPIRAL CABLE)
M32, M33, M302, M303
M77
E105
ECM
E32, F45, F46
FUEL CUTOFF VALVE
F83
EXHAUST FUEL INJECTOR
F82
TURBOCHARGER BOOST CONTROL SOLENOID VALVE
E110
F1
E8
BRAKE PEDAL POSITION SWITCH
M202
E112
M84
M201
CLUTCH INTERLOCK SWITCH
M208
E63
DATA LINE
DATA LINK CONNECTOR
M4
M76
10A
JCBWA1719GB


THERMOPLUNGER CONTROL UNIT
F63
F201
THERMO-PLUNGER No. 4
F205
THERMO-PLUNGER No. 3
F204
THERMO-PLUNGER No. 2
F203
THERMO-PLUNGER No. 1
F202
GLOW RELAY
F62
GLOW PLUG No. 4
F80
GLOW PLUG No. 3
F79
GLOW PLUG No. 2
F78
GLOW PLUG No. 1
F77
BATTERY TERMINAL WITH FUSIBLE LINK
F47
100A
B
CAMSHAFT POSITION SENSOR (PHASE)
F91
ECM
E32
F45
F46
HIGH PRESSURE SUPPLY PUMP
F98
F99
VOLUMETRIC CONTROL VALVE
PRESSURE CONTROL VALVE
EGR COOLER BYPASS CONTROL SOLENOID VALVE
F97
MASS AIR FLOW SENSOR
F84
INTAKE AIR TEMPERATURE SENSOR
E105
M77
WATER IN FUEL SENSOR
E75
E38
F1
E8
46
76
30
To CAN system
JCBWA1720GB


ACCELERATOR PEDAL POSITION SENSOR
M203
E101
SENSOR 1
SENSOR 2
CRANKSHAFT POSITION SENSOR (POS)
F92
REFRIGERANT PRESSURE SENSOR
E49
FUEL INJECTOR No. 1
F71
FUEL INJECTOR No. 2
F72
ECM
E32
F45
F46
EXHAUST GAS PRESSURE SENSOR 1
F87
ELECTRIC THROTTLE CONTROL ACTUATOR
E102
THROTTLE POSITION SENSOR
THROTTLE CONTROL MOTOR
TURBOCHARGER BOOST SENSOR
F94
EGR VOLUME CONTROL VALVE
F95
DC MOTOR
EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR
JCBWA1721GB


EXHAUST GAS TEMPERATURE SENSOR 2
F86
EXHAUST GAS TEMPERATURE SENSOR 1
F88
ENGINE COOLANT TEMPERATURE SENSOR
F89
FUEL TEMPERATURE SENSOR
F90
FUEL RAIL PRESSURE SENSOR
F93
FUEL INJECTOR No. 4
F74
FUEL INJECTOR No. 3
F73
EXHAUST GAS PRESSURE SENSOR 2
F96
ECM
E32, F45, F46
CLUTCH PEDAL POSITION SWITCH
E61 : M206
E62 : M207
E38
M76
E105
M77
M84
M201
JCBWA1722GB

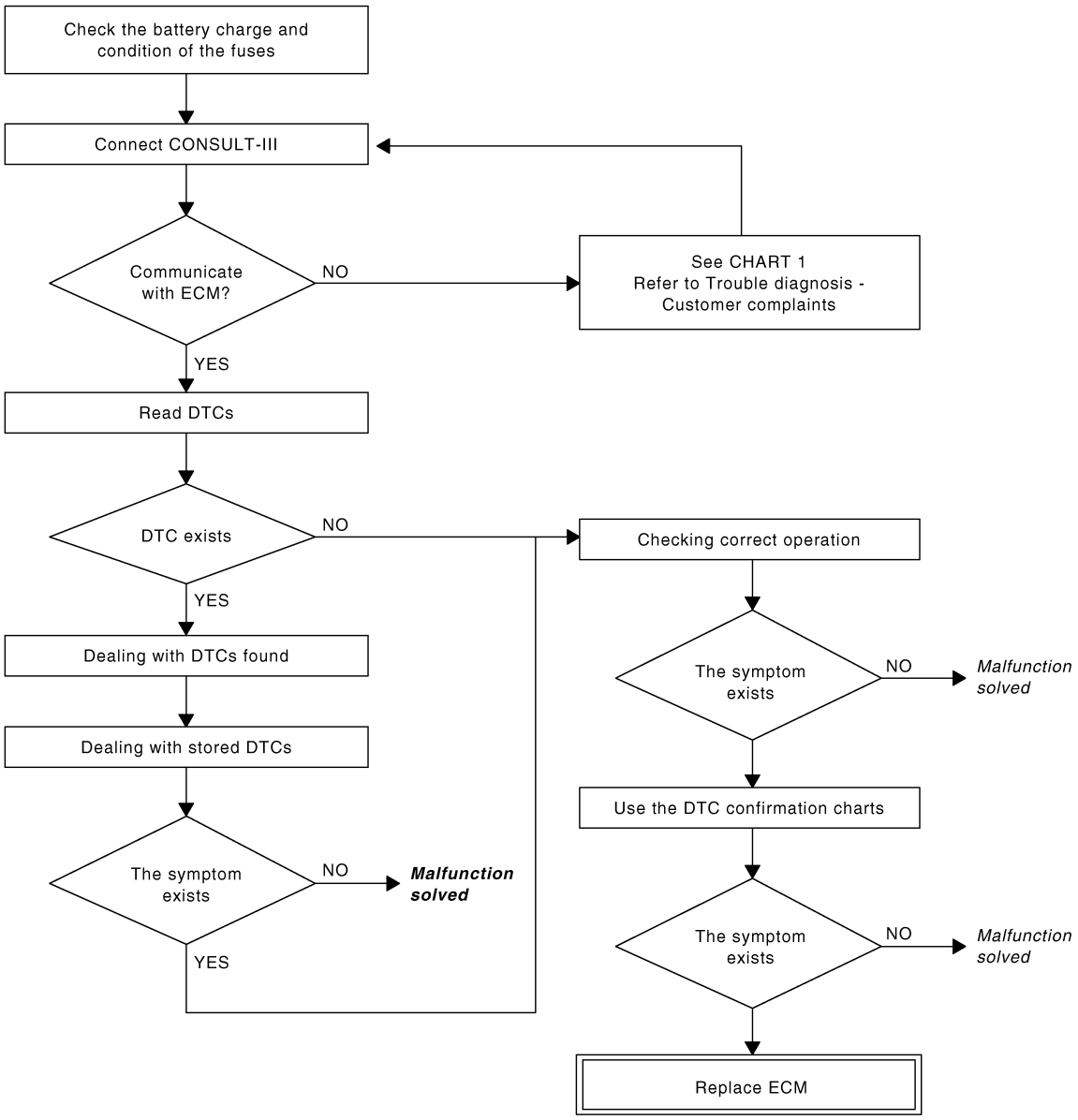
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000006496532

OVERALL SEQUENCE



JMBIA0634GB

Diagnostics Malfunctions

- Malfunctions are declared as either present or stored (depending on whether they appeared in a certain context and have disappeared since, or whether they remain present but have not been diagnosed within the current context).
- The present or stored status of malfunctions should be taken into consideration when the diagnostic tool is used following the + after ignition supply being switched on (without acting on the system components).
- For a present malfunction, apply the procedure described in the Interpretation of malfunction section.
- For a stored malfunction, note the malfunctions displayed and apply the instructions in the Notes section.
- If the malfunction is confirmed when the instructions in the Notes section are applied, the malfunction is present. Deal with the malfunction
- If the malfunction is not confirmed, check:

- the electrical lines which correspond to the malfunction,
- the connectors for these lines (for oxidation, bent pins, etc),
- the condition of the wires (insulation has melted or been cut, abrasions),
- the resistance of the component detected as malfunction.

Conformity Check

- The aim of the conformity check is to check data that does not produce a malfunction on the diagnostic tool because the data is inconsistent. Therefore, this phase is used to:

- carry out malfunction finding on malfunctions that do not have a malfunction display, and which may correspond to a customer complaint.
- check that the system is operating correctly and that there is no risk of a malfunction recurring after repairs.

- This section gives the malfunction finding procedures for statuses and parameters and the conditions for checking them.
- If a status is not behaving normally or a parameter is outside the permitted tolerance values, consult the corresponding malfunction finding page.

Customer Complaints - Malfunction finding chart

If the test with the diagnostic tool is OK but the customer complaint is still present, the malfunction should be processed by customer complaint.

NOTE:

A synopsis of the general procedure to follow is provided on the preceding page in the form of a flow chart.

Malfunction Finding Procedure (Wiring Check)

Diagnostics malfunctions

Removing the connectors and/or handling the wirings may temporarily remove the origin of a DTC. The measurements of the electrical voltages, resistance and insulation are generally correct, especially when the DTC is not present at the time of the analysis (stored DTC).

Visual Check

Look for impacts under the bonnet and in the passenger compartment.
Perform a careful check of the protections, insulation and correct running of wirings.
Look for traces of oxidation.

Tactile Check

While manipulating the wirings, use the diagnostic tool to detect a change in DTC status from “stored” to “present”.
Ensure that the connectors are correctly engaged.
Apply light stresses to the connectors.
Gently manipulate the wiring harness.
If a change of status occurs, try to isolate the origin of the incident.

Inspection of each component

Disconnect the connectors and check the appearance of the clips and blades and their crimping (no crimping on the insulating part).
Check that the clips and blades are properly engaged in the receptacles.
Ensure that there is no rebounding of clips or blades at the time of connection.
Check the contact pressure of the clips using a suitable model blade.

Resistance Control

Test the continuity of the lines in their entirety, then section by section.
Try to create a short-circuit to earth, on the + 12 V or with another wire.
If a DTC is detected, repair or replace the wiring.

REMINDERS

Trouble Diagnosis:

There are present DTCs and stored DTCs (which appeared in a certain context and have since disappeared or which are still present but have not had trouble diagnosis performed on them in the current context).
The “present” or “stored” status of DTCs must be considered when activating the diagnostic tool after power is supplied to the ECM (without activating the system components).
Deal with present DTCs according to the procedure specified in the corresponding DTC trouble diagnosis.
For stored DTCs, note the DTCs displayed and follow the instructions in the Notes section.
If the DTC is confirmed when the instructions in the Notes section are applied, the malfunction is present. Deal with the DTC.

If the DTC is not confirmed, check:
- Electrical lines which correspond to the malfunction
- Connectors for these lines (for oxidation, bent pins, etc.)
- Resistance of the malfunction component
- Condition of the wires (melted or cut insulation, wear)

Conformity Check
The conformity check is designed to check the states and data monitor items which do not display any DTCs on the diagnostic tool when inconsistent. This phase therefore allows:
- Diagnoses malfunctions that do not have a DTC display, and which may correspond to a customer complaint.
- Checks that the system is operating correctly and that there is no risk of a DTC reappearing after repairs.

This section gives the trouble diagnosis procedures for states and parameters and the conditions for checking them.
If a state is not operating normally or a data monitor value is outside permitted tolerance values, you should consult the corresponding trouble diagnosis page.

Customer Complaints - Trouble Diagnosis
If the test with the CONSULT-III is OK, but the customer complaint still present, the malfunction should be treated by customer complaints.

A synopsis of the general procedure to follow is provided on the previous page in the form of a flow chart.

SAFETY ADVICE
- The safety instructions must be followed at all times when working on components, to avoid damage or injury:
- make sure that the battery is properly charged to avoid damaging the computers with a low load,
- use the appropriate tools,
- do not touch the xenon bulbs.

Diagnostic Work Sheet

INFOID:0000000006496533

DESCRIPTION

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.
Some conditions may cause the MI to come on steady 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

Description

INFOID:0000000006496534

NOTE:
Only consult the tests after following the diagnostic procedure chart.
Some specific checks are grouped under the “tests” heading and are used as required in different diagnostic charts.

Basic test	Trouble diagnosis	Reference page
Low pressure fuel supply system check	TEST 1	EC-867, "Work Procedure (TEST 1: Low Pressure Fuel Supply System Check)"
Internal fuel transfer pump check	TEST 2	EC-868, "Work Procedure (TEST 2: Internal Fuel Transfer Pump Check)"
High pressure supply pump (Pressure control valve) check	TEST 3	EC-868, "Work Procedure [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]"
High pressure supply pump (Volumetric control valve) check	TEST 4	EC-869, "Work Procedure [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]"
Rail high pressure regulation check	TEST 5	EC-871, "Work Procedure (TEST 5: Rail High Pressure Regulation Check)"
Major leak in fuel injectors/fuel injectors open	TEST 6	EC-876, "Work Procedure (TEST 6: Fuel Injectors Leak Check)"
Incorrect fuel injection quantity	TEST 7	EC-877, "Work Procedure (TEST 7: Fuel Injection Quantity Check)"

Work Procedure (TEST 1: Low Pressure Fuel Supply System Check)

INFOID:0000000006496535

NOTE:
• **CAUSE**
- No fuel can be seen in the transparent supply pipe leading to the pump or large air bubbles can be seen (small air bubbles are permitted).
- engine does not start.

1.CHECK CONFORMITY

Check the conformity and presence of the fuel (gasoline instead of diesel, contaminated fuel).

Is the inspection result normal?

Yes >> GO TO 2.
No >> Bleed the fuel supply system with the manual priming pump.

2.CHECK FUEL CIRCUIT

Does the fuel circulate correctly when pumped manually?

Yes or No

Yes >> GO TO 5.
No >> GO TO 3.

3.CHECK FOR LEAK

Look for leaks on the unions.

Are there leaks in the hoses and unions?

Yes >> Carry out the required repairs.

No >> GO TO 4.

4.CHECK FUEL FILTER

Check the correctness of the fuel filter.

Is the fuel filter correct?

Yes >> GO TO 5.
No >> Replace the fuel filter with a genuine part.

5.INSPECTION END

Low pressure circuit OK.

>> **INSPECTION END**

Work Procedure (TEST 2: Internal Fuel Transfer Pump Check)

INFOID:0000000006496536

NOTE:
- **CONDITIONS PRIOR TO TEST**
- Test 1 Low pressure fuel supply system check has been carried out previously and results are satisfactory.
- **CAUSE**
- Fuel can be seen in the transparent supply pipe leading to the pump.
- However, fuel does not move during starting.

1.CHECK INTERNAL FUEL TRANSFER PUMP

1. Disconnect high pressure supply pump (volumetric control valve) harness connector.
2. Remove fuel return pipe from the pump and block it so that it is sealed. Connect a pipe to the pump to measure the flow of diesel.
3. To authorise a 15 second cranking engine and carry out this test it is essential to carry out the following procedure: measure the flow of diesel.

- Turn ignition switch ON.
- Perform “SAVE DATA FOR CPU REPLC” in WORK SUPPORT mode with CONSULT-III.
- Perform “PRGRM REINITIALIZE” in WORK SUPPORT mode with CONSULT-III.
- Cranking engine for at least 15 seconds (starting speed 250 rpm).
- Check the flow rate of the fuel being collected in a graduated measuring cylinder (500 ml minimum).The minimum flow rate must be 25 ml every 15 sec.
- Perform “WRT DATA AFTR REPLC CPU” in WORK SUPPORT mode with CONSULT-III.

Does the flow measure less than 25ml?

Yes >> Replace high pressure supply pump.
No >> GO TO 2.

2.INSPECTION END

Low pressure system OK.

>> **INSPECTION END**

Work Procedure [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]

INFOID:0000000006496537

NOTE:
- **CONDITIONS PRIOR TO TEST**
- The entire low pressure system must be in good condition.
- Check the sealing of the high pressure pipes and unions.
- **CAUSE**
- Rail pressure approximately 5000 kPa (50 bar, 51 kg/cm^2, 725 psi) during starting.

1.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (pressure control valve) harness connector.
3. Turn ignition switch ON.

4. Check the voltage between high pressure supply pump (pressure control valve) harness connector and ground.

High pressure supply pump (Pressure control valve)		Ground	Voltage
Connector	Terminal		
F60	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R
- Harness for open or short between IPDM E/R and high pressure supply pump (pressure control valve)
- Harness for open or short between ECM and high pressure supply pump (pressure control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between high pressure supply pump (pressure control valve) harness connector and ECM harness connector.

High pressure supply pump (Pressure control valve)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F60	4	F57	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) CHECK

Refer to EC-900, "Component Inspection".

Is the inspection result normal?

Yes >> INSPECTION END
No >> Replace high pressure supply pump.

Work Procedure [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]

INFOID:0000000006496538

NOTE:
- **CONDITIONS PRIOR TO TEST**
  - The entire low pressure system must be in good condition.
  - Check the sealing of the high pressure pipes and unions.
- **CAUSE**
  - Not enough or no rail pressure during starting.
  - Rail reference pressure during starting, minimum 15,000 kPa (150 bar, 153 kg/cm^2, 2,175 psi).

1. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)-I

Refer to EC-889, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2

NO >> Replace high pressure supply pump.

2.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)-II

- Reconnect all harness connectors disconnected.
- Turn ignition switch ON.
- Select “DATA MONITOR” mode with CONSULT-III.
- Check that the “FUEL FLOW S/V CU” indication when the cranking engine.

Is the excitation current between 0.6 - 1.0A?

YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (volumetric control valve) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between high pressure supply pump (volumetric control valve) harness connector and ground.

High pressure supply pump (volumetric control valve)		Ground	Voltage
Connector	Terminal		
F61	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R
- Harness for open or short between ECM and high pressure supply pump (volumetric control valve)
- Harness for open or short between IPDM E/R and high pressure supply pump (volumetric control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between high pressure supply pump (volumetric control valve) harness connector and ECM harness connector.

High pressure supply pump (volumetric control valve)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F61	2	F57	65	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK ENGINE CONDITION

Start engine.

Is the engine start?

YES >> GO TO 7.
NO >> GO TO 9.

7. CHECK ENGINE CONDITION

- Check that the oil level is correct and that the engine coolant temperature is normal operation temperature 60°C (140°F).
- Engine running at idle speed.
- Select “HIGH PRES CIRCUIT LEAK TEST” in “ACTIVE TEST” mode with CONSULT-III.
- Engine will perform 4 acceleration cycles.
- Select “DATA MONITOR” mode with CONSULT-III.
- Check that the “RAIL PRES SET” and “RAIL PRESSURE” indication.
- Does “RAIL PRESSURER” follow “RAIL PRES SET” at ± 5,000 kPa (50 bar, 51 kg/cm^2, 725 psi) during the phase of the 4 acceleration cycles?

NOTE:
If the rail pressure does not reach the set point there is an fuel injector leak that is too great or the pressure signal is incorrect.

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 8.

8. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Carry out TEST 5.

>> GO TO 11.

9. CHECK ENGINE CONDITION

- Check that the oil level is correct.
- Select “DATA MONITOR” mode with CONSULT-III.
- Check that the “RAIL PRES SET” and “RAIL PRESSURE” indication.
- Does “RAIL PRESSURER” follow “RAIL PRES SET” when the cranking engine.

NOTE:
If the rail pressure does not reach the set point there is an fuel injector leak that is too great or the pressure signal is incorrect.

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 10.

10. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Carry out TEST 6.

>> GO TO 11.

11. INSPECTION END

High pressure supply pump (volumetric control valve) OK.

>> **INSPECTION END**

Work Procedure (TEST 5: Rail High Pressure Regulation Check)

INFOID:0000000006496539

NOTE:
- If contaminants (swarf) can be seen in the transparent return pipe, the entire fuel injection system (fuel injectors, pump, rail, high pressure pipes and all return pipes) must be replaced.
- **CONDITIONS PRIOR TO TEST**
  - Engine coolant temperature between 80 - 90°C (176 - 194°F).
  - All the electrical load are switched off.
  - Air conditioning is switched off.
  - The tank is at least half-full.
  - The pipe connections and unions have been checked.
  - Check the sealing of the high pressure pipes and unions.
- **CAUSE**
  - Rail pressure variations around the set point.

- The rail reference pressure is not reached.
- Rough idle.
- Possibly noisy combustion.

1.CHECK AIR BUBBLES

1. Start engine
2. Are there large air bubbles in the transparent supply pipe going to the pump?

Is the inspection result normal?

YES >> Check low pressure system.
NO >> GO TO 2.

2.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)-I

Disconnect high pressure supply pump (volumetric control valve) harness connector.

Does the engine stop?

YES >> GO TO 3.
NO >> Replace high pressure supply pump (the high pressure supply pump [volumetric control valve] remains open mechanically).

3.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)-I

1. Reconnect high pressure supply pump (volumetric control valve) harness connector.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Start engine.
4. Disconnect high pressure supply pump (pressure control valve) harness connector.

Does the engine stop?

YES >> GO TO 4.
NO >> Replace high pressure supply pump (the high pressure supply pump [pressure control valve] remains open mechanically).

