

SECTION **EC**

ENGINE CONTROL SYSTEM

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HOW TO USE THIS MANUAL

HOW TO USE THIS SECTION

Information

INFOID:0000000011058891

Both “VDC” and “ESP” are used in this manual. These indicate the same system.

PRECAUTION

PRECAUTIONS

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

INFOID:0000000010774996

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.

WARNING:

Always observe the following items for preventing accidental activation.

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, 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:

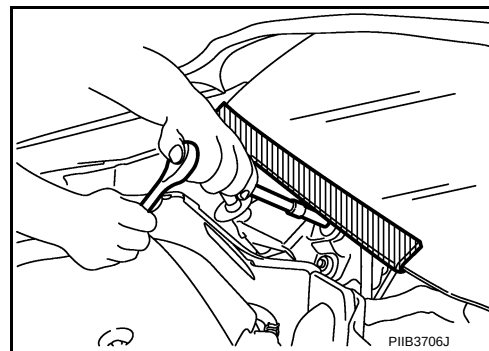
Always observe the following items for preventing accidental activation.

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

Precaution for Procedure without Cowl Top Cover

INFOID:0000000010774997

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



Precautions for Removing Battery Terminal

INFOID:0000000010774998

- With the adoption of Auto ACC function, ACC power is automatically supplied by operating the intelligent key or remote keyless entry or by opening/closing the driver side door. In addition, ACC power is supplied even after the ignition switch is turned to the OFF position, i.e. ACC power is supplied for a certain fixed time.

PRECAUTIONS

[MR20DD]

< PRECAUTION >

- When disconnecting the 12V battery terminal, turn off the ACC power before disconnecting the 12V battery terminal, observing "How to disconnect 12V battery terminal" described below.

NOTE:

Some ECUs operate for a certain fixed time even after ignition switch is turned OFF and ignition power supply is stopped. If the battery terminal is disconnected before ECU stops, accidental DTC detection or ECU data damage may occur.

- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.

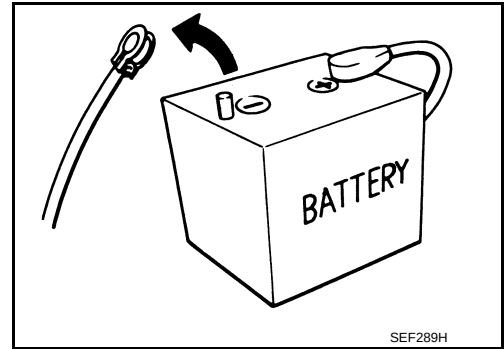
NOTE:

If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.

- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.

NOTE:

The removal of 12V battery may cause a DTC detection error.



HOW TO DISCONNECT 12V BATTERY TERMINAL

Disconnect 12V battery terminal according to Instruction 1 or Instruction 2 described below.

For vehicles parked by ignition switch OFF, refer to Instruction 2.

INSTRUCTION 1

- Open the hood.
- Turn key switch to the OFF position with the driver side door opened.
- Get out of the vehicle and close the driver side door.
- Wait at least 3 minutes.

CAUTION:

While waiting, never operate the vehicle such as locking, opening, and closing doors. Violation of this caution results in the activation of ACC power supply according to the Auto ACC function.

- Remove 12V battery terminal.

CAUTION:

After installing 12V battery, always check self-diagnosis results of all ECUs and erase DTC.

INSTRUCTION 2 (FOR VEHICLES PARKED BY IGNITION SWITCH OFF)

- Unlock the door with intelligent key or remote keyless entry.

NOTE:

At this moment, ACC power is supplied.

- Open the driver side door.
- Open the hood.
- Close the driver side door.
- Wait at least 3 minutes.

CAUTION:

While waiting, never operate the vehicle such as locking, opening, and closing doors. Violation of this caution results in the activation of ACC power supply according to the Auto ACC function.

- Remove 12V battery terminal.

CAUTION:

After installing 12V battery, always check self-diagnosis results of all ECUs and erase DTC.

On Board Diagnostic (OBD) System of Engine and CVT

INFOID:0000000010774999

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.)

PRECAUTIONS

[MR20DD]

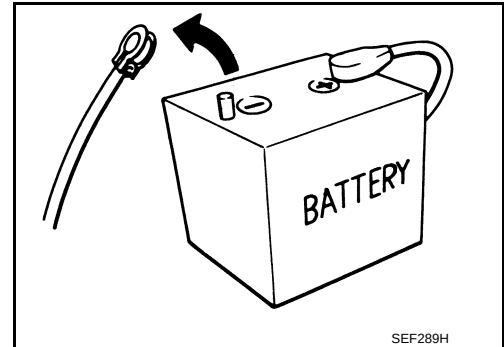
< PRECAUTION >

- 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-52, "Description"](#).
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.
- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EVAP system or fuel injection system, etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.

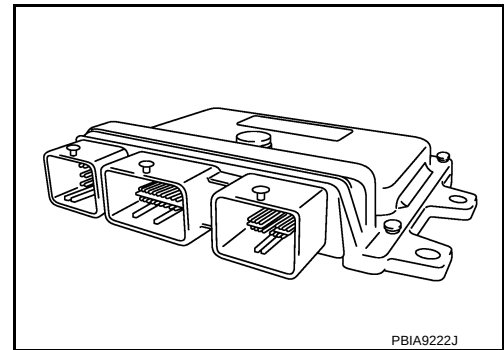
General Precautions

INFOID:000000010775000

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



- Do not disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.
The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.



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

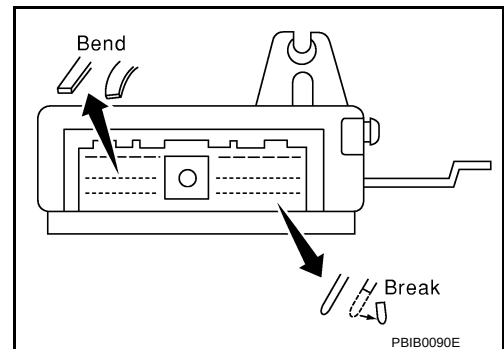
- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).

Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.

- Securely connect ECM harness connectors.

A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.

- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.
- Keep engine control system parts and harness dry.

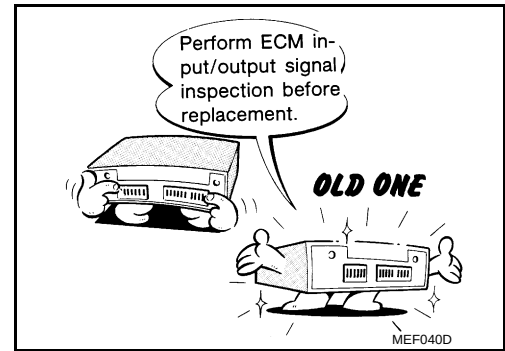


PRECAUTIONS

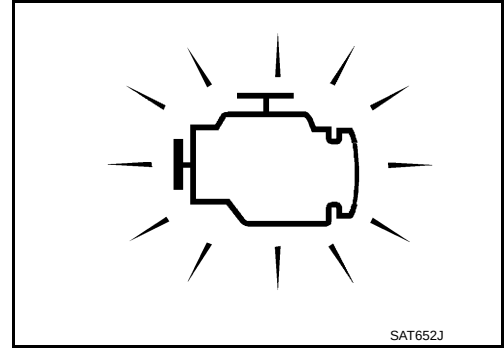
[MR20DD]

< PRECAUTION >

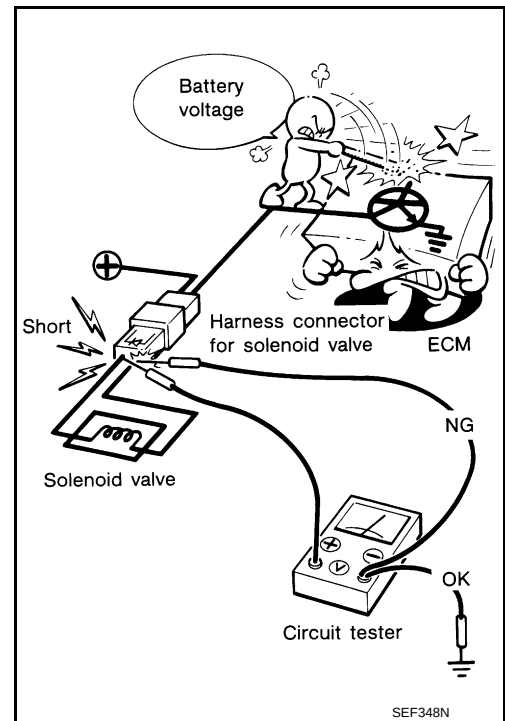
- Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to [EC-89, "Reference Value"](#).
- Handle mass air flow sensor carefully to avoid damage.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble electric 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.

PRECAUTIONS

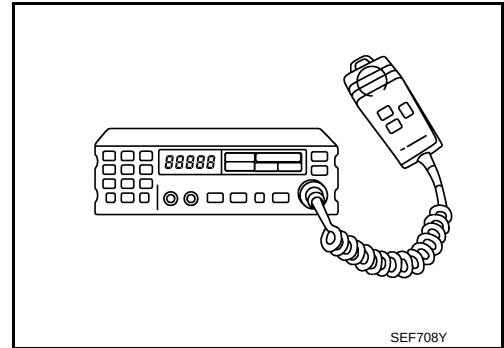
[MR20DD]

< PRECAUTION >

- 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.



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PREPARATION

< PREPARATION >

[MR20DD]

PREPARATION

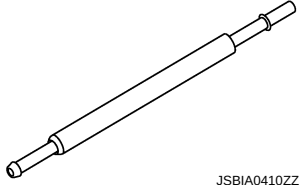
PREPARATION

Special Service Tools

INFOID:0000000010775001

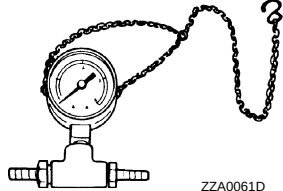
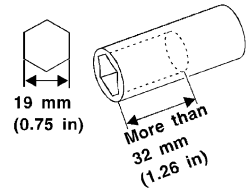
NOTE:

The actual shapes of the tools may differ from those illustrated here.

Tool number (SPX-North America No.) Tool name	Description
KV10120000 Fuel tube adapter	Measures fuel pressure
 JSBIA0410ZZ	

Commercial Service Tools

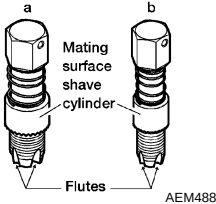
INFOID:0000000010775002

Tool name (SPX-North America No.)	Description
Fuel pressure gauge	Measuring fuel pressure
 ZZA0061D	
Fuel filler cap adapter i.e.: (MLR-8382)	Checks fuel tank vacuum relief valve opening pressure
 S-NT815	
Socket wrench	Removes and installs engine coolant temperature sensor
 19 mm (0.75 in) More than 32 mm (1.26 in) S-NT705	

PREPARATION

< PREPARATION >

[MR20DD]

Tool name (SPX-North America No.)	Description
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12) 	Reconditions the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specifica- tion MIL-A-907) 	Lubricates oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

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SYSTEM DESCRIPTION

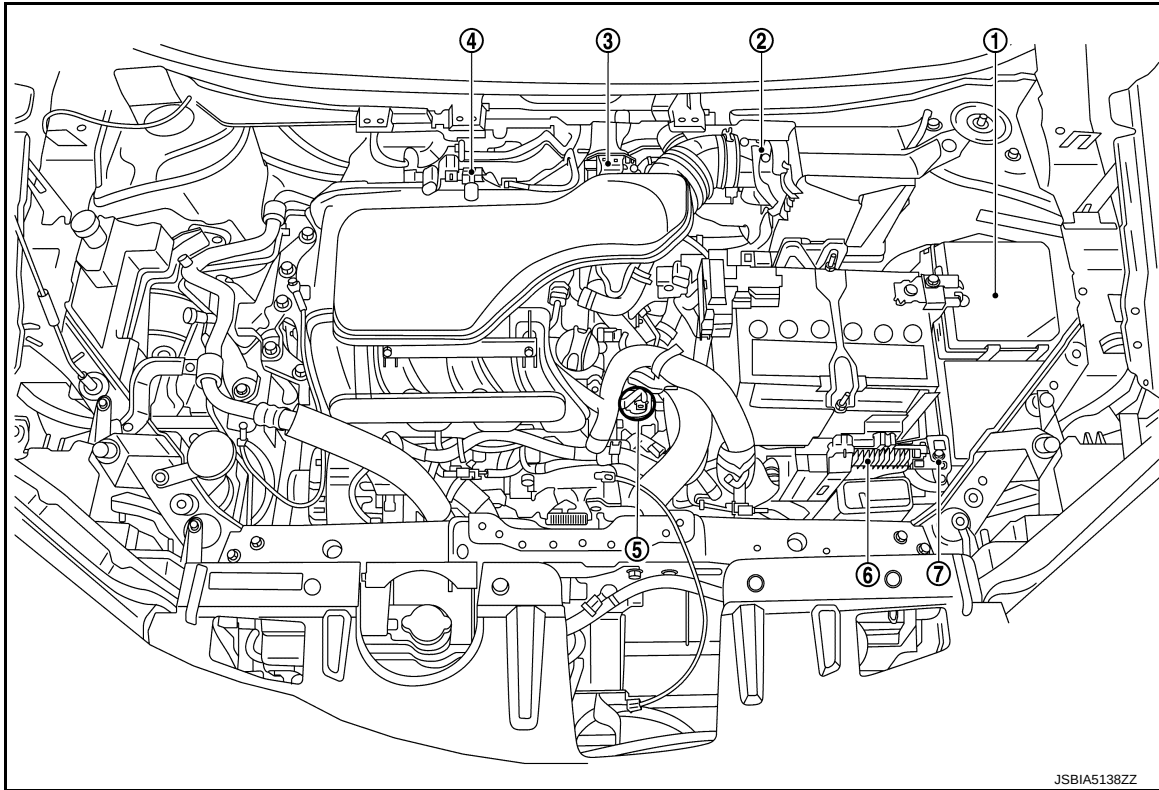
COMPONENT PARTS

ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : Component Parts Location

INFOID:0000000010775003

ENGINE ROOM COMPARTMENT



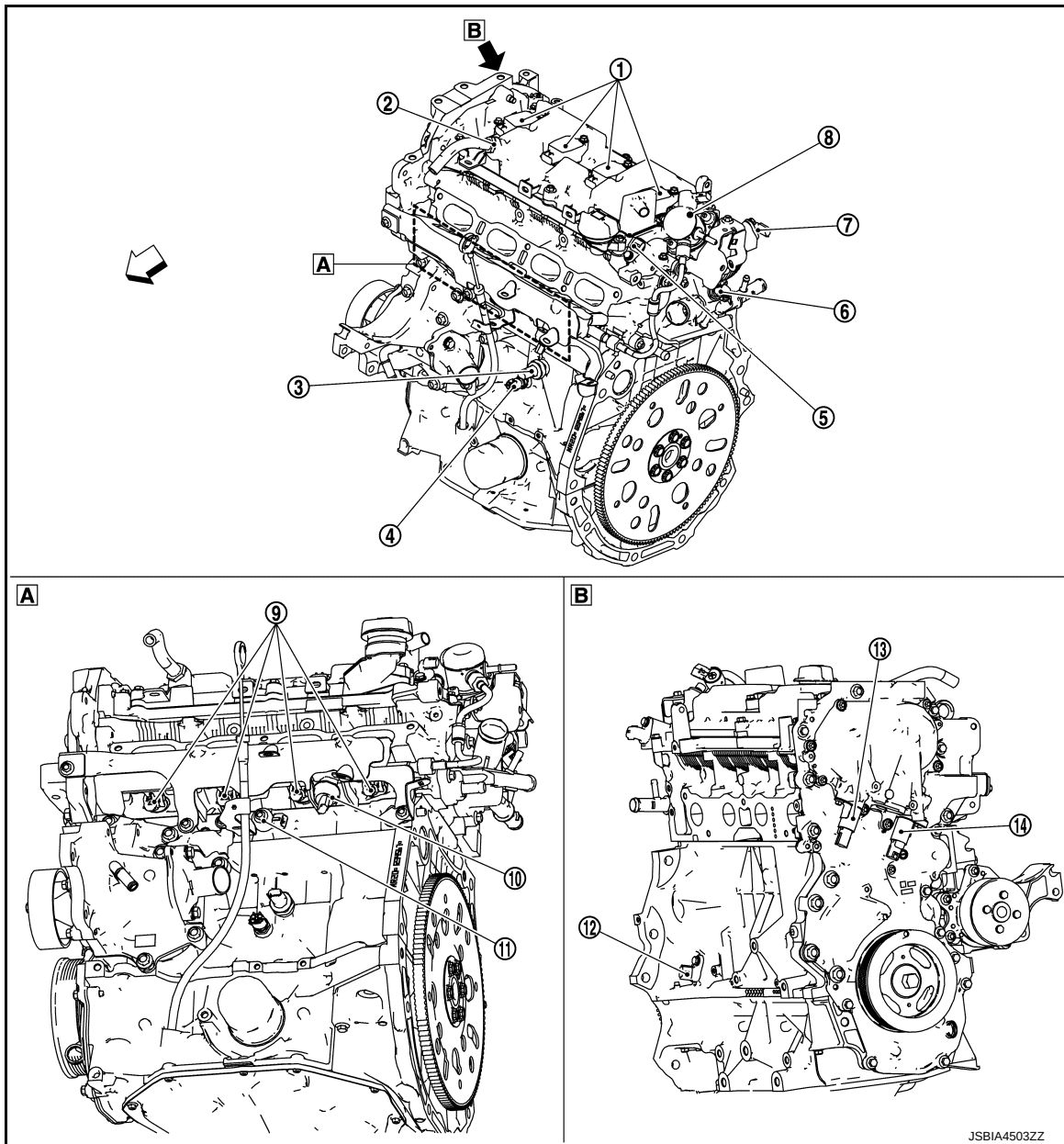
No.	Component	Function
1.	IPDM E/R	IPDM E/R control the internal relays and the actuators. And when CAN communication with ECM is impossible, IPDM E/R performs fail-safe control. PCS-7. "RELAY CONTROL SYSTEM : System Description" PCS-8. "RELAY CONTROL SYSTEM : Fail-safe" PCS-11. "POWER CONTROL SYSTEM : System Description"
2.	Mass air flow sensor (with intake air temperature sensor)	EC-35. "Mass Air Flow Sensor (With Intake Air Temperature Sensor)"
3.	Electric throttle control actuator (with built in throttle position sensor and throttle control motor)	EC-32. "Electric Throttle Control Actuator"
4.	EVAP canister purge volume control solenoid valve	EC-40. "EVAP Canister Purge Volume Control Solenoid Valve"
5.	Intake manifold runner control valve	EC-38. "Intake Manifold Runner Control Valve"
6.	ECM	EC-32. "ECM"
7.	Atmospheric pressure sensor	EC-39. "Atmospheric Pressure Sensor"

ENGINE COMPARTMENT

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[MR20DD]



A Cylinder block left side
(Vehicle front side)

B Cylinder head front side
(Vehicle right side)

← : Vehicle front

No.	Component	Function
1.	Ignition coil	EC-33, "Ignition Coil With Power Transistor"
2.	PCV valve	EC-42, "Positive Crankcase Ventilation"
3.	Engine oil pressure sensor	EC-40, "Engine Oil Pressure Sensor"
4.	Engine oil temperature sensor	EC-40, "Engine Oil Temperature Sensor"
5.	Camshaft position sensor	EC-37, "Camshaft Position Sensor"
6.	Engine coolant temperature sensor	EC-36, "Engine Coolant Temperature Sensor"
7.	Exhaust valve timing control position sensor	EC-37, "Exhaust Valve Timing Control Position Sensor"
8.	High pressure fuel pump	EC-34, "High Pressure Fuel Pump"
9.	Fuel injector	EC-34, "Fuel Injector"

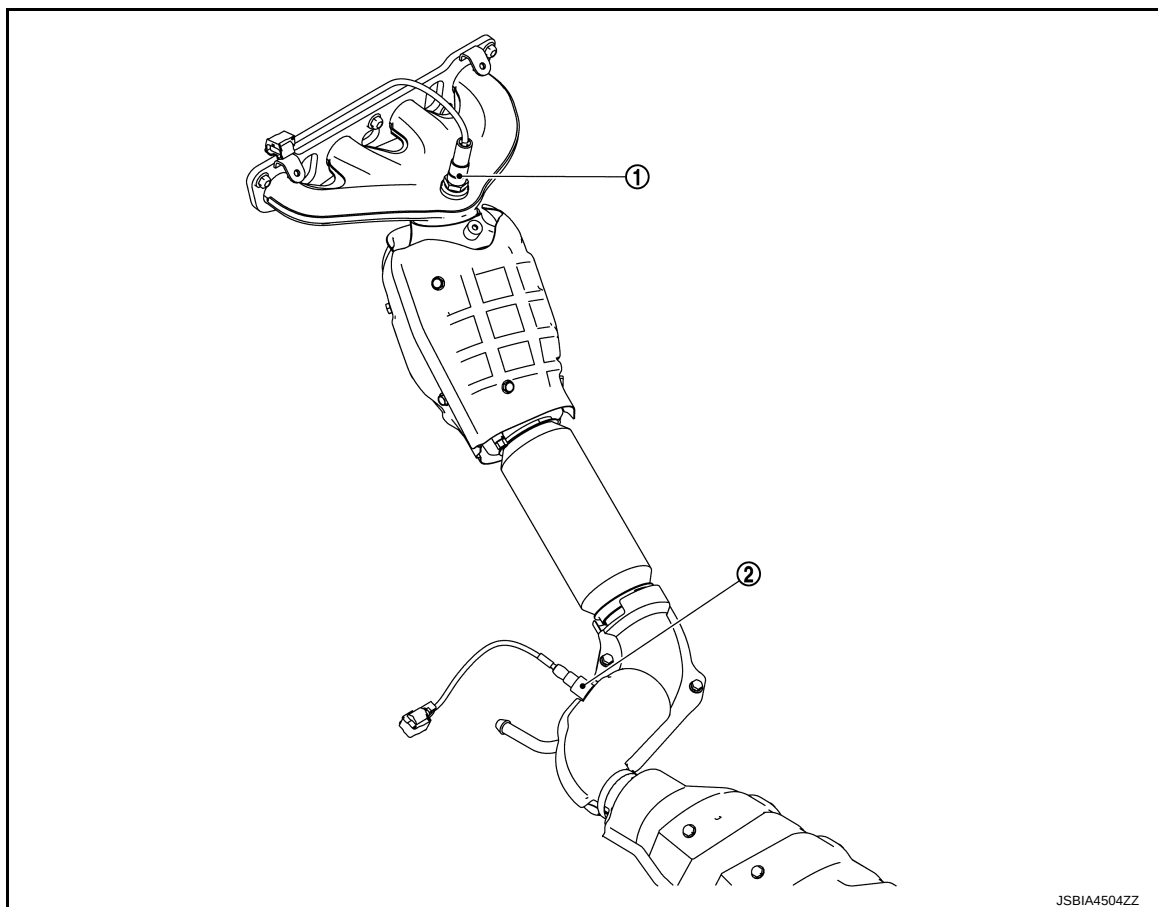
COMPONENT PARTS

< SYSTEM DESCRIPTION >

[MR20DD]

No.	Component	Function
10.	Fuel rail pressure sensor	EC-35, "Fuel Rail Pressure Sensor"
11.	Knock sensor	EC-39, "Knock Sensor"
12.	Crankshaft position sensor	EC-37, "Crankshaft Position Sensor"
13.	Exhaust valve timing control solenoid valve	EC-38, "Exhaust Valve Timing Control Solenoid Valve"
14.	Intake valve timing control solenoid valve	EC-37, "Intake Valve Timing Control Solenoid Valve"

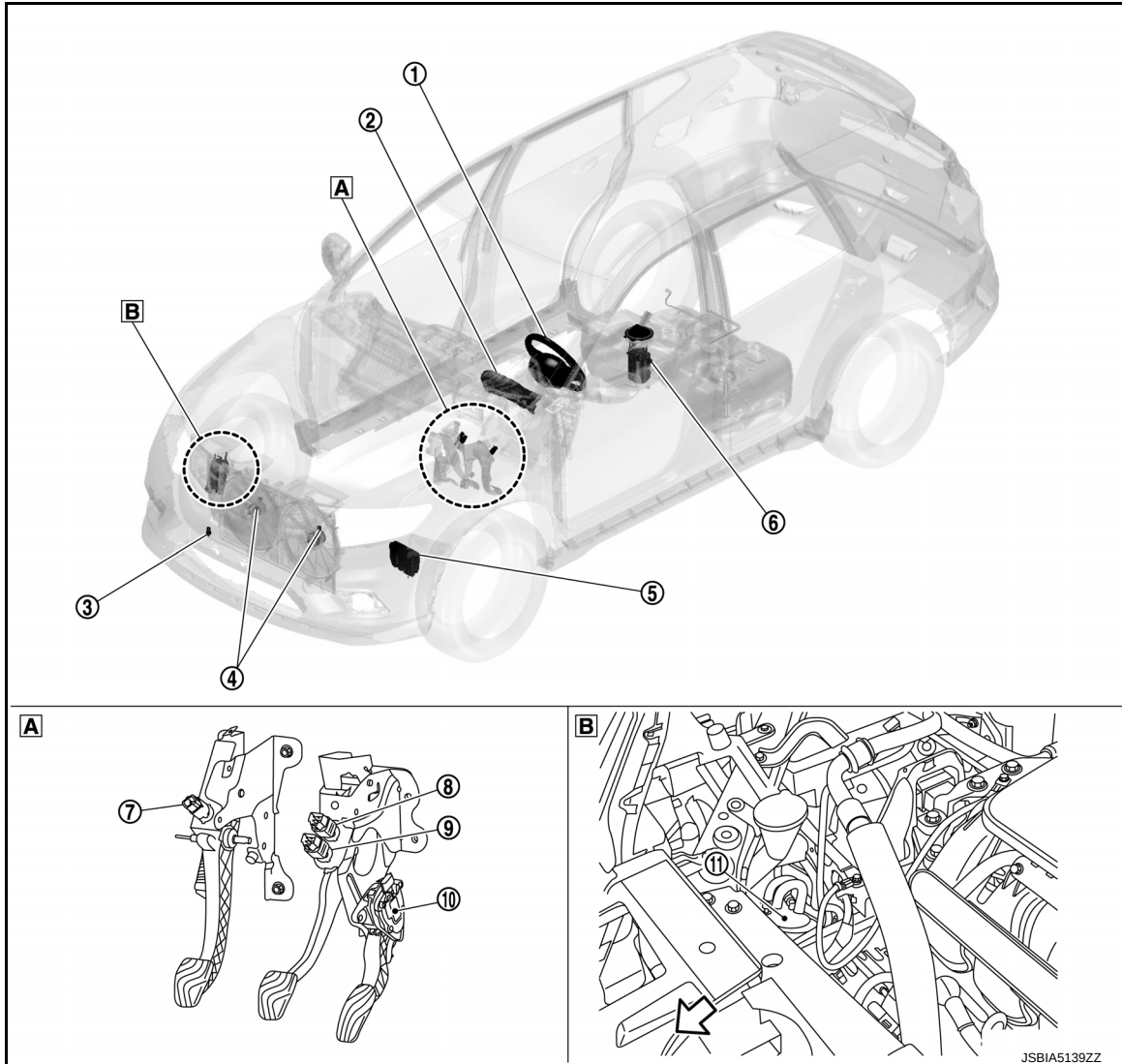
EXHAUST COMPARTMENT



JSBIA4504ZZ

No.	Component	Function
1.	Air fuel ratio (A/F) sensor 1	EC-38, "Air Fuel Ratio (A/F) Sensor 1"
2.	Heated oxygen sensor 2	EC-39, "Heated Oxygen Sensor 2"

BODY COMPARTMENT



A Periphery of pedals

B Front right side of engine room area

↶ Vehicle front

No.	Component		Function
1.	ASCD steering switch		EC-41, "ASCD Steering Switch"
2.	Combination meter	MIL	MWI-50, "WARNING LAMPS/INDICATOR LAMPS : Mal-function Indicator Lamp (MIL)"
3.	Refrigent pressure sensor		EC-41, "Refrigerant Pressure Sensor"
4.	Cooling fan motor		EC-40, "Cooling Fan"
5.	Relay box	Cooling fan relay	Controlled by IPDM E/R, which receives command from ECM, energizes cooling fan motor.
		Fuel injector relay	Controlled by ECM, energizes fuel injectors through ECM inside.
		High pressure fuel pump relay	Controlled by ECM, energizes high pressure fuel pump.
6.	Fuel gauge/ fuel filter/ fuel pump ASSY		EC-35, "Low Pressure Fuel Pump"
7.	Clutch pedal position switch		EC-41, "Clutch Pedal Position Switch"
8.	Brake pedal position switch		EC-41, "Stop Lamp Switch and Brake pedal position switch"
9.	Stop lamp switch		EC-41, "Stop Lamp Switch and Brake pedal position switch"

COMPONENT PARTS

< SYSTEM DESCRIPTION >

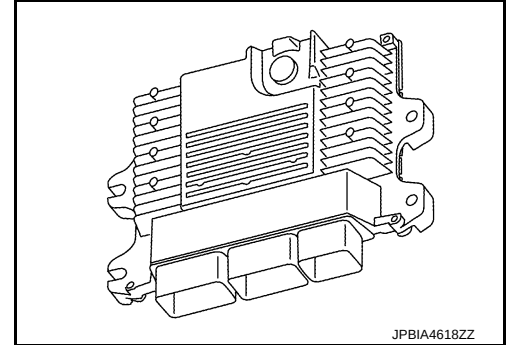
[MR20DD]

No.	Component	Function
10.	Accelerator pedal position sensor	EC-32, "Accelerator Pedal Position Sensor"
11.	EVAP canister	EC-40, "EVAP Canister Purge Volume Control Solenoid Valve"

ECM

INFOID:0000000010775004

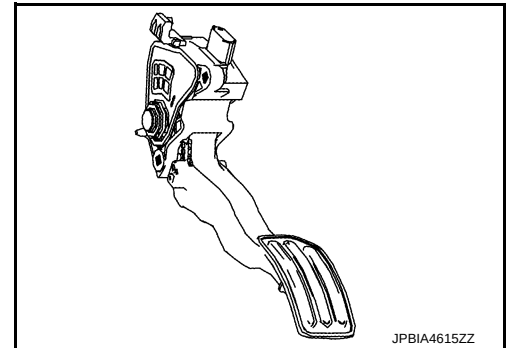
The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



Accelerator Pedal Position Sensor

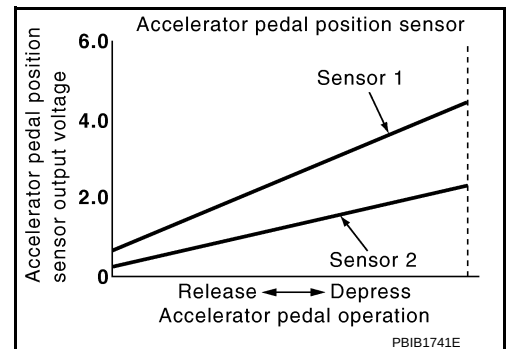
INFOID:0000000010775005

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:0000000010775006

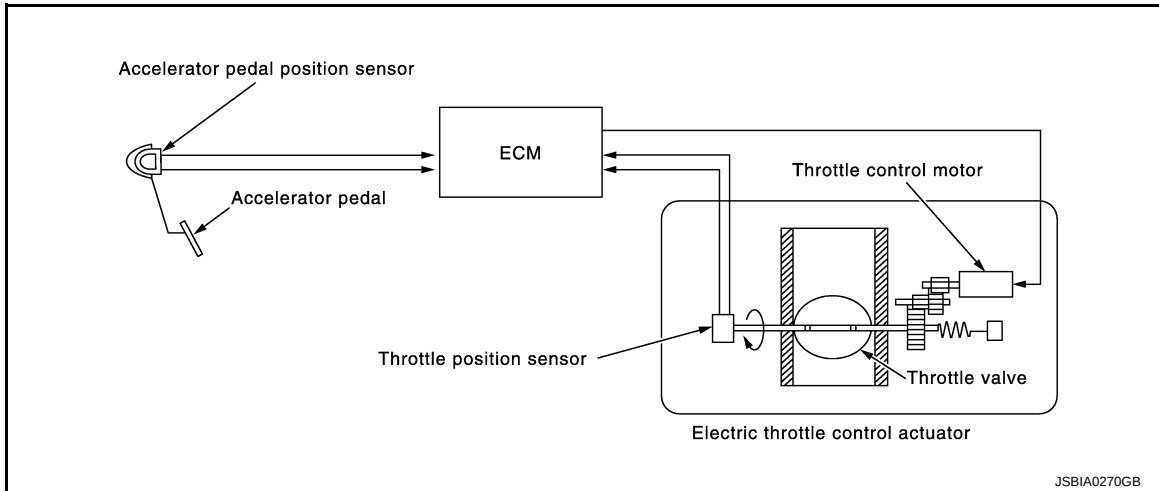
Description

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[MR20DD]

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



THROTTLE CONTROL MOTOR RELAY

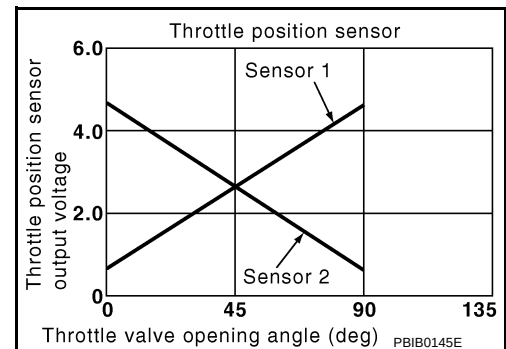
Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the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

THROTTLE POSITION SENSOR

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.