4.CHECK FUEL INJECTOR

1. Reconnect high pressure supply pump (pressure control valve) harness connector.
2. Wait at least 30 seconds.
3. Start engine and let it idle speed.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check that the “F/FLOW CORR CYL1”, “F/FLOW CORR CYL2”, “F/FLOW CORR CYL3”, “F/FLOW CORR CYL4” indication.

Are the reference value 0.3 - 1.9?

YES >> GO TO 6.
NO >> GO TO 5.

5.CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Carry out TEST 6.

>> INSPECTION END

6.CHECK ENGINE CONDITION

- Check that the oil level is correct and that the engine coolant temperature is normal operation temperature.60°C (140°F)
- Engine running at idle speed.

- Select “HIGH PRES CIRCUIT LEAK TEST” in “ACTIVE TEST” mode with CONSULT-III.
- Engine will perform 4 acceleration cycles.
- Select “DATA MONITOR” mode with CONSULT-III.
- Check that the “RAIL PRES SET” and “RAIL PRESSURE” indication.
- Does “RAIL PRESSURE” follow “RAIL PRES SET” at during the phase of 4 acceleration cycles?

Is the inspection result normal?

YES >> GO TO 22.
NO >> GO TO 7.

7.CHECK ENGINE COOLANT TEMPERATURE AND FUEL TEMPERATURE

1. Select “DATA MONITOR” mode with CONSULT-III.
2. Check that the “FUEL TEMP” indication when operating at idle speed is between 60 - 80°C (140 - 176°F)
3. Check that the “WATER TEMP” indication is between 80 - 90°C (176 - 194°F)

NOTE:
- When the fuel temperature is above 136°C (277°F), the maximum rail pressure is reduced to protect the plastic pipes.
- When the coolant temperature is above 100°C (212°F), the maximum rail pressure is reduced to protect the engine.

Are the “FUEL TEMP” and “WATER TEMP” within the reference value range?

YES >> GO TO 8.
NO >> Check the fuel temperature sensor (Refer to EC-916, "Component Inspection") or engine coolant temperature sensor (Refer to EC-908, "Component Inspection").

8. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (volumetric control valve) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between high pressure supply pump (volumetric control valve) harness connector and ground.

High pressure supply pump (volumetric control valve)		Ground	Voltage
Connector	Terminal		
F61	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R
- Harness for open or short between ECM and high pressure supply pump (volumetric control valve)
- Harness for open or short between IPDM E/R and high pressure supply pump (volumetric control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between high pressure supply pump (volumetric control valve) harness connector and ECM harness connector.

High pressure supply pump (volumetric control valve)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F61	2	F57	65	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)-II

Refer to EC-889, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace high pressure supply pump.

12. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (pressure control valve) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between high pressure supply pump (pressure control valve) harness connector and ground.

High pressure supply pump (Pressure control valve)		Ground	Voltage
Connector	Terminal		
F60	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 14.
NO >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R
- Harness for open or short between IPDM E/R and high pressure supply pump (pressure control valve)
- Harness for open or short between ECM and high pressure supply pump (pressure control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between high pressure supply pump (pressure control valve) harness connector and ECM harness connector.

High pressure supply pump (Pressure control valve)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F60	4	F57	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 15.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)-II

Refer to EC-900, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace high pressure supply pump.

16. CHECK FUEL RAIL PRESSURE SENSOR POWER SUUPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel rail pressure sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel rail pressure sensor harness connector and ground.

Fuel rail pressure sensor		Ground	Voltage (V)
Connector	Terminal		
F72	3	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

17. CHECK FUEL RAIL PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

Fuel rail pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F72	2	F58	27	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

18. CHECK FUEL RAIL PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

Fuel rail pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F72	1	F58	54	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 19.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

19. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-918, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 20.
NO >> Replace fuel rail.

20. CHECK FUEL RAIL PRESSURE-I

1. Reconnect all harness connectors disconnected.
2. Start engine and let it idle speed.
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Check that the “RAIL PRESSURE” indication under the following conditions.

NOTE:
An unusual combustion noise may be heard.

CONDITION (ENGINE SPEED)	INDICATION
At idle speed	190 - 210 bar
2,000 rpm	400 - 500 bar
3,000 rpm	500 - 700 bar
4,000 rpm	700 - 900 bar

Is the inspection result normal?

YES >> GO TO 22.
NO >> GO TO 21.

21. CHECK FUEL RAIL PRESSURE-II

1. Turn ignition switch OFF.
2. Replace fuel rail. Refer to EM-294, "Removal and Installation".
3. Start engine and let it idle speed.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check that the “RAIL PRESSURE” indication under the following conditions.
   NOTE:
   An unusual combustion noise may be heard.

CONDITION (ENGINE SPEED)	INDICATION
At idle speed	190 - 210 bar
2,000 rpm	400 - 500 bar
3,000 rpm	500 - 700 bar
4,000 rpm	700 - 900 bar

Is the inspection result normal?

YES >> GO TO 22.
NO >> Replace high pressure supply pump.

22. INSPECTION END

High pressure supply pump (volumetric control valve) OK.

>> **INSPECTION END**

Work Procedure (TEST 6: Fuel Injectors Leak Check)

INFOID:0000000006496540

NOTE:
- **CONDITIONS PRIOR TO TEST**
- The entire low pressure system must be in good condition.
- Check the sealing of the high pressure pipes and unions.
- Test 3 High pressure supply pump (pressure control valve) check is OK
- Test 4 High pressure supply pump (volumetric control valve) check is OK
- Test 5 Rail high pressure regulation circuit check is OK.
- **CAUSE**
- Not enough or no rail pressure during starting.
- The engine does not start.

1. CHECK FUEL INJECTOR-I

Refer to EC-920, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace malfunctioning fuel injector.

2. CHECK INTERNAL FUEL TRANSFER PUMP

1. Turn ignition switch OFF.
2. Disconnect the return system connections at the fuel injectors and close off the return pipes so they are leak-tight.
3. To authorise a 15 second cranking engine and carry out this test it is essential to carry out the following procedure:

- Disconnect high pressure supply pump (volumetric control valve) harness connector
- Turn ignition switch ON.
- Perform “SAVE DATA FOR CPU REPLC” in WORK SUPPORT mode with CONSULT-III.
- Perform “PRGRM REINITIALIZE” in WORK SUPPORT mode with CONSULT-III.
- Cranking engine for at least 15 seconds (starting speed 250 rpm)
- Perform “WRT DATA AFTR REPLC CPU” in WORK SUPPORT mode with CONSULT-III.

Is the return volume at the fuel injectors more than 20 ml per fuel injector for the starting phase?

NOTE:
- Do not repeat this procedure more than 3 times and wait 30 seconds between each 15 second cranking engine.
- Then wait 30 minutes before cranking the engine for 315 second cycles.
- Follow this instruction so that the starter does not get damaged.

Does the flow measure more than 20 ml?

Yes >> Replace malfunctioning fuel injector.
No >> GO TO 3.

3.CHECK FUEL INJECTOR-II

1. Turn ignition switch OFF.
2. Reconnect return pipes.
3. Start Engine.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check “RAIL PRESSURE” and “RAIL PRES SET” indication.
6. Does “RAIL PRESSURE” follow “RAIL PRES SET” during the 3 second cranking engine?

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK GLOW PLUG

1. Turn ignition switch OFF.
2. Remove the glow plugs and check for moisture.
3. If the glow plugs are wet with fuel, it is possible that the fuel injector is leaking.

Are the glow plugs wet with fuel?

Yes >> Replace malfunction fuel injector.
No >> Replace high pressure supply pump.

5.INSPECTION END

Fuel injector system OK.

>> **INSPECTION END**

Work Procedure (TEST 7: Fuel Injection Quantity Check)

INFOID:0000000006496541

NOTE:
- **CONDITIONS PRIOR TO TEST**
- The entire low pressure system must be in good condition.
- Check the sealing of the high pressure pipes and unions.
- Test 3 High pressure supply pump (pressure control valve) check is OK
- Test 4 High pressure supply pump (volumetric control valve) check is OK
- Test 5 Rail high pressure regulation circuit check is OK.
- All the electrical loads are switched off.
- Air conditioning is switched off.
- **CAUSE**
- The engine runs poorly at idle speed, possibly emits white smoke.

1.CHECK FUEL INJECTOR

Refer to EC-920, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace malfunctioning fuel injector.

2.CHECK ENGINE COOLANT TEMPERATURE AND FUEL TEMPERATURE

1. Start engine let it idle speed.
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Check “FUEL TEMP” indication is above 60°C (140°F).
4. Check “F/FLOW CORR CYL1“, “F/FLOW CORR CYL2”, “F/FLOW CORR CYL3”, “F/FLOW CORR CYL4” indication.

Are the reference value 0.3 - 1.9?

YES >> GO TO 3.
NO >> GO TO 4.

3.CHECK INTERNAL FUEL TRANSFER PUMP

1. Turn ignition switch OFF.
2. Disconnect the return system connections at the fuel injectors and close off the return pipes so they are leak-tight. While the engine is idling, check the return flow rate at the fuel injector. After 5 minutes the return volume must be between 16 - 24 ml per fuel injector.

Is there more than 24 ml or less than 16 ml of return for each fuel injector?

Yes >> Replace malfunctioning fuel injector.
No >> INSPECTION END

4.CHECK COMPRESSION PRESSURE

Check compression pressure.

>> INSPECTION END

ADDITIONAL SERVICE WHEN REPLACING ECM

Description

INFOID:0000000006496542

When replacing ECM, this procedure must be performed.

Work Procedure

INFOID:0000000006496543

1.PRECONDITIONING

- Connect a CONSULT-III
- Connect a battery charger
- Electric load switch is OFF
- Wait for the engine to cool [engine coolant temperature < 60°C (140°F) and air temperature < 50°C (122°F)].

NOTE:
While the ECM is being programmed the cooling fan motors are triggered automatically.

>> GO TO 2.

2.SAVE ECM DATA

Turn ignition switch ON.
Perform “SAVE DATA FOR CPU REPLC” in WORK SUPPORT mode with CONSULT-III.

>> GO TO 3.

3.REPLACE ECM

Replace ECM.

>> GO TO 4.

4.WRITE ECM DATA

1. Wait at least 30 seconds to turn ON the ignition switch.
2. Perform “PRGRM REINITIALIZE” in WORK SUPPORT mode with CONSULT-III.
3. Perform “WRT DATA AFTR REPLC CPU” in WORK SUPPORT mode with CONSULT-III.
4. Perform initialization of NATS system and registration of all NATS ignition key IDs.
   Refer to SEC-50, "ECM : Work Procedure" (With intelligent key system), SEC-190, "ECM : Work Procedure" (Without intelligent key system).
5. Turn ignition switch OFF, wait at least 30 seconds and then turn ON.
6. Select “DATA MONITOR” mode in ECM with CONSULT-III.
7. Check that the “CODE PROGRAM” indication.

Which is displayed on CONSULT-III?

YES >> GO TO 6.
NO >> GO TO 5.

5.WRITE ECM DATA

1. Perform initialization of NATS system and registration of all NATS ignition key IDs.
   Refer to SEC-50, "ECM : Work Procedure" (With intelligent key system), SEC-190, "ECM : Work Procedure" (Without intelligent key system).
2. Turn ignition switch OFF, wait at least 30 seconds and then turn ON.
3. Select “DATA MONITOR” mode in ECM with CONSULT-III.
4. Check that the “CODE PROGRAM” indication.

Which is displayed on CONSULT-III?

YES >> GO TO 6.
NO >> Repeat above steps.

6.PERFORM VIN REGISTRATION

1. Start engine and warm it up to normal operating temperature.
   NOTE:
   The start-up phase may last up to 30 seconds.

2. Turn ignition switch OFF, wait at least 30 seconds and then turn ON.
3. Perform “VIN REGISTRATION” in WORK SUPPORT mode with CONSULT-III.
4. Follow the instruction of CONSULT-III display.

NOTE:
After replace ECM, stored DTC may appear on other control unit. Clear the malfunction memory of these control unit.

>> END

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING

Description

INFOID:0000000006496544

EGR Volume Control Valve Closed Position Learning is an operation to learn the fully closed position of the EGR volume control valve by monitoring the EGR volume control valve control position sensor output signal.

Work Procedure

INFOID:0000000006496545

1.START

1. Turn ignition switch ON.
2. Perform “EGR ADAPTIVES” in WORK SUPPORT mode with CONSULT-III.
3. Turn ignition switch OFF and wait at least 30 seconds.
4. Start engine and let it idle.
5. Select “DATA MONITOR” mode with CONSULT-III.
6. Check that the “NEW EGR/V OFFSET” and “LAST EGR/V OFSET” indication.

0.75V < NEW EGR/V OFFSET = LAST EGR/V OFSET < 1.5V

>> END

THROTTLE VALVE CLOSED POSITION LEARNING

Description

INFOID:0000000006496546

Throttle Valve Closed Position Learning is an operation to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected.

- Electric throttle control actuator is removed.
- Electric throttle control actuator is replaced.
- ECM is replaced.

NOTE:
The necessary operation is different depending on the operation result of ECM data save or write. Always perform the operation according to procedures. Refer to EC-882, "Work Procedure".

Work Procedure

INFOID:0000000006496547

1.START

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON and wait at least 15 seconds.
   Make sure that throttle valve moves during the above 15 seconds by confirming the operating sound.
3. Turn ignition switch OFF and wait at least 4 minutes.
4. Turn ignition switch ON.

>> END

SERVICE REGENERATION

Description

INFOID:0000000006496548

Service Regeneration is performed with CONSULT-III to reduce particulate matter in diesel particulate filter. Service Regeneration should be performed in the following cases.

- ECM enters fail-safe mode because the amount of particulate matter in diesel particulate filter reaches the specified level.
  NOTE:
  When ECM enters fail-safe mode because the amount of particulate matter in diesel particulate filter reaches the specified level, check whether or not DTC is stored in ECM. In the case of DTC stored, perform the Diagnostic Procedure for the DTC.
- ECM is replaced.
  NOTE:
  Based on the signal from sensors ECM measures the amount of particulate matter in diesel particulate filter and stores the value in EEPROM (Electrically Erasable Programmable Read Only Memory). When ECM is replaced as new one, there is a difference between the actual amount of particulate matter and the value stored in new ECM, because the value stored in new ECM is initialized one. In the case above, ECM cannot perform regeneration control correctly. So, perform service regeneration to make the amount of particulate matter in diesel particulate filter zero.
- Component Inspection for diesel particulate filter is performed.
  CAUTION:
  To prevent engine racing, check engine oil level before running the forced service regeneration command.

Work Procedure

INFOID:0000000006496549

1.START

1. Check engine oil level.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF.
4. Turn ignition switch ON.
5. Select “SERVC REGENERATION” in “WORK SUPPORT” mode with CONSULT-III.
6. Touch “START” and wait for approximately 30 minutes.
   NOTE:
   • Do not perform any vehicle operation during service regeneration.
7. Wait until “END” is displayed.
   NOTE:
   • It takes approximately 30 minutes until “END” is displayed.
8. Turn ignition switch OFF and wait at least 10 seconds.
9. Check engine oil level.

>> END

DPF (DIESEL PARTICULATE FILTER) DATA CLEAR

Description

INFOID:0000000006496550

Perform “DIESEL PARTICULATE FILTER DATA CLEAR” in “WORK SUPPORT” mode with CONSULT-III when oxidation catalyst with diesel particulate filter is replaced as new one. Based on the signal from sensors ECM estimates the amount of particulate matter in diesel particulate filter and stores the value in EEPROM as diesel particulate filter data. When oxidation catalyst with diesel particulate filter is replaced as new one, there is a difference between diesel particulate filter data stored in ECM and the actual amount of particulate matter in diesel particulate filter, because no particulate matter is trapped in new diesel particulate filter. In this case, ECM cannot perform regeneration control correctly. So perform “DIESEL PARTICULATE FILTER DATA CLEAR” in “WORK SUPPORT” mode with CONSULT-III to clear diesel particulate filter data stored in ECM.

CAUTION:

Never perform “DIESEL PARTICULATE FILTER DATA CLEAR” in “WORK SUPPORT” mode with CONSULT-III when oxidation catalyst with diesel particulate filter is not replaced as new one. Diesel particulate filter may be damaged because regeneration is not performed at appropriate timing.

Work Procedure

INFOID:0000000006496551

1.START

1. Turn ignition switch ON.
2. Select “DIESEL PARTICULATE FILTER DATA CLEAR” in “WORK SUPPORT” mode with CONSULT-III.
3. Touch “CLEAR” and wait a few seconds.
4. Make sure that “CMPLT” is displayed on CONSULT-III screen.

>> END

DTC/CIRCUIT DIAGNOSIS

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000006496552

1.INSPECTION START

Start engine.

Is engine running?

YES >> GO TO 6.
NO >> GO TO 2.

2.CHECK GROUND CONNECTION-I

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace ground connection.

3.CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM				Voltage
+		–		
Connector	Terminal	Connector	Terminal	
E32	141	E32	155	Battery voltage
			156	
			157	
			160	

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M77, E105
- 10A fuse (No. 2)
- Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Disconnect ECM harness connectors.
2. Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
E32	155	Ground	Existed
	156		
	157		
	160		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to power in harness or connectors.

6.CHECK ECM POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F57	67	Ground	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0 V.
E32	153		

Is the inspection result normal?

YES >> GO TO 13.
NO-1 >> Battery voltage does not exist: GO TO 7.
NO-2 >> Battery voltage exists for more than a few seconds: GO TO 10.

7.CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F57	105	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 10.

8.CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F57	67	E14	44	Existed
E32	153			

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 15.
NO >> GO TO 9.

9.DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E8, F1
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal (Polarity)	Connector	Terminal (Polarity)	
F57	105	E14	40	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E8, F1
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK 20A FUSE

1. Disconnect 20A fuse (No. 43) from IPDM E/R.
2. Check 20A fuse.

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace 20A fuse.

13. CHECK GROUND CONNECTION-II

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair or replace ground connection.

14. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
E32	155	Ground	Existed
	156		
	157		
	160		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 15.
NO >> Repair open circuit or short power in harness or connectors.

15. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair open circuit or short to power in harness or connectors.

P0001 FUEL PUMP

DTC Logic

INFOID:0000000006496553

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0001	HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) CIRCUIT • 1.DEF: Parameter at maximum stop • 2.DEF: Parameter at minimum stop • 3.DEF: Above the max level	• Harness or connectors [High pressure supply pump (volumetric control valve) circuit is open or shorted.] • High pressure supply pump (volumetric control valve) • Fuel line

NOTE:
If DTC P0001 is displayed with DTC P0560 or P0657, first perform trouble diagnosis for DTC P0560 or P0657. Refer to EC-963, "DTC Logic" (DTC P0560) or EC-976, "DTC Logic" (DTC P0657).

Diagnosis Procedure

INFOID:0000000006496554

1.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (volumetric control valve) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between high pressure supply pump (volumetric control valve) harness connector and ground.

High pressure supply pump (volumetric control valve)		Ground	Voltage
Connector	Terminal		
F61	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E8, F1
- Harness for open or short between IPDM E/R and high pressure supply pump (volumetric control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between high pressure supply pump (volumetric control valve) harness connector and ECM harness connector.

High pressure supply pump (volumetric control valve)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F61	2	F57	65	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Refer to EC-889, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace high pressure supply pump.

5. CHECK FUEL LINE

Check fuel line cleanliness.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Fuel line cleanliness.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

>> INSPECTION END

Component Inspection

INFOID:0000000006496555

1. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (volumetric control valve) harness connector.
3. Check resistance between high pressure supply pump (volumetric control valve) terminals as follows.

Terminals	Resistance
1 and 2	1.5 - 15Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure supply pump.

P0002 FUEL PUMP

DTC Logic

INFOID:0000000006496556

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0002	HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) ADAPTIVE • 1.DEF: Parameter at maximum stop • 2.DEF: Parameter at minimum stop • 3.DEF: Above the max level • 4.DEF: Signal incoherence.	• High pressure supply pump • Fuel line

NOTE:
If DTC P0002 is displayed with DTC P0087, P0089, P0090 or P0190, first perform trouble diagnosis for DTC P0087, P0089, P0090 or P0190. Refer to EC-895, "DTC Logic" (DTC P0087), EC-897, "DTC Logic" (DTC P0089), EC-899, "DTC Logic" (DTC P0090) or EC-917, "DTC Logic" (DTC P0190).

Diagnosis Procedure

INFOID:0000000006496557

1.CHECK LOW PRESSURE FUEL SUPPLY SYSTEM

Refer to EC-867, "Work Procedure (TEST 1: Low Pressure Fuel Supply System Check)".

Is the inspection result normal?

OK >> GO TO 2.
NG >> Replace or replace. Then GO TO 9.

2.CHECK INTERNAL FUEL TRANSFER PUMP

Refer to EC-868, "Work Procedure (TEST 2: Internal Fuel Transfer Pump Check)".

Is the inspection result normal?

OK >> GO TO 3.
NG >> Replace or replace. Then GO TO 9.

3.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Refer to EC-868, "Work Procedure [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

Is the inspection result normal?

OK >> GO TO 4.
NG >> Replace or replace. Then GO TO 9.

4.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Refer to EC-869, "Work Procedure [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

Is the inspection result normal?

OK >> GO TO 5.
NG >> Replace or replace. Then GO TO 9.

5.CHECK RAIL HIGH PRESSURE REGULATION

Refer to EC-871, "Work Procedure (TEST 5: Rail High Pressure Regulation Check)".

Is the inspection result normal?

OK >> GO TO 6.
NG >> Replace or replace. Then GO TO 9.

6.CHECK MAJOR LEAK IN FUEL INJECTORS/FUEL INJECTORS OPEN

Refer to EC-876, "Work Procedure (TEST 6: Fuel Injectors Leak Check)".

Is the inspection result normal?

OK >> GO TO 7.
NG >> Replace or replace. Then GO TO 9.

7.CHECK INCORRECT FUEL INJECTION QUANTITY

Refer to EC-877, "Work Procedure (TEST 7: Fuel Injection Quantity Check)".

Is the inspection result normal?

OK >> GO TO 8.
NG >> Replace or replace. Then GO TO 9.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

Is the inspection result normal?

YES >> INSPECTIO END.
NO >> Repair or replace. Then GO TO 9.

9. CLEAR PRESSURE REGULATION

Perform “PRES REG ADAPTIVE” in WORK SUPPORT mode with CONSULT-III.

>> **INSPECTION END**.

Component Inspection

INFOID:0000000006496558

1. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (volumetric control valve) harness connector.
3. Check resistance between high pressure supply pump (volumetric control valve) terminals as follows.

Terminals	Resistance
1 and 2	1.5 - 15Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure supply pump.

P0016 CKP - CMP CORRELATION

DTC Logic

INFOID:0000000006496559

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0016	CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION • 1.DEF:Signal incoherence.	• Harness or connectors (Camshaft position sensor circuit or crankshaft position sensor circuit is open or shorted.) • Camshaft position sensor • Crankshaft position sensor • Signal plate

Diagnosis Procedure

INFOID:0000000006496560

1.CHECK CKP SENSOR AND CMP SENSOR

Refer to EC-932, "Diagnosis Procedure" (CKP sensor) and EC-934, "Diagnosis Procedure" (CMP sensor).

>> **INSPECTION END**

P0045 TC BOOST CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000006496561

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0045	TURBOCHARGER BOOST CONTROL SOLENOID VALVE CIRCUIT • 1.DEF: Signal outside lower limit • 2.DEF: Signal outside upper limit	• Harness or connectors (The solenoid valve circuit is open or shorted.) • Turbocharger boost control solenoid valve

Diagnosis Procedure

INFOID:0000000006496562

1.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

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.

Turbocharger boost control solenoid valve		Ground	Voltage
Connector	Terminal		
E55	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
• Harness for open or short between IPDM E/R and turbocharger boost control solenoid valve

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger boost control solenoid valve harness connector and ECM harness connector.

Turbocharger boost control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E55	1	F57	89	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Refer to EC-894, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace turbocharger boost control solenoid valve.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

>> INSPECTION END

Component Inspection

INFOID:0000000006496563

1.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost control solenoid valve harness connector.
3. Check resistance between turbocharger boost control solenoid valve terminals as follows.

Terminals	Resistance
1 and 2	13.8 - 16.8 Ω [at 23°C (73°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace turbocharger boost control solenoid valve.

P0087 FUEL PUMP

DTC Logic

INFOID:0000000006496564

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0087	RAIL PRESSURE • 1.DEF: Voltage outside tolerance limits	• High pressure supply pump • High pressure supply pump (Pressure control valve) • High pressure supply pump (Volumetric control valve) • Fuel injector • Fuel rail pressure sensor • Air mixed with fuel • Lack of fuel • Fuel rail pressure relief valve • Fuel line • Harness or connector

NOTE:

- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC becomes present during the first 30 seconds after the engine starts.
- In low ambient temperature conditions, diagnostic cannot make difference between a normal long engine start and abnormal long engine start. So, DTC must be take in account only if customer complains about too long or impossible engine start not only in cold conditions but also and especially in warm conditions. If customer complains only in cold conditions, root cause of the problem could elsewhere like low battery level, bad fuel specification (too viscous fuel). This DTC could appear after fuel filter too.
- **Special notes:**
  Starting and engine operation difficult or impossible.

Diagnosis Procedure

INFOID:0000000006496565

1.CHECK LOW PRESSURE FUEL SUPPLY SYSTEM

Refer to EC-867, "Work Procedure (TEST 1: Low Pressure Fuel Supply System Check)".

Is the inspection result normal?

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK INTERNAL FUEL TRANSFER PUMP

Refer to EC-868, "Work Procedure (TEST 2: Internal Fuel Transfer Pump Check)".

Is the inspection result normal?

OK >> GO TO 3.
NG >> Repair or replace.

3.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Refer to EC-868, "Work Procedure [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

Is the inspection result normal?

OK >> GO TO 4.
NG >> Repair or replace.

4.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Refer to EC-869, "Work Procedure [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

Is the inspection result normal?

OK >> GO TO 5.
NG >> Repair or replace.

5.CHECK RAIL HIGH PRESSURE REGULATION

Refer to EC-871, "Work Procedure (TEST 5: Rail High Pressure Regulation Check)".

Is the inspection result normal?

OK >> GO TO 6.
NG >> Repair or replace.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

Is the inspection result normal?

YES >> INSPECTIO END.
NO >> Repair or replace.

P0089 FUEL PUMP

DTC Logic

INFOID:0000000006496566

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0089	FUEL PRESSURE REGULATOR • 1.DEF: Parameter at maximum stop • 2.DEF: Parameter at minimum stop • 3.DEF: Implausible signal • 4.DEF: Signal incoherence.	• High pressure supply pump • High pressure supply pump (Pressure control valve) • High pressure supply pump (Volumetric control valve) • Fuel injector • Fuel rail pressure sensor • Air mixed with fuel • Lack of fuel • Fuel rail pressure relief valve • Fuel line • Harness or connector

NOTE:

- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC becomes present during the first 30 seconds after the engine starts.
- In low ambient temperature conditions, diagnostic cannot make difference between a normal long engine start and abnormal long engine start. So, DTC must be take in account only if customer complains about too long or impossible engine start not only in cold conditions but also and especially in warm conditions. If customer complains only in cold conditions, root cause of the problem could elsewhere like low battery level, bad fuel specification (too viscous fuel). This DTC could appear after fuel filter too.
- **Special notes:**
  Starting and engine operation difficult or impossible.

Diagnosis Procedure

INFOID:0000000006496567

1. CHECK LOW PRESSURE FUEL SUPPLY SYSTEM

Refer to EC-867, "Work Procedure (TEST 1: Low Pressure Fuel Supply System Check)".

Is the inspection result normal?

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK INTERNAL FUEL TRANSFER PUMP

Refer to EC-868, "Work Procedure (TEST 2: Internal Fuel Transfer Pump Check)".

Is the inspection result normal?

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Refer to EC-868, "Work Procedure [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

Is the inspection result normal?

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Refer to EC-869, "Work Procedure [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

Is the inspection result normal?

OK >> GO TO 5.
NG >> Repair or replace.

5. CHECK RAIL HIGH PRESSURE REGULATION

Refer to EC-871, "Work Procedure (TEST 5: Rail High Pressure Regulation Check)".

Is the inspection result normal?

OK >> GO TO 6.
NG >> Repair or replace.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

Is the inspection result normal?

YES >> INSPECTIO END.
NO >> Repair or replace.

P0090 FUEL PUMP

DTC Logic

INFOID:0000000006496568

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0090	HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) CIRCUIT • 1.DEF: Parameter at maximum stop • 2.DEF: Parameter at minimum stop • 3.DEF: Above the max level	• Harness or connectors [High pressure supply pump (pressure control valve) circuit is open or shorted.] • High pressure supply pump (pressure control valve)

Diagnosis Procedure

INFOID:0000000006496569

1.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (pressure control valve) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between high pressure supply pump (pressure control valve) harness connector and ground.

High pressure supply pump (Pressure control valve)		Ground	Voltage
Connector	Terminal		
F60	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E8, F1
- Harness for open or short between IPDM E/R and high pressure supply pump (pressure control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between high pressure supply pump (pressure control valve) harness connector and ECM harness connector.

High pressure supply pump (Pressure control valve)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F60	4	F57	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) CHECK

Refer to EC-900, "Component Inspection".

Is the inspection result normal?

Yes >> GO TO 5.
No >> Replace high pressure supply pump.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

>> INSPECTIO END

Component Inspection

INFOID:0000000006496570

1. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (pressure control valve) harness connector.
3. Check resistance between high pressure supply pump (pressure control valve) terminals as follows.

Terminals	Resistance
3 and 4	1.5 - 15Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure supply pump.

P0100 MAF SENSOR

DTC Logic

INFOID:0000000006496571

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0100	MASS AIR FLOW SENSOR CIRCUIT • 1.DEF: Signal outside lower limit • 2.DEF: Signal outside upper limit	• Harness or connectors (Mass air flow sensor circuit is open or shorted.) • Mass air flow sensor

Diagnosis Procedure

INFOID:0000000006496572

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between mass air flow sensor harness connector and ground.

Mass air flow sensor		Ground	Voltage
Connector	Terminal		
F74	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F1
- Harness for open or short between IPDM E/R and mass air flow sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK MASS AIR FLOW SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

Mass air flow sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F74	2	F57	125	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 MASS AIR FLOW SENSOR NPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

Mass air flow sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F74	4	F57	118	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 MASS AIR FLOW SENSOR

Refer to EC-902, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace mass air flow sensor.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

>> INSPECTION END

Component Inspection

INFOID:0000000006496573

1.CHECK MASS AIR FLOW SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Check the voltage between mass air flow sensor harness connector.

Mass air flow sensor			Voltage
Connector	+	–	
	Terminal		
F74	4 (Mass air flow sensor signal)	2 (Mass air flow sensor groundl)	0.3 - 0.7 V

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace mass air flow sensor.

P0101 MAF SENSOR

DTC Logic

INFOID:0000000006496574

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0101	REQUESTED AIR FLOW • 1.DEF: Signal outside upper limit	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor

Diagnosis Procedure

INFOID:0000000006496575

1.CHECK AIR FILTER

Check that air filter is not obstructed.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 2.

2.CHECK INTAKE AIR DUCT

Check that intake air duct is not obstructed.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 3.

3.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace ground connection.

4.CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between mass air flow sensor harness connector and ground.

Mass air flow sensor		Ground	Voltage
Connector	Terminal		
F74	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFANCTIONING PART

Check the following.
- Harness connectors E8, F1
- Harness for open or short between IPDM E/R and mass air flow sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK MASS AIR FLOW SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

Mass air flow sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F74	2	F57	125	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK MASS AIR FLOW SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

Mass air flow sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F74	4	F57	118	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK MASS AIR FLOW SENSOR

Refer to EC-904, "Component Inspection"

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace mass air flow sensor.

9.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

>> INSPECTION END

Component Inspection

INFOID:0000000006496576

1.CHECK MASS AIR FLOW SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Check the voltage between mass air flow sensor harness connector.

Mass air flow sensor			Voltage
Connector	+	–	
	Terminal		
F74	4 (Mass air flow sensor signal)	2 (Mass air flow sensor groundl)	0.3 - 0.7 V

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace mass air flow sensor.

P0110 IAT SENSOR

DTC Logic

INFOID:0000000006496577

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0110	INTAKE AIR TEMPERATURE SENSOR CIRCUIT • 1.DEF: Signal outside lower limit • 2.DEF: Signal outside upper limit	• Harness or connectors (Intake air temperature sensor circuit is open or shorted.) • Intake air temperature sensor

Diagnosis Procedure

INFOID:0000000006496578

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT-II

1. Disconnect mass air flow sensor (with intake air temperature sensor) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between mass air flow sensor harness connector and ground.

Mass air flow sensor (with intake air temperature sensor)		Ground	Voltage
Connector	Terminal		
F74	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

Mass air flow sensor (with intake air temperature sensor)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F74	2	F57	125	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-906, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace mass air flow sensor (with intake air temperature sensor).

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

>> INSPECTION END

Component Inspection

INFOID:0000000006496579

1.CHECK INTAKE AIR TEMPERATURE SENSOR

Check resistance between mass air flow sensor terminals 1 and 2 under the following conditions.

Condition	Resistance (Ω)
10°C (50°F)	3,714 ± 161
20°C (68°F)	2,448 ± 95
30°C (86°F)	1,671 ± 58

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace mass air flow sensor (with intake air temperature sensor).

P0115 ECT SENSOR

DTC Logic

INFOID:0000000006496580

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0115	ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT • 2.DEF: Signal incoherence. • 4.DEF: Voltage too low. • 5.DEF: Voltage too high	• Harness or connectors (Engine coolant temperature sensor circuit is open or shorted.) • Engine coolant temperature sensor

Diagnosis Procedure

INFOID:0000000006496581

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR SUPPLY CIRCUIT

1. Disconnect engine coolant temperature sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between engine coolant temperature sensor connector and ground.

Engine coolant temperature sensor		Ground	Voltage
Connector	Terminal		
F31	3	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK ENGINE COOLANT TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine coolant temperature sensor harness connector and ECM harness connector.

Engine coolant temperature sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	2	F57	87	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-908, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace engine coolant temperature sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

>> INSPECTION END

Component Inspection

INFOID:0000000006496582

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance between engine coolant temperature sensor terminals 2 and 3 under the following conditions.

Terminal	Condition	Resistance (Ω)
2 and 3	25°C (77°F)	2,252 ± 112.16
	50°C (122°F)	810 ± 39
	80°C (176°F)	283 ± 8

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace Engine coolant temperature sensor.

P0120 TP SENSOR

DTC Logic

INFOID:0000000006496583

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0120	Throttle position sensor circuit low input • 1.DEF: Implausible signal	• Harness or connectors (Throttle position sensor circuit is open or shorted.) • Throttle position sensor

Diagnosis Procedure

INFOID:0000000006496584

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF and wait at least 20 seconds.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.
3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F43	2	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF and wait at least 20 seconds.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F43	3	F58	19	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F43	4	F58	37	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-910, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-910, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006496585

1.CHECK THROTTLE 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 follows.

ECM		ECM		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F58	37 (TP sensor)	F58	19 (Sensor ground)	For 20 seconds after turning ignition switch OFF	Output voltage fluctuates between 0 V and 5 V
				More than 20 seconds after turning ignition switch OFF	0.63 - 0.77 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace electric throttle control actuator assembly.

Special Repair Requirement

INFOID:0000000006496586

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-882, "Work Procedure".

>> END

P012A TC BOOST SENSOR

DTC Logic

INFOID:0000000006496587

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0069	TURBOCHARGER BOOST SENSOR • 1.DEF: Signal outside lower limit • 2.DEF: Signal outside upper limit	• Harness or connectors (Turbocharger boost sensor) • Turbocharger boost sensor

Diagnosis Procedure

INFOID:0000000006496588

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK TUBOCHARGER BOOST SENSOR SUPPLY CIRCUIT

1. Disconnect turbocharger boost sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between turbocharger boost sensor connector and ground.

Turbocharger boost sensor		Ground	Voltage
Connector	Terminal		
F71	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK TUBOCHARGER BOOST SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F71	2	F58	47	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK TUBOCHARGER BOOST SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F71	3	F58	49	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK TUBOCHARGER BOOST SENSOR

Refer to EC-912, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace turbocharger boost sensor.

6. REPLACE ECM

1. Perform EC-879, "Work Procedure".
2. Perform EGR volume control valve closed position learning. Refer to EC-881, "Work Procedure".

>> **INSPECTION END**

Component Inspection

INFOID:0000000006496589

1. CHECK TURBOCHARGER BOOST SENSOR-I

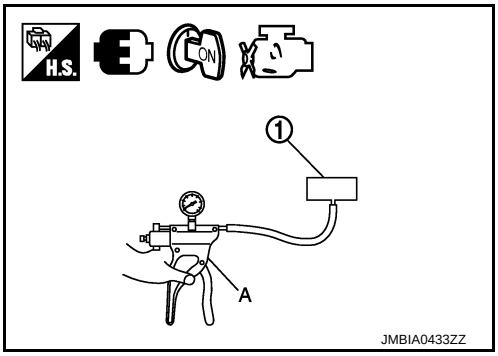
1. Turn ignition switch OFF.
2. Remove turbocharger boost sensor with its harness connected.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check “BOOST PRESS” and “ATOMOS PRESS” indication.

If the value is not very close to “ATOMOS PRESS”, maximum pressure difference between “ATOMOS PRESS” and “BOOST PRESS” with the ignition switch ON (engine stop) = ± 50 mbar?

YES >> GO TO 2.
NO >> Replace turbocharger boost sensor.

2. CHECK TURBOCHARGER BOOST SENSOR-II

1. Use pump (A) to apply turbocharger boost sensor (1) as shown in the figure.
2. Apply a pressure of between 10 kPa (0.100 bar, 0.102 kg/cm^2, 1.5 psi) - 13 kPa (0.130 bar, 0.133 kg/cm^2, 1.9 psi) [maximum pressure to be applied: 13 kPa (0.130 bar, 0.133 kg/cm^2, 1.9 psi)].
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Check “BOOST PRESS” indication with that given by the vacuum pump.



If there is no discrepancy?

YES >> INSPECTION END
NO >> Replace turbocharger boost sensor.

P012B TC BOOST SENSOR

DTC Logic

INFOID:0000000006496590

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P012B	TURBOCHARGER BOOST SENSOR • 1.DEF: Implausible signal	• Harness or connectors (Turbocharger boost sensor) • Turbocharger boost sensor

Diagnosis Procedure

INFOID:0000000006496591

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK TUBOCHARGER BOOST SENSOR SUPPLY CIRCUIT

1. Disconnect turbocharger boost sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between turbocharger boost sensor connector and ground.

Turbocharger boost sensor		Ground	Voltage
Connector	Terminal		
F71	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK TUBOCHARGER BOOST SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F71	2	F58	47	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK TUBOCHARGER BOOST SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F71	3	F58	49	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK TUBOCHARGER BOOST SENSOR

Refer to EC-914, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace turbocharger boost sensor.

6. REPLACE ECM

1. Perform EC-879, "Work Procedure".
2. Perform EGR volume control valve closed position learning. Refer to EC-881, "Work Procedure".

>> **INSPECTION END**

Component Inspection

INFOID:0000000006496592

1. CHECK TURBOCHARGER BOOST SENSOR-I

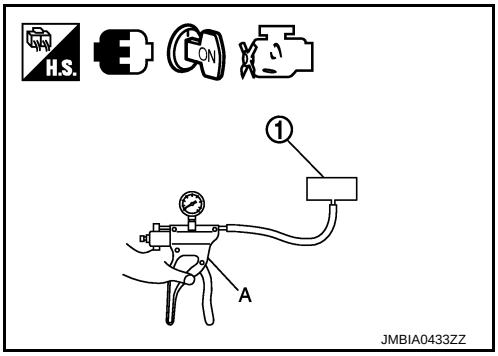
1. Turn ignition switch OFF.
2. Remove turbocharger boost sensor with its harness connected.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check “BOOST PRESS” and “ATOMOS PRESS” indication.

If the value is not very close to “ATOMOS PRESS”, maximum pressure difference between “ATOMOS PRESS” and “BOOST PRESS” with the ignition switch ON (engine stop) = ± 50 mbar?

YES >> GO TO 2.
NO >> Replace turbocharger boost sensor.

2. CHECK TURBOCHARGER BOOST SENSOR-II

1. Use pump (A) to apply turbocharger boost sensor (1) as shown in the figure.
2. Apply a pressure of between 10 kPa (0.100 bar, 0.102 kg/cm^2, 1.5 psi) - 13 kPa (0.130 bar, 0.133 kg/cm^2, 1.9 psi) [maximum pressure to be applied: 13 kPa (0.130 bar, 0.133 kg/cm^2, 1.9 psi)].
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Check “BOOST PRESS” indication with that given by the vacuum pump.



If there is no discrepancy?

YES >> INSPECTION END
NO >> Replace turbocharger boost sensor.