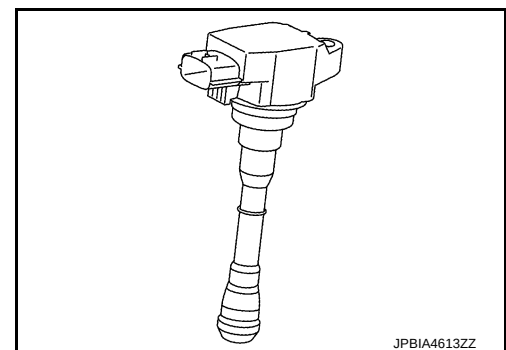


Ignition Coil With Power Transistor

INFOID:0000000010775007

Ignition coil with power transistor

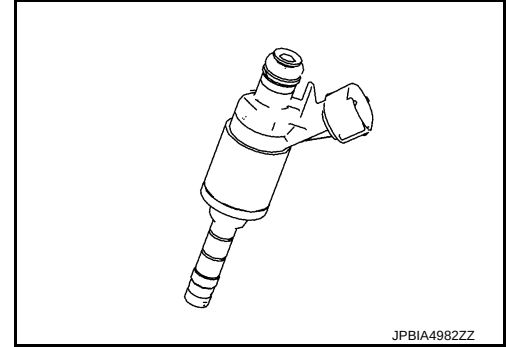
The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.



Fuel Injector

INFOID:000000010775008

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).

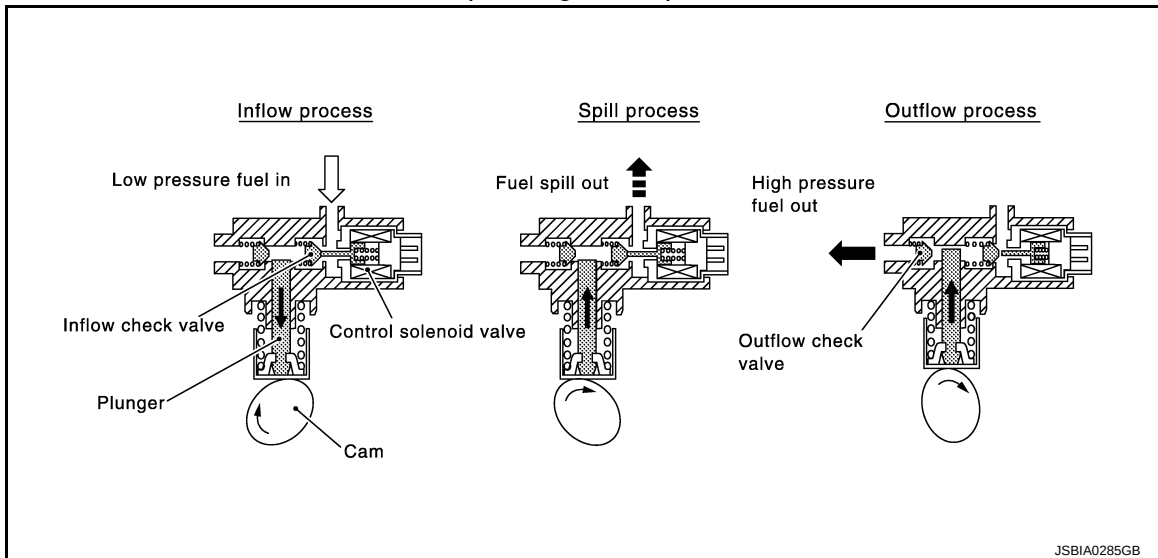


High Pressure Fuel Pump

INFOID:000000010775009

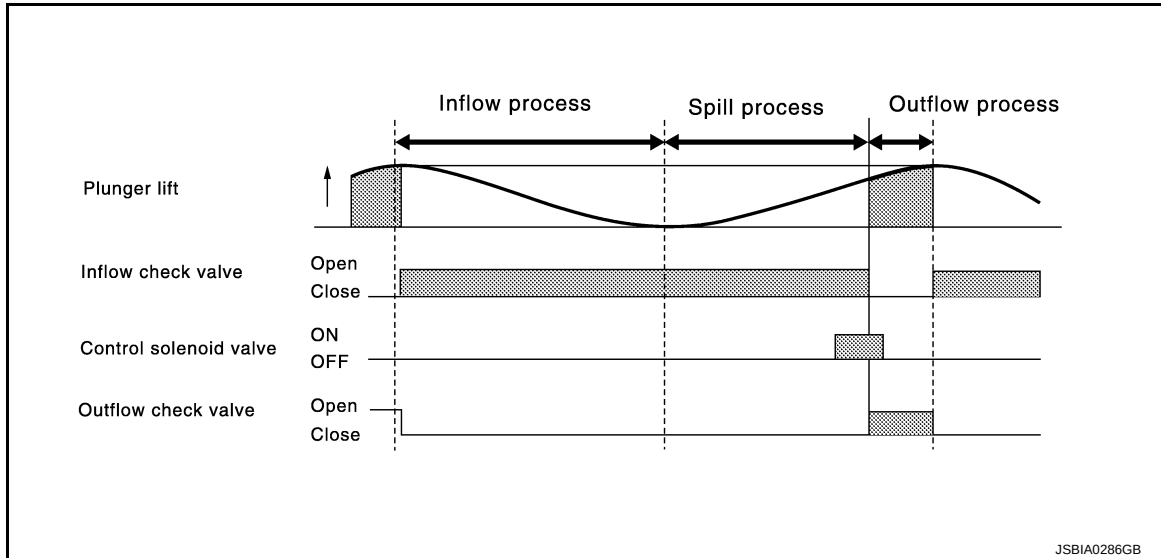
- Balanced flow volume control type single cylinder high pressure fuel pump, which approximately equalize the amount of injection and pump output, is adopted.
- The high pressure fuel pump is activated by the exhaust camshaft. ECM controls the high pressure fuel pump control solenoid valve built into the high pressure fuel pump and adjusts the amount of discharge by changing the suction timing of the low pressure fuel.
- Inflow process: Cam driven lowering plunger let the fuel from low pressure fuel pump induced into high pressure fuel pump.
- Spill process: Although the cam driven plunger start moving upward, inflow check valve still at open position due to the control solenoid valve, so the fuel is not pressurized and spilled out to low pressure fuel pump side. By changing the amount of this spill out volume changes the amount of injection.
- Outflow process: When the control solenoid valve turns ON, the inflow check valve is closed, fuel is pressurized and when the pressure exceeds certain point discharge check valve is pushed open to discharge fuel into fuel rail.

Operating Description



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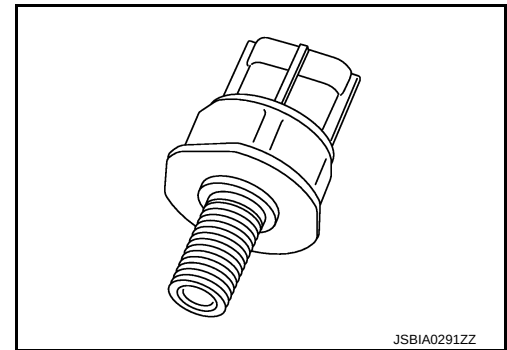
Operating Chart



Fuel Rail Pressure Sensor

INFOID:0000000010775010

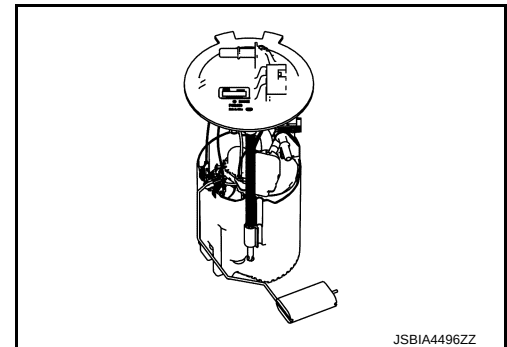
The fuel rail pressure (FRP) sensor is placed to the fuel rail and measures fuel pressure in the fuel rail. The sensor transmits voltage-signal to the ECM. As the pressure increases, the voltage rises. The ECM controls the fuel pressure in the fuel rail by operating high pressure fuel pump. The ECM uses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



Low Pressure Fuel Pump

INFOID:0000000010775011

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



Mass Air Flow Sensor (With Intake Air Temperature Sensor)

INFOID:0000000010775012

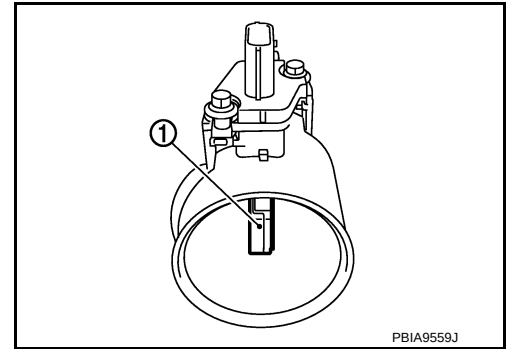
MASS AIR FLOW SENSOR

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[MR20DD]

The mass air flow sensor① is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The MAF sensor controls the temperature of the heater in sensing element to a certain amount. The temperature distribution around the heater changes according to the increase in intake air volume. The change is detected by a thermistor and the air volume data is sent to ECM by the MAF sensor.



PBIA9559J

INTAKE AIR TEMPERATURE SENSOR

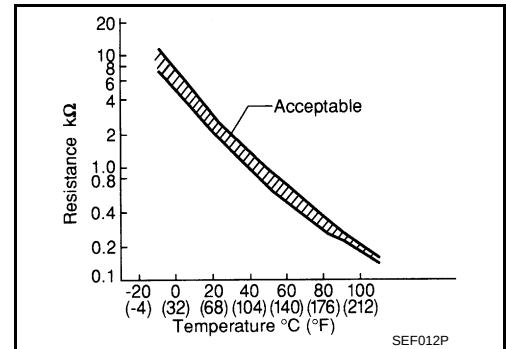
The intake air temperature sensor is built-into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature.

<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
25 (77)	3.3	1.80 - 2.20
80 (176)	1.2	0.28 - 0.36

*: These data are reference values on the diagnosis tool.

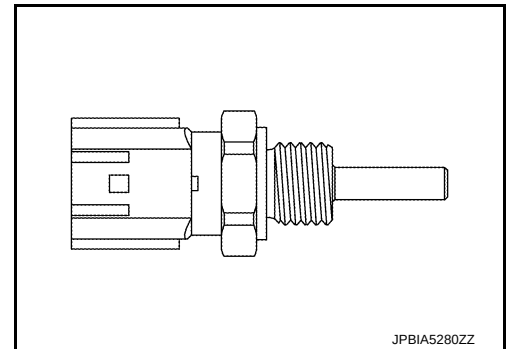


SEF012P

Engine Coolant Temperature Sensor

INFOID:000000010775013

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.

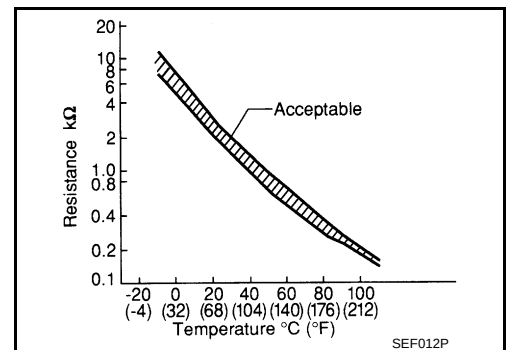


JPBIA5280ZZ

<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.

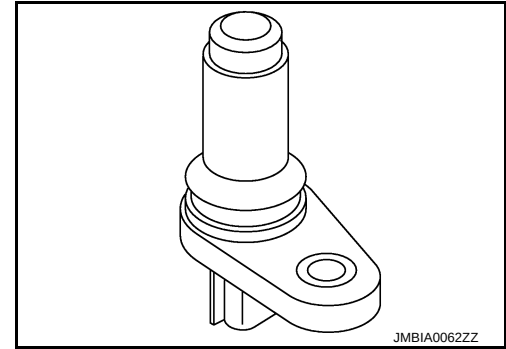


SEF012P

Crankshaft Position Sensor

INFOID:0000000010775014

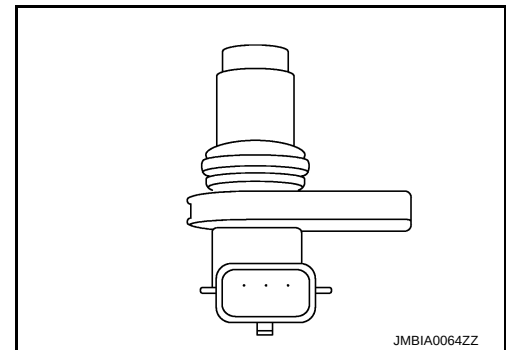
The crankshaft position sensor (POS) is located on the Cylinder block rear end. It detects the fluctuation of the engine revolution. The sensor consists of a permanent magnet and Hall IC. When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change. The changing gap causes the magnetic field near the sensor to change. Due to the changing magnetic field, the voltage from the sensor changes. The ECM receives the voltage signal and detects the fluctuation of the engine revolution.



Camshaft Position Sensor

INFOID:0000000010775015

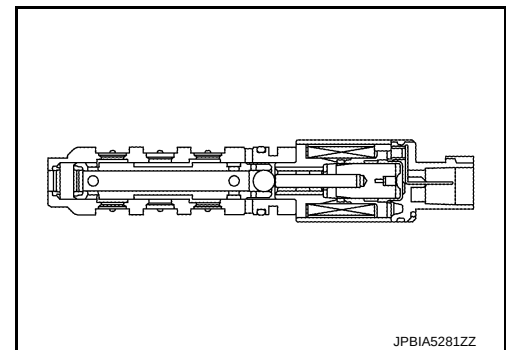
The camshaft position sensor (PHASE) senses the retraction of intake camshaft to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position. When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various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



Intake Valve Timing Control Solenoid Valve

INFOID:0000000010775016

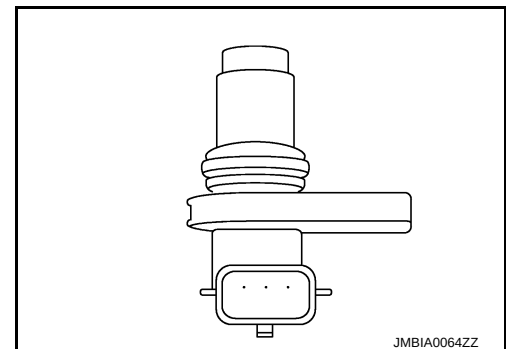
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM. The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow. The longer pulse width advances valve angle. 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:0000000010775017

Exhaust valve timing control position sensor detects the protrusion of the signal plate installed to the exhaust camshaft rear end. This sensor signal is used for sensing a position of the exhaust camshaft. The sensor consists of a permanent magnet and Hall IC. When engine is running, the high and low parts of the teeth cause the gap with the sensor to change. The changing gap causes the magnetic field near the sensor to change. Due to the changing magnetic field, the voltage from the sensor changes.



Exhaust Valve Timing Control Solenoid Valve

INFOID:000000010775018

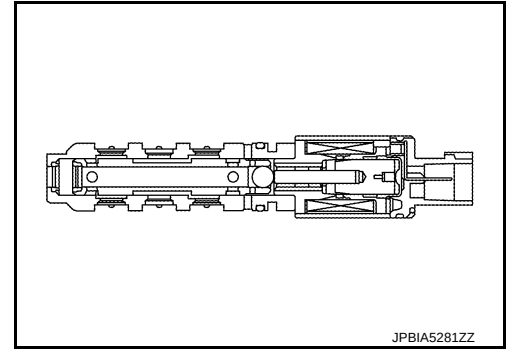
Exhaust valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

The exhaust valve timing control solenoid valve changes the oil amount and direction of flow through exhaust valve timing control unit or stops oil flow.

The longer pulse width retards valve angle.

The shorter pulse width advances valve angle.

When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the exhaust valve angle at the control position.

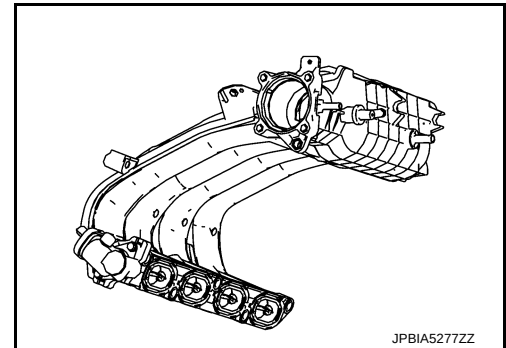


Intake Manifold Runner Control Valve

INFOID:000000010775019

Intake manifold runner control valve is consist of intake manifold runner control valve to open/close the right/left half section installed at each port of intake manifold runner control valve motor to drive open/close the valve.

ECM transmits the open/close signal to intake manifold runner control valve motor according to the driving condition based on the signals of engine speed, coolant temperature etc. ECM stabilizes combustion by causing strong swirl flow (revolving flow) by closing the intake manifold runner control valve.



Air Fuel Ratio (A/F) Sensor 1

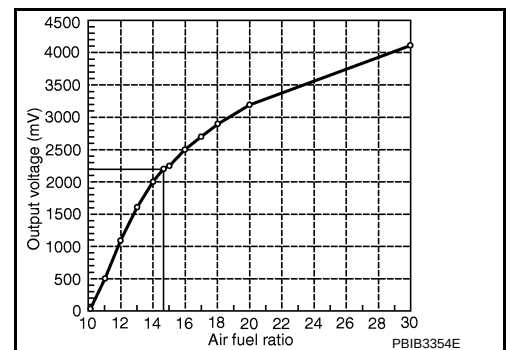
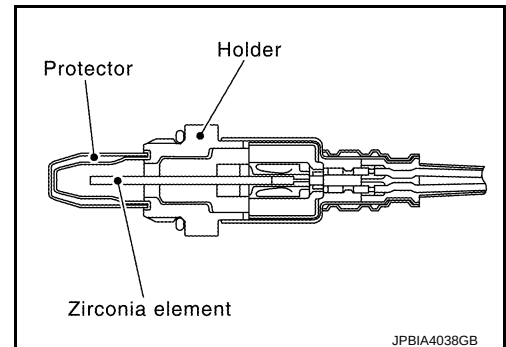
INFOID:000000010775020

Description

The A/F sensor 1 is mounted on the exhaust manifold, and transmits the signal of detected oxygen concentration in the exhaust gas to ECM.

While O2 sensor changes output voltage by ON/OFF (rich/lean) mode within a narrow range of the stoichiometric ratio, the A/F sensor changes output voltage between 0 - 4 V for a wide range of air fuel ratio.

ECM judges the state of air fuel ratio with this signal, and precisely controls air fuel ratio to match the stoichiometric ratio. Also, the sensor is equipped with heater for maintaining the activated state.



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:0000000010775021

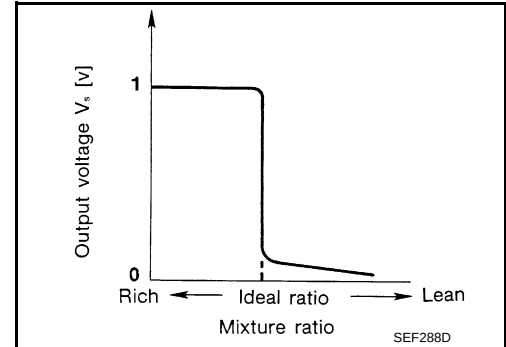
DESCRIPTION

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.

Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



HEATED OXYGEN SENSOR 2 HEATER

Heated oxygen sensor 2 heater is integrated in the sensor.

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

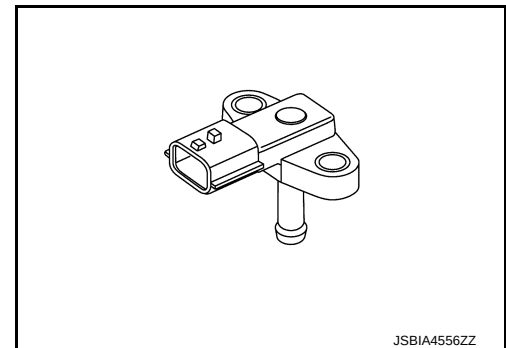
Operation

Engine speed	Heated oxygen sensor 2 heater
Above 3,200 rpm	OFF
Below 3,200 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:0000000010775022

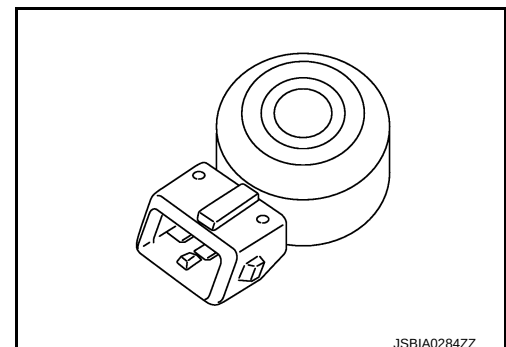
The atmospheric pressure sensor is attached to the battery tray 2. It detects atmospheric pressure and sends the voltage signal to the ECM. The sensor uses a silicon diaphragm which is sensitive to the change in pressure. As the pressure increases, the voltage rises.



Knock Sensor

INFOID:0000000010775023

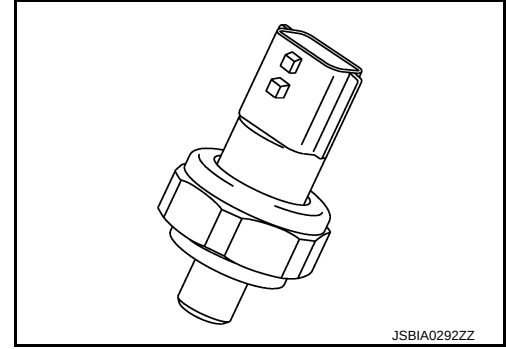
The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.



Engine Oil Pressure Sensor

INFOID:000000010775024

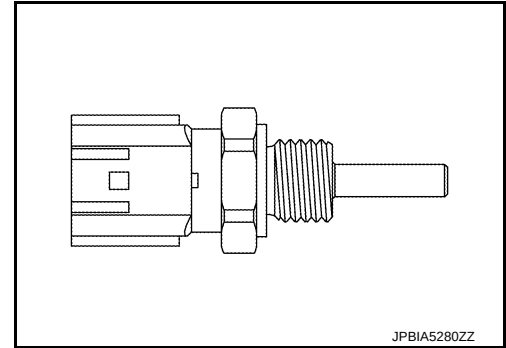
The engine oil pressure (EOP) sensor detects engine oil pressure and transmits a voltage signal to the ECM.



Engine Oil Temperature Sensor

INFOID:000000010775025

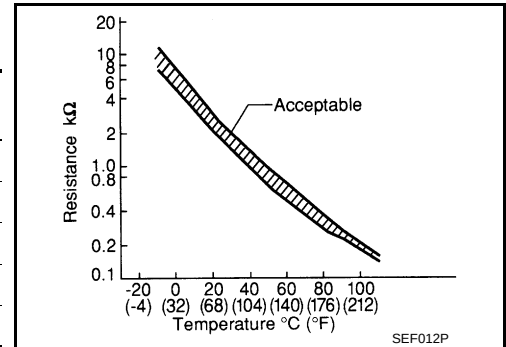
The engine oil temperature sensor is used to detect the engine oil temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine oil temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance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



<Reference data>

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

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



Cooling Fan

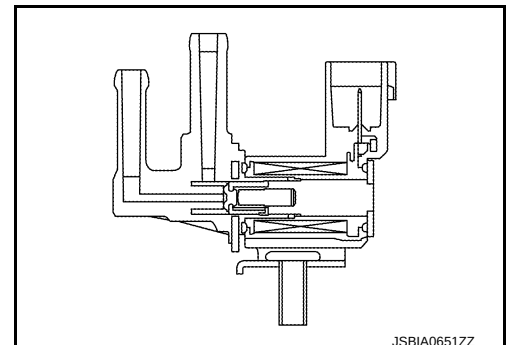
INFOID:000000010775026

The ECM controls the cooling fan speed corresponding to the vehicle speed, engine coolant temperature, and cooling fan request signal from A/C auto amp. The cooling fan is consisted of cooling fan motor, which drives cooling fan, and cooling fan relay which energizes cooling fan motor.

EVAP Canister Purge Volume Control Solenoid Valve

INFOID:000000010775027

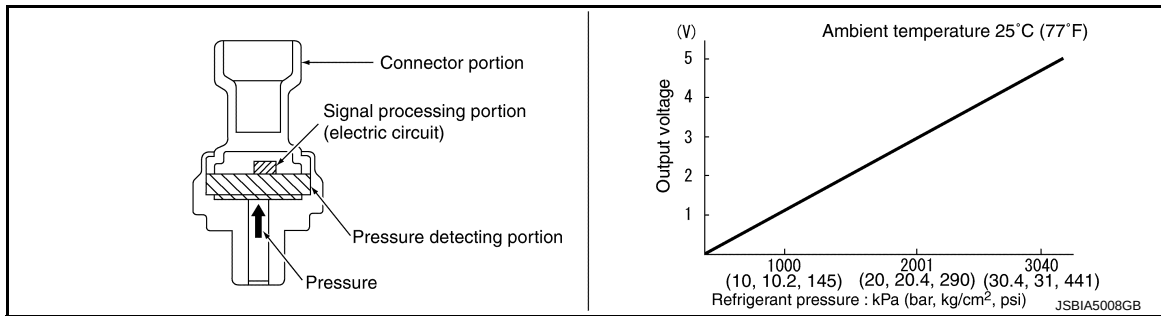
The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will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



Refrigerant Pressure Sensor

INFOID:0000000010775028

The refrigerant pressure sensor is installed at the liquid tank 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 and Brake pedal position switch

INFOID:0000000010775029

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:0000000010775030

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

Clutch pedal	Clutch pedal position switch
Released	ON
Depressed	OFF

ASCD Steering Switch

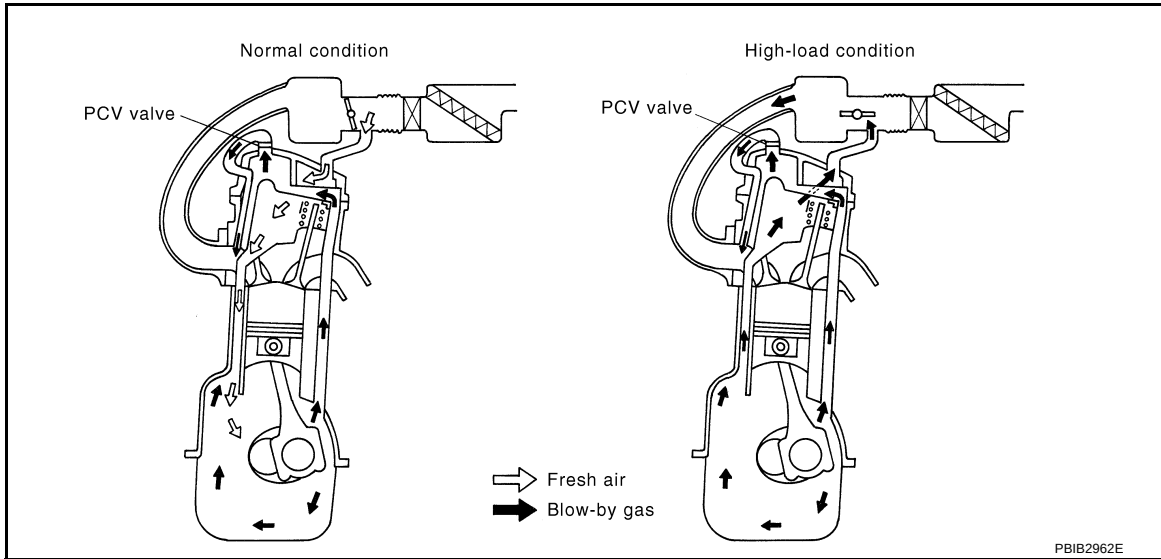
INFOID:0000000010775031

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

STRUCTURE AND OPERATION

Positive Crankcase Ventilation

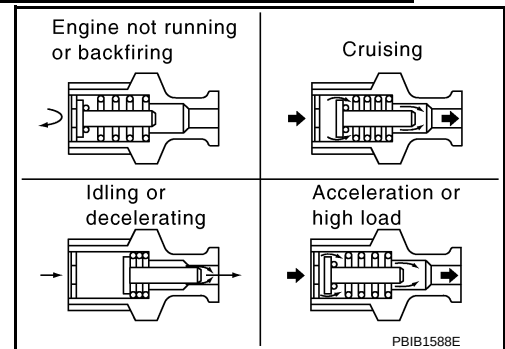
INFOID:000000010775033



This system returns blow-by gas to the intake manifold. The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.

During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover. Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.



SYSTEM

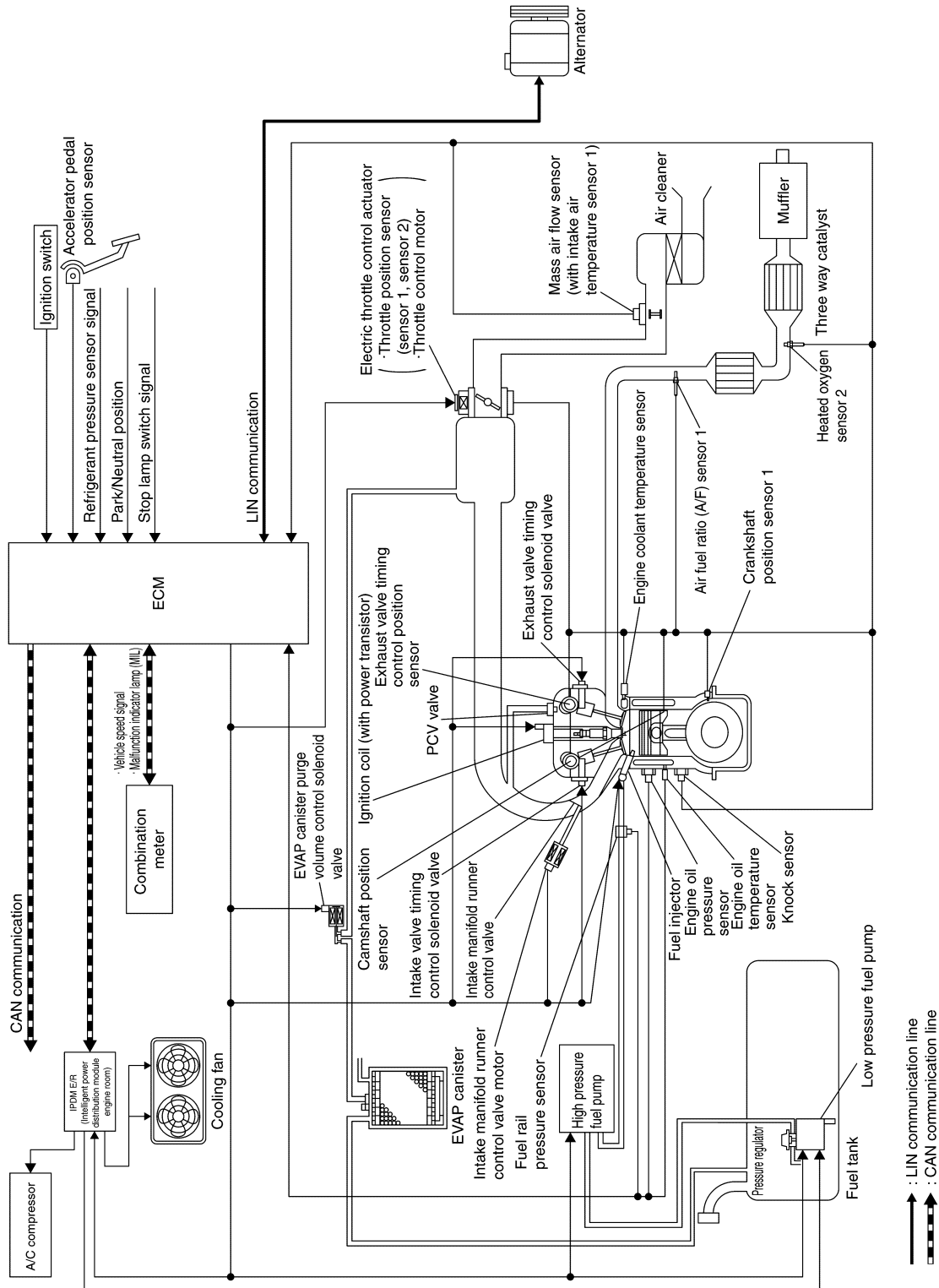
ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : System Description

INFOID:0000000010775034

EC

SYSTEM DIAGRAM



JSBIA5005GB

SYSTEM DESCRIPTION

SYSTEM

[MR20DD]

< SYSTEM DESCRIPTION >

- The adopted system enables comprehensive engine control. ECM (engine control module) performs various controls such as fuel injection control, ignition timing control, idling engine speed control, EVAP purge control and etc., and this system communicates with control unit such as CVT, ABS, etc. via CAN communication line.
- The adopted diagnostic system corresponding to OBD (on board diagnostic) system enables various function check and easily malfunction diagnosis in the engine control system.