P0180 FPT SENSOR

DTC Logic

INFOID:0000000006496593

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0180	FUEL PUMP TEMPERATURE SENSOR CIRCUIT • 2.DEF: Signal incoherence. • 3.DEF: Voltage too low. • 4.DEF: Voltage too high. • 5.DEF: Intermittent signal incoherence	• Harness or connectors (Fuel temperature sensor circuit is open or shorted.) • Fuel pump temperature sensor

Diagnosis Procedure

INFOID:0000000006496594

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK FUEL TEMPERATURE SENSOR SUPPLY CIRCUIT

1. Disconnect fuel temperature sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between fuel temperature sensor connector and ground.

Fuel temperature sensor		Ground	Voltage
Connector	Terminal		
F69	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel temperature sensor harness connector and ECM harness connector.

Fuel temperature sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F69	2	F57	95	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL TEMPERATURE SENSOR

Refer to EC-916, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace fuel temperature sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

>> INSPECTION END

Component Inspection

INFOID:0000000006496595

1. CHECK FUEL TEMPERATURE SENSOR

Check resistance between fuel temperature sensor terminals 1 and 2 under the following conditions.

Condition	Resistance (Ω)
25°C (77°F)	2,051 ± 123
50°C (122°F)	811 ± 47
80°C (176°F)	309 ± 17

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace fuel temperature sensor.

P0190 FRP SENSOR

DTC Logic

INFOID:0000000006496596

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0190	FUEL RAIL PRESSURE SENSOR CIRCUIT • 1.DEF: Implausible signal • 2.DEF: Signal outside lower limit • 3.DEF: Signal outside upper limit • 4.DEF: Signal incoherence. • 5.DEF: Microcuts detected	• Harness or connectors (Fuel rail pressure sensor circuit is open or shorted.) • Fuel rail pressure sensor

Diagnosis Procedure

INFOID:0000000006496597

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK FUEL RAIL PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect fuel rail pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between fuel rail pressure sensor connector and ground.

Fuel rail pressure sensor		Ground	Voltage
Connector	Terminal		
F72	3	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL RAIL PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

Fuel rail pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F72	2	F58	27	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL RAIL PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

Fuel rail pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F72	1	F58	54	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-918, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace fuel rail pressure sensor.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

>> INSPECTION END

Component Inspection

INFOID:0000000006496598

1.CHECK FUEL RAIL PRESSURE SENSOR

1. Turn ignition switch OFF and wait at least 1 minutes.
2. Reconnect harness connector disconnected.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check that the “RAIL PRESSURE” indication.

If the value is lower than 30 bar?

YES >> **INSPECTION END**.
NO >> Replace fuel rail pressure sensor.

P0200 FUEL INJECTOR

DTC Logic

INFOID:0000000006496599

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0200	FUEL INJECTOR CONTROL • 1.DEF: Voltage outside tolerance limits	• Harness or connectors (The fuel injector circuit is open or shorted.) • Fuel injector

Diagnosis Procedure

INFOID:0000000006496600

1.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.
4. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F81	1	F58	8	Existed
2	F82	1	F58	7	
3	F83	1	F58	6	
4	F84	1	F58	5	

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2.CHECK FUEL INJECTOR OUTPUT CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F81	2	F58	4	Existed
2	F82	2	F58	3	
3	F83	2	F58	2	
4	F84	2	F58	1	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL INJECTOR

Refer to EC-920, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace malfunctioning fuel injector.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

>> INSPECTION END

Component Inspection

INFOID:0000000006496601

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as follows.

Terminals	Resistance
1 and 2	150 - 250 kΩ [at 20°C (68°F)]

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace malfunctioning fuel injector.

P0201, P0202, P0203, P0204 FUEL INJECTOR

DTC Logic

INFOID:0000000006496602

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0201	NO. 1 CYLINDER FUEL INJECTOR CIRCUIT • CO: Open Circuit • 2.DEF: At maximum limit • 3.DEF: Signal incoherence. • 4.DEF: Comparison of conformity information • 5.DEF: Signal incorrect.	• Harness or connectors (The fuel injector circuit is open or shorted.) • Fuel injector • Injector code
P0202	NO. 2 CYLINDER FUEL INJECTOR CIRCUIT • CO: Open Circuit • 2.DEF: At maximum limit • 3.DEF: Signal incoherence. • 4.DEF: Comparison of conformity information • 5.DEF: Signal incorrect.	
P0203	NO. 3 CYLINDER FUEL INJECTOR CIRCUIT • CO: Open Circuit • 2.DEF: At maximum limit • 3.DEF: Signal incoherence. • 4.DEF: Comparison of conformity information • 5.DEF: Signal incorrect.	
P0204	NO. 4 CYLINDER FUEL INJECTOR CIRCUIT • CO: Open Circuit • 2.DEF: At maximum limit • 3.DEF: Signal incoherence. • 4.DEF: Comparison of conformity information • 5.DEF: Signal incorrect.	

NOTE:
If DTC P0201, P0202, P0203 or P0204 is displayed with DTC P0263, P0266, P0269 or P0272 first perform trouble diagnosis for DTC P0263, P0266, P0269 or P0272. Refer to EC-931, "DTC Logic".

Diagnosis Procedure

INFOID:0000000006496603

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.
4. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F81	1	F58	8	Existed
2	F82	1	F58	7	
3	F83	1	F58	6	
4	F84	1	F58	5	

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL INJECTOR OUTPUT CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F81	2	F58	4	Existed
2	F82	2	F58	3	
3	F83	2	F58	2	
4	F84	2	F58	1	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL INJECTOR

Refer to EC-922, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace malfunctioning fuel injector.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

>> INSPECTION END

Component Inspection

INFOID:0000000006496604

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as follows.

Terminals	Resistance
1 and 2	150 - 250kΩ [at 20°C (68°F)]

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace malfunctioning fuel injector.

P0217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000006496605

DTC DETECTION 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	Possible cause
P0217	Engine over temperature (Overheat) 1.DEF:Operation temperature too high.	• Harness or connectors (The cooling fan circuit is open or shorted.) • IPDM E/R (Cooling fan relay-1, -2, -3) • Cooling fan motor • Radiator hose • Radiator • Radiator cap • Water pump • Thermostat • Engine coolant temperature sensor

Diagnosis Procedure

INFOID:0000000006496606

1.CHECK COOLING FAN LOW SPEED FUNCTION

1. Start engine and let it idle.
2. Turn air conditioner switch and blower fan switch ON.
3. Make sure that cooling fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Refer to EC-1015, "Diagnosis Procedure".

2.CHECK COOLING FAN HIGH SPEED FUNCTION

1. Turn ignition switch OFF.
2. Turn air conditioner switch and blower fan switch OFF.
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect 150 Ω resistor to engine coolant temperature sensor harness connector.
5. Restart engine and make sure that cooling fan operates at higher speed than low speed.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Refer to EC-1015, "Diagnosis Procedure".

3.CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to CO-62, "Inspection".

Is leakage detected?

YES >> GO TO 4.
NO >> GO TO 5.

4.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak. Refer to CO-62, "Inspection".
- Hose
- Radiator
- Water pump

>> Repair or replace malfunctioning part.

5.CHECK RESERVOIR TANK CAP

Check reservoir tank cap. Refer to CO-65, "Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace reservoir tank cap.

6.CHECK THERMOSTAT

Check thermostat. Refer to CO-74, "Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace thermostat.

7.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-908, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace engine coolant temperature sensor.

8.CHECK MAIN 12 CAUSES

If the cause cannot be isolated, check the following.

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	MA-14, "Engine Coolant Mixture Ratio"
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-62, "Inspection"
	4	• Radiator cap	• Pressure tester	CO-65, "Inspection"	CO-65, "Inspection"
ON*2	5	• Coolant leaks	• Visual	No leaks	CO-62, "Inspection"
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	—
ON*1	7	• Cooling fan motor	• IPDM E/R (auto active test)	Operating	EC-1015, "Component Inspection"
OFF	8	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	CO-62, "Inspection"
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	CO-62, "Inspection"
OFF	11	• Cylinder head	• Straight gauge feeler gauge	EM-359, "General Specification"	EM-321, "Inspection"
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	—

*1: Engine running at idle speed.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to CO-60, "Troubleshooting Chart".

>> INSPECTION END

P0225 APP SENSOR

DTC Logic

INFOID:0000000006496607

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0225	ACCELERATOR PEDAL POSITION SENSOR 1 AND ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT • CC.1: Short circuit to +12V • 1.DEF: Signal outside upper limit • 2.DEF: Signal outside lower limit	• Harness or connectors (APP sensor 1 and 2 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1 and 2.)

NOTE:

- **If DTC P0225 is displayed with DTC P0641, first perform trouble diagnosis for DTC P0641. Refer to EC-974, "DTC Logic".**

Diagnosis Procedure

INFOID:0000000006496608

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between accelerator pedal position sensor connector and ground.

Accelerator pedal position sensor			Ground	Voltage
Sensor	Connector	Terminal		
1	E110 (LHD models) M206 (RHD models)	4	Ground	Approx. 5V
2		5		

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

- Harness connectors M77, E105 (RHD models)
- Harness connectors M95, M202 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connector.

4.CHECK ACCELERATOR PEDAL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E110 (LHD models) M206 (RHD models)	2	E32	159	Existed
2		1		152	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

- Harness connectors M77, E105 (RHD models)
- Harness connectors M95, M202 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connector.

6. CHECK ACCELERATOR PEDAL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E110 (LHD models) M206 (RHD models)	3	E32	158	Existed
2		6		151	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

- Harness connectors M77, E105 (RHD models)
- Harness connectors M95, M202 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connector.

8. CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to EC-926, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace accelerator pedal position sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

>> INSPECTION END

Component Inspection

INFOID:0000000006496609

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position sensor harness connector.
3. Check resistance between accelerator pedal position sensor as follows.

Sensor	Terminals	Resistance
1	2 and 4	1.7 ± 0.9 KΩ
2	1 and 5	2.85 ± 2.05 KΩ

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace accelerator pedal position sensor.

P0226 APP SENSOR

DTC Logic

INFOID:0000000006496610

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0226	ACCELERATOR PEDAL POSITION SENSOR 1 AND ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT • 1.DEF: Jammed accelerator pedal detected. • 2.DEF: Jammed accelerator pedal detected. • 3.DEF: Incoherence between pedal track 1 and track 2 • 4.DEF: Fault on gangs 1 and 2 of the pedal potentiometer.	• Harness or connectors (APP sensor 1 and 2 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1 and 2.)

Diagnosis Procedure

INFOID:0000000006496611

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between accelerator pedal position sensor connector and ground.

Accelerator pedal position sensor			Ground	Voltage
Sensor	Connector	Terminal		
1	E110 (LHD models) M206 (RHD models)	4	Ground	Approx. 5V
2		5		

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

- Harness connectors M77, E105 (RHD models)
- Harness connectors M95, M202 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connector.

4.CHECK ACCELERATOR PEDAL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E110 (LHD models) M206 (RHD models)	2	E32	159	Existed
2		1		152	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

- Harness connectors M77, E105 (RHD models)
- Harness connectors M95, M202 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connector.

6. CHECK ACCELERATOR PEDAL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E110 (LHD models) M206 (RHD models)	3	E32	158	Existed
2		6		151	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

- Harness connectors M77, E105 (RHD models)
- Harness connectors M95, M202 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connector.

8. CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to EC-929, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace accelerator pedal position sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

>> INSPECTION END

Component Inspection

INFOID:0000000006496612

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position sensor harness connector.
3. Check resistance between accelerator pedal position sensor as follows.

Sensor	Terminals	Resistance
1	2 and 4	1.7 ± 0.9 KΩ
2	1 and 5	2.85 ± 2.05 KΩ

Is the inspection result normal?

YES >> **INSPECTION END**

NO >> Replace accelerator pedal position sensor.

P0263, P0266, P0269, P0272 FUEL INJECTOR

DTC Logic

INFOID:0000000006496613

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0263	NO. 1 cylinder fuel injector performance	• Fuel injector
P0266	NO. 2 cylinder fuel injector performance	
P0269	NO. 3 cylinder fuel injector performance	
P0272	NO. 4 cylinder fuel injector performance	

NOTE:
Check injector code when the above DTC is indicated. If the code is normal, replace injector showing an applicable code. If the code is not normal, load injector codes and initialize the injector learning.

P0335 CKP SENSOR (POS)

DTC Logic

INFOID:0000000006496614

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0335	CRANKSHAFT POSITION SENSOR (POS) CIRCUIT • 1.DEF: Signal incoherence • 2.DEF: No signal • 3.DEF: Signal interference • 4.DEF: Number of teeth incorrect. • 5.DEF: Plausibility. • CO: Open circuit	• Harness or connectors (The sensor circuit is open or shorted.) • Crankshaft position sensor (POS) • Signal plate

Diagnosis Procedure

INFOID:0000000006496615

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F73	2	F57	114	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F73	1	F57	113	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CKP SENSOR (POS)

Refer to EC-933, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace crankshaft position sensor (POS).

5. CHECK GEAR TOOTH

Visually check for chipping flywheel gear tooth.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace signal plate.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

>> **INSPECTION END**

Component Inspection

INFOID:0000000006496616

1. CHECK CKP SENSOR (POS)

1. Turn ignition switch OFF.
2. Disconnect CKP sensor (POS) harness connector.
3. Check resistance between CKP sensor (POS) terminals as follows.

Terminals	Resistance
1 and 2	520 - 860 Ω

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace CKP sensor.

P0340 CMP SENSOR (PHASE)

DTC Logic

INFOID:0000000006496617

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0340	CAMSHAFT POSITION SENSOR (PHASE) CIRCUIT • 6.DEF: Camshaft signal incoherence • 7.DEF: No signal • 9.DEF: Signal with interference • 10.DEF: Plausibility	• Harness or connectors (The sensor circuit is open or shorted.) • Camshaft position sensor (PHASE) • Timing belt • Signal plate

Diagnosis Procedure

INFOID:0000000006496618

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK CMP SENSOR (PHASE) POWER SUPPLY CIRCUIT

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.

CMP sensor (PHASE)		Ground	Voltage
Connector	Terminal		
F70	1	Ground	Battery voltage

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 CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F70	2	F57	99	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F70	3	F57	126	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK CMP SENSOR (PHASE)

Refer to EC-935, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace camshaft position sensor (PHASE).

6.CHECK SIGNAL PLATE

Visually check for chipping signal plate gear tooth of CMP sensor.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace sprocket.

7.CHECK TIMING BELT

Refer to EM-302, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace timing belt.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

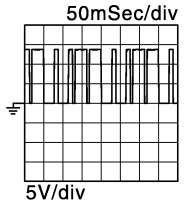
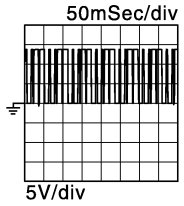
>> **INSPECTION END**

Component Inspection

INFOID:0000000006496619

1.CHECK CMP SENSOR (PHASE)

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Measure the voltage signal between ECM harness connector and ground under the following conditions.

+		-		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F57	126 (CMP sensor signal)	E32	160	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	 JSBIA0140GB
				[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	 JSBIA0141GB

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace CMP sensor.

P0380 GLOW RELAY

DTC Logic

INFOID:0000000006496620

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0380	GLOW PLUG DIAGNOSTIC CONNECTION • CO: Open circuit • CC.0: Short circuit to earth. • CC.1: Short circuit to +12V • 1.DEF: Fault alerted via the control unit	• Harness or connectors (The glow relay circuit is open or shorted.) • Glow relay • Glow plug

NOTE:
If DTC P0380 is displayed with DTC P0560 or P0657, first perform trouble diagnosis for DTC P0560 or P0657. Refer to EC-963, "DTC Logic" (DTC P0560) or EC-976, "DTC Logic" (DTC P0657).

Diagnosis Procedure

INFOID:0000000006496621

1.CHECK GLOW RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect glow relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between glow relay connector and ground.

Glow relay		Ground	Voltage
Connector	Terminal		
F16	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- 100 A fusible link (letter B)
- Harness for open and short between glow relay and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK GLOW RELAY INPUT CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between glow relay harness connector and ECM harness connector.

Glow relay		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F16	3	F57	122	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK GLOW RELAY OUTPUT CIRCUIT FOR OPEN AND SHORT-II

1. Check the continuity between glow relay harness connector and ECM harness connector.

Glow relay		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F16	8	F57	110	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

Is the inspection result normal?

YES >> Replace glow relay.
NO >> Repair or replace.

P0402 EGR VOLUME CONTROL VALVE

DTC Logic

INFOID:0000000006496622

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0402	EGR VOLUME CONTROL	• Harness or connectors (The EGR volume control valve circuit is open or shorted.) • EGR volume control valve

Diagnosis Procedure

INFOID:0000000006496623

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK EGR VOLUME CONTROL VALVE INSTALLATION

Check that EGR volume control valve is installed properly.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Install EGR volume control valve properly.

3.CHECK EGR VOLUME CONTROL VALVE CONTROL MOTOR CIRCUIT

1. Check harness continuity between the following terminals.

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	2	F58	14	Existed
			13	Not existed
	6		14	Not existed
			13	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK 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 5.
NO >> Remove the foreign matter and clean the EGR volume control valve.

5.CHECK EGR PASSAGE

Check the following for clogging and cracks.
- EGR tube
- EGR hose
- EGR cooler

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace EGR passage.

6.CHECK EGR VOLUME CONTROL VALVE

Refer to EC-939, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 8.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.REPLACE EGR VOLUME CONTROL VALVE

1. Replace the EGR volume control valve.
2. Perform EC-881, "Work Procedure"

>> **INSPECTIO END**

Component Inspection

INFOID:0000000006496624

1.CHECK EGR VOLUME CONTROL VALVE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Check resistance between EGR volume control valve terminals as follows.

Terminals	Resistance
2 and 6	2.3 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> GO TO 2.

2.REPLACE EGR VOLUME CONTROL VALVE

1. Replace the EGR volume control valve.
2. Perform EC-881, "Work Procedure"

>> **INSPECTIO END**

P0403 EGR VOLUME CONTROL VALVE

DTC Logic

INFOID:0000000006496625

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0403	EGR VOLUME CONTROL VALVE CIRCUIT • 1.DEF: Internal electronic fault • 2.DEF: Operation temperature too high.	• Harness or connectors (The EGR volume control valve circuit is open or shorted.) • EGR volume control valve

Diagnosis Procedure

INFOID:0000000006496626

1.CHECK EGR VOLUME CONTROL VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector and ECM harness connector.
3. Check the continuity between EGR volume control valve terminal harness connector and ECM harness connector.

EGR volume control valve terminal		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	1	F58	32	Existed
	2		14	
	3		59	
	5		38	
	6		13	

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2.CHECK EGR VOLUME CONTROL VALVE

Refer to EC-941, "Component Inspection".

OK or NG

OK >> GO TO 3.
NG >> Replace EGR volume control valve.

3.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR

Refer to EC-941, "Component Inspection".

OK or NG

OK >> GO TO 4.
NG >> Replace EGR volume control valve.

4.CHECK EGR PASSAGE

Check the following for clogging and cracks.
- EGR tube
- EGR hose
- EGR cooler

OK or NG

OK >> GO TO 5.
NG >> Repair or replace EGR passage.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000006496627

EGR VOLUME CONTROL VALVE

1. Disconnect EGR volume control valve harness connector.
2. Check resistance EGR volume control valve harness connector.

EGR volume control valve				Resistance
Connector	Terminal	Connector	Terminal	
F88	2	F88	6	2.3 Ω [at 25°C (77°F)]

If NG, replace EGR volume control valve. Refer to EC-881, "Work Procedure".

EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR

1. Disconnect EGR volume control valve harness connector.
2. Check continuity EGR volume control valve harness connector.

EGR volume control valve				Continuity
Connector	Terminal	Connector	Terminal	
F88	1	F88	3	Continuity should exist.

If NG, replace EGR volume control valve. Refer to EC-881, "Work Procedure".

P0409 EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR

DTC Logic

INFOID:0000000006496628

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible Cause
P0409	EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR CIRCUIT	• Harness or connectors (The EGR volume control valve control position sensor circuit is open or shorted.) • EGR volume control valve control position sensor

Diagnosis Procedure

INFOID:0000000006496629

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.
2. Turn ignition switch ON.
3. Check the voltage between EGR volume control valve control position sensor connector and ground.

EGR volume control valve control position sensor		Ground	Voltage
Connector	Terminal		
F88	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EGR volume control valve control position sensor harness connector and ECM harness connector.

EGR volume control valve control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	3	E58	59	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR INPUT CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EGR volume control valve control position sensor harness connector and ECM harness connector.