Function	Reference
Fuel injection control	EC-51. "DIG (DIRECT INJECTION GASOLINE) SYSTEM : System Description"
Fuel pressure control	EC-54. "FUEL PRESSURE CONTROL : System Description"
Electric ignition control	EC-55. "ELECTRIC IGNITION SYSTEM : System Description"
Idling control	EC-56. "IDLE SPEED CONTROL : System Description"
Cooling fan control	EC-57. "COOLING FAN CONTROL : System Description"
Intake valve timing control	EC-58. "INTAKE VALVE TIMING CONTROL : System Description"
Exhaust valve timing control	EC-59. "EXHAUST VALVE TIMING CONTROL : System Description"
Intake manifold runner control valve control	EC-61. "INTAKE MANIFOLD RUNNER CONTROL : System Description"
Engine protection control (Low engine oil pressure)	EC-62. "ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description"
Air conditioning cut control	EC-63. "AIR CONDITIONING CUT CONTROL : System Description"
ASCD (Automatic speed control device)	EC-64. "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description"
ECO mode control	EC-65. "ECO MODE SYSTEM : System Description"
Engine/CVT/ABS total control	EC-65. "INTEGRATED CONTROL OF ENGINE, CVT, AND ABS : System Description"
EVAP purge control	EC-66. "EVAPORATIVE EMISSION SYSTEM : System Description"
Power generation voltage variable control	EC-66. "POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : System Description"
Fail-safe function	EC-103. "Fail-safe"
On board diagnostic (OBD) system	EC-71. "Diagnosis Description"

ENGINE CONTROL SYSTEM : Fail-safe

INFOID:0000000010775035

NON DTC RELATED ITEM

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

DTC RELATED ITEM

Description

SYSTEM

< SYSTEM DESCRIPTION >

[MR20DD]

When a DTC is detected, ECM executes a mode (in the Fail-safe mode) applicable to the DTC. The fail-safe mode has the preset traveling control mode (accelerator angle variation and engine output limit), device fix mode and combustion control mode.

Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
	Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction.
Device fix mode		- This mode fixes the IVT control solenoid valve and the EVT control solenoid valve in the reference position. - The intake manifold runner control valve motor is turned OFF (intake manifold runner control valve opens).
Combustion control mode	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).
	Idle speed control	Stops feedback control of idle speed and controls with specified speed.
	Recovery speed control at decelerating	Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.
	Idle neutral control	Stops idle neutral control.
	Ignition timing correction control	Partially controls ignition timing control.
	Retardation control	Controls ignition timing delay control in the intermediate water temperature range.

Fail Safe Pattern

Pattern	Fail safe mode	
A	Traveling control mode	Accelerator angle variation control
B		Engine output control
C	Device fix mode	
D	Combustion control mode	Stratified charge combustion control at starting
E		- Idle speed control - Recovery speed control at decelerating - Idle neutral control
F		- Ignition timing correction control - Retardation control

Fail Safe List

×:Applicable —: Not applicable

DTC No.	Detected items	Vehicle behavior						
		Pattern						Others
		A	B	C	D	E	F	
P0011	Intake valve timing control	—	—	×	—	—	—	—
P0014	Exhaust valve timing control	—	—	×	—	—	—	—
P0075	Intake valve timing control solenoid valve	—	—	×	—	—	—	—
P0078	Exhaust valve timing control solenoid valve	—	—	×	—	—	—	—

SYSTEM

< SYSTEM DESCRIPTION >

[MR20DD]

DTC No.	Detected items	Vehicle behavior						Others
		Pattern					F	
		A	B	C	D	E		
P0087 P0088 P0090	FRP control system	×	—	—	×	—	—	—
P0102 P0103	Mass air flow sensor circuit	×	×	×	×	×	×	—
P0117 P0118	Engine coolant temperature sensor circuit	—	—	—	×	×	—	Engine speed will not rise more than 1,800rpm due to the fuel cut.
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	—	—	—	—	—	—	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor. NOTE: If throttle position sensor 1 and 2 malfunction at the same time conducts following control. ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P0171 P0172	Fuel injection system	×	—	—	×	×	—	—
P0190	FRP sensor	×	—	—	×	×	—	—
P0197 P0198	Engine oil temperature sensor	—	—	—	—	—	—	Intake and exhaust valve timing control does not function.
P0201 P0202 P0203 P0204	Injector	×	—	—	×	—	—	—
P0300	Misfire	×	—	—	×	×	—	—
P0335	Crankshaft position sensor	—	—	×	—	—	—	—
P0340	Camshaft position sensor	—	—	×	—	—	—	—
P0365	Exhaust valve timing control position sensor	—	—	×	—	—	—	—
P0500	Vehicle speed sensor	×	—	—	×	×	—	—
P0524	Engine oil pressure	—	—	—	—	—	—	- ECM illuminates engine oil pressure warning lamp on the combination meter. - Engine speed will not rise more than 4,000rpm due to the fuel cut. - Fail-safe is canceled when ignition switch OFF → ON.
P0603 P0607	ECM	×	×	—	—	—	—	—
P0604 P0605 P0606		—	—	—	—	—	—	(Computing part of ECM does not operate normally.) ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P062B		×	—	—	×	—	—	NOTE: Fail-safe mode may not start depending on malfunction type of ECM.

SYSTEM

< SYSTEM DESCRIPTION >

[MR20DD]

DTC No.	Detected items	Vehicle behavior						Others	
		Pattern					F		
		A	B	C	D	E			
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.	
P1197	Out of gas	—	—	—	—	—	—	Engine torque is limited.	
P1217	Engine over temperature	—	—	—	—	—	—	Engine speed will not rise more than 1,800rpm due to the fuel cut.	
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
P2008	Intake manifold runner control valve	×	×	×	×	×	×	—	
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	×	×	—	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. NOTE: For pattern A and B refer to A and B of P2119 DTC detection logic. (Refer to EC-369, "DTC Description" .) For C of P2119 DTC detection logic ECM behaves as above.	
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. Therefore, the acceleration will be poor. NOTE: If accelerator pedal position sensor 1 and 2 malfunction at the same time conducts following control. ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	

A

EC

C

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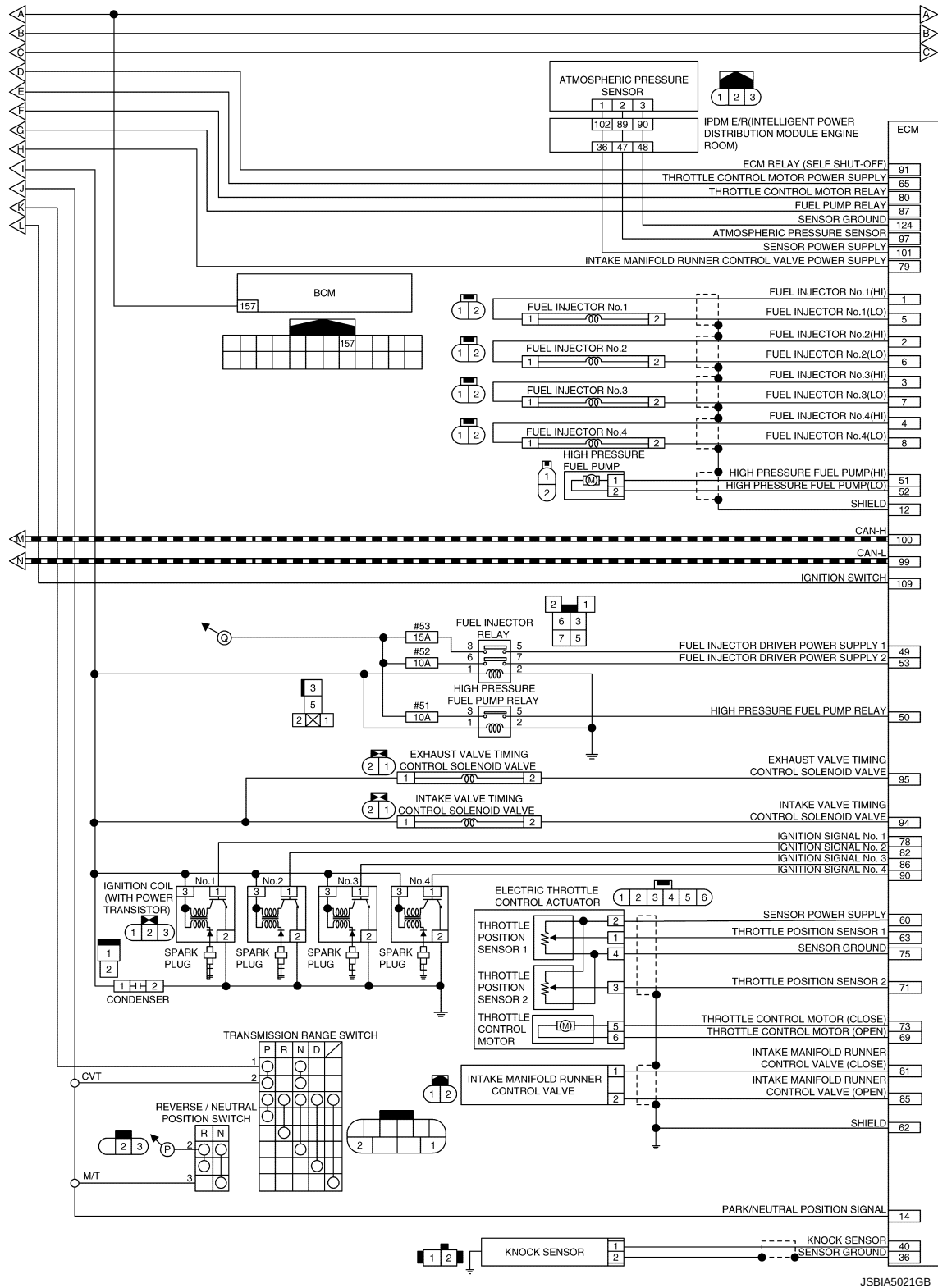
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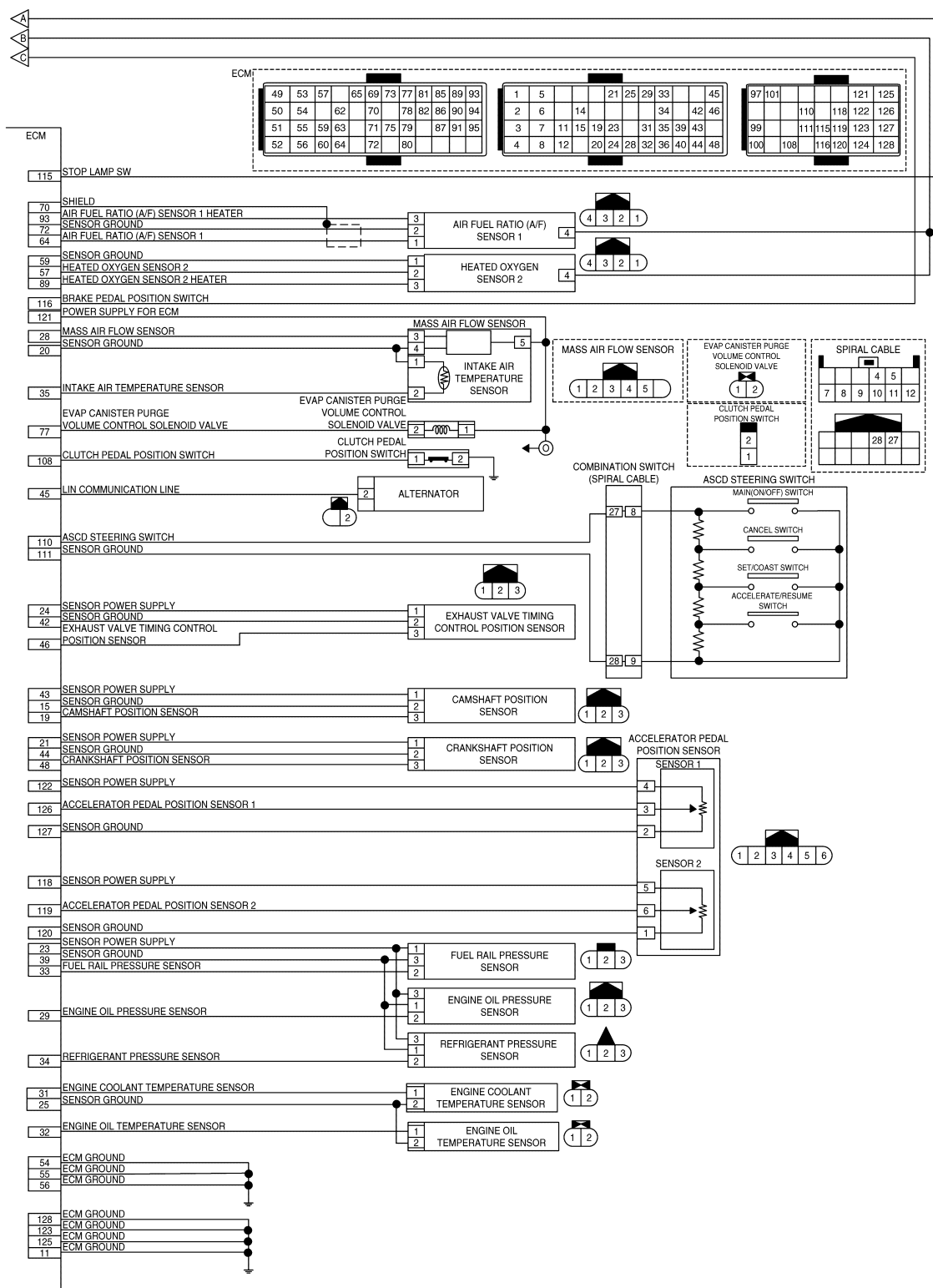
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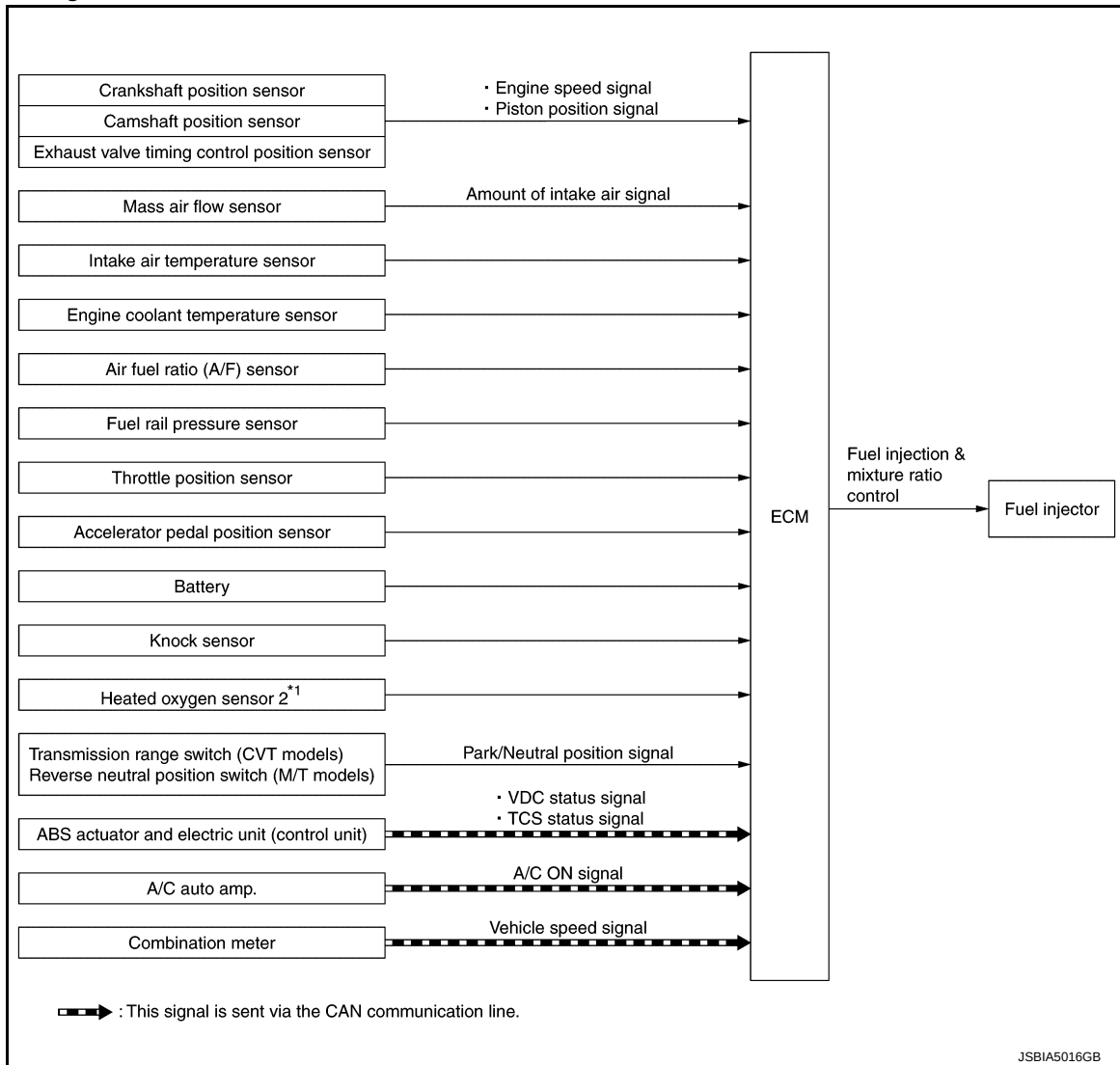
JSBIA5022GB

DIG (DIRECT INJECTION GASOLINE) SYSTEM

DIG (DIRECT INJECTION GASOLINE) SYSTEM : System Description

INFOID:000000010775037

System Diagram



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

SYSTEM DESCRIPTION

The adoption of the direct fuel injection system [DIG (Direct Injection Gasoline)] enables more accurate adjustment of fuel injection quantity by injecting atomized high-pressure fuel directly into the cylinder. This method allows high-powered engine, high torque, low fuel consumption, quietness, 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 and intake air and fuel rail pressure) from the crankshaft position sensor, camshaft position sensor, mass air flow sensor and the fuel rail pressure sensor.

FUEL INJECTION CONTROL

Injection Pattern

ECM conducts sequential injection (1 injection per 2 rotations of engine to each cylinder, suitable injection according to each cylinder's ignition order).

Injection when starting the engine

When starting the engine, ECM determines the amount of fuel injected according to conditions such as engine coolant temperature to make the starting smoother.

Also, conducts the starting control with stratified-charge combustion according to conditions.

Injection when driving normally

< SYSTEM DESCRIPTION >

Normally, ECM determines the amount of injection to be an optimum air-fuel mixture ratio for homogeneous combustion.

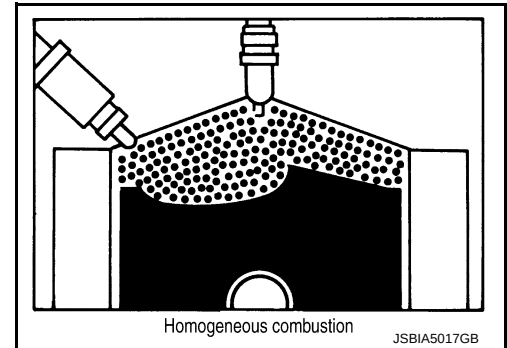
Cut-in injection when acceleration

When accelerating, according to the opening speed of throttle valve, ECM conducts a cut-in injection adding to normal injection and improves accelerating performance.

DIRECT FUEL INJECTION CONTROL

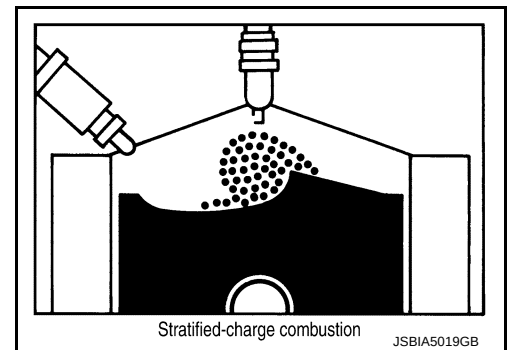
Homogeneous Combustion

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.



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.



VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

The amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

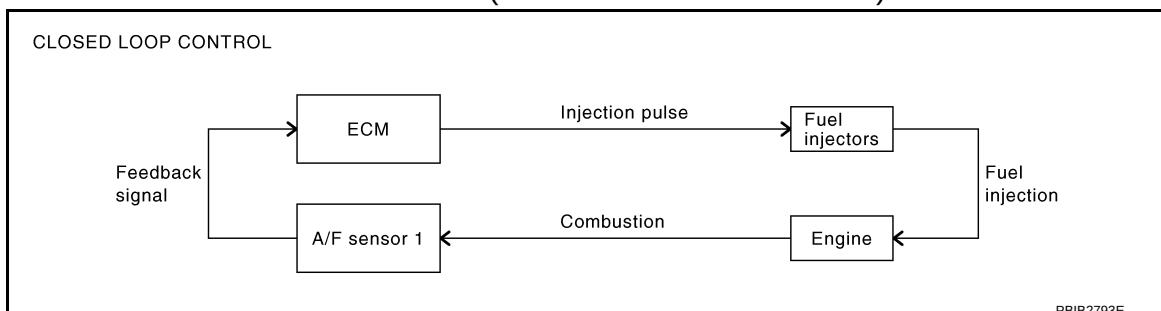
<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever position is changed from N to D
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



< SYSTEM DESCRIPTION >

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. And the correcting factor to control the pulse width is displayed as "A/F CORRECTION", or "S-FUEL TRM-B1 [%]". For more information about A/F sensor 1, refer to [EC-38, "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 (clamp) 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
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from heated oxygen 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.

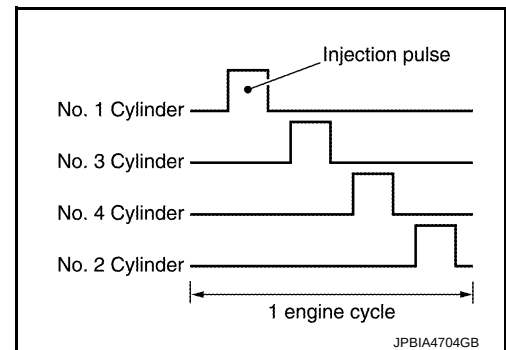
"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.

"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from heated oxygen 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

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 with the engine cold.

FUEL SHUT-OFF

Fuel shut-off during deceleration

Fuel to each cylinder is cut off during deceleration for restraint of HC and improvement of fuel efficiency.

< SYSTEM DESCRIPTION >

Engine speed at which fuel shut-off and recovery is conducted are programmed in detail according to various factors such as idle judgment, vehicle speed, gear position, engine coolant temperature etc. for optimizing emission and mileage performance. Also, no fuel shut-off is applied at extreme deceleration.

Fuel shut-off when the engine speed is excessively high

ECM shuts off fuel for all cylinders at the engine speed over 6,500 rpm, and recovers under 6,200 rpm.

Fuel shut-off when the engine speed is excessively high with no load

ECM shuts off fuel for all cylinders at the engine speed is high, and the vehicle speed is 0 km/h with N or P gear position for more than certain duration.

Fuel shut-off when the engine is over heating

ECM judges as the engine is over heating and conducts fuel shut-off when the output voltage of engine coolant temperature sensor exceeds the over heating judgment voltage for certain duration.

Also, malfunction indicator lamp (MIL) illuminates when the engine is judged as over heating.

And, once the engine over heating judgment is made, malfunction indicator lamp (MIL) remains ON even the engine coolant temperature becomes low (returns to normal), then fuel will be shut off at 2,000 rpm.

Fuel shut-off will be deactivated when the ignition key is turned OFF once, but malfunction indicator lamp (MIL) remains ON. The deactivation of malfunction indicator lamp (MIL) can be done by clearing self diagnosis results.

CAUTION:

Erase self diagnosis results only after the investigation of the engine over heating cause.

Fuel shut-off when N → D position is selected

Fuel shut-off is conducted when the engine speed is high and N → D position is selected.

Fuel shut-off when the engine stalls consecutively

To protect CVT, ECM conducts fuel shut-off when the engine speed is high despite the vehicle speed is excessively slow for more than several minutes with gear position except N or P. This control is not conducted when the malfunction of vehicle speed signal exists.

Fuel shut-off when malfunction indicator lamp (MIL) system is not working

ECM warns driver by conducting fuel shut-off when the request to illuminate malfunction indicator lamp (MIL) due to some of the self diagnosis relating electric throttle system or ECM continuously exist for more than 5 trips. ECM shuts off fuel at approx. 2,500 rpm and recovers at approx. 2,000 rpm.

Fuel shut-off when the throttle stuck to closed position

ECM conducts fuel shut-off when the electric throttle is stuck to its closed position.

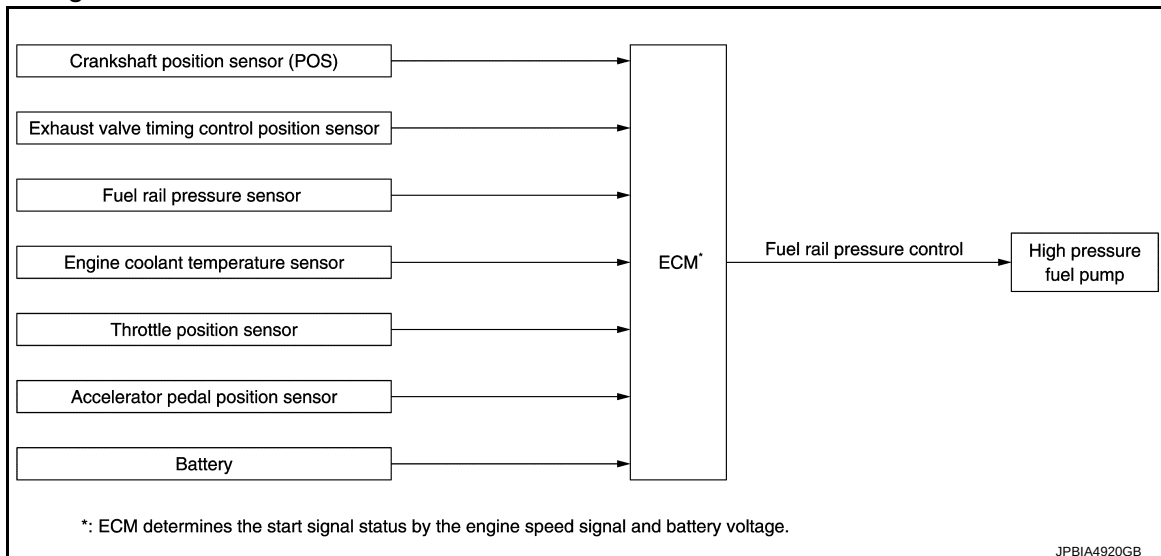
But, for the sake of heating capability, ECM allows the engine start at N or P gear position with limited engine speed.

FUEL PRESSURE CONTROL

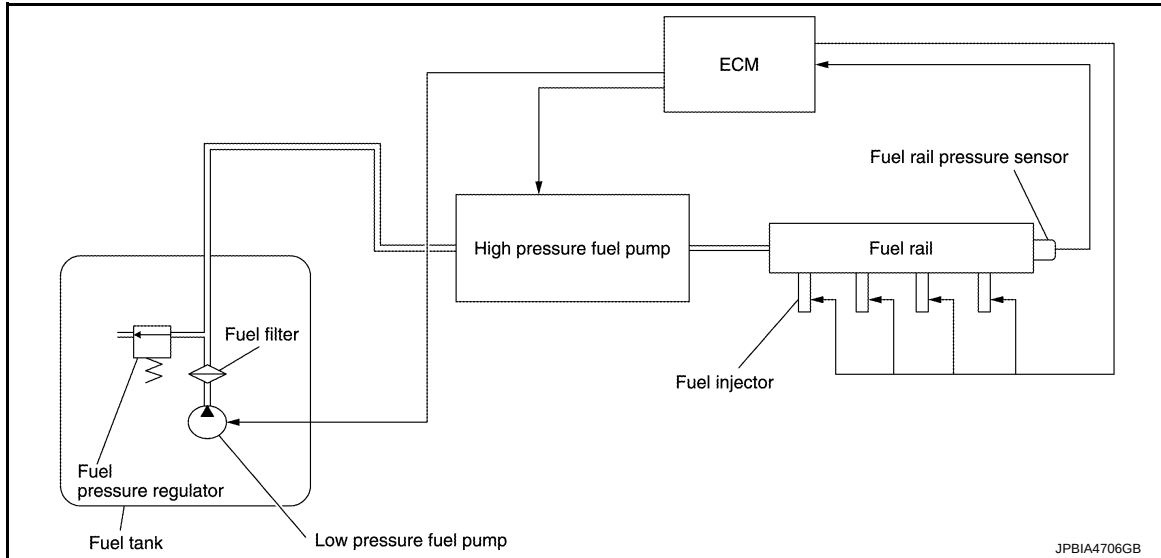
FUEL PRESSURE CONTROL : System Description

INFOID:0000000010775038

System Diagram



SYSTEM DESCRIPTION



Low fuel pressure control

- The low fuel pressure pump is controlled by ECM 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.
- Low fuel pressure is adjusted by the fuel pressure regulator.

High fuel pressure control

- The high pressure fuel pump is actuated by the cam of camshaft (EXH).
- 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 checkvalve to control fuel rail pressure.

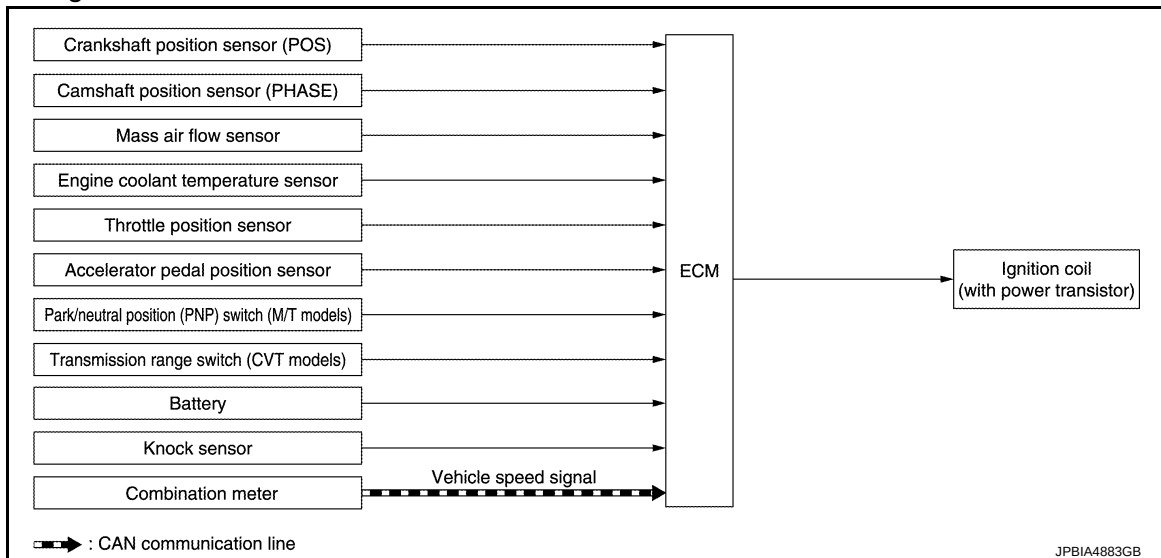
For details about operation, refer to [EC-34, "High Pressure Fuel Pump"](#).