EGR volume control valve control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	5	E58	38	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6. REPLACE EGR VOLUME CONTROL VALVE

1. Replace the EGR volume control valve.
2. Perform EC-881, "Work Procedure"

>> **INSPECTIO END**

P0470 EXHAUST GAS PRESSURE SENSOR 1

DTC Logic

INFOID:0000000006496630

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0470	Exhaust gas pressure sensor 1 circuit • 2.DEF: Signal outside lower limit • 3.DEF: Signal outside upper limit	• Harness or connectors (The exhaust gas pressure sensor 1 circuit is open or shorted.) • Exhaust gas pressure sensor 1

NOTE:
If DTC P0470 is displayed with DTC P0651 or P2263, first perform trouble diagnosis for DTC P0651 or P2263. Refer to EC-975, "DTC Logic" (P0651), EC-1003, "DTC Logic" (P2263).

Diagnosis Procedure

INFOID:0000000006496631

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF and wait at least 20 seconds.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK EXHAUST GAS PRESSURE SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect exhaust gas pressure sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between exhaust pressure sensor 1 harness connector and ground.

Exhaust gas pressure sensor 1		Ground	Voltage
Connector	Terminal		
F67	3	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK EXHAUST GAS PRESSURE SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF and wait at least 20 seconds.
2. Check the continuity between exhaust gas pressure sensor 1 harness connector and ECM harness connector.

Exhaust gas pressure sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F67	1	F58	23	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK EXHAUST GAS PRESSURE SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between exhaust gas pressure sensor 1 harness connector and ECM harness connector.

Exhaust gas pressure sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F67	2	F58	42	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace exhaust gas pressure sensor 1.
NO >> Repair or replace.

P0471 EXHAUST GAS PRESSURE SENSOR 1

DTC Logic

INFOID:0000000006496632

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0471	Exhaust gas pressure sensor 1 • 1.DEF: Incorrect sensor mounting • 2.DEF: Implausible signal	• Exhaust gas pressure sensor 1 • Exhaust gas pipe (Between Exhaust gas pressure sensor 1 and Exhaust manifold)

NOTE:
If DTC P0471 is displayed with DTC P0470 or P2226, first perform trouble diagnosis for DTC P0470 or P2226. Refer to EC-944, "DTC Logic" (P0470), EC-1002, "DTC Logic" (P2226).

Diagnosis Procedure

INFOID:0000000006496633

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF and wait at least 20 seconds.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK EXHAUST GAS PRESSURE SENSOR 1 AND EXHAUST GAS PIPE INSTALLATION

Check exhaust gas pressure sensor and exhaust gas pipe for poor installation and damage.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Install exhaust gas pressure sensor and exhaust gas pipe properly.

3.CHECK EXHAUST GAS PRESSURE SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect exhaust pressure sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between exhaust gas pressure sensor 1 harness connector and ground.

Exhaust gas pressure sensor 1		Ground	Voltage
Connector	Terminal		
F67	3	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK EXHAUST GAS PRESSURE SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF and wait at least 20 seconds.
2. Check the continuity between exhaust gas pressure sensor 1 harness connector and ECM harness connector.

Exhaust gas pressure sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F67	1	F58	23	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK EXHAUST PRESSURE SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between exhaust gas pressure sensor 1 harness connector and ECM harness connector.

Exhaust gas pressure sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F67	2	F58	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 INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace exhaust gas pressure sensor 1.
NO >> Repair or replace.

P047A EXHAUST GAS PRESSURE SENSOR 2

DTC Logic

INFOID:0000000006496634

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P047A	Exhaust gas pressure sensor 2 circuit • 1.DEF: Signal outside lower limit • 2.DEF: Signal outside upper limit	• Harness or connectors (The exhaust gas pressure sensor 2 circuit is open or shorted.) • Exhaust gas pressure sensor 2

NOTE:
If DTC P047A is displayed with DTC P0651, first perform trouble diagnosis for DTC P0651. Refer to EC-975, "DTC Logic".

Diagnosis Procedure

INFOID:0000000006496635

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF and wait at least 20 seconds.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK EXHAUST GAS PRESSURE SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect exhaust gas pressure sensor 2 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between exhaust pressure sensor 2 harness connector and ground.

Exhaust gas pressure sensor 2		Ground	Voltage
Connector	Terminal		
F75	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK EXHAUST GAS PRESSURE SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF and wait at least 20 seconds.
2. Check the continuity between exhaust gas pressure sensor 2 harness connector and ECM harness connector.

Exhaust gas pressure sensor 2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F75	2	F58	31	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK EXHAUST GAS PRESSURE SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between exhaust gas pressure sensor 2 harness connector and ECM harness connector.

Exhaust gas pressure sensor 2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F75	3	F58	53	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace exhaust gas pressure sensor 2.
NO >> Repair or replace.

P047B EXHAUST GAS PRESSURE SENSOR 2

DTC Logic

INFOID:0000000006496636

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P047B	Exhaust gas pressure sensor 2 circuit • 1.DEF: Signal incoherence. • 2.DEF: Signal detected outside upper or lower limit.	• Harness or connectors (The exhaust gas pressure sensor 2 circuit is open or shorted.) • Exhaust gas pressure sensor 2

Diagnosis Procedure

INFOID:0000000006496637

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF and wait at least 20 seconds.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK EXHAUST GAS PRESSURE SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect exhaust gas pressure sensor 2 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between exhaust pressure sensor 2 harness connector and ground.

Exhaust gas pressure sensor 2		Ground	Voltage
Connector	Terminal		
F75	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK EXHAUST GAS PRESSURE SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF and wait at least 20 seconds.
2. Check the continuity between exhaust gas pressure sensor 2 harness connector and ECM harness connector.

Exhaust gas pressure sensor 2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F75	2	F58	31	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK EXHAUST GAS PRESSURE SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between exhaust gas pressure sensor 2 harness connector and ECM harness connector.

Exhaust gas pressure sensor 2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F75	3	F58	53	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace exhaust gas pressure sensor 2.
NO >> Repair or replace.

P0487 EGR VOLUME CONTROL VALVE

DTC Logic

INFOID:0000000006496638

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0487	EGR VOLUME CONTROL VALVE CIRCUIT	• Harness or connectors (The EGR volume control valve circuit is open or shorted.) • EGR volume control valve (DC motor) • EGR volume control valve control position sensor

Diagnosis Procedure

INFOID:0000000006496639

1.CHECK EGR VOLUME CONTROL VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector and ECM harness connector.
3. Check the continuity between EGR volume control valve terminal harness connector and ECM harness connector.

EGR volume control valve terminal		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	1	F58	32	Existed
	2		14	
	3		59	
	5		38	
	6		13	

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2.CHECK EGR VOLUME CONTROL VALVE

Refer to EC-952, "Component Inspection".

OK or NG

OK >> GO TO 3.
NG >> Replace EGR volume control valve. Refer to EC-881, "Work Procedure".

3.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR

Refer to EC-952, "Component Inspection".

OK or NG

OK >> GO TO 4.
NG >> Replace EGR volume control valve. Refer to EC-881, "Work Procedure".

4.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000006496640

EGR VOLUME CONTROL VALVE

1. Disconnect EGR volume control valve harness connector.
2. Check resistance EGR volume control valve harness connector.

EGR volume control valve				Resistance
Connector	Terminal	Connector	Terminal	
F88	2	F88	6	2.3 Ω [at 25°C (77°F)]

If NG, replace EGR volume control valve. Refer to EC-881, "Work Procedure".

EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR

1. Disconnect EGR volume control valve harness connector.
2. Check continuity EGR volume control valve harness connector.

EGR volume control valve				Continuity
Connector	Terminal	Connector	Terminal	
F88	1	F88	3	Continuity should exist.

If NG, replace EGR volume control valve. Refer to EC-881, "Work Procedure".

P0488 EGR SYSTEM

DTC Logic

INFOID:0000000006496641

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0488	EGR VOLUME CONTROL • 5.DEF: Valve locked • 6.DEF: Valve locked	• Harness or connectors (The EGR volume control valve circuit is open or shorted.) • EGR volume control valve (DC motor) • EGR volume control valve control position sensor

Diagnosis Procedure

INFOID:0000000006496642

1.CHECK EGR VOLUME CONTROL VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector and ECM harness connector.
3. Check the continuity between EGR volume control valve terminal harness connector and ECM harness connector.

EGR volume control valve terminal		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	1	F58	32	Existed
	2		14	
	3		59	
	5		38	
	6		13	

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2.CHECK EGR VOLUME CONTROL VALVE

Refer to EC-954, "Component Inspection".

OK or NG

OK >> GO TO 3.
NG >> Replace EGR volume control valve. Refer to EC-881, "Work Procedure".

3.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR

Refer to EC-954, "Component Inspection".

OK or NG

OK >> GO TO 4.
NG >> Replace EGR volume control valve. Refer to EC-881, "Work Procedure".

4.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000006496643

EGR VOLUME CONTROL VALVE

1. Disconnect EGR volume control valve harness connector.
2. Check resistance EGR volume control valve harness connector.

EGR volume control valve				Resistance
Connector	Terminal	Connector	Terminal	
F88	2	F88	6	2.3 Ω [at 25°C (77°F)]

If NG, replace EGR volume control valve. Refer to EC-881, "Work Procedure".

EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR

1. Disconnect EGR volume control valve harness connector.
2. Check continuity EGR volume control valve harness connector.

EGR volume control valve				Continuity
Connector	Terminal	Connector	Terminal	
F88	1	F88	3	Continuity should exist.

If NG, replace EGR volume control valve. Refer to EC-881, "Work Procedure".

P0504 ASCD BRAKE SWITCH

DTC Logic

INFOID:0000000006496644

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0504	ASCD brake switch circuit	• Harness or connectors (The ASCD brake switch circuit is open or shorted.) • ASCD brake switch

Diagnosis Procedure

INFOID:0000000006496645

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF and wait at least 20 seconds.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Disconnect ACSD brake switch harness connector.
2. Check the voltage between ACSD brake switch harness connector and ground.

ACSD brake switch		Ground	Voltage
Connector	Terminal		
M203 (RHD models) E112 (LHD models)	1	Ground	Battery voltage

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 ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ACSD brake switch harness connector and ECM harness connector.

ACSD brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M203 (RHD models) E112 (LHD models)	2	E32	148	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ASCD BRAKE SWITCH

Refer to EC-957, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace ASCD brake switch.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace ACSD brake switch.

NO >> Repair or replace.

Component Inspection

INFOID:0000000006496646

1. CHECK ASCD BRAKE SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check the continuity between ASCD brake switch terminals under the following condition.

ASCD brake switch				Condition		Continuity
Connector	Terminals	Connector	Terminal			
M203 (RHD models) E112 (LHD models)	1	M203 (RHD models) E112 (LHD models)	2	ASCD brake switch	Depressed	Not existed
					Released	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD brake switch.

P0525 ASCD SYSTEM

DTC Logic

INFOID:0000000006496647

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0525	• ASCD brake switch circuit • Clutch pedal position switch circuit	• Harness or connectors (The ASCD brake switch circuit is open or shorted.) (The Clutch pedal position switch circuit is open or shorted.) • ASCD brake switch • Clutch pedal position switch

Diagnosis Procedure

INFOID:0000000006496648

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF and wait at least 20 seconds.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ASCD BRAKE SWITCH AND CLUTCH PEDAL POSITION SWITCH POWER SUPPLY CIRCUIT

1. Disconnect ACSD brake switch and clutch pedal position switch harness connectors.
2. Check the voltage between ACSD brake switch and clutch pedal position switch harness connectors and ground.

ACSD brake switch		Ground	Voltage
Connector	Terminal		
M203 (RHD models) E112 (LHD models)	1	Ground	Battery voltage

Clutch pedal position switch		Ground	Voltage
Connector	Terminal		
M208 (RHD models) E111 (LHD models)	3	Ground	Battery voltage

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 ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT AND CLUTCH PEDAL POSITION SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ACSD brake switch harness connector and ECM harness connector.

ACSD brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M203 (RHD models) E112 (LHD models)	2	E32	148	Existed

2. Check the continuity between clutch pedal position switch harness connector and ground.

Clutch pedal position switch		Ground	Continuity
Connector	Terminal		
M208 (RHD models) E111 (LHD models)	4	Ground	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ASCD BRAKE SWITCH AND CLUTCH PEDAL POSITION SWITCH

Refer to EC-959, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace ASCD brake switch or clutch pedal position switch.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace ACSD brake switch or clutch pedal position switch.
NO >> Repair or replace.

Component Inspection

INFOID:0000000006496649

1. CHECK ASCD BRAKE SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check the continuity between ASCD brake switch terminals under the following condition.

ASCD brake switch				Condition		Continuity
Connector	Terminals	Connector	Terminal			
M203 (RHD models) E112 (LHD models)	1	M203 (RHD models) E112 (LHD models)	2	ASCD brake switch	Depressed	Not existed
					Released	Existed

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace ASCD brake switch.

2. 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 under the following condition.

clutch pedal position switch				Condition		Continuity
Connector	Terminals	Connector	Terminal			
M208 (RHD models) E111 (LHD models)	3	M208 (RHD models) E111 (LHD models)	4	clutch pedal position switch	Depressed	Not existed
					Released	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace clutch pedal position switch.

P0530 REFRIGERANT PRESSURE SENSOR

DTC Logic

INFOID:0000000006496650

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0530	REFRIGERANT PRESSURE SENSOR CIRCUIT	• Harness or connectors (Refrigerant pressure sensor circuit is open or shorted.) • Refrigerant pressure sensor

Diagnosis Procedure

INFOID:0000000006496651

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between refrigerant pressure sensor connector and ground.

Refrigerant pressure sensor		Ground	Voltage
Connector	Terminal		
E49	3	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F1
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E49	1	F58	35	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F1
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E49	2	F58	46	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F1
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.
NO >> Repair or replace.

P0544 EGT SENSOR 1

DTC Logic

INFOID:0000000006496652

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0544	Exhaust gas temperature sensor 1 circuit • 1.DEF: Signal outside lower limit • 2.DEF: Signal outside upper limit	• Harness or connectors (Exhaust gas temperature sensor 1 circuit is open or shorted.) • Exhaust gas temperature sensor 1

Diagnosis Procedure

INFOID:0000000006496653

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK EXHAUST GAS TEMPERATURE SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect exhaust gas temperature sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between exhaust gas temperature sensor 1 harness connector and ground.

Exhaust gas temperature sensor 1		Ground	Voltage
Connector	Terminal		
F76	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK EXHAUST GAS TEMPERATURE SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between exhaust gas temperature sensor 1 harness connector and ECM harness connector.

Exhaust gas temperature sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F76	2	F76	63	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

Is the inspection result normal?

YES >> Replace exhaust gas temperature sensor 1.
NO >> Repair or replace.

P0560 BATTERY VOLTAGE

DTC Logic

INFOID:0000000006496654

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0560	BATTERY VOLTAGE • 1.DEF: Permanent low level • 2.DEF: Permanent high level • 3.DEF: Battery voltage too low	• Harness connectors (ECM power supply circuit is open or shorted.) • Battery • Battery terminal • Alternator • IPDM E/R

NOTE:
When IPDM E/R DTC is indicated with DTC P0560, IPDM E/R DTC must be checked first.

Diagnosis Procedure

INFOID:0000000006496655

1.CHECK BATTERY VOLTAGE

1. Turn ignition switch ON.
2. Check battery voltage.

Voltage: Above 11 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> Recharge the battery.

2.CHECK BATTERY TERMINALS

1. Turn ignition switch OFF.
2. Check battery terminals condition.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair the battery terminals.

3.CHECK BATTERY AND ALTERNATOR

Check that the proper type of battery and type of alternator are installed.
Refer to, PG-126, "Battery" and CHG-35, "Alternator".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace with a proper one.

4.CHECK ECM POWER SUPPLY CIRCUIT-I

Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F57	67	Ground	Battery voltage
E32	153		

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 5.

5.CHECK ECM POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E14.

3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F57	68	E14	43	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F1
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK 20A FUSE

1. Disconnect 20A fuse (No. 43) from IPDM E/R.
2. Check 20A fuse.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace 20A fuse.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace.

P0564 ASCD STEERING SWITCH

DTC Logic

INFOID:0000000006496656

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0564	ASCD steering switch circuit • CO.1: Open circuit or short circuit to +12 V • 1.DEF: Values outside tolerances. • 2.DEF: Signal incoherence.	• Harness or connectors (The switch circuit is open or shorted.) • ASCD steering switch

Diagnosis Procedure

INFOID:0000000006496657

1.CHECK ASCD STEERING SWITCH CIRCUIT

1. Check ASCD steering switch circuit.

ASCD steering switch>>Refer to EC-1011, "Component Function Check" and EC-1011, "Diagnosis Procedure".
ASCD main switch>>Refer to EC-1009, "Component Function Check" and EC-1009, "Diagnosis Procedure".

P0574 VSS

DTC Logic

INFOID:0000000006496658

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0574	VEHICLE SPEED SIGNAL	Combination meter

P0575 ASCD STEERING SWITCH

DTC Logic

INFOID:0000000006496659

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible Cause
P0575	ASCD steering switch circuit DEF:Signal incoherence.	• Harness or connectors (ASCD steering switch circuit is open or shorted.) • ASCD steering switch

Diagnosis Procedure

INFOID:0000000006496660

1.CHECK ASCD STEERING SWITCH CIRCUIT

1. Check ASCD steering switch circuit.

ASCD steering switch>>Refer to EC-1011, "Component Function Check" and EC-1011, "Diagnosis Procedure".
ASCD main switch>>Refer to EC-1009, "Component Function Check" and EC-1009, "Diagnosis Procedure".

P0606 ECM

DTC Logic

INFOID:0000000006496661

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0606	ECM • 1.DEF: Internal electronic fault	ECM

Diagnosis Procedure

INFOID:0000000006496662

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Turn ignition switch OFF and wait for 20 seconds.
4. Turn ignition switch ON and perform the self-diagnosis.

Is the DTC P0606 displayed again?

YES >> GO TO 2.
NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Go to EC-879, "Work Procedure".

>> INSPECTION END

P060A ECM

DTC Logic

INFOID:0000000006496663

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P060A	COMPUTER (C/U) • 1.DEF: Internal electronic fault • 2.DEF: Internal electronic fault • 3.DEF: Internal electronic fault	ECM

Diagnosis Procedure

INFOID:0000000006496664

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Turn ignition switch OFF and wait for 20 seconds.
4. Turn ignition switch ON and perform the self-diagnosis.

Is the DTC P060A displayed again?

YES >> GO TO 2.
NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Go to EC-879, "Work Procedure".

>> INSPECTION END

P060B ECM

DTC Logic

INFOID:0000000006496665

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P060B	Engine control module (A/D processing performance) • 1.DEF:Internal electronic fault	• ECM

Diagnosis Procedure

INFOID:0000000006496666

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Turn ignition switch OFF and wait for 20 seconds.
4. Turn ignition switch ON and perform the self-diagnosis.

Is the DTC P060B displayed again?

YES >> GO TO 2.
NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Go to EC-879, "Work Procedure".

>> INSPECTION END

P061A ECM

DTC Logic

INFOID:0000000006496667

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P061A	ECM • 1.DEF: Internal electronic fault • 2.DEF: Internal electronic fault • 3.DEF: Internal electronic fault • 4.DEF: Internal electronic fault	ECM

Diagnosis Procedure

INFOID:0000000006496668

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Turn ignition switch OFF and wait for 20 seconds.
4. Turn ignition switch ON and perform the self-diagnosis.

Is the DTC P061A displayed again?

YES >> GO TO 2.
NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Go to EC-879, "Work Procedure".

>> INSPECTION END

P062B ECM

DTC Logic

INFOID:0000000006496669

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P062B	Engine control module (Injector module error) • 1.DEF:Internal electronic fault • 2.DEF:Internal electronic fault • 3.DEF:Internal electronic fault • 4.DEF:Internal electronic fault • 5.DEF:Internal electronic fault	• ECM

Diagnosis Procedure

INFOID:0000000006496670

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Turn ignition switch OFF and wait for 20 seconds.
4. Turn ignition switch ON and perform the self-diagnosis.

Is the DTC P062B displayed again?

YES >> GO TO 2.
NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Go to EC-879, "Work Procedure".

>> INSPECTION END

P0638 ELECTRIC THROTTLE CONTROL ACTUATOR FUNCTION

DTC Logic

INFOID:0000000006496671

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0638	Electric throttle control actuator 1.DEF:No response from the valve motor 2.DEF:Inlet flap blocked closed 3.DEF:Inlet flap blocked open. 4.DEF:Closing of air inlet flap	Electric throttle control actuator

NOTE:
If DTC P0638 is displayed with DTC P0120 or P2100, first perform trouble diagnosis for DTC P0120 or P2100. Refer to EC-909, "DTC Logic" (P0120), EC-997, "DTC Logic" (P2100).

Diagnosis Procedure

INFOID:0000000006496672

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Perform EC-910, "Component Inspection" (P0120), EC-998, "Component Inspection" (P2100).

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-973, "Special Repair Requirement".

>> INSPECTION END

3.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006496673

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-882, "Work Procedure".

>> END

P0641 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000006496674

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0641	SENSOR POWER SUPPLY CIRCUIT • 1.DEF: Above the max level • 2.DEF: Below the min level	• Harness or connectors (The APP sensor power supply circuit) (Turbocharger boost sensor power supply circuit) (EGR volume control valve control position sensor power supply circuit) (Throttle position sensor power supply circuit) (Exhaust gas temperature sensor 1 power supply circuit) • Accelerator pedal position sensor • Turbocharger boost sensor • EGR volume control valve control position sensor • Throttle position sensor • Exhaust gas temperature sensor 1

Diagnosis Procedure

INFOID:0000000006496675

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F58	64	Exhaust gas temperature sensor 1	F76	1
	32	EGR volume control valve (EGR volume control valve control position sensor)	F88	1
	16	Throttle position sensor	F43	2
	52	Turbocharger boost sensor	F71	1
E32	154	Accelerator pedal position sensor (sensor 1)	M206 (RHD models) E110 (LHD models)	4
	150	Accelerator pedal position sensor (sensor 2)		5

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair short to ground or short to power in harness or connectors.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

>> INSPECTION END

P0651 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000006496676

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0651	SENSOR POWER SUPPLY CIRCUIT • 1.DEF: Above the max level • 2.DEF: Below the min level	• Harness or connectors (The APP sensor power supply circuit) (Refrigerant pressure sensor power supply circuit) (Exhaust gas temperature sensor 2 power supply circuit) • Accelerator pedal position sensor • Refrigerant pressure sensor • Exhaust gas temperature sensor 2

Diagnosis Procedure

INFOID:0000000006496677

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F58	40	Refrigerant pressure sensor	E49	3
F57	88	Exhaust gas temperature sensor 2	F68	1
E32	154	Accelerator pedal position sensor (sensor 1)	M206 (RHD models) E110 (LHD models)	4
	150	Accelerator pedal position sensor (sensor 2)		5

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair short to ground or short to power in harness or connectors.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

>> INSPECTION END

P0657 ECM RELAY

DTC Logic

INFOID:0000000006496678

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0657	ECM RELAY CIRCUIT CC.0: Short circuit to earth.	• Harness or connectors (The ECM relay circuit is open or short-ed.) • IPDM E/R (ECM relay) • 20A fuse (No. 43)

NOTE:
When IPDM E/R DTC is indicated with DTC P0657, IPDM E/R DTC must be checked first.

Diagnosis Procedure

INFOID:0000000006496679

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ECM RELAY CIRCUIT-I

Check the voltage between ECM harness connector and ground.

ECM				Voltage
+		–		
Connector	Terminal	Connector	Terminal	
F57	105	E32	160	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK ECM RELAY CIRCUIT-II

1. Disconnect ECM harness connector F57.
2. Disconnect IPDM E/R harness connector E14.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F57	105	E14	40	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E8, F1
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK 20A FUSE

1. Disconnect 20A fuse (No. 43) from IPDM E/R.
2. Check 20A fuse.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace 20A fuse.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

P0697 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000006496680

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0697	Sensor power supply 3 circuit 1.DEF:Above the max level 2.DEF:Below the min level	• Harness or connectors (Fuel rail pressure sensor circuit is shorted.) • Fuel rail pressure sensor

Diagnosis Procedure

INFOID:0000000006496681

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF and wait at least 4 minutes.
2. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK FUEL RAIL PRESSURE SENSOR POWER SUPPLY CIRCUIT-I

1. Disconnect fuel rail pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between fuel rail pressure sensor harness connector and ground.

Fuel rail pressure sensor		Ground	Voltage
Connector	Terminal		
F72	3	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK FUEL RAIL PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF and wait at least 4 minutes.
2. Disconnect ECM harness connectors.
3. Check harness for short to power and short to ground between fuel rail pressure sensor harness connector and ECM harness connector.

ECM		Fuel rail pressure sensor	
Connector	Terminal	Connector	Terminal
F58	56	F72	3

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair short to ground or short to power in harness or connectors.

4.CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-918, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace fuel rail.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

P0833 CPP SWITCH

DTC Logic

INFOID:0000000006496682

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0833	Clutch pedal position switch circuit	• Harness or connectors (Fuel rail pressure sensor circuit is shorted.) • Clutch pedal position switch

Diagnosis Procedure

INFOID:0000000006496683

1.CHECK CLUTCH PEDAL POSITION SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect clutch pedal position switch harness connector.
3. Check the continuity between clutch pedal position switch harness connector and ground.

Clutch pedal position switch		Ground	Continuity
Connector	Terminal		
E111 (LHD) M208 (RHD)	4	Ground	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to power in harness or connectors.

2.CHECK CLUTCH PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between clutch pedal position switch harness connector and ECM harness connector.

Clutch pedal position switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E111 (LHD) M208 (RHD)	3	E32	140	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK CLUTCH PEDAL POSITION SWITCH

Refer to EC-981, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace clutch pedal position switch.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006496684

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 under the following conditions.

Clutch pedal position switch		Condition		Continuity
Connector	Terminals			
E111 (LHD) M208 (RHD)	3 and 4	Clutch pedal	Fully released	Existed
			Fully 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-7, "Inspection and Adjustment".
2. Check the continuity between clutch pedal position switch terminals under the following conditions.

Clutch pedal position switch		Condition		Continuity
Connector	Terminals			
E111 (LHD) M208 (RHD)	3 and 4	Clutch pedal	Fully released	Existed
			Fully depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace clutch pedal position switch.

P1205 EXHAUST FUEL INJECTOR

DTC Logic

INFOID:0000000006496685

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P1205	EXHAUST FUEL INJECTOR CONTROL • CC.0: Short circuit to earth. • CC.1: Short circuit to +12V • CO: Open circuit	• Harness or connectors (The exhaust fuel injector circuit is open or shorted.) • Exhaust fuel injector

Diagnosis Procedure

INFOID:0000000006496686

1.CHECK EXHAUST FUEL INJECTOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect exhaust fuel injector harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust fuel injector harness connector and ground.

Exhaust fuel injector		Ground	Voltage
Connector	Terminal		
F85	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F1
- Harness for open or short between IPDM E/R and exhaust fuel injector

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust fuel injector harness connector and ECM harness connector.

Exhaust fuel injector		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F85	2	F57	85	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK EXHAUST FUEL INJECTOR

Refer to EC-983, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace exhaust fuel injector.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

>> INSPECTION END

Component Inspection

INFOID:0000000006496687

1. CHECK EXHAUST FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect exhaust fuel injector harness connector.
3. Check resistance between exhaust fuel injector terminals as follows.

Terminals	Resistance
1 and 2	150 - 250 Ω [at 20°C (68°F)]

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace exhaust fuel injector.

P1525 COMMUNICATION CIRCUIT FOR ASCD AND SPEED LIMITER

DTC Logic

INFOID:0000000006496688

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible Cause
P1525	ASCD and speed limiter communication circuit DEF:The data supplied to the cruise control or speed limiter are not correct.	• ASCD brake switch • Clutch pedal position switch • Combination meter

P1544 EGT SENSOR 2

DTC Logic

INFOID:0000000006496689

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P1544	Exhaust gas temperature sensor 2 circuit • 1.DEF: Signal outside lower limit • 2.DEF: Signal outside upper limit • 3.DEF: Signal incoherence.	• Harness or connectors (Exhaust gas temperature sensor 2 circuit is open or shorted.) • Exhaust gas temperature sensor 2

NOTE:
If DTC P1544 is displayed with DTC P0115, first perform trouble diagnosis for DTC P0115. Refer to EC-907, "DTC Logic".

Diagnosis Procedure

INFOID:0000000006496690

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK EXHAUST GAS TEMPERATURE SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect exhaust gas temperature sensor 2 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between exhaust gas temperature sensor 2 harness connector and ground.

Exhaust gas temperature sensor 2		Ground	Voltage
Connector	Terminal		
F68	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK EXHAUST GAS TEMPERATURE SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor 2 harness connector and ECM harness connector.

Exhaust gas temperature sensor 2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F68	2	F57	75	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace exhaust gas temperature sensor 2.
NO >> Repair or replace.

P1545 EGT SENSOR 2

DTC Logic

INFOID:0000000006496691

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P1545	Exhaust gas temperature sensor 2 performance • 1.DEF:Signal outside lower limit • 2.DEF:Signal outside upper limit	• Electric throttle control actuator • Turbocharger • Mass air flow sensor • EGR circuit • Exhaust pipes • Air cleaner filter • Turbocharger boost control solenoid valve • Vacuum pump circuit

NOTE:
If DTC P1545 is displayed with DTC P1544, first perform trouble diagnosis for DTC P1544. Refer to EC-985, "DTC Logic".

P160C ECM

DTC Logic

INFOID:0000000006496692

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P160C	ECM 1.DEF: Internal electronic fault	ECM

Diagnosis Procedure

INFOID:0000000006496693

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Turn ignition switch OFF and wait for 20 seconds.
4. Turn ignition switch ON and perform the self-diagnosis.

Is the DTC P160C displayed again?

YES >> GO TO 2.
NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Go to EC-879, "Work Procedure".

>> INSPECTION END

P1632 FUEL CUT OFF VALVE

DTC Logic

INFOID:0000000006496694

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P1632	FUEL CUT OFF VALVE CIRCUIT • CC.0: Short circuit to earth. • CC.1: Short-circuit to +12V • CO: Open Circuit	• Harness or connectors (The fuel injector circuit is open or shorted.) • Fuel cut off valve

Diagnosis Procedure

INFOID:0000000006496695

1.CHECK FUEL CUT OFF VALVE POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuel cut off valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel cut off valve harness connector and ground.

Fuel cut off valve		Ground	Voltage
Connector	Terminal		
F86	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F1
- Harness for open or short between IPDM E/R and fuel cut off valve

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL CUT OFF VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel cut off valve harness connector and ECM harness connector.

Fuel cut off valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F86	2	F57	66	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL CUT OFF VALVE

Refer to EC-989, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace exhaust fuel injector.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006496696

1. CHECK FUEL CUT OFF VALVE

1. Turn ignition switch OFF.
2. Disconnect fuel cut off valve harness connector.
3. Check resistance between fuel cut off valve terminals as follows.

Terminals	Resistance
1 and 2	150 - 250 Ω [at 20°C (68°F)]

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace fuel cut off valve.

P1641 THERMOPLUNGER CONTROL UNIT

DTC Logic

INFOID:0000000006496697

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P1641	THERMOPLUNGER CONTROL UNIT DIAGNOSTIC CONNECTION • CO: Open circuit • CC.0: Short circuit to earth. • CC.1: Short circuit to +12V	• Harness or connectors (Thermoplunger control unit circuit is open or shorted.) • Thermoplunger control unit

Diagnosis Procedure

INFOID:0000000006496698

1.CHECK THERMOPLUNGER CONTROL UNIT POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect thermoplunger control unit harness connector.
3. Check the voltage between thermoplunger control unit harness connector and ground.

Thermoplunger control unit		Ground	Voltage
Connector	Terminal		
F25	4	Ground	Battery voltage
	5		

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- 100A fusible link (letter B)
- Harness for open and short between thermoplunger control unit and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK THERMOPLUNGER CONTROL UNIT GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between thermoplunger control unit harness connector and ECM harness connector.

Thermoplunger control unit		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F25	2	F57	93	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

Is the inspection result normal?

YES >> Replace thermoplunger control unit.
NO >> Repair or replace.

P1642 THERMOPLUNGER CONTROL UNIT

DTC Logic

INFOID:0000000006496699

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P1642	THERMOPLUNGER CONTROL UNIT DIAGNOSTIC CONNECTION • CO: Open circuit • CC.0: Short circuit to earth. • CC.1: Short circuit to +12V	• Harness or connectors (Thermoplunger control unit circuit is open or shorted.) • Thermoplunger control unit

Diagnosis Procedure

INFOID:0000000006496700

1.CHECK THERMOPLUNGER CONTROL UNIT POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect thermoplunger control unit harness connector.
3. Check the voltage between thermoplunger control unit harness connector and ground.

Thermoplunger control unit		Ground	Voltage
Connector	Terminal		
F25	4	Ground	Battery voltage
	5		

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- 100A fusible link (letter B)
- Harness for open and short between thermoplunger control unit and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK THERMOPLUNGER CONTROL UNIT GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between thermoplunger control unit harness connector and ECM harness connector.

Thermoplunger control unit		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F25	8	F57	108	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

Is the inspection result normal?

YES >> Replace thermoplunger control unit.
NO >> Repair or replace.

P1643 THERMOPLUNGER CONTROL UNIT

DTC Logic

INFOID:0000000006496701

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P1643	THERMOPLUNGER CONTROL UNIT DIAGNOSTIC CONNECTION • C0: Open circuit • CC.0: Short circuit to earth. • CC.1: Short circuit to +12V	• Harness or connectors (Thermoplunger control unit circuit is open or shorted.) • Thermoplunger control unit

Diagnosis Procedure

INFOID:0000000006496702

1.CHECK THERMOPLUNGER CONTROL UNIT POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect thermoplunger control unit harness connector.
3. Check the voltage between thermoplunger control unit harness connector and ground.

Thermoplunger control unit		Ground	Voltage
Connector	Terminal		
F25	4	Ground	Battery voltage
	5		

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- 100A fusible link (letter B)
- Harness for open and short between thermoplunger control unit and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK THERMOPLUNGER CONTROL UNIT GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between thermoplunger control unit harness connector and ECM harness connector.

Thermoplunger control unit		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F25	1	F57	104	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

Is the inspection result normal?

YES >> Replace thermoplunger control unit.
NO >> Repair or replace.

P1650 THERMOPLUNGER CONTROL UNIT

DTC Logic

INFOID:0000000006496703

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P1650	THERMOPLUNGER CONTROL UNIT CIRCUIT • 1.DEF: Signal incoherence.	• Fusible link • Harness or connectors (Thermoplunger control unit circuit is open or shorted.) • Thermoplunger control unit • Thermoplunger

Diagnosis Procedure

INFOID:0000000006496704

1.CHECK THERMOPLUNGER CONTROL UNIT POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect thermoplunger control unit harness connector.
3. Check the voltage between thermoplunger control unit harness connector and ground.

Thermoplunger control unit		Ground	Voltage
Connector	Terminal		
F25	4	Ground	Battery voltage
	5		

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- 100A fusible link (letter B)
- Harness for open and short between thermoplunger control unit and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK THERMOPLUNGER CONTROL UNIT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Disconnect ECM harness connector.
2. Check the continuity between thermoplunger control unit harness connector and ECM harness connector.

Thermoplunger control unit		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F25	1	F57	104	Existed
	2		93	
	3		120	
	7		123	
	8		108	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between thermoplunger control unit and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THERMOPLUNGER CONTROL UNIT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect thermoplunger harness connector.
2. Check the continuity between thermoplunger control unit harness connector and thermoplunger harness connector.

Thermoplunger control unit		Thermoplunger		Continuity
Connector	Terminal	Connector	Terminal	
F201	10	F202	1	Existed
	11	F203		
	12	F204		
	9	F205		

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK THERMOPLUNGER

Refer to EC-994, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace malfunctioning Thermoplunger.

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace thermoplunger control unit.
NO >> Repair or replace.

Component Inspection

INFOID:0000000006496705

1. CHECK THERMOPLUNGER

1. Turn ignition switch OFF.
2. Disconnect thermoplunger harness connector.
3. Check resistance between thermoplunger terminals as follows.

Terminal	Resistance
1 and ground	Not less than 2Ω [at 20°C (68°F)]

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace malfunctioning thermoplunger.

P2002 DIESEL PARTICULATE FILTER

DTC Logic

INFOID:0000000006496706

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2002	Diesel particulate filter efficiency below threshold • 1.DEF: Connections • 2.DEF: Clogged	• Diesel particulate filter

Diagnosis Procedure

INFOID:0000000006496707

1.CHECK DIESEL PARTICULATE FILTER

Refer to EC-995, "Component Inspection".

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2.REPLACE DIESEL PARTICULATE FILTER

1. Replace diesel particulate filter.
2. Perform “Diesel Particulate Filter Data Clear”. Refer to EC-884, "Work Procedure"

>> **INSPECTION END**

Component Inspection

INFOID:0000000006496708

1.CHECK DIESEL PARTICULATE FILTER-I

1. Start engine and warm it up to normal operating temperature.
2. With engine running in neutral position, make 4 accelerations (wait at least 10 seconds between 2 accelerations).
3. Put white duster on exhaust line output.
4. With engine running in neutral position, make 1 acceleration.
5. Duster is still white.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK DIESEL PARTICULATE FILTER-II

1. Put a new white duster.
2. With engine running in neutral position, make 10 accelerations.
3. Compare duster state with the first one (Step 1 - 5). If duster becames dark grey or black, diesel particulate filter is damaged.

Is the diesel particulate filter damaged?

YES >> GO TO 3.
NO >> INSPECTION END

3.REPLACE DIESEL PARTICULATE FILTER

1. Replace diesel particulate filter.
2. Perform “Diesel Particulate Filter Data Clear”. Refer to EC-884, "Work Procedure".

>> INSPECTION END

P2080 EGT SENSOR 1

DTC Logic

INFOID:0000000006496709

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2080	Exhaust gas temperature sensor 1 circuit • 1.DEF: Measured temperature too high	• Harness or connectors (Exhaust gas temperature sensor 1 circuit is open or shorted.) • Exhaust gas temperature sensor 1

Diagnosis Procedure

INFOID:0000000006496710

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK EXHAUST GAS TEMPERATURE SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect exhaust gas temperature sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between exhaust gas temperature sensor 1 harness connector and ground.

Exhaust gas temperature sensor 1		Ground	Voltage
Connector	Terminal		
F76	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK EXHAUST GAS TEMPERATURE SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between exhaust gas temperature sensor 1 harness connector and ECM harness connector.

Exhaust gas temperature sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F76	2	F58	63	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

Is the inspection result normal?

YES >> Replace exhaust gas temperature sensor 1.
NO >> Repair or replace.

P2100 ELECTRIC THROTTLE CONTROL FUNCTION

DTC Logic

INFOID:0000000006496711

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2100	Throttle control motor circuit 1.DEF:Signal incoherence. 2.DEF:Thermal protection	• Harness or connectors (Throttle control motor circuit is open or shorted) • Electric throttle control actuator

Diagnosis Procedure

INFOID:0000000006496712

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF and wait at least 4 minutes.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR CIRCUIT FOR OPEN AND SHORT

1. Disconnect electric throttle control actuator harness connector.
2. Disconnect ECM harness connectors.
3. Check the continuity between the following terminals.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F43	1	F58	9	Existed
			10	Not existed
	6		9	Not existed
			10	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 THROTRTLE CONTROL MOTOR

Perform EC-998, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-998, "Special Repair Requirement".

>> INSPECTION END

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

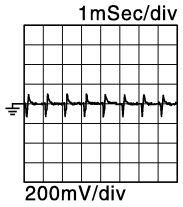
>> INSPECTION END

Component Inspection

INFOID:0000000006496713

1.CHECK THROTTLE CONTROL MOTOR

1. Reconnect all harness connectors disconnected.
2. Check the voltage between ECM harness connectors terminals under the following conditions.

ECM				Condition	Voltage
+		–			
Connector	Terminal	Connector	Terminal		
F58	9	E32	160	**[Engine is running]** • **Warm-up condition** • Idle speed	0 V
	10			**[Engine is running]** • **Warm-up condition** • Idle speed	 JSBIA0128GB
				[Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-998, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006496714

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-882, "Work Procedure".

>> END

P2119 ELECTRIC THROTTLE CONTROL FUNCTION

DTC Logic

INFOID:0000000006496715

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2119	Electric Throttle control actuator circuit 1.DEF:Offset implausible	• Harness or connectors • Electric throttle control actuator

Diagnosis Procedure

INFOID:0000000006496716

1.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-999, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006496717

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-882, "Work Procedure".

>> END

P2120 APP SENSOR

DTC Logic

INFOID:0000000006496718

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2120	ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT • 1.DEF: Signal outside upper limit • 2.DEF: Signal outside lower limit	• Harness or connectors (APP sensor 2 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 2)

Diagnosis Procedure

INFOID:0000000006496719

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between accelerator pedal position sensor connector and ground.