ELECTRIC IGNITION SYSTEM

ELECTRIC IGNITION SYSTEM : System Description

INFOID:000000010775039

System Diagram



SYSTEM DESCRIPTION

Ignition order: 1 - 3 - 4 - 2

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

< SYSTEM DESCRIPTION >

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 basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The knock sensor feedback control 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.

BASIC CONTROL

- When starting, ECM controls ignition timing according to the engine speed and coolant temperature.
- After the engine is started, ECM corrects the ignition timing according to the driving conditions (engine coolant temperature, accelerator pedal position, throttle position, control request from CVT etc.) based on the engine speed and fuel injection pulse width.
- If knocking occurs, ECM retards the ignition timing within the anti-knocking control zone according to the knocking condition.
- When the engine is idling, ECM controls the ignition timing to stabilize idling speed.
- ECM controls the duration of power transmission (power transistor ON time) to ignition coil according to the engine speed and battery voltage.
- When the engine idle speed or the ignition timing deviates from specified value, "Idle Air Volume Learning" is required.

CYLINDER DISTINCTION CONTROL

ECM distinguishes cylinder based on the combination of signals of crankshaft position sensor, camshaft position sensor and the exhaust valve timing control position sensor, and if any of sensor malfunctions distinguishes cylinder with normal sensors.

Abnormal point	Sensor to use for cylinder distinction
Crankshaft position sensor	Camshaft position sensor
Camshaft position sensor	• Crankshaft position sensor • Exhaust valve timing control position sensor
Exhaust valve timing control position sensor	• Crankshaft position sensor • Camshaft position sensor

IDLE SPEED CONTROL

IDLE SPEED CONTROL : System Description

INFOID:0000000010775040

SYSTEM DESCRIPTION

ECM conducts feedback control of the engine idle speed to the target value, by controlling intake air volume with electric throttle, according to driving conditions such as engine warm-up condition, A/C loads, electric loads, etc.

IDLE SPEED FEEDBACK

ECM determines control target value based on the engine coolant temperature, A/C operation status, gear position, etc., then conducts feedback control to match the target value when idle judgment is made with reverse/neutral position switch signal ON, or when the vehicle speed is very low.

Also, adjustment of the engine idle speed is conducted by ECM's self learning (IDLE AIR VOLUME LEARNING).

CORRECTION OF BATTERY VOLTAGE

When battery voltage becomes lower than specified value, ECM corrects the target value to improve battery charging.

OTHER CORRECTIVE CONTROLS

- When some electric load (power steering load, electric load, etc.) is turned ON, ECM controls target engine speed for each load accordingly.
- When gear position is selected (N→D, D→N), ECM controls the engine speed by optimizing throttle opening to minimize shift shock.

< SYSTEM DESCRIPTION >

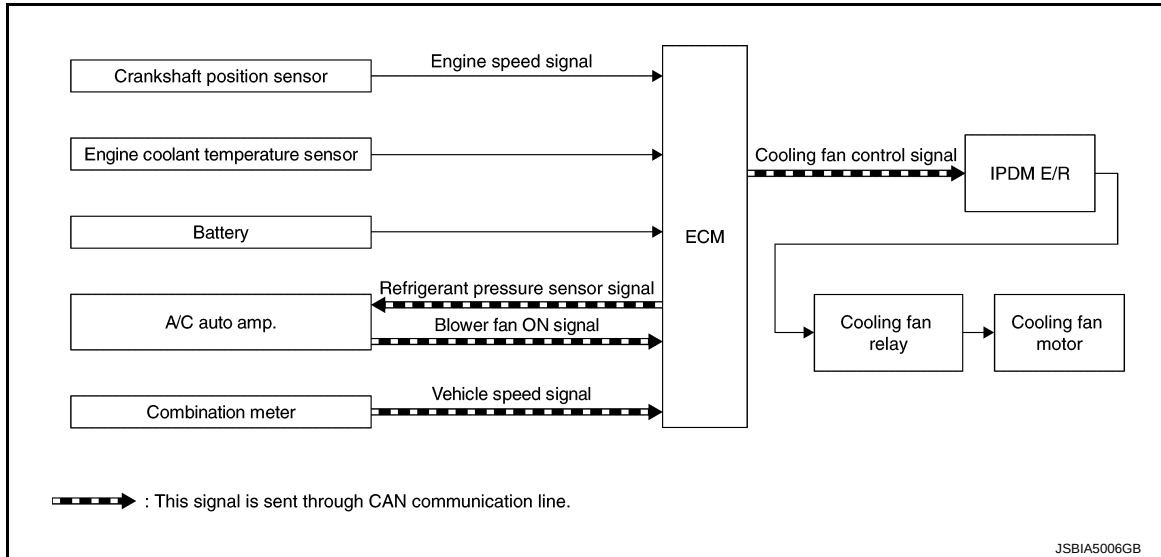
- When deceleration (accelerator pedal ON→OFF), ECM controls the engine speed by optimizing throttle opening to minimize shift shock and exhaust gas emission.

COOLING FAN CONTROL

COOLING FAN CONTROL : System Description

INFOID:000000010775041

System Diagram



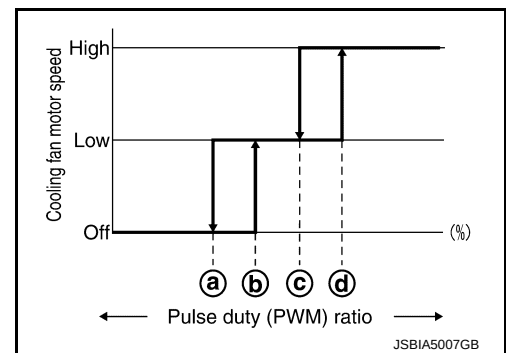
SYSTEM DESCRIPTION

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

ECM transmits a pulse duty (PWM) signal to IPDM E/R. IPDM E/R has threshold value to the pulse duty (PWM) signal and operates cooling fan motor with three phases of [HI (high-speed) / LOW (low-speed) /OFF].

- (a) : Less than 30% (OFF ← low-speed)
- (b) : More than 40% (OFF → low-speed)
- (c) : Less than 50% (low-speed ← high-speed)
- (d) : More than 60% (low-speed → high-speed)



Cooling Fan Relay Operation

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

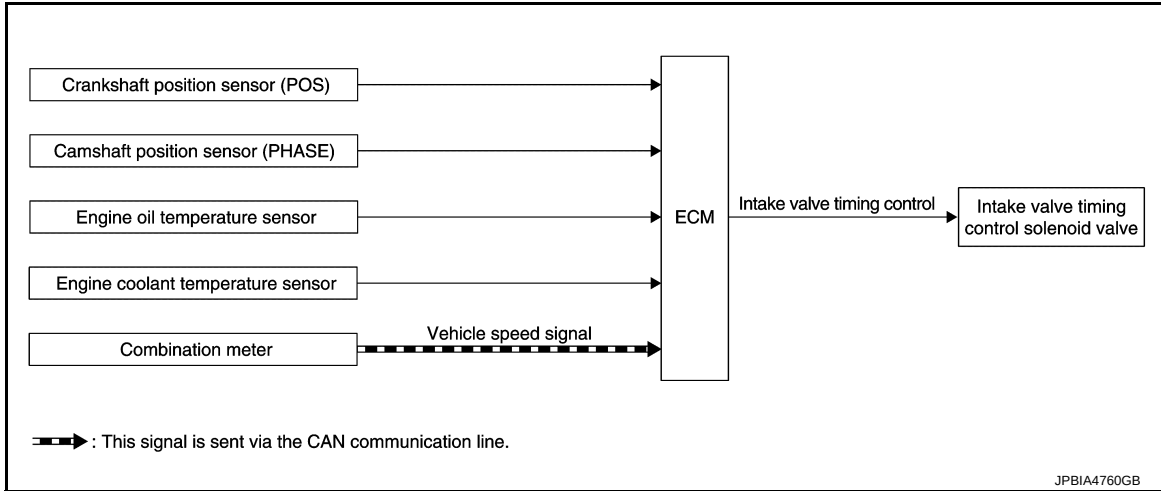
Cooling fan speed	Cooling fan relay		
	1	2	3
Stop (OFF)	OFF	OFF	OFF
Low (LOW)	OFF	ON	OFF
High (HI)	ON	OFF	ON

INTAKE VALVE TIMING CONTROL

INTAKE VALVE TIMING CONTROL : System Description

INFOID:000000010775042

System Diagram



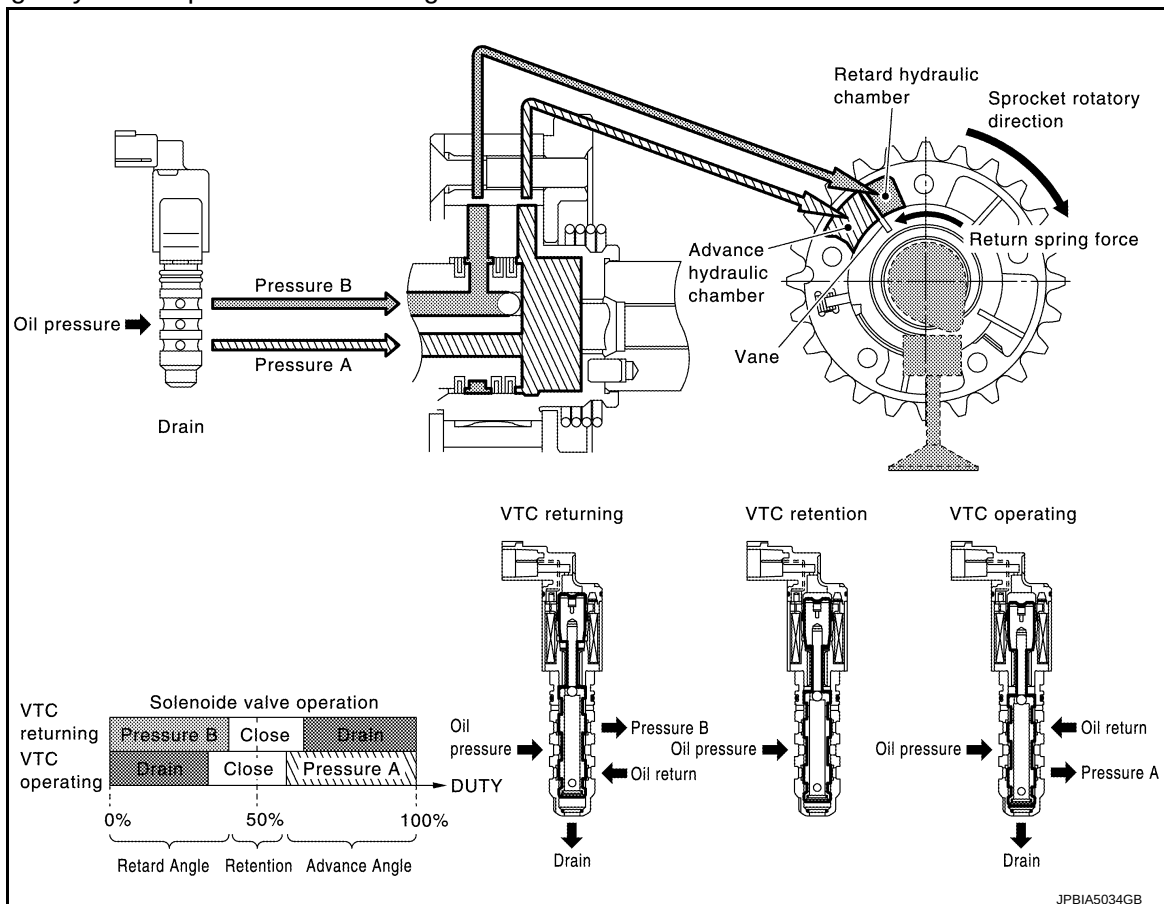
System Description

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.

Intake Valve Timing Control Solenoid Valve

Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM. Intake valve timing control solenoid valve controls the timing of intake valve opening/closing optimally by changing duty ratio depends on the driving conditions.



Status of intake valve timing solenoid valve	Intake valve timing controller activation
Engine OFF	When starting the engine, the controller vane and sprocket are fixed in full retard position by the reaction force of return spring, improving the starting performance of the engine.
Active (Advanced angle)	When the energization rate to the control solenoid valve is increased, the oil pressure from the oil pump is conveyed to the advance angle chamber of the controller. And retard angle chamber oil is drained. Accordingly, the controller vane rotates rightward and the phase of camshaft becomes advance angle. This condition brings about the greater overlap with the exhaust valve, enabling the exhaust gas cleaning by the internal EGR effect and the fuel consumption improvement by the reduction in pumping loss.
Neutral (Maintained)	When it is the target valve timing, the energization rate to the control solenoid valve is adjusted to the intermediate state. The solenoid valve is positioned at the neutral position and the oil path is interrupted to maintain the cam shaft phase.
Return (Retard angle)	When the energization rate to the control solenoid valve is decreased, the oil pressure from the oil pump is conveyed to the retard chamber of the controller. And advanced angle chamber oil is drained. Accordingly, the controller vane rotates leftward and the phase of camshaft becomes retard angle.

INTAKE VALVE TIMING CONTROL FEEDBACK CONTROL

Cam Position Detection

The camshaft position sensor mounted at the rear of the cylinder head detects a cam position, by using the groove on the plate located at the rear of the intake camshaft.

Feedback Control

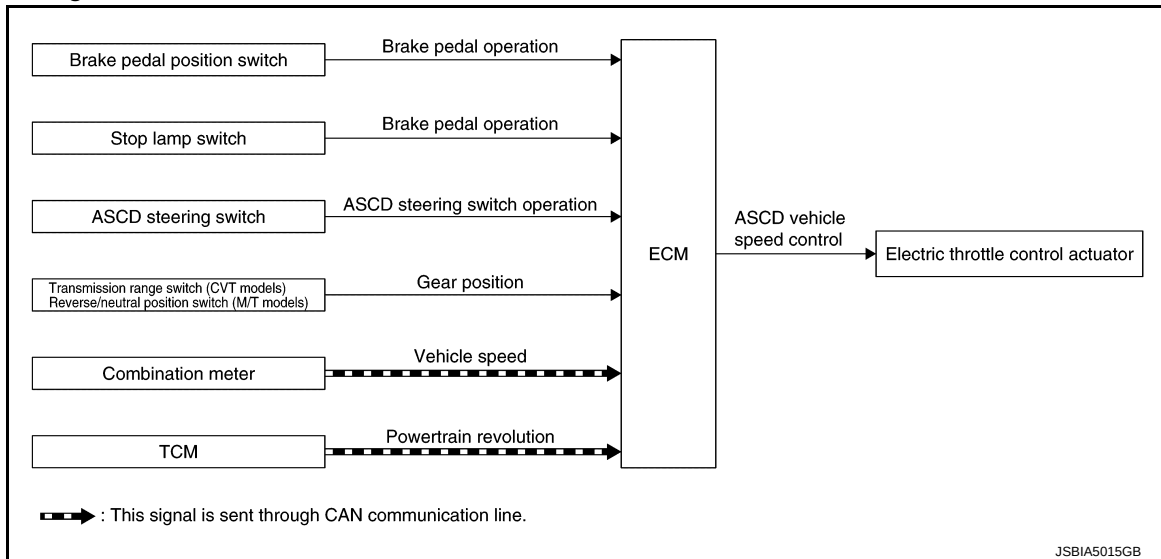
The camshaft position sensor feeds back an actual cam position signal to ECM. Based on the signal, ECM controls the intake valve timing control solenoid valve to satisfy the optimum target valve opening/closing timing according to a driving condition.

EXHAUST VALVE TIMING CONTROL

EXHAUST VALVE TIMING CONTROL : System Description

INFOID:0000000010775043

System Diagram



SYSTEM DESCRIPTION

With the exhaust valve timing controller which controls the phase of exhaust camshaft to optional position continuously, ECM improves both low-middle speed torque and high speed performance, emission and fuel efficiency by optimizing the exhaust valve open/close timing according to driving conditions.

The exhaust valve timing controller is hydraulically controlled by the exhaust valve timing control solenoid valve.

SYSTEM

[MR20DD]

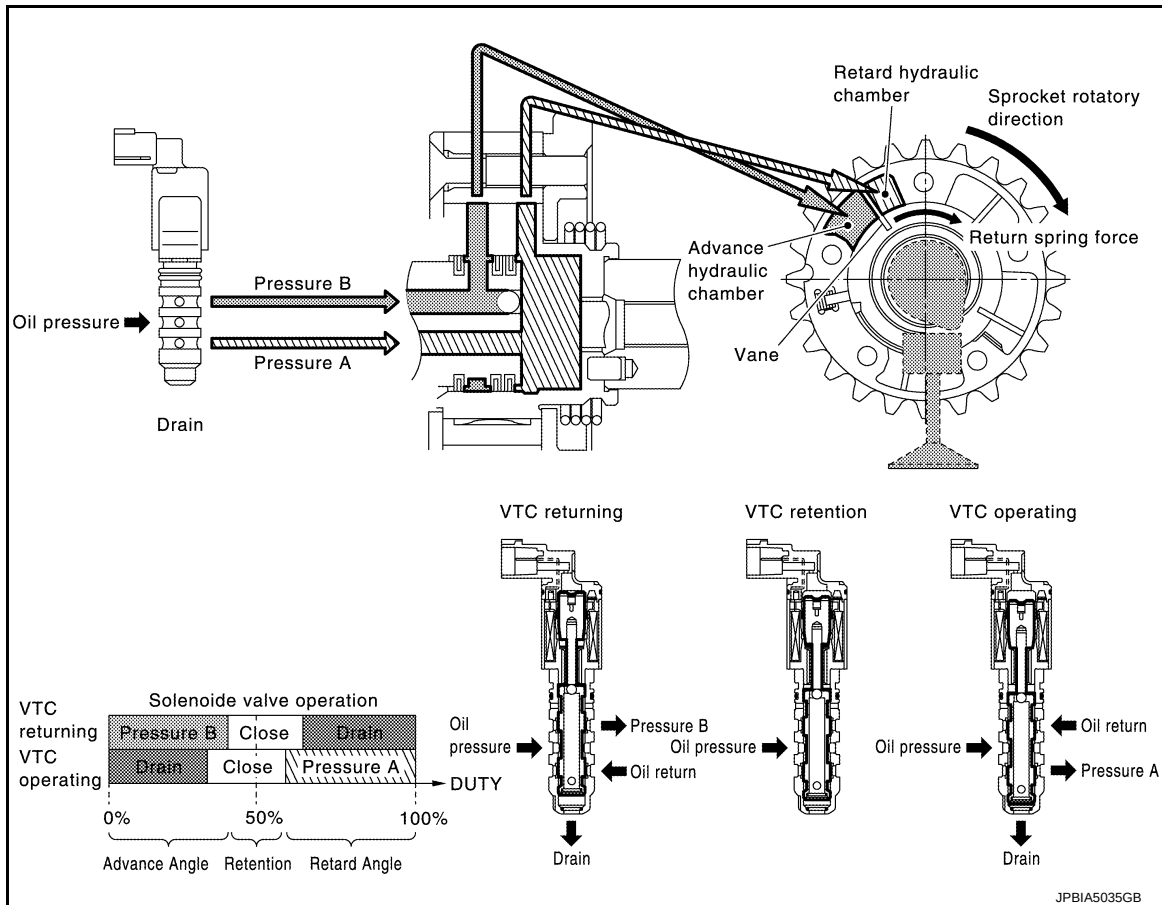
< SYSTEM DESCRIPTION >

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 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.

EXHAUST VALVE TIMING CONTROL SOLENOID VALVE CONTROL

The exhaust valve timing control solenoid valve is driven ON-OFF (duty control) by ECM output signal, and controls the open/close timing of the exhaust valve to the optimum by changing its duty ratio according to the vehicle's driving condition.



Exhaust valve timing control solenoid valve condition	Exhaust valve timing controller operation
Engine OFF	When starting the engine, the controller vane and sprocket are fixed in full advanced position by the reaction force of return spring, improving the starting performance of the engine.
Active (Retard angle)	When the energization rate to the control solenoid valve is increased, the oil pressure from the oil pump is conveyed to the retard angle chamber of the controller. And advanced angle chamber oil is drained. Accordingly, the controller vane rotates leftward and the phase of camshaft becomes retard angle. This condition brings about the greater overlap with the intake valve, enabling the exhaust gas cleaning by the internal EGR effect and the fuel consumption improvement by the reduction in pumping loss.
Neutral (Maintained)	When it is the target valve timing, the energization rate to the control solenoid valve is adjusted to the intermediate state. The solenoid valve is positioned at the neutral position and the oil path is interrupted to maintain the cam shaft phase.
Return (Advanced angle)	When the energization rate to the control solenoid valve is decreased, the oil pressure from the oil pump is conveyed to the advanced chamber of the controller. And retard angle chamber oil is drained. Accordingly, the controller vane rotates rightward and the phase of camshaft becomes advanced angle.

EXHAUST VALVE TIMING CONTROL FEEDBACK CONTROL

< SYSTEM DESCRIPTION >

Cam Position Detection

The camshaft position sensor mounted at the rear of the cylinder head detects a cam position, by using the groove on the plate located at the rear of the exhaust camshaft.

Feedback Control

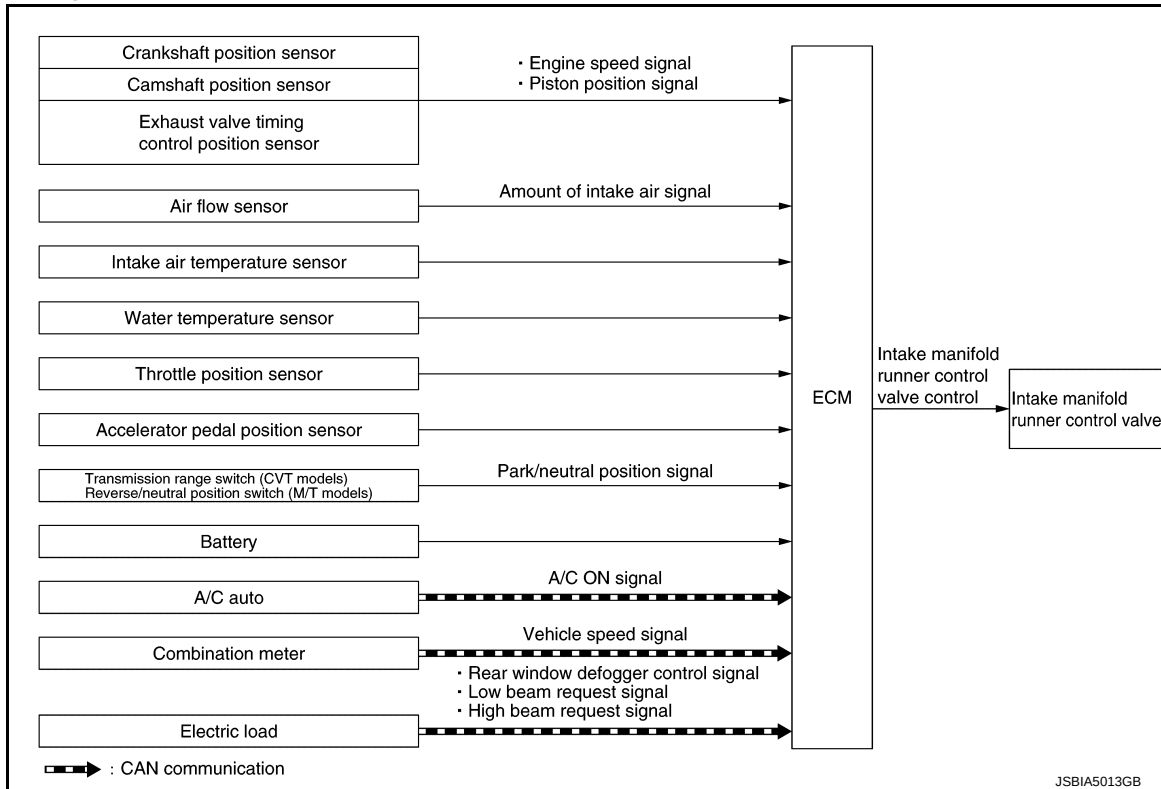
The camshaft position sensor feeds back an actual cam position signal to ECM. Based on the signal, ECM controls the exhaust valve timing control solenoid valve to satisfy the optimum target valve opening/closing timing according to a driving condition.

INTAKE MANIFOLD RUNNER CONTROL

INTAKE MANIFOLD RUNNER CONTROL : System Description

INFOID:0000000010775044

System Diagram

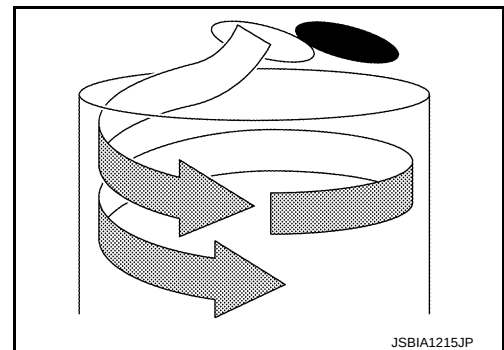


SYSTEM DESCRIPTION

The intake manifold runner control valve installed at intake manifold generates swirl flow (revolving flow) in combustion chamber, and by that effect air-fuel mixture is homogenized so that stabilizes combustion. The intake manifold runner control valve is driven by DC motor and controlled by ECM.

IDLING, LOW SPEED·SMALL LOAD RANGE

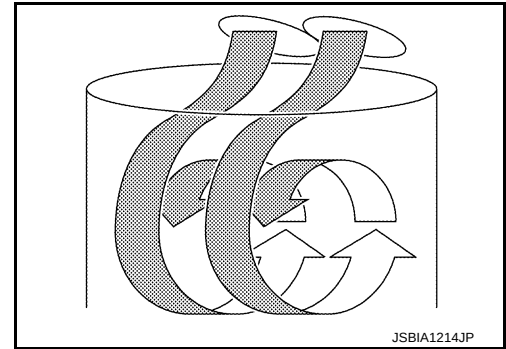
With intake manifold runner control valve closed the flowing field of swirl flow (revolving flow) is generated by increased flow speed of gas and improves combustion so that enables stable combustion.



MIDDLE·HIGH SPEED RANGE

< SYSTEM DESCRIPTION >

- With intake manifold runner control valve opened the flowing field mainly consist of tumble (vertical revolving flow) by atomizer, port shape and shallow piston head is generated.
- Which makes more swirl remained at the latter half of compression process so that improves combustion and enables stable combustion.



OPERATION OF INTAKE MANIFOLD RUNNER CONTROL VALVE

When the engine is idling or running at slow speed the valves are closed and swirl flow is generated. By closing valves the flowing speed of gas is increased and it stabilizes combustion also improves fuel efficiency.

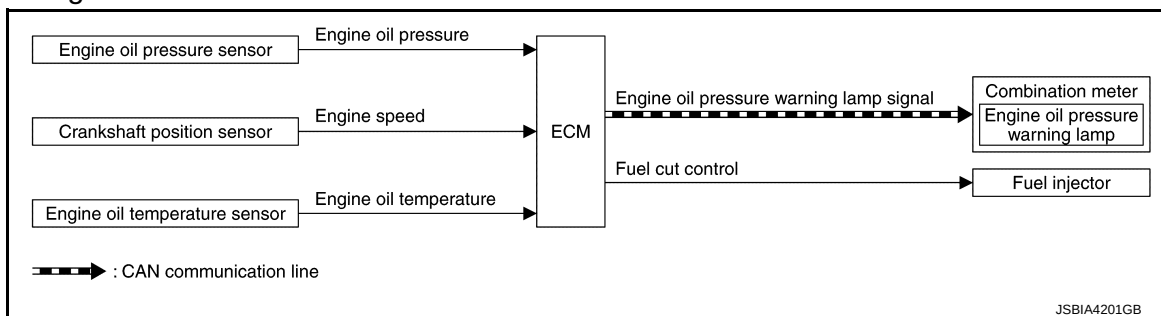
Valve position	operating condition
Valve closed	Idling, low -small load range
Valve opened	Other than above

ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE

ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description

INFOID:0000000010775045

System Diagram



SYSTEM DESCRIPTION

- The engine protection control at low engine oil pressure warns the driver of a decrease in engine oil pressure by the engine oil pressure warning lamp 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 engine oil pressure warning lamp signal to the combination meter. The combination meter turns ON the engine oil pressure warning lamp, according to the signal.
- When detecting a decrease in engine oil pressure at an engine speed 1,000 rpm or more, ECM transmits an engine oil pressure warning lamp signal to the combination meter. When detecting a decrease in engine oil pressure, ECM cuts fuel if the engine speed exceeds the specified value. Refer to [EC-103, "Fail-safe"](#).

Decrease in engine oil pressure	Engine speed	Combination meter	Fuel cut
		Engine oil pressure warning lamp	
Detection	Less than 1,000 rpm	ON*	NO
	1,000 rpm or more	ON	YES

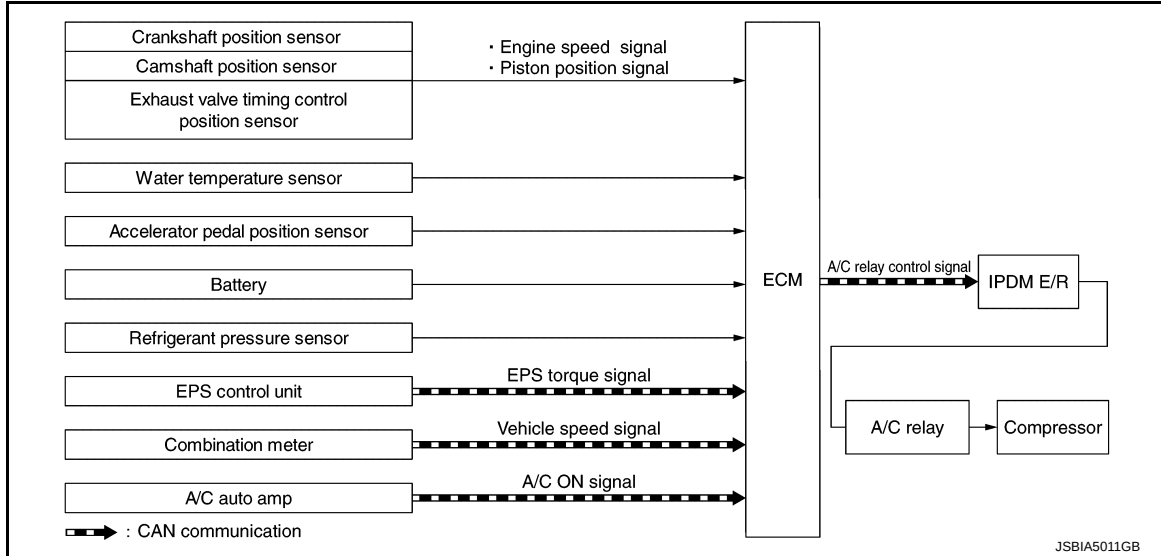
*: When detecting a normal engine oil pressure, ECM turns OFF the engine oil pressure warning lamp.

AIR CONDITIONING CUT CONTROL

AIR CONDITIONING CUT CONTROL : System Description

INFOID:000000010775046

System Diagram



SYSTEM DESCRIPTION

This system improves engine operation when the air conditioner is used.

Under the following conditions, the air compressor is turned off.

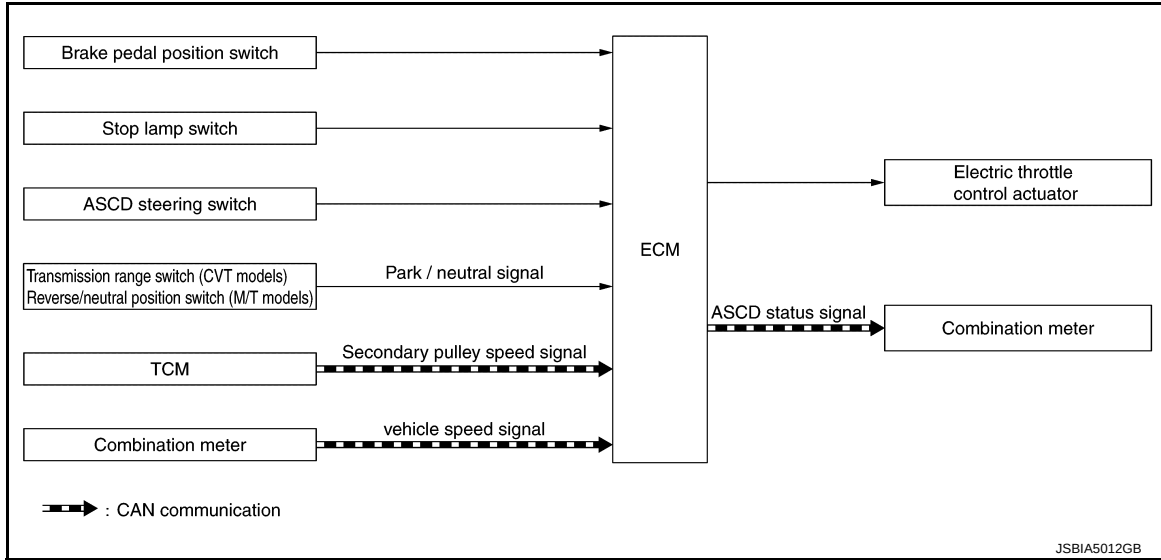
- When the accelerator pedal is fully depressed (selector lever is in R position).
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is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

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description

INFOID:000000010775047

System Diagram



BASIC ASCD SYSTEM

CAUTION:

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

- Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal by driver's setting of vehicle speed*.
- *: Driver can set the vehicle speed between approximately 40 km/h (25 MPH) and 172 km/h [107 MPH (for CVT)] or 181 km/h [112 MPH (for M/T)].
- ECM transmits a ASCD operation status signal to the combination meter and operation status of ASCD is indicated on the information display in the combination meter. Refer to [EC-70, "AUTOMATIC SPEED CONTROL DEVICE \(ASCD\) : Switch Name and Function"](#).
- If any malfunction occurs in ASCD system, it automatically deactivates control.

CANCEL OPERATION

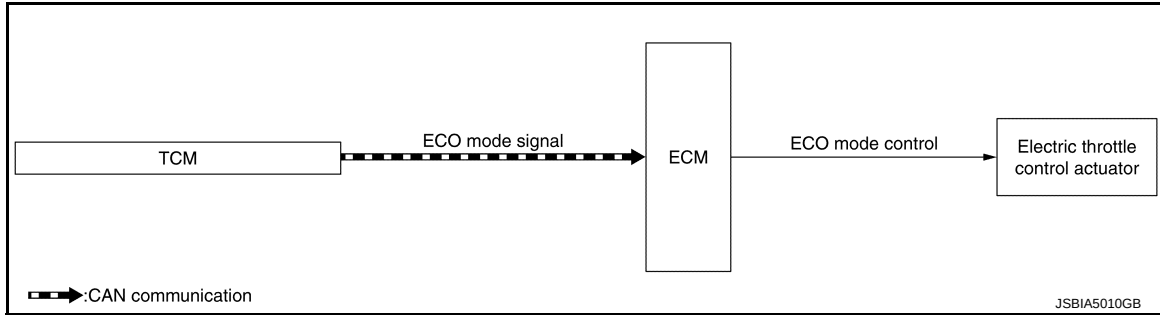
- When any of following conditions exist, cruise operation will be canceled.
 - MAIN switch is pressed (Set speed will be cleared)
 - CANCEL switch is pressed
 - More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
 - Brake pedal is depressed
 - Selector lever is in N, P or R range
 - Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
 - VDC system is operated
 - Actual vehicle speed decreased to approximately 30 km/h (18 MPH) or less
- When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking ASCD indicator.
 - Engine coolant temperature is excessively higher than the normal operating temperature, ASCD indicator may blink slowly.
(When the engine coolant temperature decreases to the normal operating temperature, ASCD indicator will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ACCELERATE switch.)
- Malfunction for some self-diagnoses regarding ASCD control
(When ASCD is operating, all of ASCD operations will be canceled and vehicle speed memory will be erased.)

ECO MODE SYSTEM

ECO MODE SYSTEM : System Description

INFOID:000000010775048

System Diagram



CONTROL

ECM receives an ECO mode signal from TCM via CAN communication and improves the fuel economy by controlling the throttle movement to less than usual.

NOTE:

For the details of the ECO mode, refer to [DMS-7, "ECO MODE CONTROL : System Description"](#).

SYSTEM DISPLAY FUNCTION

ECO Mode Indicator Lamp

When the ECM receives ECO mode signal from TCM, ECM transmits an ECO mode indicator lamp signal to the combination meter via CAN communication, and the combination meter illuminates ECO mode indicator located in itself.

ECO DRIVE NAVIGATOR

ECM transmits an ECO drive navigator signal calculated from the accelerator pedal position and the vehicle speed to the combination meter via CAN communication.

When the acceleration guide is selected in ECO meter display switching function, the suitable accelerator position for fuel economy will be displayed. For display, refer to [DMS-7, "ECO MODE CONTROL : System Description"](#).

INTEGRATED CONTROL OF ENGINE, CVT, AND ABS

INTEGRATED CONTROL OF ENGINE, CVT, AND ABS : System Description

INFOID:000000010775049

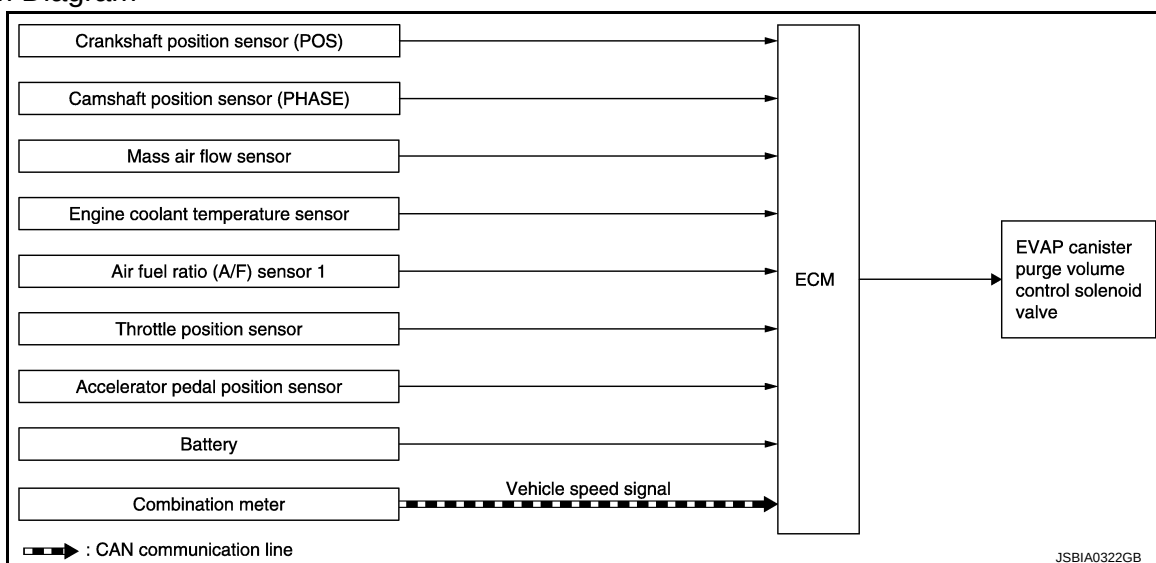
Real time communications (signal exchange) among control units (e.g. ECM, CVT, ABS, and combination meter) via CAN communication optimizes engine torque and lock-up during gear shift and prevents engine speed from decreasing during deceleration.

EVAPORATIVE EMISSION SYSTEM

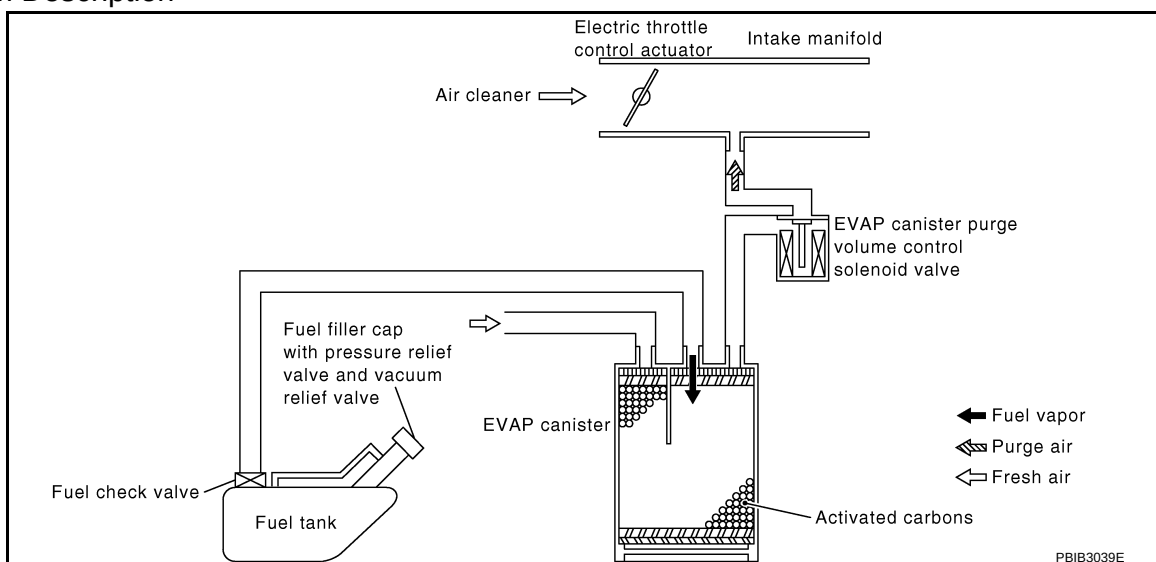
EVAPORATIVE EMISSION SYSTEM : System Description

INFOID:000000010775050

System Diagram



System Description



The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel-system.

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.

POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM

POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : System Description

INFOID:000000010775051

DESCRIPTION

ECM transmits a target power generation voltage signal received from IPDM E/R to the generator via LIN communication.

SYSTEM

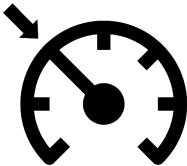
< SYSTEM DESCRIPTION >

[MR20DD]

The generator includes a self-diagnosis function and transmits a diagnosis signal to ECM via LIN communication when detecting a malfunction. When ECM receives a diagnosis signal, ECM detects DTC and transmits a charge warning lamp request signal to the combination meter to turn ON the charge warning lamp.

INFORMATION DISPLAY (COMBINATION METER)

INFORMATION DISPLAY (COMBINATION METER) : Indicator/Information INFOID:0000000010775052

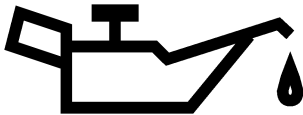
Item	Symbol	Function
ASCD indicator	 JSCIA0831ZZ Message: - - Km/h / - - MPH	For detail of ASCD function, refer to EC-64. "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description" .

INFORMATION DISPLAY (COMBINATION METER) : Engine Oil Pressure Warning

INFOID:0000000010775053

DESIGN/PURPOSE

When engine oil pressure is low, the engine oil pressure warning lamp informs the driver of low oil pressure to prevent damage to the engine.

Symbol	Message
 JPNIA1881ZZ	Low Oil Pressure Stop Vehicle

BULB CHECK

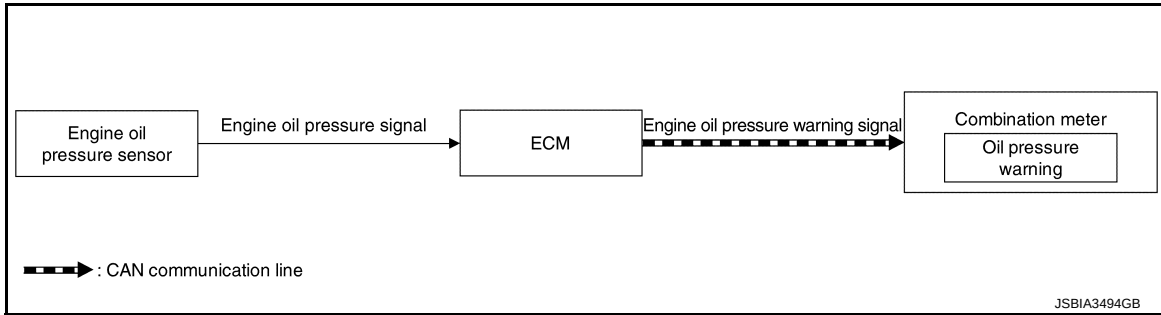
The bulb turns ON after turning ON the ignition switch (engine stop) and turns OFF after restarting the engine.

OPERATION AT COMBINATION METER CAN COMMUNICATION CUT-OFF OR UNUSUAL SIGNAL

For the operation for CAN communications blackout or abnormal signal reception, refer to [EC-103. "Fail-safe"](#).

< SYSTEM DESCRIPTION >

SYSTEM DIAGRAM



SIGNAL PATH

- ECM reads the resistance value of an engine oil pressure sensor and transmits the engine oil pressure warning signal to combination meter via CAN communication.
- The information display (on combination meter) is SHOWN/HIDDEN the engine oil pressure warning, according to the engine oil pressure sensor signal received from ECM.

LIGHTING CONDITION

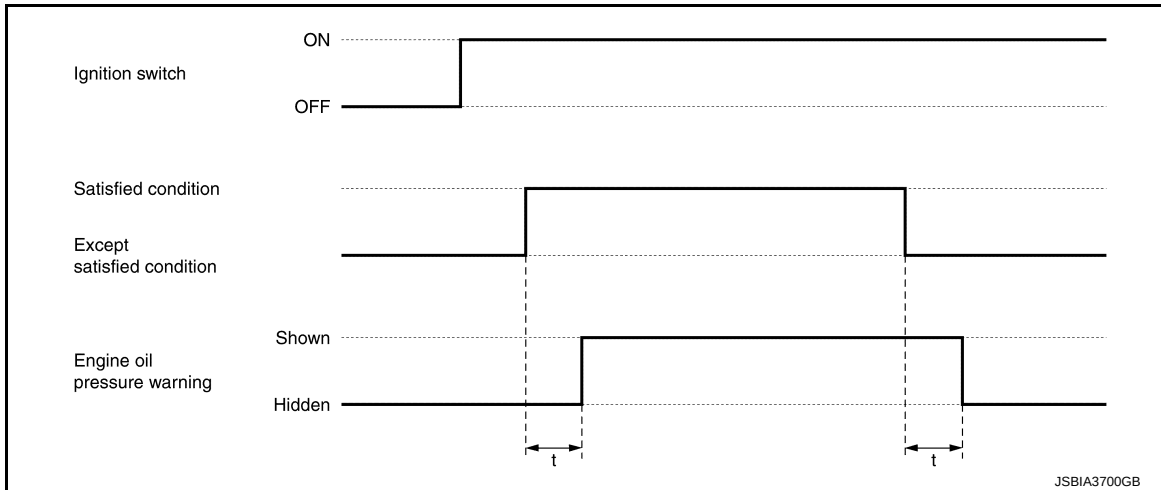
When all of the following conditions are satisfied:

- Ignition switch: ON
- Engine running
- Engine oil pressure is less than the specified value.

SHUTOFF CONDITION

- Ignition switch: OFF
- Engine stop
- Engine oil pressure is the specified value or more.

TIMING CHART



t : 100 ms

WARNING/INDICATOR/CHIME LIST

WARNING/INDICATOR/CHIME LIST : Warning lamps/Indicator lamps

INFOID:0000000010775054

NOTE:

Regarding the arrangement. Refer to [MWI-10. "METER SYSTEM : Design"](#).

Item	Design	Reference
Malfunction indicator lamp (MIL)		Regarding the function. Refer to MWI-50. "WARNING LAMPS/INDICATOR LAMPS : Malfunction Indicator Lamp (MIL)" .

WARNING/INDICATOR/CHIME LIST : Warning/Indicator (On Information Display)

INFOID:0000000010775055

A

Item	Reference
Engine oil pressure warning	Refer to EC-67, "INFORMATION DISPLAY (COMBINATION METER) : Engine Oil Pressure Warning" .
ASCD indicator	Refer to EC-67, "INFORMATION DISPLAY (COMBINATION METER) : Indicator/Information" .

EC

C

CAN COMMUNICATION

CAN COMMUNICATION : System Description

INFOID:0000000010775056

D

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.

E

Refer to [LAN-8, "System Description"](#), about CAN communication for detail.

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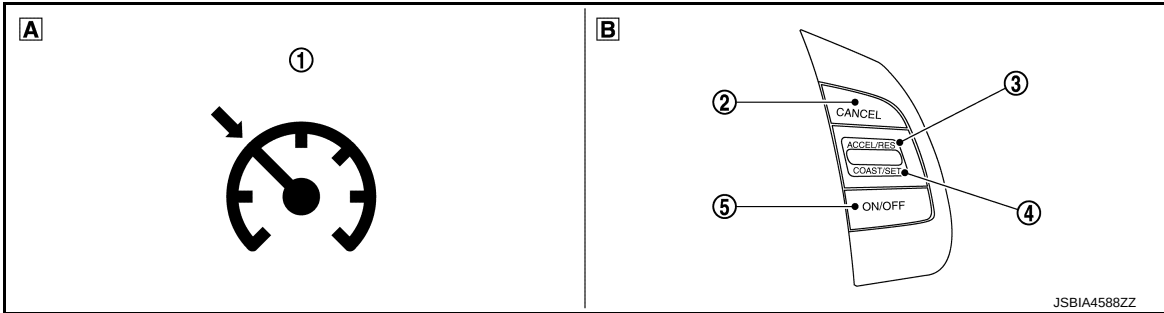
OPERATION

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

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

INFOID:0000000010775057

SWITCHES AND INDICATORS



- A** On the combination meter **B** On the steering wheel
- ① ASCD indicator ② CANCEL switch ③ RES / + switch (RESUME/ACCELERATE)
- ④ SET / - switch (SET/COAST) ⑤ MAIN switch

SET SPEED RANGE

ASCD system can be set the following vehicle speed.

Minimum speed (Approx.)	Maximum speed (Approx.)	
40 km/h (25 MPH)	CVT	172 km/h (107 MPH)
	M/T	181 km/h (112 MPH)

SWITCH OPERATION

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

Refer to [EC-64, "AUTOMATIC SPEED CONTROL DEVICE \(ASCD\) : System Description"](#) for ASCD operating instructions.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000010775058

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:0000000010775059

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-52, "CONSULT Function and System Application*1"](#).

NOTE:

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

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DIAGNOSIS SYSTEM (ECM)

DIAGNOSIS DESCRIPTION

DIAGNOSIS DESCRIPTION : 1st Trip Detection Logic and Two Trip Detection Logic

INFOID:0000000010775060

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

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL illuminates. The MIL illuminates at the same time when the DTC is stored. <2nd trip> The "trip" in the "Two Trip Detection Logic" means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to illuminate or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Illuminated	Blinking	Illuminated				
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0304 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0304 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses (Refer to EC-109, "DTC Index" .)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

INFOID:0000000010775061

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-109, "DTC Index"](#). These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT.

1st trip DTC is specified in Service \$07 of SAE J1979/ISO 15031-5. 1st trip DTC detection occurs without illuminating the MIL and therefore does not warn the driver of a malfunction.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to [EC-136, "Work Flow"](#). Then perform DTC Confirmation Procedure or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT or GST. The 1st trip freeze frame data can only be displayed on the CONSULT screen.

DIAGNOSIS SYSTEM (ECM)

[MR20DD]

< SYSTEM DESCRIPTION >

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

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 – P0304 Fuel Injection System Function — DTC: P0171, P0172
2		Except the above items
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:0000000010775062

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

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

COUNTER SYSTEM CHART

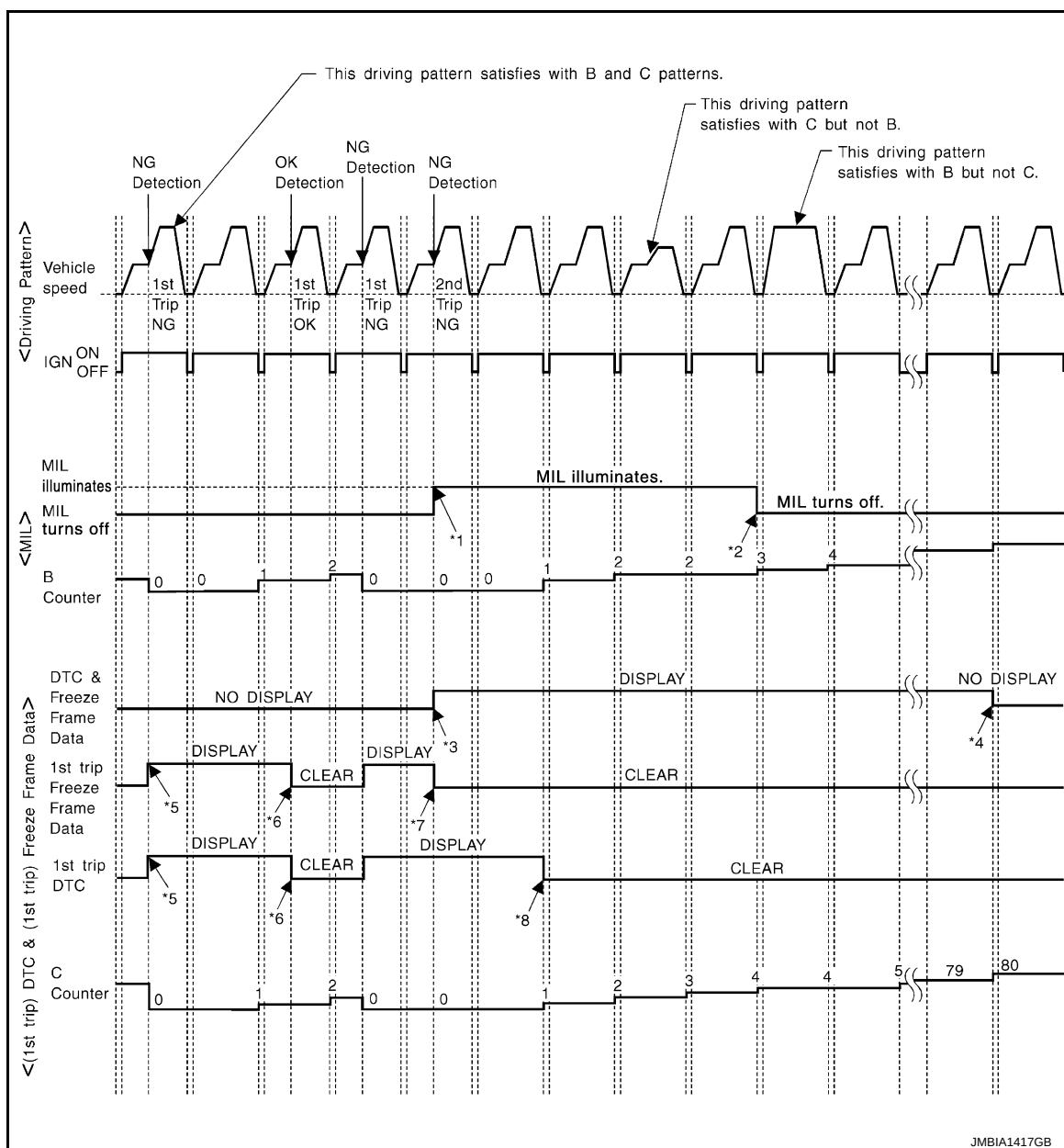
Items	Fuel Injection System	Misfire	Other
MIL (turns OFF)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2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

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

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

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

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



- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *2: MIL will turn OFF after vehicle is driven 3 times (pattern B) without any malfunctions.
- *3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.
- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- *5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.
- *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-76. "DIAGNOSIS DESCRIPTION : Driving Pattern".](#)

< SYSTEM DESCRIPTION >

Driving Pattern C

Refer to [EC-76, "DIAGNOSIS DESCRIPTION : Driving Pattern"](#).

Example:

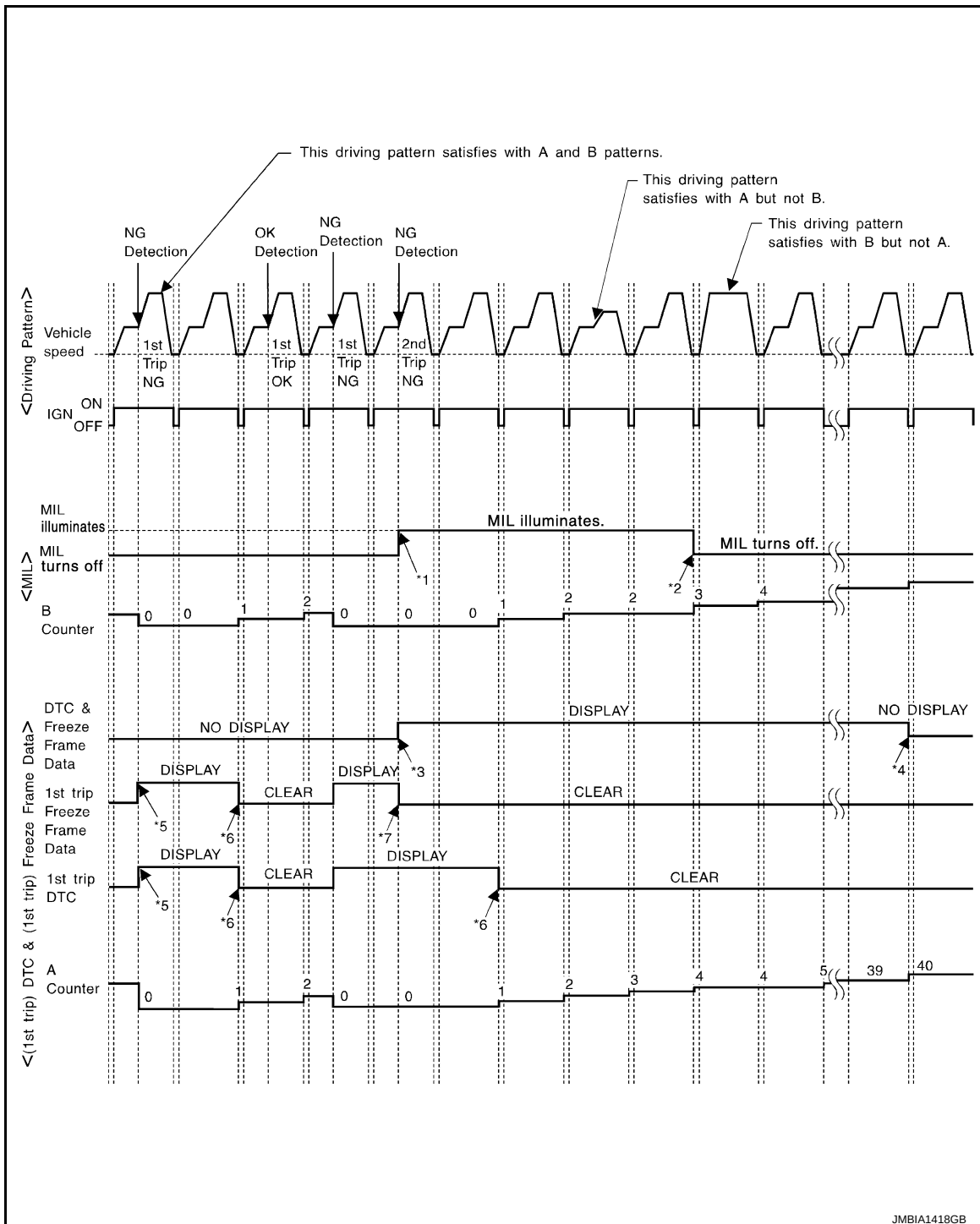
If the stored freeze frame data is as per the following:

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"



< SYSTEM DESCRIPTION >

*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-76, "DIAGNOSIS DESCRIPTION : Driving Pattern"](#).

Driving Pattern B

Refer to [EC-76, "DIAGNOSIS DESCRIPTION : Driving Pattern"](#).

DIAGNOSIS DESCRIPTION : Driving Pattern

INFOID:0000000010775063

CAUTION:

Always drive at a safe speed.

DRIVING PATTERN A

Driving pattern A means a trip satisfying the following conditions.

- Engine speed reaches 400 rpm or more.
- Engine coolant temperature rises by 20°C (36°F) or more after starting the engine.
- Engine coolant temperature reaches 70°C (158°F) or more.
- The ignition switch is turned from ON to OFF.

NOTE:

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

DRIVING PATTERN B

Driving pattern B means a trip satisfying the following conditions.

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

NOTE:

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

DRIVING PATTERN C

Driving pattern C means operating vehicle as per the following:

The following conditions should be satisfied at the same time:

Engine speed: (Engine speed in the freeze frame data) ± 375 rpm

DIAGNOSIS SYSTEM (ECM)

[MR20DD]

< SYSTEM DESCRIPTION >

Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]

Engine coolant temperature condition:

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

NOTE:

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

DRIVING PATTERN D

Driving pattern D means a trip satisfying the following conditions.

- The state of driving at 40 km/h (25 MPH) reaches 300 seconds or more in total.
- Idle speed lasts 30 seconds or more.
- A lapse of 600 seconds or more after engine start.

NOTE:

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

DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code

INFOID:0000000010775064

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.

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[MR20DD]

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

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

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

—: Self-diagnosis is not carried out.

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

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

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

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

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

NOTE:

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

DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)

INFOID:0000000010775065

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.

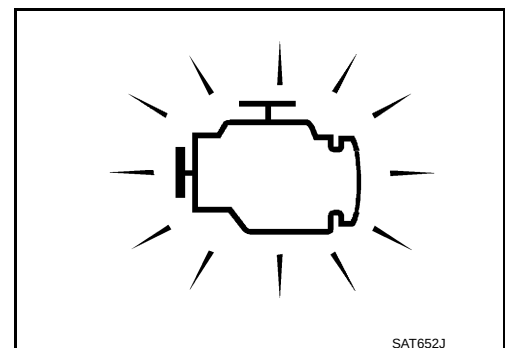
1. The MIL illuminates when ignition switch is turned ON (engine is not running).

NOTE:

Check the MIL circuit if MIL does not illuminate. Refer to [EC-413, "Diagnosis Procedure"](#).

2. When the engine is started, the MIL should go off.

NOTE:



< SYSTEM DESCRIPTION >

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:0000000010775066

EC

ON BOARD DIAGNOSIS ITEM

The on board diagnostic system has the following functions.

Diagnostic test mode	Function
Bulb check	MIL can be checked.
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-144, "Description" .
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to EC-145, "Description" .
Idle air volume learning	ECM can learn the idle air volume. Refer to EC-146, "Description" .
Mixture ratio self-learning value clear	Erase the air-fuel ratio learning value. Refer to EC-148, "Description" .

BULB CHECK MODE

Description

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

Operation Procedure

1. Turn ignition switch ON.
2. The MIL on the instrument panel should stay ON.
If it remains OFF, check MIL circuit. Refer to [EC-413, "Diagnosis Procedure"](#).

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-413, "Diagnosis Procedure"](#).
3. Start engine and let it idle.
 - For two trip detection logic diagnoses, ECM turns on MIL when it detects the same malfunction twice in the two consecutive driving cycles. (2 trip detection logic diagnoses)
 - 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:

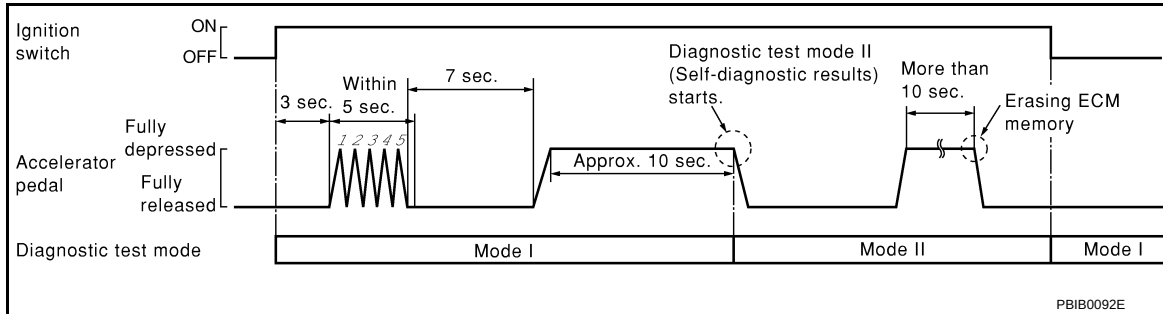
- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.