Accelerator pedal position sensor			Ground	Voltage
Sensor	Connector	Terminal		
2	E110 (LHD models) M206 (RHD models)	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

- Harness connectors E105, M77 (RHD models)
- Harness connectors M95, M202 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connector.

4.CHECK ACCELERATOR PEDAL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position sensor.
3. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
2	E110 (LHD models) M206 (RHD models)	1	E32	152	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

- Harness connectors E105, M77 (RHD models)
- Harness connectors M95, M202 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connector.

6.CHECK ACCELERATOR PEDAL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
2	E110 (LHD models) M206 (RHD models)	6	E32	151	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

- Harness connectors E105, M77 (RHD models)
- Harness connectors M95, M202 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connector.

8.CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to EC-1001, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace accelerator pedal position sensor.

9.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

>> INSPECTION END

Component Inspection

INFOID:0000000006496720

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position sensor harness connector.
3. Check resistance between accelerator pedal position sensor as follows.

Sensor	Terminals	Resistance
1	2 and 4	1.7 ± 0.9 KΩ
2	1 and 5	2.85 ± 2.05 KΩ

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace accelerator pedal position sensor.

P2226 BARO SENSOR

DTC Logic

INFOID:0000000006496721

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2226	BAROMETRIC PRESSURE SENSOR CIRCUIT • 1.DEF: Above the max level • 2.DEF: Below the min level	• ECM

Diagnosis Procedure

INFOID:0000000006496722

1.REPLACE ECM

Perform EC-879, "Work Procedure".

>> **INSPECTION END**

P2263 TC SYSTEM

DTC Logic

INFOID:0000000006496723

DTC DETECTION LOGIC

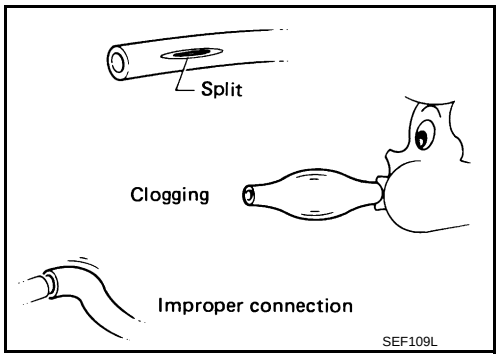
DTC No.	Trouble diagnosis name	Possible cause
P2263	AIR INLET CIRCUIT • 1.DEF: Turbocharging pressure is too high. • 2.DEF: Turbocharging pressure is too low.	• Harness or connectors (Turbocharger boost control solenoid valve circuit is open or shorted.) • Air inlet circuit • Vacuum pump • Vacuum hose • Turbocharger • Turbocharger boost control solenoid valve • Turbocharger boost sensor • Electric throttle control actuator • EGR circuit • Exhaust pipe

Diagnosis Procedure

INFOID:0000000006496724

1.CHECK VACUUM HOSES AND VACUUM GALLERY

1. Turn ignition switch OFF.
2. Check vacuum hoses and vacuum gallery for clogging, cracks or improper connection. Refer to EC-825, "TURBOCHARGER BOOST CONTROL : Vacuum Hose Drawing".



Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 2.

2.CHECK AIR FILTER

Check that air filter is not obstructed.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 3.

3.CHECK INTAKE AIR DUCT

Check that intake air duct is not obstructed.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 4.

4.CHECK VACUUM PUMP

Check vacuum pump.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 5.

5.CHECK TURBOCHARGER

Check turbocharger.

Is the inspection result normal?

Yes >> Repair or replace.

No >> GO TO 6.

6.CHECK EGR COOLER BYPASS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Disconnect EGR cooler bypass control solenoid valve harness connector.
2. Turn ignition switch ON.
3. Check the voltage between EGR cooler bypass control solenoid valve harness connector and ground.

EGR cooler bypass control solenoid valve		Ground	Voltage
Connector	Terminal		
F89	2	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
- Harness for open or short between IPDM E/R and EGR cooler bypass control solenoid valve

>> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK EGR COOLER BYPASS CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EGR cooler bypass control solenoid valve harness connector and ECM harness connector.

EGR cooler bypass control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E89	1	F57	86	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK EGR COOLER BYPASS CONTROL SOLENOID VALVE

Refer to EC-894, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace turbocharger boost control solenoid valve.

10.CHECK TURBOCHARGER BOOST SENSOR

Refer to EC-912, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace turbocharger boost sensor.

11.CHECK THROTTLE CONTROL MOTOR

Refer to EC-998, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace electric throttle control actuator.

12.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

>> **INSPECTION END**

P245A EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000006496725

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P245A	EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE CIRCUIT • 2.DEF: Signal outside lower limit • 3.DEF: Signal outside upper limit	• Harness or connectors (The EGR cooler bypass valve control solenoid valve circuit is open or shorted.) • EGR cooler bypass valve control solenoid valve

NOTE:
If DTC P245A is displayed with DTC P0560 or P0657, first perform trouble diagnosis for DTC P0560 or P0657. Refer to EC-963, "DTC Logic" (DTC P0560) or EC-976, "DTC Logic" (DTC P0657).

Diagnosis Procedure

INFOID:0000000006496726

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EGR cooler bypass valve control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EGR cooler bypass valve control solenoid valve harness connector and ground.

EGR cooler bypass valve control solenoid valve		Ground	Voltage
Connector	Terminal		
F89	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F1
- Harness for open or short between IPDM E/R and EGR cooler bypass valve control solenoid valve

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors.
3. Check the continuity between EGR cooler bypass valve control solenoid valve harness connector and ECM harness connector.

EGR cooler bypass valve control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F89	1	F57	86	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 EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE

Refer to EC-1007, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EGR cooler bypass valve control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006496727

1. CHECK EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE

1. Reconnect all harness connectors disconnected.
2. Measure the voltage signal between ECM harness connector and ground under the following conditions.

ECM				Condition	Voltage
+		–			
Connector	Terminal	Connector	Terminal		
F57	86	E32	160	**[Engine is running]** • **Not warm-up condition** • Idle speed	0.1 V
				[Engine is running] • **Warm-up condition** • Idle speed	BATTERY VOLTAGE (11 - 14 V)

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace EGR cooler bypass valve control solenoid valve.

PC415 COMMUNICATION CIRCUIT

Description

INFOID:0000000006496728

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:0000000006496729

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
PC415	COMMUNICATION CIRCUIT • 1.DEF: Invalid source computer multiplex signals • 2.DEF: Invalid source computer multiplex signals.	• Harness or connectors (CAN communication line is open or shorted) • ABS actuator and electric unit (control unit)

Diagnosis Procedure

INFOID:0000000006496730

Go to LAN-17, "Trouble Diagnosis Flow Chart".

ASCD MAIN SWITCH

Component Function Check

INFOID:0000000006496731

1.CHECK ASCD MAIN SWITCH FUNCTION

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition		Voltage (V)
Connector	+	-			
	Terminal	Terminal			
E32	130 (ASCD main switch signal)	160	ASCD MAIN switch	Pressed	Battery voltage
				Released	Approx. 0

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1009, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496732

1.CHECK ASCD MAIN SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Turn ignition switch ON.
4. Check voltage between combination switch (spiral cable) harness connector and ground.

Combination switch (spiral cable)		Ground	Voltage
Connector	Terminal		
M303	35	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Combination switch (spiral cable)
- 10 A fuse (No. 2)
- Harness for open and short between combination switch (spiral cable) and ground.

>> Repair open circuit, short to ground or short to power in harness or connectors.

3.CHECK ASCD MAIN SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and combination switch (spiral cable) harness connector.

ECM		Combination switch (spiral cable)		Continuity
Connector	Terminal	Connector	Terminal	
E32	142	M302	13	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E105, M77
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch (spiral cable)

>> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK ASCD STEERING SWITCH

Refer to EC-1010, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace ASCD steering switch.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

>> INSPECTION END

Component Inspection

INFOID:0000000006496733

1.CHECK ASCD STEERING SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Check the continuity between combination switch (spiral cable) harness connector terminals under the following condition.

Combination switch (spiral cable)				Condition		Continuity
Connector	Terminals	Connector	Terminal			
M303	35	M303	36	Speed limiter MAIN switch	Pressed	Existed
					Released	Not existed
			37	ASCD MAIN switch	Pressed	Existed
					Released	Not existed

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace ASCD steering switch.

2.CHECK ASCD STEERING SWITCH-II

Check resistance between combination switch (spiral cable) harness connector terminals under the following conditions.

Combination switch (spiral cable)		Condition	Resistance (Ω)
Connector	Terminals		
M302	13 and 16	CANCEL switch: Pressed	Approx. 0
		SET/COAST switch: Pressed	Approx. 100
		SET/ACCELERATE switch: Pressed	Approx. 274
		RESUME switch: Pressed	Approx. 910

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD steering switch.

ASCD STEERING SWITCH

Component Function Check

INFOID:0000000006496734

1.CHECK ASCD STEERING SWITCH FUNCTION

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
E32	142 (ASCD steering switch signal)	143	CANCEL switch: Pressed	Approx. 0V
			SET/COAST switch: Pressed	Approx. 0.5V
			SET/ACCELERATE switch: Pressed	Approx. 1.1V
			RESUME switch: Pressed	Approx. 2.2V
			All ASCD steering switches: Released	Approx. 5V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1011, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496735

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ASCD STEERING SWITCH CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between combination switch (spiral cable) harness connector and ECM harness connector.

Combination switch (spiral cable)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M302	13	E32	142	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

- Harness connector E105, M77
- Combination switch (spiral cable)
- Harness for open or short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between combination switch (spiral cable) harness connector and ECM harness connector.

Combination switch (spiral cable)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M302	16	E32	143	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

- Harness connector E105, M77
- Combination switch (spiral cable)
- Harness for open or short between ECM and combination switch (spiral cable)

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK ASCD STEERING SWITCH

Refer to EC-1012, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace ASCD steering switch.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “GROUND INSPECTION” and “INCIDENT SIMULATION TESTS”.

>> INSPECTION END

Component Inspection

INFOID:0000000006496736

1.CHECK ASCD STEERING SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Check the continuity between combination switch (spiral cable) harness connector terminals under the following condition.

Combination switch (spiral cable)				Condition		Continuity
Connector	Terminals	Connector	Terminal			
M303	35	M303	36	Speed limiter MAIN switch	Pressed	Existed
					Released	Not existed
			37	ASCD MAIN switch	Pressed	Existed
					Released	Not existed

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace ASCD steering switch.

2.CHECK ASCD STEERING SWITCH-II

Check resistance between combination switch (spiral cable) harness connector terminals under the following conditions.

Combination switch (spiral cable)		Condition	Resistance (Ω)
Connector	Terminals		
M302	13 and 16	CANCEL switch: Pressed	Approx. 0
		SET/COAST switch: Pressed	Approx. 100
		SET/ACCELERATE switch: Pressed	Approx. 274
		RESUME switch: Pressed	Approx. 910

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD steering switch.

CAN COMMUNICATION CIRCUIT

Description

INFOID:0000000006496737

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.

Component Function Check

INFOID:0000000006496738

1. CHECK CAN COMMUNICATION CIRCUIT

1. Turn ignition switch ON.
2. Check DTC.

Is DTC detected?

YES >> EC-1014, "Diagnosis Procedure"
NO >> INSPECTION END.

Diagnosis Procedure

INFOID:0000000006496739

Go to LAN-17, "Trouble Diagnosis Flow Chart".

COOLING FAN

Diagnosis Procedure

INFOID:0000000006496740

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK COOLING FAN MOTOR CIRCUIT

1. Disconnect cooling fan motor harness connector.
2. Check the continuity between IPDM E/R harness connector and cooling fan motor harness connector.

IPDM E/R		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E10	5	E75	1	Existed
	7	E76	3	
E11	10		4	

3. Check the continuity between cooling fan motor harness connector and ground.

Cooling fan motor		Ground	Continuity
Connector	Terminal		
E75	2	Ground	Existed

4. Also check harness for short to ground and short to power.

YES or NO

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and ground

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK COOLING FAN MOTOR

Refer to EC-1015, "Component Inspection".

YES or NO

YES >> GO TO 5.
NO >> Replace cooling fan motor.

5.CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

YES or NO

YES >> Replace IPDM E/R. Refer to PCS-34, "Exploded View" (WITH I-KEY) or PCS-63, "Exploded View" (WITHOUT I-KEY).
NO >> Repair or replace harness or connector.

Component Inspection

INFOID:0000000006496741

1.CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector E75 and E76.
3. Supply cooling fan motor terminals with battery voltage and check operation.

	Speed	terminals	
		(+)	(–)
Cooling fan motor	Low	1	2
		3	4
	High	1 and 3	2 and 4

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan motor.

INFORMATION DISPLAY (ASCD)

Component Function Check

INFOID:0000000006496742

1.CHECK INFORMATION DISPLAY

1. Start engine.
2. Press ASCD MAIN switch.
3. Drive the vehicle at more than 30 km/h (20 MPH)
   CAUTION:
   Always drive vehicle at a safe speed.
4. Press SET/ACCELERATE or SET/COAST switch.
5. Check that the readings of the speedometer show the same values 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 >> Go to EC-1017, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496743

1.CHECK CAN COMMUNICATION LINE

Refer to LAN-31, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart".

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK DTC WITH “UNIFIED METER AND A/C AMP.”

Refer to MWI-23, "CONSULT-III Function".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis relevant to DTC indicated.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

Is the inspection result normal?

YES >> Replace combination meter.
NO >> Repair or replace.

INFORMATION DISPLAY (SPEED LIMITER)

Component Function Check

INFOID:0000000006496744

1.CHECK INFORMATION DISPLAY (SPEED LIMITER) FUNCTION

1. Start engine.
2. Press speed limiter MAIN switch.
3. Drive the vehicle at more than 30 km/h (20 MPH).
   CAUTION:
   Always drive vehicle at a safe speed.
4. Press SET/ACCELERATE or SET/COAST switch.
5. Perform a test drive on a flat road conditions. Check that the speedometer indicated the same value as the set speed indicator on the information display while depressing the accelerator pedal until just before a kickdown occurs.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1018, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496745

1.CHECK CAN COMMUNICATION LINE

Refer to LAN-31, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart".

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK DTC WITH “UNIFIED METER AND A/C AMP.”

Refer to MWI-23, "CONSULT-III Function".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis relevant to DTC indicated.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

Is the inspection result normal?

YES >> Replace combination meter.
NO >> Repair or replace.

MALFUNCTION INDICATOR

Component Function Check

INFOID:0000000006496746

1.CHECK MI FUNCTION

1. Turn ignition switch ON.
2. Make sure that MI lights up.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1019, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496747

1.CHECK CAN COMMUNICATION LINE

Refer to LAN-17, "Trouble Diagnosis Flow Chart"

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace.

2.CHECK COMBINATION METER

Refer to MWI-23, "CONSULT-III Function".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “GROUND INSPECTION” and “INCIDENT SIMULATION TESTS”.

Is the inspection result normal?

YES >> Replace combination meter.
NO >> Repair or replace.

SPEED LIMITER MAIN SWITCH

Component Function Check

INFOID:0000000006496748

1.CHECK SPEED LIMITER MAIN SWITCH FUNCTION

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals under the following conditions.

ECM		Ground	Condition		Voltage (V)
Connector	Terminal				
E32	139	Ground	Speed limiter MAIN switch	Pressed	Battery voltage
				Released	Approx. 0

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1020, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006496749

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK SPEED LIMITER MAIN SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Turn ignition switch ON.
4. Check voltage between combination switch (spiral cable) harness connector and ground.

Combination switch (spiral cable)		Ground	Voltage
Connector	Terminal		
M303	35	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Combination switch (spiral cable)
- 10 A fuse (No. 2)
- Harness for open and short between combination switch (spiral cable) and ground.

>> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK SPEED LIMITER MAIN SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and combination switch (spiral cable) harness connector.

ECM		Combination switch (spiral cable)		Continuity
Connector	Terminal	Connector	Terminal	
E32	139	M303	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E105, M77
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch (spiral cable)

>> Repair open circuit, short to ground or short to power in harness or connectors.

6.CHECK ASCD STEERING SWITCH

Refer to EC-1021, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace ASCD steering switch.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

>> INSPECTION END

Component Inspection

INFOID:0000000006496750

1.CHECK ASCD STEERING SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Check the continuity between combination switch (spiral cable) harness connector terminals under the following condition.

Combination switch (spiral cable)				Condition		Continuity
Connector	Terminals	Connector	Terminal			
M303	35	M303	36	Speed limiter MAIN switch	Pressed	Existed
					Released	Not existed
			37	ASCD MAIN switch	Pressed	Existed
					Released	Not existed

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace ASCD steering switch.

2.CHECK ASCD STEERING SWITCH-II

Check resistance between combination switch (spiral cable) harness connector terminals under the following conditions.

Combination switch (spiral cable)		Condition	Resistance (Ω)
Connector	Terminals		
M302	13 and 16	CANCEL switch: Pressed	Approx. 0
		SET/COAST switch: Pressed	Approx. 100
		SET/ACCELERATE switch: Pressed	Approx. 274
		RESUME switch: Pressed	Approx. 910

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD steering switch.

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:0000000006496751

NOTE:
Only consult this customer complaint after a complete check using the CONSULT-III.

Symptom		Trouble diagnosis	Reference page
No communication with the ECM		CHART 1	EC-1024, "Diagnosis Procedure"
Starting malfunction	Engine does not start or starts with difficulty	CHART 2	EC-1025, "Diagnosis Procedure"
	Starting difficult with cold engine	CHART 3	EC-1027, "Diagnosis Procedure"
	Impossible to shut off engine	CHART 4	EC-1029, "Diagnosis Procedure"
Idle speed malfunction	Engine Idle speed too high	CHART 5	EC-1030, "Diagnosis Procedure"
	Engine Idle speed too low or unstable	CHART 6	EC-1031, "Diagnosis Procedure"
Behavior while driving	Engine stalling	CHART 7	EC-1033, "Diagnosis Procedure"
	No or very little acceleration, increase in engine speed	CHART 8	EC-1035, "Diagnosis Procedure"
	Engine bucking	CHART 9	EC-1038, "Diagnosis Procedure"
	Erratic acceleration	CHART 10	EC-1040, "Diagnosis Procedure"
	No engine braking	CHART 11	EC-1042, "Diagnosis Procedure"
	Loss of power	CHART 12	EC-1043, "Diagnosis Procedure"
	Too much power	CHART 13	EC-1046, "Diagnosis Procedure"
	Overspeed at idle speed or on releasing brake	CHART 14	EC-1048, "Diagnosis Procedure"
	Excessive consumption	CHART 15	EC-1049, "Diagnosis Procedure"
	Engine knock	CHART 16	EC-1051, "Diagnosis Procedure"
	Engine overheating	CHART 17	EC-1053, "Diagnosis Procedure"
Noise, odors or smoke	Engine smokes when started	CHART 18	EC-1054, "Diagnosis Procedure"
	Engine emits blue smoke	CHART 19	EC-1055, "Diagnosis Procedure"
	Engine smokes when revved	CHART 20	EC-1057, "Diagnosis Procedure"
	Engine emits white smoke (especially when starting)	CHART 21	EC-1058, "Diagnosis Procedure"
	Emission control not satisfactory	CHART 22	EC-1059, "Diagnosis Procedure"

NOT COMMUNICATION WITH THE ECM

Description

INFOID:0000000006496752

CHART 1: NO COMMUNICATION WITH THE ECM

Diagnosis Procedure

INFOID:0000000006496753

1.INSPECTION START

Ensure that CONSULT-III is not causing the malfunction by trying to establish dialogue with an ECM on another vehicle. If the CONSULT-III is not at malfunction, and dialogue cannot be established with any other ECM on the same vehicle, the cause could be a suspected ECM interfering on the CAN communication line.
Check the voltage of the battery and carry out the operations necessary to obtain a voltage which is to specification (9.5 V < U battery < 17.5 V).

>> GO TO 2.

2.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-31, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK ECM GROUND

Check the ECM earth (ground).

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace ground connection.

4.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-885, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connector.

5.CHECK DATA LINK CONNECTOR CIRCUIT

Check for the presence of 12 V on terminal 16 with ignition switch OFF, 12 V on terminal 8 with ignition switch ON and an earth (ground) on terminals 4 and 5 of the data link connector.
Repair if necessary.

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Repair or replace harness or connector.

ENGINE DOES NOT START OR STARTS WITH DIFFICULTY

Description

INFOID:0000000006496754

CHART 2: ENGINE DOES NOT START OR STARTS WITH DIFFICULTY

Diagnosis Procedure

INFOID:0000000006496755

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK BATTERY

Check the battery. Refer to PG-124, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace battery. Refer to PG-124, "Removal and Installation".