DIAGNOSIS SYSTEM (ECM)

[MR20DD]

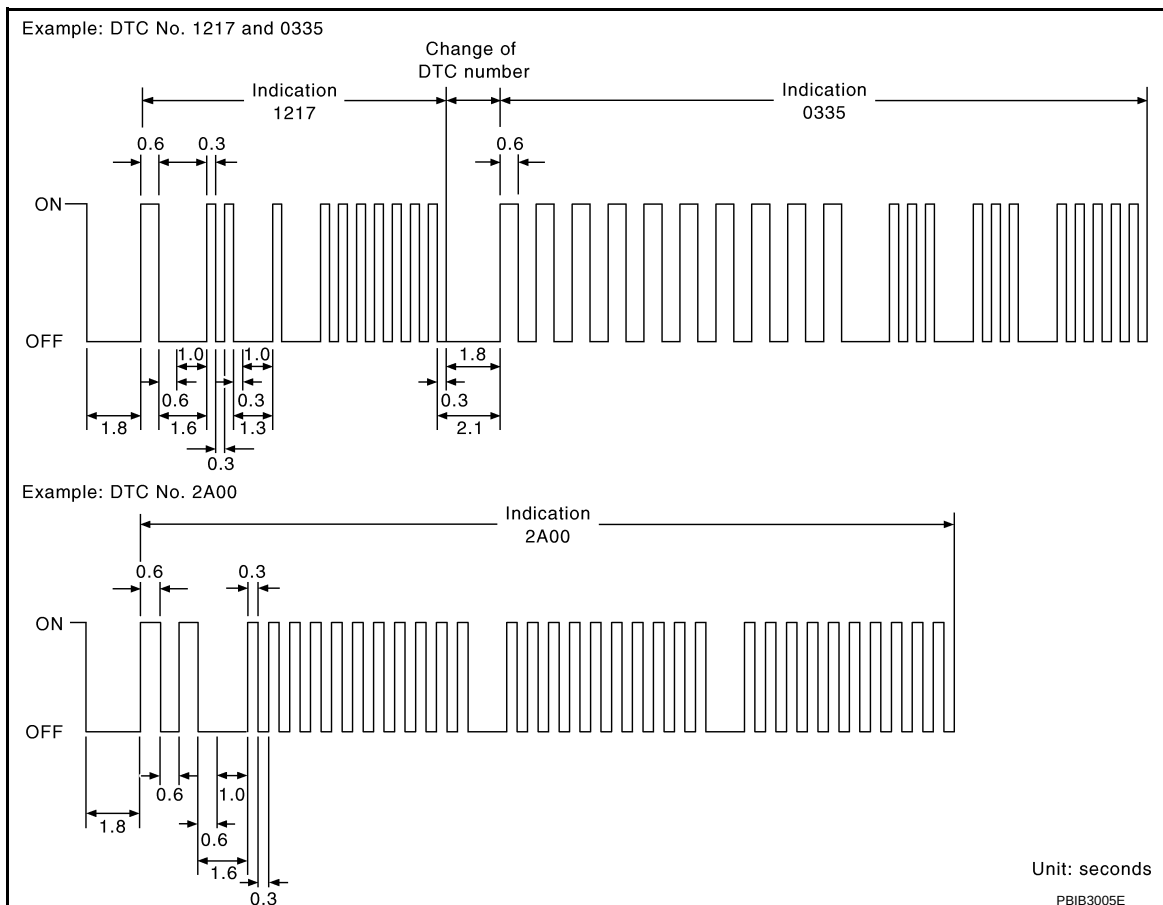
< SYSTEM DESCRIPTION >

- After ignition switch is turned off, ECM always returns to the diagnostic test mode I.
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.
 4. Fully depress the accelerator pedal.
ECM has entered to the diagnostic test mode II (Self-diagnostic results).



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. Judgment of DTCs or 1st trip DTCs is impossible by the number of blinks only. 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 the diagnostic test mode II (Self-diagnostic results), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT or GST. A DTC will be used as an example for how to read a code.



DTCs can be identified by the number of four-digit numeral flashes per the following.

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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 upper digit numeral to lower one occurs at an interval of 1.0-second OFF. For example, the 10th-digit numeral flashes 1.3 seconds (0.3+1.0seconds) after hide of the 100th-digit numeral.

A change from one DTC 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-109. "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.

- DTC (Diagnostic trouble codes)
- 1st trip DTC
- 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 the diagnostic test mode II (Self-diagnostic results).
6. The diagnostic information has been erased from the backup memory in the ECM.
Fully depress the accelerator pedal and keep it depressed for more than 10 seconds.
7. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

CONSULT Function

INFOID:0000000010775067

FUNCTION

Diagnostic test mode	Function
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.
Work Support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT unit.
Active Test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
ECU Identification	ECM part number can be read.
DTC Work Support	SRT and operating condition to check DTC can be confirmed.

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

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

SELF DIAGNOSTIC RESULT MODE

< SYSTEM DESCRIPTION >

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to [EC-109, "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" mode with CONSULT. "TIME" indicates the number of driving the vehicle after the last detection of DTC.

- When ECM has detected a current DTC, "0" is displayed for "TIME".
- When ECM memorizes a 1st trip DTC, "1t" is displayed for "TIME".
- If "TIME" is neither "0" nor "1t", the DTC occurred in the past.

How to Erase 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.
2. Select "SELF-DIAG RESULTS" mode.
3. Touch "ERASE". (DTC in ECM will be erased.)

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*1	Description
DIAG TROUBLE CODE [PXXXX]	The engine control component part/control system has a trouble code displayed as PXXXX. (Refer to EC-109, "DTC Index" .)
CAL/LD VALUE %]	The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C]	The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 %]	• "Long-term fuel trim" at the moment a malfunction is detected is displayed. • The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
L-FUEL TRM-B2 %]	
S-FUEL TRM-B1 %]	• "Short-term fuel trim" at the moment a malfunction is detected is displayed. • The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
S-FUEL TRM-B2 %]	
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH-P/S [%]	The throttle valve opening angle at the moment a malfunction is detected is displayed.
INJ PULSE [msec]	The basic injection quantity 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. - MODE 2: Open loop due to detected system malfunction - MODE 3: Open loop due to driving conditions (power enrichment, deceleration enrichment) - MODE 4: Closed loop - using oxygen sensor(s) as feedback for fuel control - MODE 5: Open loop - has not yet satisfied condition to go to closed loop
FUEL SYS-B2	
INT MANI PRES [kPa]	• Constant value is displayed. • These items are displayed but are not applicable to this model.
COMBUST CONDITION	
FUEL RAIL PRESSURE [MPa]	The fuel rail pressure at the moment a malfunction is detected is displayed.
TARGET FUEL RAIL PRESSURE [MPa]	The target fuel rail pressure at the moment a malfunction is detected is displayed.
BATTERY VOLTAGE [V]	The battery voltage at the moment a malfunction is detected is displayed.
FUEL LEVEL [%]	The fuel level at the moment a malfunction is detected is displayed.

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

DATA MONITOR MODE

NOTE:

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- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- For reference values of the following items, refer to [EC-89. "Reference Value"](#).

Monitored Item

Monitored item	Unit	Description	Remarks
ENG SPEED	rpm	Indicates the engine speed computed from the signal of the crankshaft position sensor and camshaft position sensor.	Accuracy becomes poor if engine speed drops below the idle rpm.
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, normal 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, normal range is indicated in "SPEC".
A/F ALPHA-B1	%	The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • This data also includes the data for the air-fuel ratio learning control. • When engine is running, normal range is indicated in "SPEC".
COOLAN TEMP/S	°C	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 voltage computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed.	
HO2S1 (B1)	V	The signal voltage of the heated oxygen sensor 2 is displayed.	
VHCL SPEED SE	km/h	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 signal voltage of the accelerator pedal position sensor 1 is displayed.	
ACCEL SEN 2	V	The converted value of the accelerator pedal position sensor signal voltage is displayed.	ACCEL SEN 2 signal is converted by ECM internally. Thus, they differ from ECM terminal voltage signal.
TP SEN 1-B1	V	The signal voltage of the throttle position sensor 1 B1 is displayed.	
TP SEN 2-B1	V	The value converted from the signal voltage of the throttle position sensor 2 B1 is displayed.	TP SEN 2-B1 signal is converted by ECM internally. Thus, they differ from ECM terminal voltage signal.
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	Indicates [ON/OFF] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor signal).	

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Monitored item	Unit	Description	Remarks
LOAD SIGNAL	ON/ OFF	Indicates [ON/OFF] condition of the electrical load signal. • ON...Rear window defogger switch is ON 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 blower ON 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		NOTE: These items are displayed but are not applicable to this model.	
CAL/LD VALUE	%	"Calculated load value" indicates the value of the current air flow divided by peak air flow.	
MASS AIRFLOW	g/s	Indicates the mass air flow computed by ECM according to the mass air flow sensor signal.	
PURG VOL C/V	%	• Indicates the control value of the EVAP canister purge volume control solenoid valve 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 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.	
VTC DTY EX B1	%	• The control value of the exhaust valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. • The advance angle becomes larger as the value increases.	
SWRL CONT S/V*	ON/ OFF	• The control condition of the intake manifold runner control valve (determined by ECM according to the input signals) is indicated. - On: Closed - Off: Open	
AIR COND RLY	ON/ OFF	The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RELAY	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.	
HO2S1 HTR (B1)	ON/ OFF	Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
I/P PULLY SPD	rpm	Indicates the engine speed computed from the input shaft revolution signal.	
VEHICLE SPEED	km/h	The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	

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Monitored item	Unit	Description	Remarks
IDL A/V LEARN	YET/ DONE	Displays the condition of Idle Air Volume Learning. • YET...Idle air volume learning has not been performed yet. • DONE...Idle air volume learning has already been performed successfully.	
TRVL AFTER MIL	km or mile	Distance traveled while MIL is activated.	
ENG OIL TEMP	°C°F	The engine oil temperature (determined by the signal voltage of the engine oil temperature sensor) is displayed.	
A/F S1 HTR (B1)	%	- Indicates the duty ratio of the Air fuel ratio (A/F) sensor 1 heater computed by ECM according to the input signals. - The current flow to the heater becomes larger as the value increases.	
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from unified meter and combination meter is displayed.	
SET VHCL SPD	km/h or mph	The preset vehicle speed is displayed.	
MAIN SW	ON/ OFF	Indicates [ON/OFF] condition from 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...When the vehicle speed decreased to excessively low speed compared with the ASCD set speed, 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...When the vehicle speed decreased lower than the ASCD minimum set speed, ASCD operation is cut off.	
AT OD MONITOR	ON/ OFF	Indicates [ON/OFF] condition of A/T O/D according to the input signal from the TCM.	
AT OD CANCEL	ON/ OFF	Indicates [ON/OFF] condition of A/T O/D cancel request signal.	
CRUISE LAMP	ON/ OFF	Indicates [ON/OFF] condition of CRUISE indicator determined by the ECM according to the input signals.	
SET LAMP	ON/ OFF	Indicates [ON/OFF] condition of SET indicator determined by the ECM according to the input signals.	
AC EVA TEMP	°C or °F	Indicates A/C evaporator temperature calculated according to the signal voltage of the intake air temperature sensor.	

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Monitored item	Unit	Description	Remarks
AC EVA TARGET	°C or °F	Indicates target A/C evaporator temperature sent from "A/C auto amp"	
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 reverse/neutral position 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.	
AC PRESS SEN	V	The signal voltage from the refrigerant pressure sensor is displayed.	
FUEL PRESS SEN	MPa	Indicates the fuel rail pressure computed by ECM according to the input signals.	
ATOM PRES SEN	V	The signal voltage from the atmospheric pressure sensor is displayed.	
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.	
H/P FUEL PUMP DEG	deg	Displays ECM-calculated fuel discharge position of the high pressure fuel pump.	
FUEL PRES SEN V	mV	The signal voltage of FRP sensor is displayed.	
EOP SENSOR	mV	The signal voltage of EOP sensor is displayed.	
ECM TEMP 1	°C	Displays a temperature calculated from a signal of ECM temperature sensor 1.	
ECM TEMP 2	°C	Displays a temperature calculated from a signal of ECM temperature sensor 2.	
FUEL INJ TIM	BTDC	Indicates the fuel injection timing computed by ECM according to the input signals.	
FAN DUTY	%	Indicates a command value for cooling fan. The value is calculated by ECM based on input signals.	
THRTL STK CNT B1	—	NOTE: These items are displayed but are not applicable to this model.	
A/F SEN1 (B1)	V	The A/F signal computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed.	
A/F-S ATMSPHRC CRCT B1	—	Displays a determined value of atmospheric correction factor necessary for correcting an A/F sensor signal input to ECM. The signal used for the correction is an A/F sensor signal transmitted while driving under atmospheric pressure.	
A/F-S ATMSPHRC CRCT UP B1	count	Displays the number of updates of the A/F sensor atmospheric correction factor.	
A/F SEN1 DIAG2(B1)	INCMPL/ CMPLT	- Indicates DTC P014C or P014D self-diagnosis condition. - INCMPL: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
A/F SEN1 DIAG3(B1)	ABSNT/ PRSNT	- Indicates DTC P014C, P014D, P015A or P015B self-diagnosis condition. - ABSNT: The vehicle condition is not within the diagnosis range. - PRSNT: The vehicle condition is within the diagnosis range.	

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Monitored item	Unit	Description	Remarks
HO2 S2 DIAG1 (B1)	INCMP/ CMPLT	- Indicates DTC P0139 self-diagnosis (delayed response) condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
HO2 S2 DIAG2 (B1)	INCMP/ CMPLT	- Indicates DTC P0139 self-diagnosis (slow response) condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	

NOTE:

Any monitored item that does not match the vehicle is not displayed.

*: Indicates intake manifold runner control valve.

WORK SUPPORT MODE

Work Item

Work item	Condition	Usage
IDLE AIR VOL LEARN	The idle air volume that keeps the engine speed within the specified range is memorized in ECM.	When learning the idle air volume
FUEL PRESSURE RELEASE	- Fuel pump will stop by touching "START" during idling. - Crank a few times after engine stops.	When releasing fuel pressure from fuel line
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 selflearning value.
TARGET IGN TIM ADJ*	Idle condition	When adjusting target ignition timing
VIN REGISTRATION	In this mode, VIN is registered in ECM.	When registering VIN in ECM
CLSD THL POS LEARN	Ignition switch ON and engine stopped.	When learning the throttle valve closed position
SAVING DATA FOR REPLC CPU	In this mode, save data that is in ECM.	When ECM is replaced.
WRITING DATA FOR REPLC CPU	In this mode, write data stored by "SAVE DATA FOR CPU REPLC" in work support mode to ECM.	When ECM is replaced.

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

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
ENG COOLANT TEMP	Change the engine coolant temperature using CONSULT.	If malfunctioning symptom disappears, see CHECK ITEM.	- Harness and connectors - Engine coolant temperature sensor - Fuel injector
FUEL INJECTION	Change the amount of fuel injection using CONSULT.	If malfunctioning symptom disappears, see CHECK ITEM.	- Harness and connectors - Fuel injector - Air fuel ratio (A/F) sensor 1
PURG VOL CONT/V	- Engine: After warming up, run engine at 1,500 rpm. - Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT.	Engine speed changes according to the opening percent.	- Harness and connectors - EVAP canister purge volume control solenoid valve
FUEL PUMP RELAY	- Ignition switch: ON (Engine stopped) - Turn the fuel pump relay "ON" and "OFF" using CONSULT and listen to operating sound.	Fuel pump relay makes the operating sound.	- Harness and connectors - Fuel pump relay

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TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
INTAKE MANIFOLD RUNNER CONTROL VALVE (OPEN/CLOSE)	- Ignition switch: ON (Engine stopped) - Turn the intake manifold runner control valve "ON" and "OFF" using CONSULT to open or close.	Touch the intake manifold runner control valve motor and check the operating vibration and sound.	- Harness and connectors - Intake manifold runner control valve - Intake manifold runner control valve motor
FAN DUTY CONTROL*	- Engine: Idle - Change duty ratio (0 - 100%) using CONSULT.	Cooling fan moves and stops.	- Harness and connectors - Cooling fan motor - Cooling fan relay - IPDM E/R
IGNITION TIMING	- Timing light: Set - Retard the ignition timing using CONSULT.	If malfunctioning symptom disappears, see CHECK ITEM.	Perform Idle Air Volume Learning.
POWER BALANCE	- Engine: After warming up, idle the engine. - A/C switch OFF - Selector lever: N (CVT), Neutral (M/T) - Cut off each injector signal one at a time using CONSULT.	Engine runs rough or stops. (Works for accidental fire.)	- Harness and connectors - Compression - Fuel injector - Power transistor - Spark plug - Ignition coil
INT V/T ASSIGN ANGLE	Changes intake valve timing using CONSULT.	If malfunctioning symptom disappears, see CHECK ITEM.	- Harness and connectors - Intake valve timing control solenoid valve
EXT V/T ASSIGN ANGLE	Changes exhaust valve timing using CONSULT.	If malfunctioning symptom disappears, see CHECK ITEM.	- Harness and connectors - Exhaust valve timing control solenoid valve

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

DTC WORK SUPPORT MODE

Test Item

Test mode	Test item	Reference page
HO2S2	O2 (B1) P0138	EC-229, "DTC Description"
	O2 (B1) P0137	EC-223, "DTC Description"
A/F SEN1	A/F (B1) P0133	EC-243, "DTC Description"
	A/F (B1) P0130	EC-214, "DTC Description"

SRT & P-DTC MODE

SRT STATUS Mode

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

SRT WORK SUPPORT Mode

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

ECU DIAGNOSIS INFORMATION

ECM

Reference Value

INFOID:0000000010775068

VALUES ON THE DIAGNOSIS TOOL

NOTE:

- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- Numerical values in the following table are reference values.
- These values are input/output values that ECM receives/transmits and may differ from actual operations.
Example: The ignition timing shown by the timing light may differ from the ignition timing displayed on the data monitor.
This occurs because the timing light shows a value calculated by ECM according to signals received from the camshaft position sensor and other sensors related to ignition timing.
- For outlines of following items, refer to [EC-81. "CONSULT Function"](#).

Monitor Item	Condition		Values/Status
ENG SPEED	• Connect the tachometer. • Run engine and compare CONSULT value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-154, "Description" .		
B/FUEL SCHDL	See EC-154, "Description" .		
A/F ALPHA-B1	See EC-154, "Description" .		
COOLAN TEMP/S	Engine: After warming up		More than 70°C
A/F SEN1 (B1)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
HO2S1 (B1)	• 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.	Revving engine from idle up to 3,000 rpm quickly	0 – 0.3 V ↔ Approx. 0.6 – 1.0 V
			LEAN ↔ RICH
VHCL SPEED SE	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	Ignition switch: ON (Engine stopped)		11 – 14 V
ACCEL SEN 1	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 – 0.9 V
		Accelerator pedal: Fully depressed	4.0 – 4.8 V
ACCEL SEN 2*1	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.3 – 4.7 V
		Accelerator pedal: Fully depressed	1.95 – 2.4 V
TP SEN 1-B1	• Ignition switch: ON (Engine stopped) • Selector lever: D position	Accelerator pedal: Fully released	More than 0.36 V
		Accelerator pedal: Fully depressed	Less than 4.75 V
TP SEN 2-B1*1	• Ignition switch: ON (Engine stopped) • Selector lever: D position	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

ECM

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Monitor Item	Condition		Values/Status
CLSD THL POS	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Brake pedal: Slightly depressed	OFF
AIR COND SIG	Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
PW/ST SIGNAL	Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON
		Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	Engine: After warming up, idle the engine	Blower fan switch: ON	ON
		Blower fan switch: OFF	OFF
BRAKE SW	Ignition switch: ON	Brake pedal: Fully released OFF	OFF
		Brake pedal: depressed	ON
IGN TIMING	- Engine: After warming up - Selector lever: P or N position - A/C switch: OFF - No load	Idle	-2 – 8 °BTDC
		2,000 rpm	18 – 38 °BTDC
COMBUSTION	NOTE: This item is displayed but are not applicable to this model.		—
CAL/LD VALUE	- Engine: After warming up - Selector lever: P or N position - A/C switch: OFF - No load	Idle	5 – 35 %
		2,500 rpm	5 – 35 %
MASS AIRFLOW	- Engine: After warming up - Selector lever: P or N position - A/C switch: OFF - No load	Idle	1.0 – 5.0 g/s
		2,500 rpm	2.0 – 10.0 g/s
PURG VOL C/V	- Engine: After warming up - Selector lever: P or N position - A/C switch: OFF - No load	Idle (Accelerator pedal: Not depressed even slightly, after engine starting)	1 %
		2,000 rpm	1 – 90 %
INT/V TIM(B1)	- Engine: After warming up - Selector lever: P or N - A/C 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 - A/C 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 position - A/C switch: OFF - No load	Idle	0 %
		When revving engine up to 2,000 rpm quickly	0 – 90 %

ECM

< ECU DIAGNOSIS INFORMATION >

[MR20DD]

Monitor Item	Condition		Values/Status
SWRL CONT S/V*2	- Engine: After warming up - Selector lever: P or N position - A/C switch: OFF - No load	Idle	ON
		4,000 rpm	OFF
VTC DTY EX B1	- Engine: After warming up - Selector lever: P or N position - A/C switch: OFF - No load	Idle	2 %
		When revving engine up to 2,000 rpm quickly	Approx. 0 – 90 %
AIR COND RLY	Engine: After warming up, idle the engine	A/C switch: OFF	OFF
		A/C switch: ON (Compressor operates)	ON
FUEL PUMP RLY	- For 1 seconds after turning ignition switch ON - Engine is running or cranking		ON
	Except above		OFF
THRTL RELAY	Ignition switch: ON		ON
HO2S1 HTR (B1)	- Engine speed is less than 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: More than 3,600 rpm		OFF
I/P PULLY SPD	- Connect the tachometer. - Start the engine and compare CONSULT value with the tachometer indication.	Vehicle speed: More than 20 km/h (12 MPH)	Almost the same speed as the tachometer indication
VEHICLE SPEED	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as the speedometer indication
IDL A/V LEARN	- Engine: After warming up - A/C switch: OFF - No load - Throttle valve closed position learning: Completed	Idle air volume learning has already been performed successfully.	CMPLT
		Idle air volume learning has not been performed yet.	YET
TRVL AFTER MIL	Ignition switch: ON		0 – 65,535 km
ENG OIL TEMP	Engine: After warming up		More than 70 °C (158°F)
A/F S1 HTR (B1)	Engine: After warming up, idle the engine (More than 140 seconds after starting engine)		4 – 100%
SET VHCL SPD	Engine: After warming up	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: Depressed	OFF
BRAKE SW2 (Stop lamp switch)	Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Depressed	ON

ECM

< ECU DIAGNOSIS INFORMATION >

[MR20DD]

Monitor Item	Condition		Values/Status
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 172 km/h [107 MPH(for CVT)] - When vehicle speed is between 40 km/h (25MPH) and 181 km/h [112 MPH (for M/T)]	ASCD: Operating	ON
		ASCD: Not operating	OFF
AC EVA TEMP	- Engine: Idle - A/C switch: ON		Varies with the target A/C evaporator temperature sent from "A/C auto amp."
AC EVA TARGET	- Engine: Idle - A/C switch: ON		Varies with the target A/C evaporator temperature sent from "A/C auto amp."
A/F ADJ-B1	Engine: Idle		-0.450 – 0.330
P/N POSI SW	Ignition switch: ON	Selector lever: P or N	ON
		Selector lever: Except above position	OFF
INT/A TEMP SE	Engine: After warming up		Indicates intake air temperature
AC PRESS SEN	- Engine: Idle - Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 – 4.0 V
FUEL PRES SEN	- Engine: After warming up - Selector lever: P or N position - A/C switch: OFF - No load	Idle	Approx. 2.74 MPa
		2,000 rpm	Approx. 3.0 MPa
ATOM PRES SEN	Ignition switch: ON		3.15 - 4.60 V
FUEL INJ B1	- Engine: After warming up - Selector lever: P or N position - A/C switch: OFF - No load	Idle	Approx. 0.8 msec
		2,000 rpm	Approx. 1.1 msec
BAT TEMP SEN	Engine: After warming up		More than 70 °C
H/P FUEL PUMP DEG	- Engine: After warming up - Selector lever: P or N position - A/C switch: OFF - No load	Idle	Approx. 255 – 275 deg
		2,000 rpm	Approx. 255 – 275 deg
FUEL PRES SEN V	- Engine: After warming up - Selector lever: P or N position - A/C switch: OFF - No load	Idle	Approx. 820 – 1,140 mV
		When revving engine up to 4,000 rpm quickly	Approx. 820 – 2,900 mV
EOP SENSOR	- Engine oil temperature: 80°C - Selector lever: P or N position - A/C switch: OFF - No load	Idle	Approx. 1,450 mV
		2,000 rpm	Approx. 2,850 mV
ECM TEMP 1	- Engine: At cooling - Ignition switch: Right after ON		Indicates the ambient temperature.
ECM TEMP 2	- Engine: At cooling - Ignition switch: Right after ON		Indicates the ambient temperature.

Monitor Item	Condition		Values/Status
FUEL INJ TIM	- Engine oil temperature: 80°C - Selector lever: P or N position - A/C switch: OFF - No load	Idle	Approx. 62 deg
		2,000 rpm	Approx. 62 deg
FAN DUTY	Engine: Running		0 - 100%
THRTL STK CNT B1	NOTE: This item is displayed but are not applicable to this model.		—
A/F SEN1 (B1)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
A/F-S ATMSPHRC CRCT B1	Engine: After warming up, idle the engine		Varies depending on vehicle environment.
A/F-S ATMSPHRC CRCT UP B1	Engine: Running		Varies depending on the number of updates.
A/F SEN1 DIAG2 (B1)	DTC P014C and P014D self-diagnosis incomplete.		INCMP
	DTC P014C and P014D self-diagnosis is complete.		CMPLT
A/F SEN1 DIAG3 (B1)	The vehicle condition is not within the diagnosis range of DTC P014C or P014D.		ABSNT
	The vehicle condition is within the diagnosis range of DTC P014C or P014D.		PRSNT
HO2 S2 DIAG1 (B1)	DTC P0139 self-diagnosis (delayed response) is incomplete.		INCMP
	DTC P0139 self-diagnosis (delayed response) is complete.		CMPLT
HO2 S2 DIAG2 (B1)	DTC P0139 self-diagnosis (slow response) is incomplete.		INCMP
	DTC P0139 self-diagnosis (slow response) is complete.		CMPLT

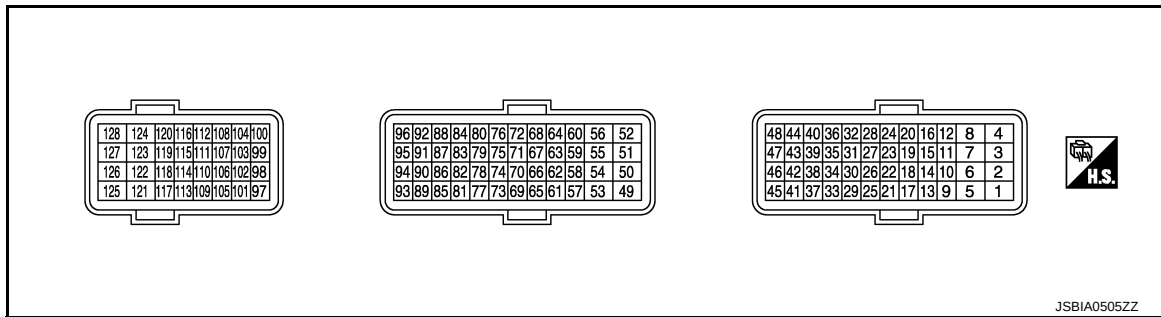
*1: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

*2: Indicates the intake manifold runner control valve.

*3: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [PG-124, "EXCEPT FOR R9M : Work Procedure"](#).

*4: Varies with the atmospheric pressure changed by whether or elevation as this is an absolute pressure sensor.

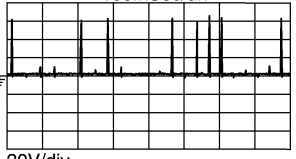
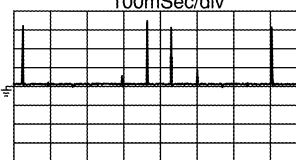
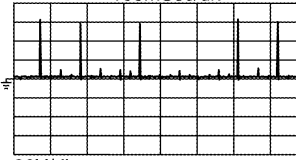
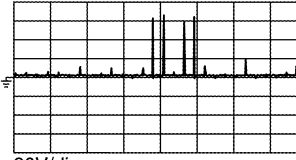
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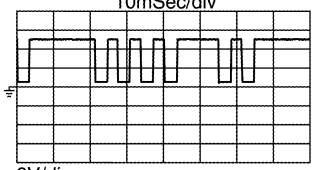
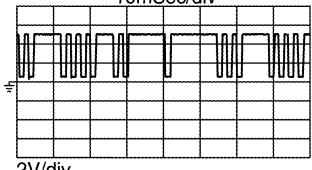


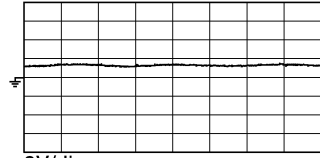
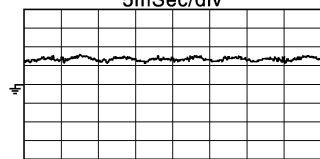
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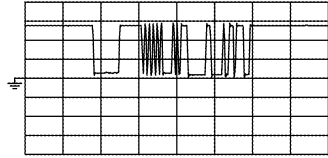
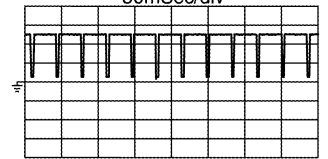
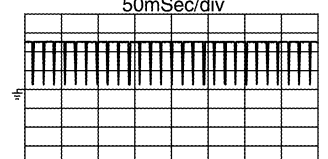
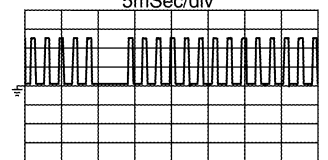
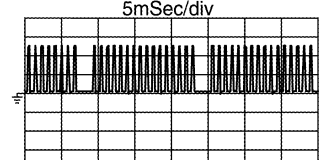
NOTE:

- ECM is located in the engine room left side near battery.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT.

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
1 (W)	55 (GR)	Fuel injector No. 1 (HI) Fuel injector No. 2 (HI) Fuel injector No. 3 (HI) Fuel injector No. 4 (HI)	Output	[Engine is running] • Engine: after warming up • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 – 14 V) ★ 100mSec/div  20V/div JPBIA4718ZZ
2 (W)					
3 (W)				[Engine is running] • Engine: after warming up • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 – 14 V) ★ 100mSec/div  20V/div JPBIA4719ZZ
4 (W)					
5 (B)	55 (GR)	Fuel injector No. 1 (LO) Fuel injector No. 2 (LO) Fuel injector No. 3 (LO) Fuel injector No. 4 (LO)	Output	[Engine is running] • Engine: after warming up • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 – 14 V) ★ 100mSec/div  20V/div JPBIA4720ZZ
6 (B)					
7 (B)				[Engine is running] • Engine: after warming up • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 – 14 V) ★ 100mSec/div  20V/div JPBIA4721ZZ
8 (B)					
11 (B)	—	ECM ground	—	—	—
12 (BR)	—	Shield	—	—	—
14 (W)	128 (B)	Reverse/Neutral position signal (M/T) Park/Neutral position signal (CVT)	Input	[Ignition switch: ON] • Selector lever: P or N position [Ignition switch: ON] • Selector lever: Except above position	BATTERY VOLTAGE (11 - 14 V) 0 V
15 (R)	—	Sensor ground (Camshaft position sensor)	—	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
19 (W)	15 (R)	Camshaft position sensor	Input	[Engine is running] - Engine: after warming up - Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	1.0 – 2.0 ★ 10mSec/div  2V/div JPBI4726ZZ
				[Engine is running] - Engine: after warming up - Engine speed: 2,000 rpm	1.0 – 2.0 ★ 10mSec/div  2V/div JPBI4727ZZ
20 (L)	—	Sensor ground (Mass air flow sensor, intake air temperature sensor)	—	—	—
21 (L)	44 (BR)	Sensor power supply (Crankshaft position sensor)	—	[Ignition switch: ON]	5 V
23 (Y)	39 (R)	Sensor power supply (Fuel rail pressure sensor, refrigerant pressure sensor, engine oil pressure sensor)	—	[Ignition switch: ON]	5 V
24 (Y)	42 (B)	Sensor power supply (Exhaust valve timing control position sensor)	—	[Ignition switch: ON]	5 V
25 (L)	—	Sensor ground (Engine coolant temperature sensor, engine oil temperature sensor)	—	—	—
28 (BR)	20 (L)	Mass air flow sensor	Input	[Ignition switch: ON] Engine stopped	0.4 V
				[Engine is running] - Engine: after warming up - Idle speed	0.7 – 1.2 V
				[Engine is running] - Engine: after warming up - Revvng engine from idle to 4,000 rpm NOTE: The voltage rises smoothly in response to revving up the engine.	0.7 – 1.2 V → 2.4 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
29 (GR)	39 (R)	Engine oil pressure sensor	Input	[Engine is running] • Engine: after warming up • Idle speed	1.3 V ★ 5mSec/div  2V/div JPBIA3359ZZ
				[Engine is running] • Engine speed: 2,000 rpm	2.7 V ★ 5mSec/div  2V/div JPBIA3360ZZ
31 (G)	25 (L)	Engine coolant temperature sensor	Input	[Engine is running]	0 – 4.8 V Output voltage varies with engine coolant temperature.
32 (P)	25 (L)	Engine oil temperature sensor	Input	[Engine is running]	0 – 4.8 V Output voltage varies with engine oil temperature.
33 (G)	39 (R)	Fuel rail pressure sensor	Input	[Engine is running] • Engine: after warming up • Idle speed	0.82 – 1.14 V
				[Engine is running] • Engine: after warming up • Revving engine from idle to 4,000 rpm	0.82 – 2.9 V
34 (P)	39 (R)	Refrigerant pressure sensor	Input	[Engine is running] • Engine: after warming up • Idle speed • A/C switch: ON (Compressor operates)	1.0 – 4.0 V
35 (V)	20 (L)	Intake air temperature sensor	Input	[Engine is running]	0 – 4.8 V Output voltage varies with intake air temperature.
36 (—)	—	Sensor ground (Knock sensor)	—	—	—
39 (R)	—	Sensor ground (Fuel rail pressure sensor, refrigerant pressure sensor, engine oil pressure sensor)	—	—	—
40 (W)	36 (—)	Knock sensor	Input	[Engine is running] • Idle speed	2.5 V
42 (B)	—	Sensor ground (Exhaust valve timing control position sensor)	—	—	—
43 (G)	15 (R)	Sensor power supply (Camshaft position sensor)	—	[Ignition switch: ON]	5 V
44 (BR)	—	Sensor ground (Crankshaft position sensor)	—	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
45 (G)	128 (B)	LIN communication line	Input/ Output	[Ignition switch: ON]	12 V ★ 1mSec/div  5V/div JPBIA4273ZZ
46 (LG)	42 (B)	Exhaust valve timing control position sensor	Input	[Engine is running] • Engine: after warming up • Idle speed NOTE: The pulse cycle changes depend- ing on rpm at idle.	1.0 – 2.0 ★ 50mSec/div  2V/div JPBIA4730ZZ
				[Engine is running] • Engine: after warming up • Engine speed: 2,000 rpm	1.0 – 2.0 ★ 50mSec/div  2V/div JPBIA4731ZZ
48 (GR)	44 (BR)	Crankshaft position sensor	Input	[Engine is running] • Engine: after warming up • Idle speed NOTE: The pulse cycle changes depend- ing on rpm at idle.	4.0 V ★ 5mSec/div  2V/div JPBIA4728ZZ
				[Engine is running] • Engine: after warming up • Engine speed: 2,000 rpm	4.0 V ★ 5mSec/div  2V/div JPBIA4729ZZ
49 (Y)	55 (GR)	Fuel injector driver power supply 1	Input	[Engine is running] • Engine: after warming up • Idle speed	BATTERY VOLTAGE (11 – 14 V)
50 (V)	54 (BR)	High pressure fuel pump re- lay	Input	[Engine is running] • Engine: after warming up • Idle speed	BATTERY VOLTAGE (11 – 14 V)

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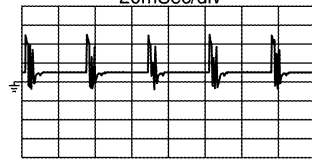
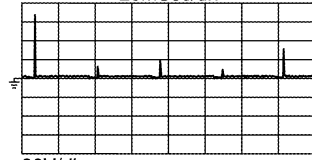
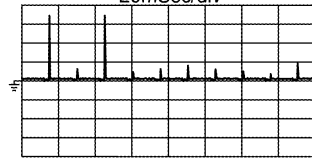
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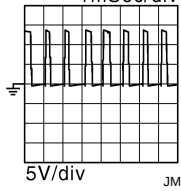
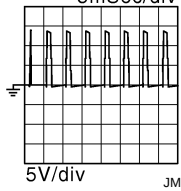
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Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
51 (W)	54 (BR)	High pressure fuel pump(HI)	Output	[Engine is running] - Engine: after warming up - Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 – 14 V) ★ 20mSec/div  5V/div JPBI4722ZZ
				[Engine is running] - Engine: after warming up - Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 – 14 V) ★ 20mSec/div  5V/div JPBI4723ZZ
52 (B)	128 (B)	High pressure fuel pump(LO)	Output	[Engine is running] - Engine: after warming up - Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 – 14 V) ★ 20mSec/div  20V/div JPBI4724ZZ
				[Engine is running] - Engine: after warming up - Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 – 14 V) ★ 20mSec/div  20V/div JPBI4725ZZ
53 (W)	55 (GR)	Fuel injector driver power supply 2	Input	[Engine is running] - Engine: after warming up - Idle speed	BATTERY VOLTAGE (11 – 14 V)
54 (BR)	—	ECM ground (High pressure fuel pump)	—	—	—
55 (GR)	—	ECM ground (Fuel injector)	—	—	—
56 (B)	—	ECM ground (Fuel injector)	—	—	—
57 (Y)	59 (B)	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

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
59 (B)	—	Sensor ground (Heated oxygen sensor 2)	—	—	—
60 (R)	75 (B)	Sensor power supply (Throttle position sensor 1, throttle position sensor 2)	—	[Ignition switch: ON]	5 V
62 (B)	—	Shield	—	—	—
63 (G)	75 (B)	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D position • Accelerator pedal: Fully released	More than 0.36 V
				[Ignition switch: ON] • Engine stopped • Selector lever: D position • Accelerator pedal: Fully depressed	Less than 4.75 V
64 (Y)	128 (B)	Air fuel ratio (A/F) sensor 1	Input	[Engine is running] • Engine: after warming up • Engine speed: 2,000 rpm	2.2 V Varies with air fuel ratio.
65 (W)	128 (B)	Throttle control motor power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
69 (R)	128 (B)	Throttle control motor (OPEN)	Output	[Ignition switch: ON] • Engine: Stopped • Selector lever: D position • Accelerator pedal: Fully depressed	3.2 V ★ 1mSec/div  5V/div JMBIA0324GB
70 (—)	—	Shield	—	—	—
71 (W)	75 (B)	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D position • Accelerator pedal: Fully released	Less than 4.75 V
				[Ignition switch: ON] • Engine stopped • Selector lever: D position • Accelerator pedal: Fully depressed	More than 0.36 V
72 (G)	128 (B)	Air fuel ratio (A/F) sensor 1	Input	[Ignition switch: ON]	1.8 V
73 (L)	128 (B)	Throttle control motor (CLOSE)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D position • Accelerator pedal: Fully released	1.8 V ★ 5mSec/div  5V/div JMBIA0326GB
75 (B)	—	Sensor ground (Throttle position sensor 1, throttle position sensor 2)	—	—	—

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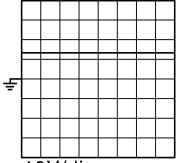
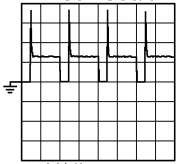
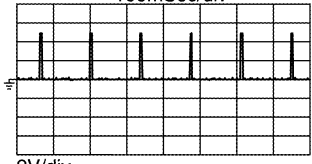
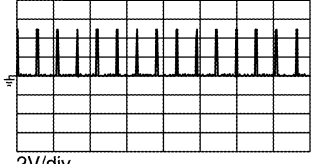
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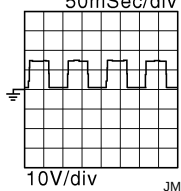
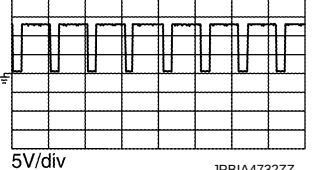
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Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
77 (BG)	128 (B)	EVAP canister purge volume control solenoid valve	Output	[Engine is running] - Idle speed - Accelerator pedal: Fully released after starting engine	BATTERY VOLTAGE (11 – 14 V) ★ 50mSec/div  10V/div JMBIA0327GB
				[Engine is running] Engine speed: 2,000 rpm (Passing 100 seconds after starting engine)	10 V ★ 50mSec/div  10V/div JMBIA0328GB
78 (Y)	128 (B)	Ignition signal No.1 Ignition signal No.2 Ignition signal No.3 Ignition signal No.4	Output	[Engine is running] - Engine: after warming up - Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	0 – 0.3 V ★ 100mSec/div  2V/div JPBIA4733ZZ
82 (BR)					
86 (W)				[Engine is running] - Engine: after warming up - Engine speed: 2,000 rpm	0.2 – 0.5 V ★ 100mSec/div  2V/div JPBIA4734ZZ
90 (SB)					
79 (V)	128 (B)	Intake manifold runner control valve power supply	Input	[Engine is running] - Engine: after warming up - Idle speed	BATTERY VOLTAGE (11 – 14 V)
80 (V)	128 (B)	Throttle control motor relay	Output	[Ignition switch: OFF]	BATTERY VOLTAGE (11 – 14 V)
				[Ignition switch: ON]	0 – 1.0 V
81 (G)	128 (B)	Intake manifold runner control valve (CLOSE)	Output	[Engine is running] - Engine: after warming up - Idle speed	0 V
				[Engine is running] - Engine: after warming up - No load - When the engine speed is decreased from 3,000 rpm to idle speed (Accelerator pedal is released)	Generates a voltage for a moment (11 – 14 V)

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
85 (Y)	128 (B)	Intake manifold runner control valve (OPEN)	Output	[Engine is running] • Engine: after warming up • Idle speed	0 V
				[Engine is running] • Engine: after warming up • No load • Revving engine from idle to 3,000 rpm	Generates a voltage for a moment (11 - 14 V)
87 (P)	128 (B)	Fuel pump relay	Output	[Ignition switch: ON] • More than 1 second after turning ignition switch ON [Engine is running]	0 - 1.0 V
				[Ignition switch: ON] • 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14 V)
89 (V)	59 (B)	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 ★ 50mSec/div  10V/div JMBIA0325GB
				[Ignition switch: ON] • Engine: Stopped [Engine is running] • Engine speed: More than 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
91 (P)	128 (B)	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)
93 (P)	128 (B)	Air fuel ratio (A/F) sensor 1 heater	Input	[Engine is running] • Engine: after warming up • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8 V ★ 100mSec/div  5V/div JPBIA4732ZZ

A

EC

C

D

E

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I

J

K

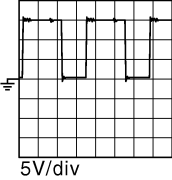
L

M

N

O

P

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
94 (G)	128 (B)	Intake valve timing control solenoid valve	Output	[Engine is running] • Engine: after warming up • Idle speed	0 V
				[Engine is running] • Engine: after warming up • Revving engine from idle to 2,000 rpm quickly	BATTERY VOLTAGE (11 – 14 V) ★ 
95 (GR)	128 (B)	Exhaust valve timing control solenoid valve	Output	[Engine is running] • Engine: after warming up • Idle speed	0 V
				[Engine is running] • Engine: after warming up • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 – 14 V)
97 (W)	124 (R)	Atmospheric pressure sensor	Input	[Ignition switch: ON]	1.8 – 4.8 V Output voltage varies with atmospheric pressure.
99 (P)	—	CAN - L	Input/ Output	—	—
100 (L)	—	CAN - H	Input/ Output	—	—
101 (Y)	124 (R)	Sensor power supply (Atmospheric pressure sensor)	—	[Ignition switch: ON]	5 V
108 (R)	128 (B)	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 (LG)	128 (B)	Ignition switch	Input	[Ignition switch: OFF]	0 V
				[Ignition switch: ON]	BATTERY VOLTAGE (11 – 14 V)
110 (G)	111 (BR)	ASCD steering switch	Input	[Ignition switch: ON] • ASCD steering switch: OFF	4.0 V
				[Ignition switch: ON] • Main switch: Pressed	0 V
				[Ignition switch: ON] • CANCEL switch: Pressed	1.0 V
				[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3.0 V
				[Ignition switch: ON] • SET/COAST switch: Pressed	2.0 V
111 (BR)	—	Sensor ground (ASCD steering switch)	—	—	—
115 (V)	128 (B)	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0 V
				[Ignition switch: OFF] • Brake pedal: Depressed	BATTERY VOLTAGE (11 – 14 V)

ECM

< ECU DIAGNOSIS INFORMATION >

[MR20DD]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
116 (GR)	128 (B)	Brake pedal position switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: OFF] • Brake pedal: Depressed	0 V
118 (SB)	120 (LG)	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5 V
119 (Y)	120 (LG)	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 (LG)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
121 (BR)	128 (B)	ECM power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
122 (V)	127 (R)	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5 V
123 (B)	—	ECM ground	—	—	—
124 (R)	—	Sensor ground (Atmospheric pressure sensor)	—	—	—
125 (B)	—	ECM ground	—	—	—
126 (GR)	127 (R)	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7 V
127 (R)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—
128 (B)	—	ECM ground	—	—	—

★: 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-124, "EXCEPT FOR R9M : Work Procedure"](#).

Fail-safe

INFOID:0000000010775069

NON DTC RELATED ITEM

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

DTC RELATED ITEM

Description

When a DTC is detected, ECM executes a mode (in the Fail-safe mode) applicable to the DTC. The fail-safe mode has the preset traveling control mode (accelerator angle variation and engine output limit), device fix mode and combustion control mode.

Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
	Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction.
Device fix mode		- This mode fixes the IVT control solenoid valve and the EVT control solenoid valve in the reference position. - The intake manifold runner control valve motor is turned OFF (intake manifold runner control valve opens).
Combustion control mode	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).
	Idle speed control	Stops feedback control of idle speed and controls with specified speed.
	Recovery speed control at decelerating	Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.
	Idle neutral control	Stops idle neutral control.
	Ignition timing correction control	Partially controls ignition timing control.
	Retardation control	Controls ignition timing delay control in the intermediate water temperature range.

Fail Safe Pattern

Pattern	Fail safe mode	
A	Traveling control mode	Accelerator angle variation control
B		Engine output control
C	Device fix mode	

Pattern	Fail safe mode	
D	Combustion control mode	Stratified charge combustion control at starting
E		- Idle speed control - Recovery speed control at decelerating - Idle neutral control
F		- Ignition timing correction control - Retardation control

Fail Safe List

×:Applicable —: Not applicable

DTC No.	Detected items	Vehicle behavior						
		Pattern					Others	
		A	B	C	D	E	F	
P0011	Intake valve timing control	—	—	×	—	—	—	—
P0014	Exhaust valve timing control	—	—	×	—	—	—	—
P0075	Intake valve timing control solenoid valve	—	—	×	—	—	—	—
P0078	Exhaust valve timing control solenoid valve	—	—	×	—	—	—	—
P0087 P0088 P0090	FRP control system	×	—	—	×	—	—	—
P0102 P0103	Mass air flow sensor circuit	×	×	×	×	×	×	—
P0117 P0118	Engine coolant temperature sensor circuit	—	—	—	×	×	—	Engine speed will not rise more than 1,800rpm due to the fuel cut.
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	—	—	—	—	—	—	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor. NOTE: If throttle position sensor 1 and 2 malfunction at the same time conducts following control. ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P0171 P0172	Fuel injection system	×	—	—	×	×	—	—
P0190	FRP sensor	×	—	—	×	×	—	—
P0197 P0198	Engine oil temperature sensor	—	—	—	—	—	—	Intake and exhaust valve timing control does not function.
P0201 P0202 P0203 P0204	Injector	×	—	—	×	—	—	—
P0300	Misfire	×	—	—	×	×	—	—
P0335	Crankshaft position sensor	—	—	×	—	—	—	—
P0340	Camshaft position sensor	—	—	×	—	—	—	—
P0365	Exhaust valve timing control position sensor	—	—	×	—	—	—	—

DTC No.	Detected items	Vehicle behavior						Others	
		Pattern					F		
		A	B	C	D	E			
P0500	Vehicle speed sensor	×	—	—	×	×	—	—	
P0524	Engine oil pressure	—	—	—	—	—	—	- ECM illuminates engine oil pressure warning lamp on the combination meter. - Engine speed will not rise more than 4,000rpm due to the fuel cut. - Fail-safe is canceled when ignition switch OFF → ON.	
P0603 P0607	ECM	×	×	—	—	—	—	—	
P0604 P0605 P0606		—	—	—	—	—	—	(Computing part of ECM does not operate normally.) ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P062B		×	—	—	×	—	—	NOTE: Fail-safe mode may not start depending on malfunction type of ECM.	
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.	
P1197	Out of gas	—	—	—	—	—	—	Engine torque is limited.	
P1217	Engine over temperature	—	—	—	—	—	—	Engine speed will not rise more than 1,800rpm due to the fuel cut.	
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
P2008	Intake manifold runner control valve	×	×	×	×	×	×	—	
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	Vehicle behavior						Others
		Pattern					F	
		A	B	C	D	E		
P2119	Electric throttle control actuator	×	×	—	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. NOTE: For pattern A and B refer to A and B of P2119 DTC detection logic. (Refer to EC-369, "DTC Description" .) For C of P2119 DTC detection logic ECM behaves as above.
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. Therefore, the acceleration will be poor. NOTE: If accelerator pedal position sensor 1 and 2 malfunction at the same time conducts following control. ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Inspection Priority Chart

INFOID:0000000010775070

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

Priority	DTC	Detected items
1	U0101, U1001	CAN communication line
	U1040, U1044	Engine communication line
	U1050, U1051	LIN communication line
	P0102, P0103	Mass air flow sensor
	P0107, P0108	Atmospheric pressure sensor
	P0112, P0113	Intake air temperature sensor
	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
	P0340, P0365	Camshaft position sensor
	P0500	Vehicle speed sensor
	P0520	Engine oil pressure sensor
	P0604, P0605, P0606, P0607, P0611, P062B, P062F	ECM
	P0643	Sensor power supply
	P0850	Reverse/neutral position sensor switch
	P1197	Out of gas*
	P155D	Generator
	P1568	Intelligent cruise control command value
	P161D, P161E, P161F	IMMOBILIZER
	P2122, P2123, P2127, P2128, P2138	Accelerator pedal position sensor
2	P0031, P0032	Air fuel ratio (A/F) sensor 1 heater
	P0037, P0038	Heated oxygen sensor 2 heater
	P0075	Intake valve timing control solenoid valve
	P0078	Exhaust valve timing control solenoid valve
	P0130, P0131, P0132, P014C, P014D	Air fuel ratio (A/F) sensor 1
	P0137, P0138, P0139	Heated oxygen sensor 2
	P0444	EVAP canister purge volume control solenoid valve
	P0603	ECM
	P1078	Exhaust valve timing control position sensor
	P1217	Engine over temperature (OVERHEAT)
	P1805	Brake switch
	P2008	Intake manifold runner control valve position sensor
	P2100, P2103	Throttle control motor relay
	P2101	Electric throttle control function
	P2118	Throttle control motor

Priority	DTC	Detected items
3	P0011	Intake valve timing control
	P0014	Exhaust valve timing control
	P0087, P0088, P0090, P0190	Fuel pressure control
	P0171, P0172	Fuel injection system function
	P0201 - P0204	Fuel injector
	P0300 - P0304	Misfire
	P0420	Three way catalyst function
	P0506, P0507	Idle speed control
	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

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

DTC Index

INFOID:0000000010775071

×:Applicable —: Not applicable

DTC*1		Items (CONSULT screen terms)	SRT code	Trip	MIL	Reference page
CONSULT GST*2	ECM*3					
U0101	0101*4	LOST COMM (TCM)	—	2	—	EC-165
U1001	1001*4	CAN COMM CIRCUIT	—	1	—	EC-166
U1040	1040*4	ENG COMM CIRCUIT	—	2	—	EC-167
U1044	1044*4	ENG COMM CIRCUIT	—	2	—	EC-169
U1050	1050*4	LIN COMMUNICATION	—	2	—	EC-171
U1051	1051*4	LIN COMMUNICATION	—	2	—	EC-171
P0000	0000	NO DTC IS DETECTED.	—	—	—	—
P0011	0011	INT/V TIM CONT-B1	×	2	×	EC-173
P0014	0014	EXH/V TIM CONT-B1	—	2	×	EC-177
P0031	0031	A/F SEN1 HTR (B1)	—	2	×	EC-181
P0032	0032	A/F SEN1 HTR (B1)	—	2	×	EC-181
P0037	0037	HO2S2 HTR (B1)	—	2	×	EC-184
P0038	0038	HO2S2 HTR (B1)	—	2	×	EC-184
P0075	0075	INT/V TIM V/CIR-B1	—	2	×	EC-187
P0078	0078	EX V/T ACT/CIRC-B1	—	2	×	EC-190
P0087	0087	LOW FUEL PRES	—	2	×	EC-193
P0088	0088	HIGH FUEL PRES	—	2	×	EC-193
P0090	0090	FUEL PRESSURE CONTROL FUNCTION	—	2	×	EC-193
P0102	0102	MAF SEN/CIRCUIT-B1	—	1	×	EC-196
P0103	0103	MAF SEN/CIRCUIT-B1	—	1	×	EC-196
P0107	0107	ABSL PRES SEN/CIRC	—	2	×	EC-202
P0108	0108	ABSL PRES SEN/CIRC	—	2	×	EC-202
P0112	0112	IAT SEN/CIRCUIT-B1	—	2	×	EC-206

ECM

< ECU DIAGNOSIS INFORMATION >

[MR20DD]

DTC*1		Items (CONSULT screen terms)	SRT code	Trip	MIL	Reference page	
CONSULT GST*2	ECM*3						
P0113	0113	IAT SEN/CIRCUIT-B1	—	2	×	EC-206	
P0117	0117	ECT SEN/CIRC	—	1	×	EC-208	
P0118	0118	ECT SEN/CIRC	—	1	×	EC-208	
P0122	0122	TP SEN 2/CIRC-B1	—	1	×	EC-211	
P0123	0123	TP SEN 2/CIRC-B1	—	1	×	EC-211	
P0130	0130	A/F SENSOR1 (B1)	—	2	×	EC-214	
P0131	0131	A/F SENSOR1 (B1)	—	2	×	EC-217	
P0132	0132	A/F SENSOR1 (B1)	—	2	×	EC-220	
P0137	0137	HO2S2 (B1)	×	2	×	EC-223	
P0138	0138	HO2S2 (B1)	×	2	×	EC-229	
P0139	0139	HO2S2 (B1)	×	2	×	EC-237	
P014C	014C	A/F SENSOR1 (B1)	×	2	×	EC-243	
P014D	014D	A/F SENSOR1 (B1)	×	2	×	EC-243	
P0171	0171	FUEL SYS-LEAN-B1	—	2	×	EC-248	
P0172	0172	FUEL SYS-RICH-B1	—	2	×	EC-253	
P0190	0190	FUEL PRES SEN/CIRC	—	1	×	EC-258	
P0197	0197	EOT SEN/CIRC	—	2	×	EC-262	
P0198	0198	EOT SEN/CIRC	—	2	×	EC-262	
P0201	0201	INJECTOR CIRC-CYL1	—	2	×	EC-264	
P0202	0202	INJECTOR CIRC-CYL2	—	2	×	EC-264	
P0203	0203	INJECTOR CIRC-CYL3	—	2	×	EC-264	
P0204	0204	INJECTOR CIRC-CYL4	—	2	×	EC-264	
P0222	0222	TP SEN 1/CIRC-B1	—	1	×	EC-265	
P0223	0223	TP SEN 1/CIRC-B1	—	1	×	EC-265	
P0300	0300	MULTI CYL MISFIRE	—	1 or 2	×	or flashing	EC-268
P0301	0301	CYL 1 MISFIRE	—	1 or 2	×	or flashing	EC-268
P0302	0302	CYL 2 MISFIRE	—	1 or 2	×	or flashing	EC-268
P0303	0303	CYL 3 MISFIRE	—	1 or 2	×	or flashing	EC-268
P0304	0304	CYL 4 MISFIRE	—	1 or 2	×	or flashing	EC-268
P0327	0327	KNOCK SEN/CIRC-B1	—	2	—		EC-275
P0328	0328	KNOCK SEN/CIRC-B1	—	2	—		EC-275
P0335	0335	CKP SEN/CIRCUIT	—	2	×		EC-277
P0340	0340	CMP SEN/CIRC-B1	—	2	×		EC-282
P0365	0365	CMP SEN/CIRC-B1	—	2	×		EC-286
P0420	0420	TW CATALYST SYS-B1	×	2	×		EC-290
P0444	0444	PURG VOLUME CONT/V	—	2	×		EC-295
P0500*4	0500	VEHICLE SPEED SENSOR A	—	2	×		EC-298
P0506	0506	ISC SYSTEM	—	2	×		EC-300
P0507	0507	ISC SYSTEM	—	2	×		EC-302
P0520	0520	EOP SENSOR/SWITCH	—	2	—		EC-304
P0524	0524	ENGINE OIL PRESSURE	—	1	—		EC-307
P0603	0603	ECM BACK UP/CIRCUIT	—	2	×		EC-311

ECM

< ECU DIAGNOSIS INFORMATION >

[MR20DD]

DTC*1		Items (CONSULT screen terms)	SRT code	Trip	MIL	Reference page	
CONSULT GST*2	ECM*3						
P0604	0604	ECM	—	1	×	EC-313	EC
P0605	0605	ECM	—	1 or 2	×	EC-314	
P0606	0606	CONTROL MODULE	—	1	×	EC-315	C
P0607	0607	ECM	—	2	×	EC-317	
P0611	0611	FIC MODULE	—	2	—	EC-318	D
P062B	062B	ECM	—	2	×	EC-319	
P062F	062F	CONTROL MODULE	—	1	×	EC-311	E
P0643	0643	SENSOR POWER/CIRC	—	1	×	EC-321	
P0850	0850	P-N POS SW/CIRCUIT	—	2	×	EC-323	F
P1078	1078	EXH TIM SEN/CIRC-B1	—	2	×	EC-327	
P1197	1197	FUEL RUN OUT	—	2	—	EC-331	G
P1212	1212	TCS/CIRC	—	2	—	EC-333	
P1217	1217	ENG OVER TEMP	—	1	×	EC-335	H
P1225	1225	CTP LEARNING-B1	—	2	—	EC-338	
P1226	1226	CTP LEARNING-B1	—	2	—	EC-339	I
P155D	155D	GENERATOR	—	2	—	EC-340	
P1564	1564	ASCD SW	—	1	—	EC-341	J
P1568	1568	ICC COMMAND VALUE	—	1	×	EC-344	
P1572	1572	ASCD BRAKE SW	—	1	—	EC-346	K
P1574	1574	ASCD VHL SPD SEN	—	1	—	EC-352	
P161D*5	161D	IMMOBILIZER	—	—	—	—	L
P161E*5	161E	IMMOBILIZER	—	—	—	—	
P161F*5	161F	IMMOBILIZER	—	—	—	—	M
P1805	1805	BRAKE SW/CIRCUIT	—	1	×	EC-354	
P2008	2008	TUMBLE CONT/V	—	1	—	EC-357	N
P2100	2100	ETC MOT PWR-B1	—	1	×	EC-361	
P2101	2101	ETC FNCTN/CIRC-B1	—	1	×	EC-364	O
P2103	2103	ETC MOT PWR-B1	—	1	×	EC-361	
P2118	2118	ETC MOT-B1	—	1	×	EC-367	P
P2119	2119	ETC ACTR-B1	—	1	×	EC-369	
P2122	2122	APP SEN 1/CIRC	—	1	×	EC-371	
P2123	2123	APP SEN 1/CIRC	—	1	—	EC-371	
P2127	2127	APP SEN 2/CIRC	—	1	×	EC-374	
P2128	2128	APP SEN 2/CIRC	—	1	×	EC-374	
P2135	2135	TP SENSOR-B1	—	1	×	EC-378	
P2138	2138	APP SENSOR	—	1	×	EC-381	

*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.

*5: This DTC is related with immobilizer.

Test Value and Test Limit

INFOID:000000010775072

The following is the information specified in Service \$06 of SAE J1979/ISO 15031-5.

The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

These data (test value and test limit) are specified by On Board Monitor ID (OBDMID), Test ID (TID), Unit and Scaling ID and can be displayed on the GST screen.