3.CHECK STARTER MOTOR

Check the starter and starter control relay. Refer to STR-8, "STARTING SYSTEM (WITH INTELLIGENT KEY) : System Description", STR-9, "STARTING SYSTEM (WITHOUT INTELLIGENT KEY) : System Description".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace starter motor or starter control relay.

4.CHECK ECM RELAY

Check the ECM relay. Refer to EC-976, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace IPDM E/R. Refer to PCS-34, "Removal and Installation" (With intelligent key system), PCS-63, "Removal and Installation" (With intelligent key system).

5.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-885, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace harness or connector.

6.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace harness or connector.

7.CHECK CAMSHAFT POSITION SENSOR

Check the camshaft position sensor. Refer to EC-935, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK CAMSHAFT

Check the camshaft. Refer to EC-935, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace camshaft.

9. CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-280, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace air intake system. Refer to EM-280, "Removal and Installation".

10. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-909, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-867, "Work Procedure (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 12.

12. CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-868, "Work Procedure (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 13.

13. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-868, "Work Procedure [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 14.

14. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-869, "Work Procedure [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 15.

15. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-871, "Work Procedure (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 16.

16. CHECK MAJOR LEAK IN FUEL INJECTORS/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-876, "Work Procedure (TEST 6: Fuel Injectors Leak Check)".

>> GO TO 17.

17. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-877, "Work Procedure (TEST 7: Fuel Injection Quantity Check)".

>> **INSPECTION END**

STARTING DIFFICULT WITH COLD ENGINE

Description

INFOID:0000000006496756

CHART 3: STARTING DIFFICULT WITH COLD ENGINE

Diagnosis Procedure

INFOID:0000000006496757

1.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 2.
No >> Top up the oil.

2.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-33, "Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace engine oil. Refer to LU-34, "Draining", LU-34, "Refilling".

3.CHECK BATTERY

Check the battery. Refer to PG-113, "Work Flow".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace battery. Refer to PG-124, "Removal and Installation".

4.CHECK STARTER MOTOR

Check the starter motor. Refer to STR-8, "STARTING SYSTEM (WITH INTELLIGENT KEY) : System Description" (With intelligent key), STR-9, "STARTING SYSTEM (WITHOUT INTELLIGENT KEY) : System Description" (With intelligent key).

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace starter motor.

5.CHECK COMPONENT PART

Check the following.

- Engine coolant temperature sensor. Refer to EC-908, "Component Inspection".
- Fuel temperature sensor. Refer to EC-916, "Component Inspection".
- Intake air temperature sensor. Refer to EC-906, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK GLOW SYSTEM

Check the glow system. Refer to EC-936, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace glow system. Refer to EM-292, "Removal and Installation".

7.CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-867, "Work Procedure (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 8.

8.CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-868, "Work Procedure (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 9.

9. CHECK COMPRESSION PRESSURE

Check the compression pressure.

>> **INSPECTION END**

IMPOSSIBLE TO SHUT OFF ENGINE

Description

INFOID:0000000006496758

CHART 4: IMPOSSIBLE TO SHUT OFF ENGINE

Diagnosis Procedure

INFOID:0000000006496759

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-885, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Repair or replace harness or connector.

ENGINE IDLE SPEED TOO HIGH

Description

INFOID:0000000006496760

CHART 5: ENGINE IDLE SPEED TOO HIGH

Diagnosis Procedure

INFOID:0000000006496761

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-885, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK ACCELERATOR PEDAL POSITION SENSOR

Check the accelerator pedal position sensor. Refer to EC-1001, "Component Inspection".

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Repair or replace.

ENGINE IDLE SPEED TOO LOW OR UNSTABLE

Description

INFOID:0000000006496762

CHART 6: ENGINE IDLE SPEED TOO LOW OR UNSTABLE

Diagnosis Procedure

INFOID:0000000006496763

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-885, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connector.

4.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-280, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace air intake system. Refer to EM-280, "Removal and Installation".

5.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-909, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-902, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace.

7.CHECK REFRIGERANT PRESSURE SENSOR

Check refrigerant pressure sensor. Refer to EC-960, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK EGR SYSTEM

Check EGR system. Refer to EC-954, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace.

9.CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace.

10. CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-867, "Work Procedure (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 11.

11. CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-868, "Work Procedure (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 12.

12. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-868, "Work Procedure [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 13.

13. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-869, "Work Procedure [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 14.

14. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-871, "Work Procedure (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 15.

15. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-876, "Work Procedure (TEST 6: Fuel Injectors Leak Check)".

>> GO TO 16.

16. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-877, "Work Procedure (TEST 7: Fuel Injection Quantity Check)".

>> **INSPECTION END**

ENGINE STALLING

Description

INFOID:0000000006496764

CHART 7: ENGINE STALLING

Diagnosis Procedure

INFOID:0000000006496765

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-885, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connector.

4.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-280, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace air intake system.

5.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-909, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-902, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace.

7.CHECK EGR SYSTEM

Check EGR system. Refer to EC-954, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace.

9.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-31, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace harness or connector.

10. CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-867, "Work Procedure (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 11.

11. CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-868, "Work Procedure (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 12.

12. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-868, "Work Procedure [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 13.

13. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-869, "Work Procedure [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 14.

14. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-871, "Work Procedure (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 15.

15. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-876, "Work Procedure (TEST 6: Fuel Injectors Leak Check)".

>> GO TO 16.

16. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-877, "Work Procedure (TEST 7: Fuel Injection Quantity Check)".

>> **INSPECTION END**

NO OR VERY LITTLE ACCELERATION, INCREASE IN ENGINE SPEED

Description

INFOID:0000000006496766

CHART 8: NO OR VERY LITTLE ACCELERATION, INCREASE IN ENGINE SPEED

Diagnosis Procedure

INFOID:0000000006496767

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-885, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connector.

4.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-280, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace air intake system.

5.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-909, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-902, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace.

7.CHECK TURBOCHARGER

Check that the turbocharger is working properly. Refer to EC-1003, "Diagnosis Procedure".

Is the turbocharger correct?

Yes >> GO TO 8.
No >> Repair or replace.

8.CHECK ACCELERATOR PEDAL POSITION SENSOR

Check the accelerator pedal position sensor. Refer to EC-1001, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace.

9.CHECK EGR SYSTEM

Check EGR system. Refer to EC-954, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace.

10. CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-31, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair or replace harness or connector.

12. CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-867, "Work Procedure (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 13.

13. CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-868, "Work Procedure (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 14.

14. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-868, "Work Procedure [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 15.

15. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-869, "Work Procedure [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 16.

16. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-871, "Work Procedure (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 17.

17. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-876, "Work Procedure (TEST 6: Fuel Injectors Leak Check)".

>> GO TO 18.

18. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-877, "Work Procedure (TEST 7: Fuel Injection Quantity Check)".

>> **INSPECTION END**

ENGINE BUCKING

Description

INFOID:0000000006496768

CHART 9: ENGINE BUCKING

Diagnosis Procedure

INFOID:0000000006496769

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-885, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK ACCELERATOR PEDAL POSITION SENSOR

Check the accelerator pedal position sensor. Refer to EC-1001, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace.

4.CHECK CLUTCH PEDAL POSITION SWITCH

Check clutch pedal position switch.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace.

5.CHECK VEHICLE SPEED SIGNAL

Check the following component.

- “ABS actuator and electric unit (control unit)” [Refer to BRC-24, "CONSULT-III Function". (Without ESP), BRC-131, "CONSULT-III Function". (With ESP)]
- Combination meter (Refer to MWI-23, "CONSULT-III Function".)

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-31, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace harness or connector.

7.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-280, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace air intake system.

8.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-909, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace.

9. CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-902, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace.

10. CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-867, "Work Procedure (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 11.

11. CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-868, "Work Procedure (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 12.

12. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-868, "Work Procedure [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 13.

13. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-869, "Work Procedure [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 14.

14. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-871, "Work Procedure (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 15.

15. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-876, "Work Procedure (TEST 6: Fuel Injectors Leak Check)".

>> GO TO 16.

16. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-877, "Work Procedure (TEST 7: Fuel Injection Quantity Check)".

>> **INSPECTION END**

ERRATIC ACCELERATION

Description

INFOID:0000000006496770

CHART 10: Erratic acceleration

Diagnosis Procedure

INFOID:0000000006496771

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-885, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK ACCELERATOR PEDAL POSITION SENSOR

Check the accelerator pedal position sensor. Refer to EC-1001, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace.

4.CHECK CLUTCH PEDAL POSITION SWITCH

Check clutch pedal position switch.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace.

5.CHECK VEHICLE SPEED SIGNAL

Check the following component.

- “ABS actuator and electric unit (control unit)” [Refer to BRC-24, "CONSULT-III Function". (Without ESP), BRC-131, "CONSULT-III Function". (With ESP)]
- Combination meter (Refer to MWI-23, "CONSULT-III Function".)

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-31, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace harness or connector.

7.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-868, "Work Procedure [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 8.

8.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-869, "Work Procedure [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 9.

9. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-871, "Work Procedure (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 10.

10. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-876, "Work Procedure (TEST 6: Fuel Injectors Leak Check)".

>> GO TO 11.

11. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-877, "Work Procedure (TEST 7: Fuel Injection Quantity Check)".

>> **INSPECTION END**

NO ENGINE BRAKING

Description

INFOID:0000000006496772

CHART 11: NO ENGINE BRAKING

Diagnosis Procedure

INFOID:0000000006496773

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-885, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK ACCELERATOR PEDAL POSITION SENSOR

Check the accelerator pedal position sensor. Refer to EC-1001, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace.

4.CHECK IDLE SPEED

Check idle speed. Refer to EC-1061, "Idle Speed".

>> GO TO 5.

5.CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-876, "Work Procedure (TEST 6: Fuel Injectors Leak Check)".

>> GO TO 6.

6.CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-877, "Work Procedure (TEST 7: Fuel Injection Quantity Check)".

>> **INSPECTION END**

LOSS OF POWER

Description

INFOID:0000000006496774

CHART 12: LOSS OF POWER

Diagnosis Procedure

INFOID:0000000006496775

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK FUEL FILTER

Check the correctness of the fuel filter.

Is the fuel filter correct?

Yes >> GO TO 3.
No >> Replace the fuel filter with an genuine part.

3.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-33, "Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace engine oil. Refer to LU-34, "Refilling".

4.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 5.
No >> Top up the oil.

5.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-885, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace harness or connector.

6.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace harness or connector.

7.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-280, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-909, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace.

9.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-902, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace.

10. CHECK ACCELERATOR PEDAL POSITION SENSOR

Check the accelerator pedal position sensor. Refer to EC-1001, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. CHECK CLUTCH PEDAL POSITION SWITCH

Check clutch pedal position switch.

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair or replace.

12. CHECK VEHICLE SPEED SIGNAL

Check the following component.

- "ABS actuator and electric unit (control unit)" [Refer to BRC-24, "CONSULT-III Function". (Without ESP), BRC-131, "CONSULT-III Function". (With ESP)]
- Combination meter (Refer to MWI-23, "CONSULT-III Function".)

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair or replace.

13. CHECK TURBOCHARGER

Check that the turbocharger is working properly. Refer to EC-1003, "Diagnosis Procedure".

Is the turbocharger correct?

Yes >> GO TO 14.
No >> Repair or replace.

14. CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-31, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Repair or replace harness or connector.

15. CHECK EGR SYSTEM

Check EGR system. Refer to EC-954, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Repair or replace.

16. CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair or replace.

17. CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-867, "Work Procedure (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 18.

18. CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-868, "Work Procedure (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 19.

19. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-868, "Work Procedure [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 20.

20. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-869, "Work Procedure [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 21.

21. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-871, "Work Procedure (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 22.

22. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-876, "Work Procedure (TEST 6: Fuel Injectors Leak Check)".

>> GO TO 23.

23. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-877, "Work Procedure (TEST 7: Fuel Injection Quantity Check)".

>> **INSPECTION END**

TOO MUCH POWER

Description

INFOID:0000000006496776

CHART 13: TOO MUCH POWER

Diagnosis Procedure

INFOID:0000000006496777

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-885, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to EC-908, "Component Inspection".

Is the turbocharger correct?

Yes >> GO TO 4.
No >> Repair or replace.

4.CHECK TURBOCHARGER

Check that the turbocharger is working properly. Refer to EC-1003, "Diagnosis Procedure".

Is the turbocharger correct?

Yes >> GO TO 5.
No >> Repair or replace.

5.CHECK CLUTCH PEDAL POSITION SWITCH

Check clutch pedal position switch.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK VEHICLE SPEED SIGNAL

Check the following component.

- “ABS actuator and electric unit (control unit)” [Refer to BRC-24, "CONSULT-III Function". (Without ESP), BRC-131, "CONSULT-III Function". (With ESP)]
- Combination meter (Refer to MWI-23, "CONSULT-III Function".)

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace.

7.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-31, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace harness or connector.

8.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-868, "Work Procedure [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 9.

9. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-869, "Work Procedure [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 10.

10. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-871, "Work Procedure (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 11.

11. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-876, "Work Procedure (TEST 6: Fuel Injectors Leak Check)".

>> GO TO 12.

12. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-877, "Work Procedure (TEST 7: Fuel Injection Quantity Check)".

>> **INSPECTION END**

OVERSPEED AT IDLE SPEED OR ON RELEASING BRAKE

Description

INFOID:0000000006496778

CHART 14: OVERSPEED AT IDLE SPEED OR ON RELEASING BRAKE

Diagnosis Procedure

INFOID:0000000006496779

1.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-33, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine oil. Refer to LU-34, "Refilling".

2.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 3.
No >> Top up the oil.

3.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-885, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connector.

4.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connector.

5.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-31, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace harness or connector.

6.CHECK “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Perform trouble diagnosis on the “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”. [Refer to BRC-24, "CONSULT-III Function". (Without ESP), BRC-131, "CONSULT-III Function". (With ESP)]

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Repair or replace.

EXCESSIVE CONSUMPTION

Description

INFOID:0000000006496780

CHART 15:EXCESSIVE CONSUMPTION

Diagnosis Procedure

INFOID:0000000006496781

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-885, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-280, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace air intake system.

4.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-909, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace.

5.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-902, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK TURBOCHARGER

Check that the turbocharger is working properly. Refer to EC-1003, "Diagnosis Procedure".

Is the turbocharger correct?

Yes >> GO TO 7.
No >> Repair or replace.

7.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to EC-908, "Component Inspection".

Is the inspection result normal?

Yes >> GO TO 8.
No >> Repair or replace.

8.CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-867, "Work Procedure (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 9.

9.CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-868, "Work Procedure (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 10.

10. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-868, "Work Procedure [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 11.

11. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-869, "Work Procedure [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 12.

12. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-871, "Work Procedure (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 13.

13. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-876, "Work Procedure (TEST 6: Fuel Injectors Leak Check)".

>> GO TO 14.

14. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-877, "Work Procedure (TEST 7: Fuel Injection Quantity Check)".

>> **INSPECTION END**

ENGINE KNOCK

Description

INFOID:0000000006496782

CHART 16: ENGINE KNOCK

Diagnosis Procedure

INFOID:0000000006496783

1.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-33, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine oil. Refer to LU-34, "Refilling".

2.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 3.
No >> Top up the oil.

3.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-885, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connector.

4.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connector.

5.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-280, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace air intake system.

6.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-909, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace.

7.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-902, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace.

9.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-868, "Work Procedure [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 10.

10. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-869, "Work Procedure [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 11.

11. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-871, "Work Procedure (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 12.

12. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-876, "Work Procedure (TEST 6: Fuel Injectors Leak Check)".

>> GO TO 13.

13. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-877, "Work Procedure (TEST 7: Fuel Injection Quantity Check)".

>> **INSPECTION END**

ENGINE OVERHEATING

Description

INFOID:0000000006496784

CHART 17: ENGINE OVERHEATING

Diagnosis Procedure

INFOID:0000000006496785

1.CHECK COOLING SYSTEM

Check the cooling system. Refer to CO-60, "Troubleshooting Chart".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-885, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connector.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to EC-908, "Component Inspection".

Is the inspection result normal?

Yes >> GO TO 5.
No >> Repair or replace.

5.CHECK COOLING FAN OPERATION

Check cooling fan operation. Refer to EC-1015, "Diagnosis Procedure".

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Repair or replace.

ENGINE SMOKES WHEN STARTED

Description

INFOID:0000000006496786

CHART 18: ENGINE SMOKES WHEN STARTED

Diagnosis Procedure

INFOID:0000000006496787

1.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-33, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine oil. Refer to LU-34, "Refilling".

2.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 3.
No >> Top up the oil.

3.CHECK FUEL TEMPERATURE SENSOR

Check fuel temperature sensor. Refer to EC-916, "Component Inspection".

Is the inspection result normal?

Yes >> GO TO 4.
No >> Repair or replace.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to EC-908, "Component Inspection".

Is the inspection result normal?

Yes >> GO TO 5.
No >> Repair or replace.

5.CHECK COOLING SYSTEM

Check the cooling system. Refer to CO-60, "Troubleshooting Chart".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-868, "Work Procedure [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 7.

7.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-869, "Work Procedure [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 8.

8.CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-871, "Work Procedure (TEST 5: Rail High Pressure Regulation Check)".

>> **INSPECTION END**

ENGINE EMITS BLUE SMOKE

Description

INFOID:0000000006496788

CHART 19: ENGINE EMITS BLUE SMOKE

Diagnosis Procedure

INFOID:0000000006496789

1.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-33, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine oil. Refer to LU-34, "Refilling".

2.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 3.
No >> Top up the oil.

3.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 4.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to EC-908, "Component Inspection".

Is the inspection result normal?

Yes >> GO TO 5.
No >> Repair or replace.

5.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-280, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace air intake system.

6.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-909, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace.

7.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-902, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK TURBOCHARGER

Check that the turbocharger is working properly. Refer to EC-1003, "Diagnosis Procedure".

Is the turbocharger correct?

Yes >> GO TO 9.
No >> Repair or replace.

9.CHECK EGR SYSTEM

Check EGR system. Refer to EC-954, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace.

10. CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-868, "Work Procedure [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 12.

12. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-869, "Work Procedure [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 13.

13. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-871, "Work Procedure (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 14.

14. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-876, "Work Procedure (TEST 6: Fuel Injectors Leak Check)".

>> GO TO 15.

15. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-877, "Work Procedure (TEST 7: Fuel Injection Quantity Check)".

>> GO TO 16.

16. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-885, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair or replace harness or connector.

17. CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Repair or replace harness or connector.

ENGINE SMOKES WHEN REVVED

Description

INFOID:0000000006496790

CHART 20: ENGINE SMOKES WHEN REVVED

Diagnosis Procedure

INFOID:0000000006496791

1.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-25, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine oil. Refer to LU-26, "Refilling".

2.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 3.
No >> Top up the oil.

3.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-908, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connector.

4.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connector.

5.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-902, "Component Inspection".

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Repair or replace.

ENGINE EMITS WHITE SMOKE (ESPECIALLY WHEN STARTING)

Description

INFOID:0000000006496792

CHART 21: ENGINE EMITS WHITE SMOKE (ESPECIALLY WHEN STARTING)

Diagnosis Procedure

INFOID:0000000006496793

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK COOLING SYSTEM

Check the cooling system. Refer to CO-60, "Troubleshooting Chart".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK GLOW SYSTEM

Check the glow system.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace glow system. Refer to EM-292, "Removal and Installation".

4.CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-876, "Work Procedure (TEST 6: Fuel Injectors Leak Check)".

>> GO TO 5.

5.CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-877, "Work Procedure (TEST 7: Fuel Injection Quantity Check)".

>> **INSPECTION END**

EMISSION CONTROL NOT SATISFACTORY

Description

INFOID:0000000006496794

CHART 22: EMISSION CONTROL NOT SATISFACTORY

Diagnosis Procedure

INFOID:0000000006496795

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-885, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-280, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace air intake system.

4.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-909, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace.

5.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-902, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK TURBOCHARGER

Check that the turbocharger is working properly. Refer to EC-1003, "Diagnosis Procedure".

Is the turbocharger correct?

Yes >> GO TO 7.
No >> Repair or replace.

7.CHECK EGR SYSTEM

Check EGR system. Refer to EC-954, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-868, "Work Procedure [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 9.

9.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-869, "Work Procedure [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 10.

10. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-871, "Work Procedure (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 11.

11. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-876, "Work Procedure (TEST 6: Fuel Injectors Leak Check)".

>> GO TO 12.

12. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-877, "Work Procedure (TEST 7: Fuel Injection Quantity Check)".

>> **INSPECTION END**

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:0000000006496796

Condition	Specification
No load* (in Neutral position)	800 ± 50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, glow plug, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position