The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (e.g., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

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

ECM

< ECU DIAGNOSIS INFORMATION >

[MR20DD]

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

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P015D	94H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1
			P0153	95H	04H	Response rate: Response ratio (lean to rich)
			P0153	96H	84H	Response rate: Response ratio (rich to lean)
	06H	Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for test cycle
			P0157	08H	0CH	Maximum sensor output voltage for test cycle
			P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
			P0159	82H	11H	Rear O2 sensor delay response diagnosis
	07H	Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for test cycle
			P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage
			P0165	81H	0CH	Difference in sensor output voltage
CATA- LYST	21H	Three way catalyst function (Bank1)	P0420	80H	01H	O2 storage index
			P0420	82H	01H	Switching time lag engine exhaust index value
			P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2423	84H	84H	O2 storage index in HC trap catalyst
	22H	Three way catalyst function (Bank2)	P0430	80H	01H	O2 storage index
			P0430	82H	01H	Switching time lag engine exhaust index value
			P2424	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst
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

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

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
O2 SENSOR HEATER	41H	A/F sensor 1 heater (Bank 1)	Low Input: P0031 High Input: P0032	81H	0BH	Converted value of heater electric current to voltage
	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
			P117A	82H	03H	Cylinder A/F imbalance monitoring
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	80H	2FH	Long term fuel trim
			P0174 or P0175	81H	24H	The number of lambda control clamped
			P117B	82H	03H	Cylinder A/F imbalance monitoring

ECM

< ECU DIAGNOSIS INFORMATION >

[MR20DD]

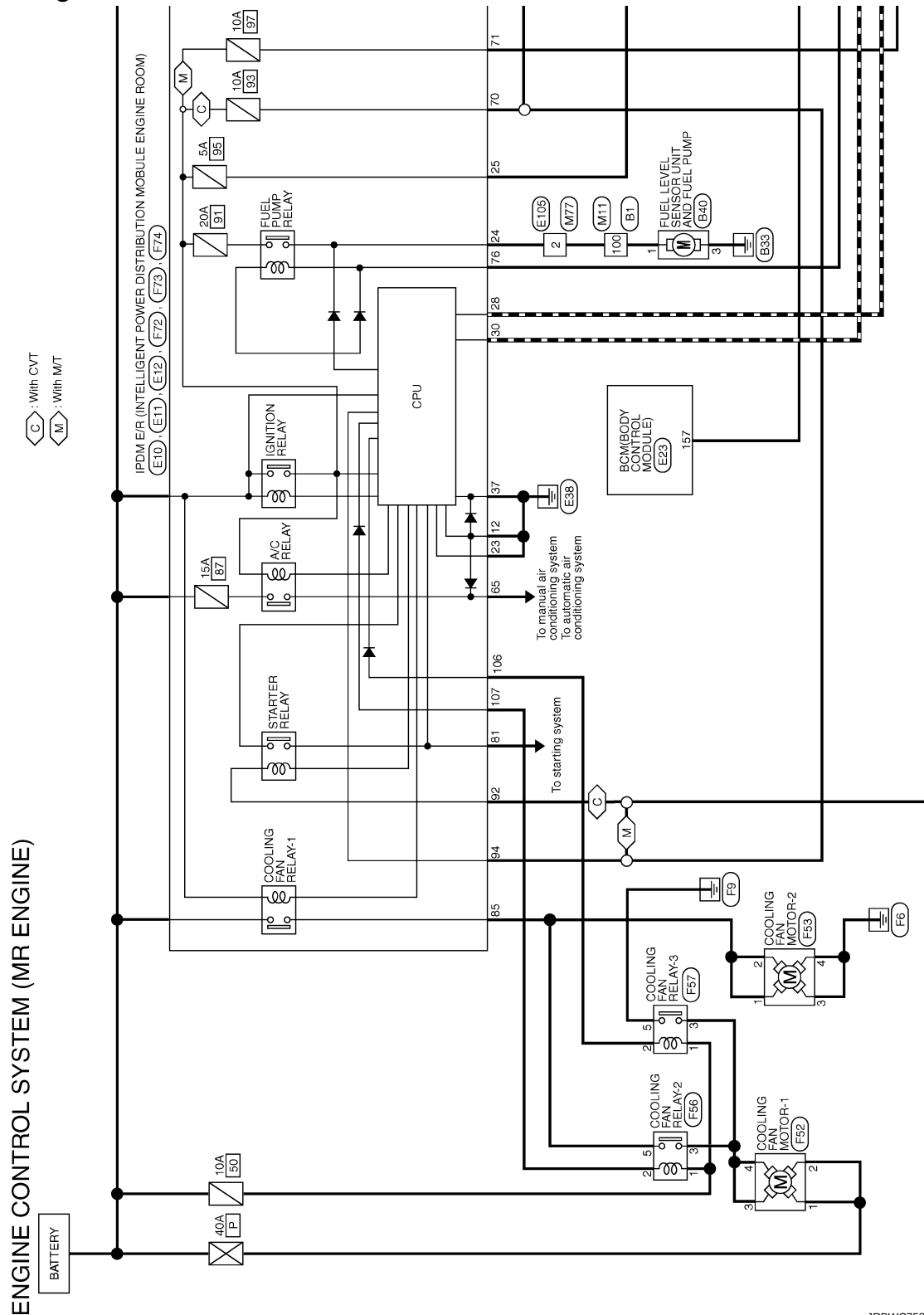
Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A1H	Multiple cylinder misfires	P0301	80H	24H	Misfiring counter at 1000 revolution of the first cylinder
			P0302	81H	24H	Misfiring counter at 1000 revolution of the second 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



*: This connector is not shown in "harness layout".

2014/03/17

JRBWC7586GB

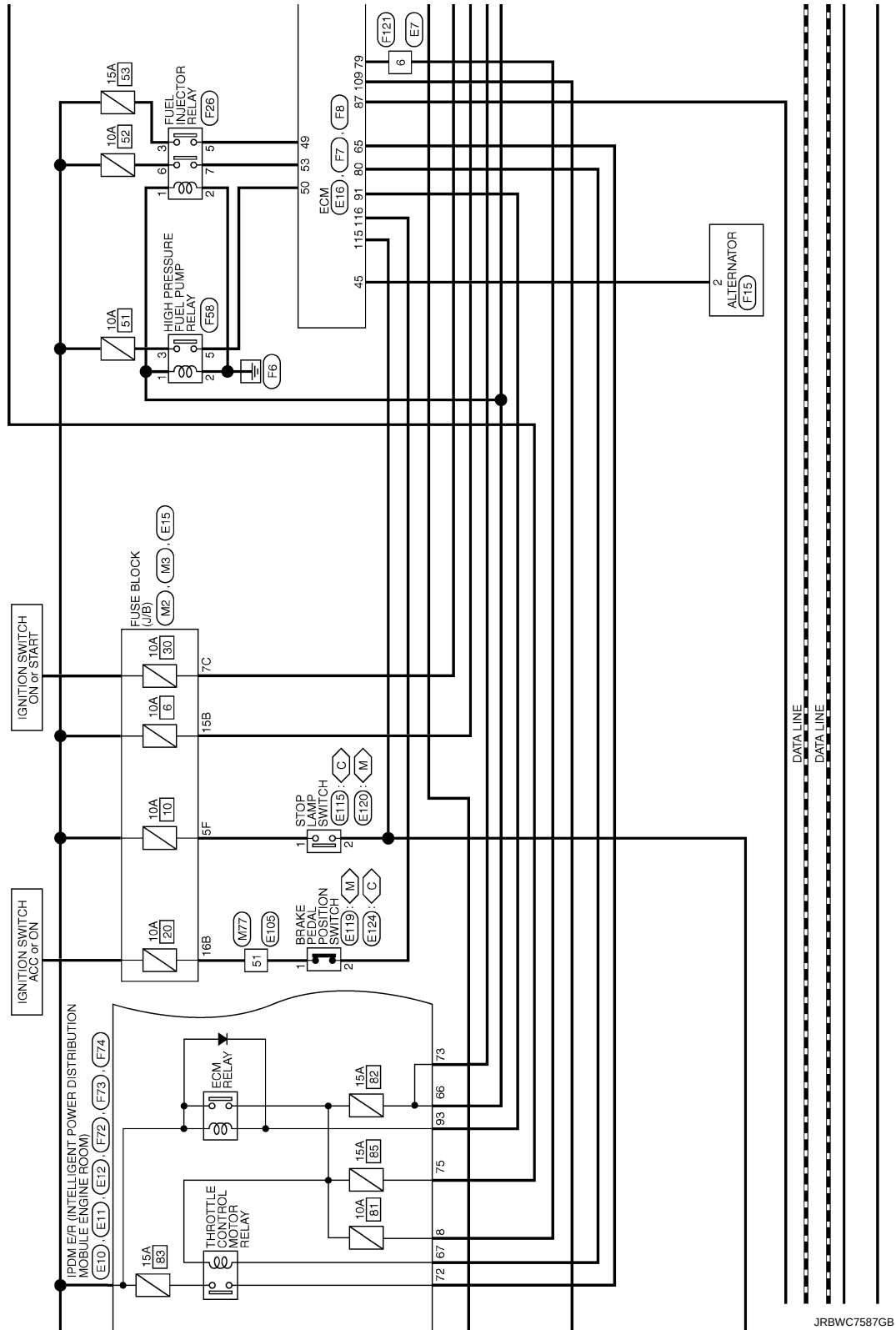
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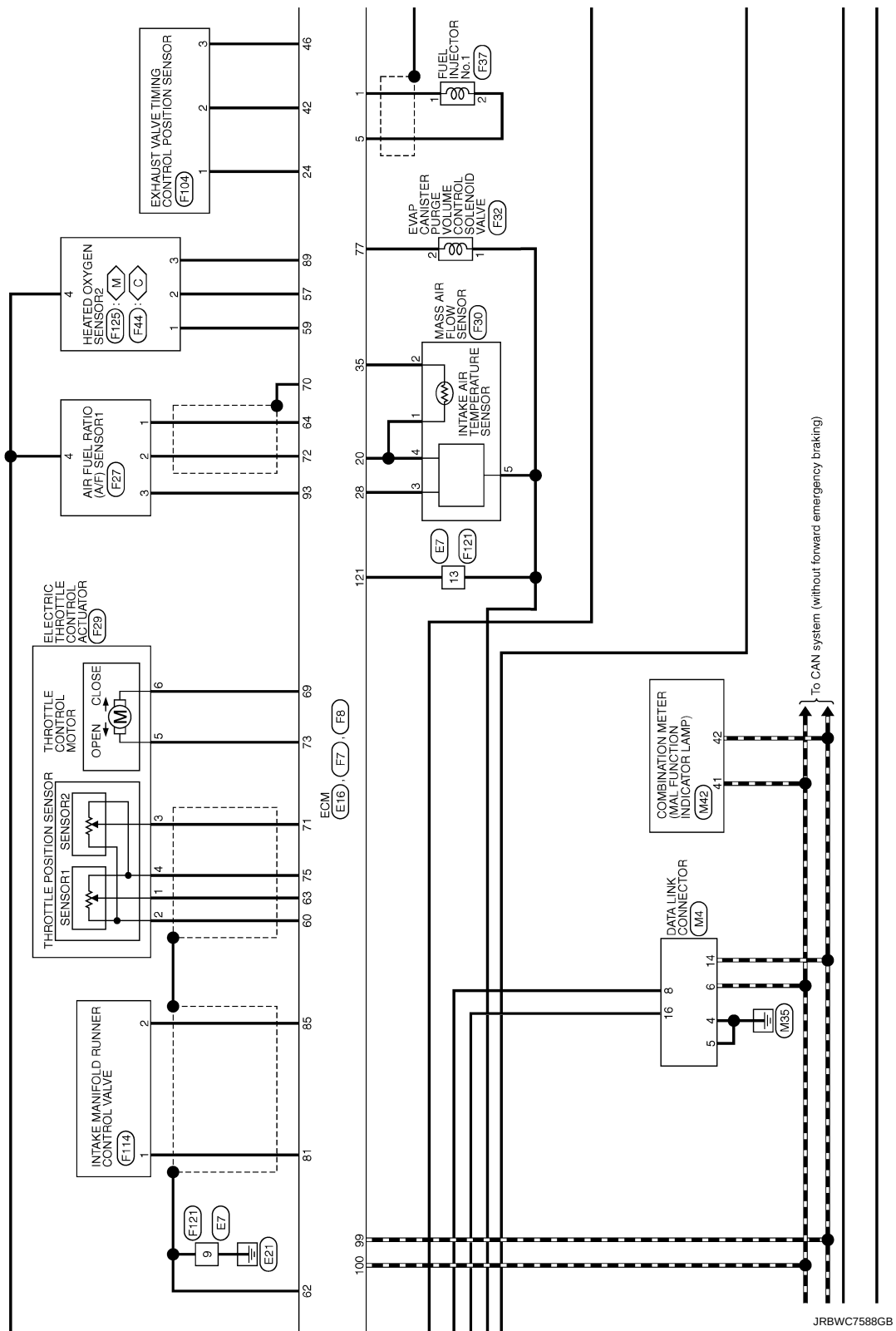
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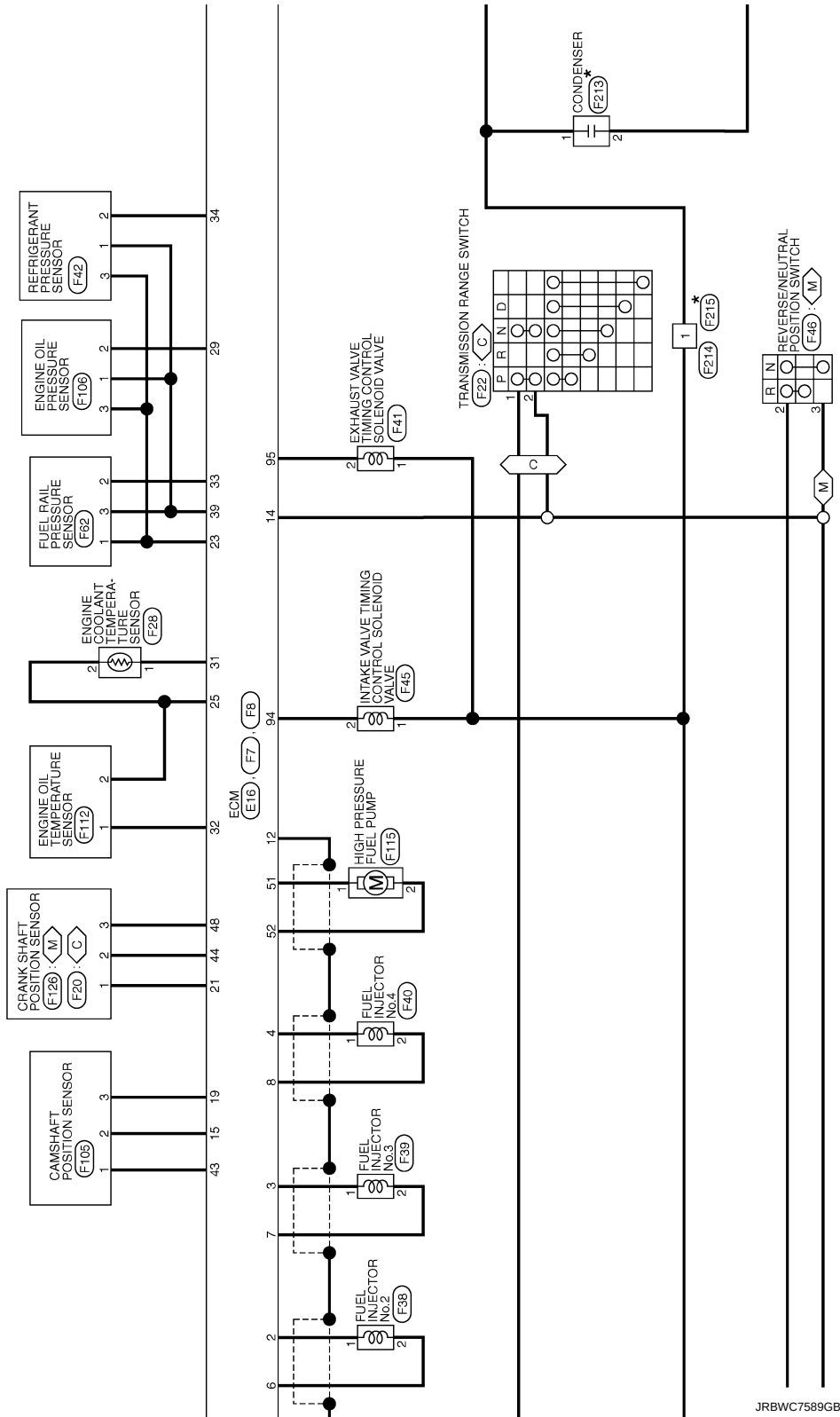
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[MR20DD]



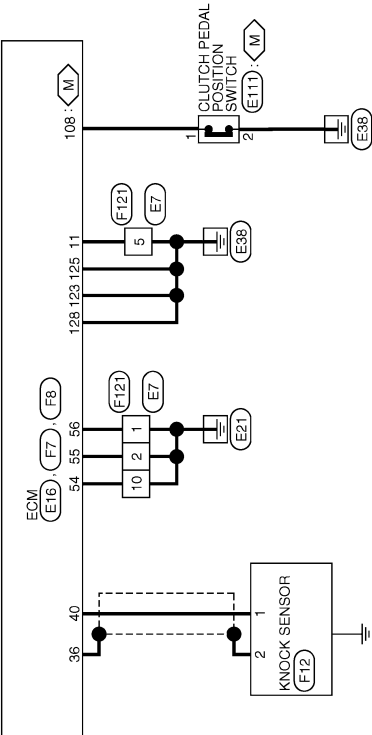
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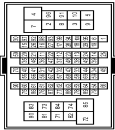
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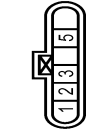
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ENGINE CONTROL SYSTEM (MR ENGINE)

Connector No.	B1
Connector Name	WIRE TO WIRE
Connector Type	TH80MW-CS16-TM4



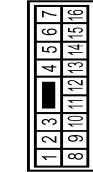
Connector No.	B40
Connector Name	FUEL LEVEL SENSOR UNIT AND FUEL PUMP
Connector Type	ED0FGY-RS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	-
2	LAY	-
3	LAL	-
4	LAV	-
20	L	- [With diesel engine]
21	B	- [With gasoline engine]
21	LAV	- [With diesel engine]
24	G	- [With gasoline engine]
25	BR	-
73	LAY	-
74	R	-
75	R	-
84	L	-
85	L	-
92	LAV	-
93	LAL	-
95	LAVR	-
97	L	-
98	Y	-
99	LAP	-
100	GR	- [With diesel engine]
100	LAVR	- [With gasoline engine]

Terminal No.	Color Of Wire	Signal Name [Specification]
1	LAVR	-
2	LAL	-
3	LAV	-

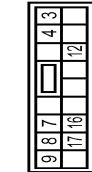
Connector No.	E7
Connector Name	WIRE TO WIRE
Connector Type	NS16MR-CS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	- [With MR20 or QR25 engine]
1	SB	- [With R9M engine]
2	BR	- [With MR20 or QR25 engine]
2	GR	- [With R9M engine]
3	G	-
4	R	-
5	B	- [With MR20 engine]
5	L	- [With R9M engine]
5	LG	- [With QR25 engine]
6	BG	-
7	G	-
8	V	- [With MR20 engine or R9M engine]
8	W	- [With QR25 engine]
9	BG	- [With R9M engine]
9	BR	- [With MR20 engine]

10	BR	-
11	Y	-
12	L	- [With R9M engine]
12	LG	- [With QR25 engine]
13	BR	- [With MR20 or QR25 engine]
13	R	- [With R9M engine]
15	L	-
16	SB	-

Connector No.	E10
Connector Name	POWER INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	NS16FGY-CS



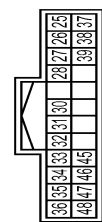
Terminal No.	Color Of Wire	Signal Name [Specification]
3	P	-
4	Y	-
7	L	-
8	BG	-
9	L	-
12	B	-
16	G	-
17	W	-

Connector No.	E11
Connector Name	POWER INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	reversit, 243405408R



Terminal No.	Color Of Wire	Signal Name [Specification]
19	V	-
20	R	-
21	LG	-
22	Y	-
23	B	-
24	W	-

Connector No.	E12
Connector Name	POWER INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	TH24FGY-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
25	LG	-
26	W	-
27	SB	-
28	P	-
30	L	-
31	G	-
32	B	-
33	BG	-
34	LG	-
35	V	-
36	Y	-
37	B	-
38	GR	-
39	BR	-
45	L	-
46	P	-
47	W	-
48	R	-

ENGINE CONTROL SYSTEM (MR ENGINE)

Connector No.	E15
Connector Name	FUSE BLOCK (J/B)
Connector Type	INS10FW-CS



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ENGINE CONTROL SYSTEM (MR ENGINE)

Connector No.	E111
Connector Name	CLUTCH PEDAL POSITION SWITCH
Connector Type	IM02FBR-LC



Connector No.	E119
Connector Name	BRAKE PEDAL POSITION SWITCH
Connector Type	IM02FBR-LC



Connector No.	E124
Connector Name	BRAKE PEDAL POSITION SWITCH
Connector Type	IM02FBR-LC



Connector No.	F7
Connector Name	ECM
Connector Type	RH40FB-EZB-R-LH



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

Connector No.	E115
Connector Name	STOP LAMP SWITCH
Connector Type	IM04FW-LC



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

Connector No.	E120
Connector Name	STOP LAMP SWITCH
Connector Type	IM04FW-LC



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

Connector No.	E167
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Type	RH06FB



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

Terminal Color Of No.	Wire	Signal Name [Specification]
1	V	-
2	LG	-
3	Y	-
4	W	-

Terminal Color Of No.	Wire	Signal Name [Specification]
1	LG	- [With MR20 engine]
2	P	- [With R9M Engine]
3	Y	- [With MR20 engine]
4	W	- [With R9M Engine]
5	L	- [With MR20 engine]
6	V	- [With R9M Engine]
8	Y	- [With MR20 engine]

Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	FUEL INJECTOR NO.1(H)
2	W	FUEL INJECTOR NO.2(H)
3	W	FUEL INJECTOR NO.3(H)
4	W	FUEL INJECTOR NO.4(H)
5	B	FUEL INJECTOR NO.1(L)
6	B	FUEL INJECTOR NO.2(L)
7	B	FUEL INJECTOR NO.3(L)
8	B	FUEL INJECTOR NO.4(L)
11	B	ECM GROUND
12	BR	SHIELD
14	W	PARK/NEUTRAL POSITION SIGNAL
15	R	GNDA-PHASE
19	W	CAMSHAFT POSITION SENSOR
20	L	SENSOR GROUND
21	L	SENSOR POWER SUPPLY
23	Y	SENSOR POWER SUPPLY
24	Y	SENSOR POWER SUPPLY
25	L	SENSOR GROUND
28	BR	MASS AIR FLOW SENSOR
29	GR	ENGINE OIL PRESSURE SENSOR
31	G	ENGINE COOLANT TEMPERATURE SENSOR
32	P	ENGINE OIL TEMPERATURE SENSOR
33	G	FUEL RAIL PRESSURE SENSOR
34	P	REFRIGERANT PRESSURE SENSOR
35	V	INTAKE AIR TEMPERATURE SENSOR
36	SHIELD	SENSOR GROUND
39	R	SENSOR GROUND
40	W	KNOCK SENSOR
42	B	SENSOR GROUND
43	G	SENSOR POWER SUPPLY
44	BR	SENSOR GROUND
45	G	LIN COMMUNICATION LINE [With M4 ISS]
46	L	LIN COMMUNICATION LINE [With ISS]
48	GR	CRANKSHAFT POSITION SENSOR

ENGINE CONTROL SYSTEM (MR ENGINE)

Connector No.	F8
Connector Name	ECM
Connector Type	RH40FBR-R28-LH



49	53	57	65	68	73	77	81	83	88	93
50	54	62	70	78	82	86	90	94		
51	55	59	63	71	75	79	87	91	95	
52	56	60	64	72	80					

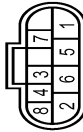
Connector No.	F12
Connector Name	KNOCK SENSOR
Connector Type	BS02FGY-B-H



Terminal No.	Color Of Wire	Signal Name [Specification]
49	Y	FUEL INJECTOR DRIVER POWER SUPPLY 1
50	V	HIGH PRESSURE FUEL PUMP RELAY
51	B	HIGH PRESSURE FUEL PUMP (H)
52	B	HIGH PRESSURE FUEL PUMP (L)
53	W	FUEL INJECTOR DRIVER POWER SUPPLY 2
54	BR	ECM GROUND
55	GR	ECM GROUND
56	B	ECM GROUND
57	Y	HEATED OXYGEN SENSOR
59	B	SENSOR GROUND
60	R	SENSOR POWER SUPPLY
62	B	SHIELD
63	G	THROTTLE POSITION SENSOR 1
64	Y	AIR FUEL RATIO (AF) SENSOR 1
65	W	VMOT
69	R	THROTTLE CONTROL MOTOR (OPEN)
70	SHIELD	SHIELD
71	W	THROTTLE POSITION SENSOR 2
72	G	SENSOR GROUND
73	L	THROTTLE CONTROL MOTOR (CLOSE)
75	B	SENSOR GROUND
77	BG	SWP CAMSHAFT PULSE VOLUME CONTROL SOLENOID VALVE
78	Y	IGNITION SIGNAL NO.1
79	V	INTAKE MANIFOLD RUNNER CONTROL VALVE POWER SUPPLY
80	V	THROTTLE MOTOR RELAY
81	G	INTAKE MANIFOLD RUNNER CONTROL VALVE (CLOSE)
82	BR	IGNITION SIGNAL NO.2
85	Y	INTAKE MANIFOLD RUNNER CONTROL VALVE (OPEN)
86	W	IGNITION SIGNAL NO.3
87	P	FUEL PUMP RELAY
89	V	HEATED OXYGEN SENSOR HEATER
90	SB	IGNITION SIGNAL NO.4
91	P	ECM RELAY (SELF SHUT OFF)
93	P	AIR FUEL RATIO (AF) SENSOR 1 HEATER
94	G	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
95	GR	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE

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

Connector No.	F22
Connector Name	TRANSMISSION RANGE SWITCH
Connector Type	YDX06FB-HS4



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

Connector No.	F26
Connector Name	FUEL INJECTOR RELAY
Connector Type	MD0F-BR-R-LC



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	-
2	B	-
3	U	-
6	V	-
6	LG	-

7	W	-

Connector No.	F27
Connector Name	AIR FUEL RATIO (AF) SENSOR 1
Connector Type	RH40FDCY-P



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

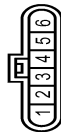
Connector No.	F28
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Type	ED02FGY-RS



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

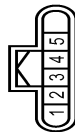
ENGINE CONTROL SYSTEM (MR ENGINE)

Connector No.	F29
Connector Name	ELECTRIC THROTTLE CONTROL ACTUATOR
Connector Type	HS06FB



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

Connector No.	F30
Connector Name	MASS AIR FLOW SENSOR
Connector Type	HS06FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	-
2	V	-
3	BR	-
4	L	-
5	L	-

Connector No.	F32
Connector Name	EVAP CANISTER PURGE VALVE CONTROL SOLENOID VALVE
Connector Type	E02FL-RS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	- [With QR25 engine]
1	W	- [With MR20 engine]
2	BG	- [With MR20 engine]
2	Y	- [With QR25 engine]

Connector No.	F33
Connector Name	IGNITION COIL No. 1 (WITH POWER TRANSISTOR)
Connector Type	E03F-GY-RS



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

Connector No.	F34
Connector Name	IGNITION COIL No. 3 (WITH POWER TRANSISTOR)
Connector Type	E03F-GY-RS



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

Connector No.	F35
Connector Name	IGNITION COIL No. 3 (WITH POWER TRANSISTOR)
Connector Type	E03F-GY-RS



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

Connector No.	F36
Connector Name	IGNITION COIL No. 4 (WITH POWER TRANSISTOR)
Connector Type	E03F-GY-RS



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

Connector No.	F37
Connector Name	FUEL INJECTOR No.1
Connector Type	HS02FGY



Terminal No.	Color Of Wire	Signal Name [Specification]
1	LG	- [With QR25 engine]
1	W	- [With MR20 engine]
2	B	- [With MR20 engine]
2	L	- [With QR25 engine]

ENGINE CONTROL SYSTEM (MR ENGINE)

Connector No.	F-38
Connector Name	FUEL INJECTOR No.2
Connector Type	HS02FGY



Connector No.	F-40
Connector Name	FUEL INJECTOR No.4
Connector Type	HS02FGY



Connector No.	F-42
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Type	RK03FB



Connector No.	F-45
Connector Name	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
Connector Type	E02FBR-RS-GY



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	- [With QR25 engine]
1	W	- [With MR20 engine]
2	B	- [With MR20 engine]
2	G	- [With QR25 engine]

Terminal No.	Color Of Wire	Signal Name [Specification]
1	SB	- [With QR25 engine]
1	W	- [With MR20 engine]
2	B	- [With MR20 engine]
2	Y	- [With QR25 engine]

Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	- [With QR25 engine]
1	R	- [With MR20 engine]
1	V	- [With R304 Engine]
2	P	- [With MR20 or QR25 Engine]
2	SB	- [With R304 Engine]
3	BG	- [With QR25 engine]
3	L	- [With R304 Engine]
3	Y	- [With MR20 engine]

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

Connector No.	F-39
Connector Name	FUEL INJECTOR No.3
Connector Type	HS02FGY



Connector No.	F-41
Connector Name	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE
Connector Type	E02FBR-RS-GY



Connector No.	F-44
Connector Name	HEATED OXYGEN SENSOR 2
Connector Type	RH04FGY-P



Connector No.	F-46
Connector Name	REVERSE / NEUTRAL POSITION SWITCH
Connector Type	FEA03FG-LC



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	B	- [With MR20 engine]
2	P	- [With QR25 engine]

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



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

ENGINE CONTROL SYSTEM (MR ENGINE)

Connector No.	F52
Connector Name	COOLING FAN MOTOR-1
Connector Type	RSMFYG-PR



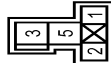
Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	-
2	BG	-
3	G	-
4	G	-

Connector No.	F53
Connector Name	COOLING FAN MOTOR-2
Connector Type	RSMFYG-PR



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

Connector No.	F56
Connector Name	COOLING FAN RELAY-2
Connector Type	24381-4BA1A



Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	-
2	V	-
3	G	-
4	P	-

Connector No.	F57
Connector Name	COOLING FAN RELAY-3
Connector Type	24381-4BA1A



Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	-
2	BR	-
3	G	-
5	GR	-

Connector No.	F58
Connector Name	HIGH PRESSURE FUEL PUMP RELAY
Connector Type	24381-4BA1A



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	-
2	B	-
3	BR	-
4	V	-

Connector No.	F62
Connector Name	FUEL RAIL PRESSURE SENSOR
Connector Type	AF203FB



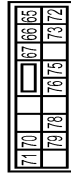
Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	-
2	G	-
3	R	-

Connector No.	F67
Connector Name	ATMOSPHERIC PRESSURE SENSOR
Connector Type	RH03FB



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

Connector No.	F72
Connector Name	POWER STEERING/IGNITION/POWER DISTRIBUTION MODULE (P/S/IG/IDM)
Connector Type	NS16FW-CS



Terminal No.	Color Of Wire	Signal Name [Specification]
65	P	-
66	L	- [With R3M Engine]
67	R	- [With MF20 or QF25 Engine]
67	V	-
70	BG	- [With CVT]
70	GR	- [With M1]
71	SB	-
72	GR	-
73	R	-
73	Y	- [With R3M Engine]
75	BR	- [With MF20 or QF25 Engine]
76	L	- [With R3M Engine]
76	P	-
78	L	- [With QF25 engine]
78	R	- [With R3M Engine]
79	G	-

ENGINE CONTROL SYSTEM (MR ENGINE)

Connector No.	F73
Connector Name	IPDM-ER INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	YLAGEGY



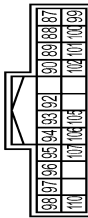
102	Y	-
105	W	-
106	BR	-
107	V	-
110	SB	-

Connector No.	F104
Connector Name	EXHAUST VALVE TIMING CONTROL POSITION SENSOR
Connector Type	RHD3FB



Terminal No.	Color Of Wire	Signal Name [Specification]
81	G	-
83	L	-
84	GR	-
85	P	-
86	LG	-

Connector No.	F74
Connector Name	IPDM-ER INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	TH24FE-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
87	L	-
88	P	-
89	W	-
90	R	-
92	GR	-
93	G	- [With R&M Engine]
94	P	- [With MR20 or QR25 Engine]
95	LG	-
96	W	-
97	P	-
98	Y	-
99	RG	-
100	LG	-
101	V	-

Connector No.	F106
Connector Name	ENGINE OIL PRESSURE SENSOR
Connector Type	RHD3FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	- [With MR20 engine]
1	SB	- [With QR25 engine]
2	GR	- [With MR20 engine]
2	P	- [With QR25 engine]
3	W	- [With MR20 engine]
3	Y	- [With QR25 engine]

Connector No.	F112
Connector Name	ENGINE OIL TEMPERATURE SENSOR
Connector Type	E02FGY-RS



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

Connector No.	F114
Connector Name	INTAKE MANIFOLD RUNNER CONTROL VALVE
Connector Type	RHD2FB



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

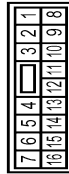
Connector No.	F115
Connector Name	HIGH PRESSURE FUEL PUMP
Connector Type	HS02FGY-YR



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

ENGINE CONTROL SYSTEM (MR ENGINE)

Connector No.	F121
Connector Name	WIRE TO WIRE
Connector Type	INST6BRC-5



Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	- [With MR20 or QR25 engine]
2	P	- [With R3M engine]
3	BR	- [With QR25 engine]
4	GR	- [With MR20 engine]
5	Y	- [With R3M engine]
6	G	-
7	G	-
8	BR	- [With MR20 engine or R3M engine]
9	W	- [With QR25 engine]
10	W	- [With R3M engine]
11	P	- [Without ISS]
12	G	- [With QR25 engine]
13	R	- [With R3M engine]
14	Y	- [With MR20 or QR25 engine]
15	L	-
16	LG	-

Connector No.	F125
Connector Name	HEATED OXYGEN SENSOR 2
Connector Type	RH4FLGY-P



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

Connector No.	F126
Connector Name	CRANKSHAFT POSITION SENSOR
Connector Type	RH03FB



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

Connector No.	F213
Connector Name	CONDENSER
Connector Type	M02FW-LC



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

Connector No.	F214
Connector Name	WIRE TO WIRE
Connector Type	TH10MW-NH



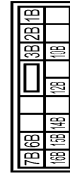
Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	R	-
3	B	-
4	P	-
5	GR	-
6	BG	-
7	B	-
8	BR	-
9	B	-
10	B	-

Connector No.	F215
Connector Name	WIRE TO WIRE
Connector Type	TH10FW-NH



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

Connector No.	M2
Connector Name	FUSE BLOCK (J/B)
Connector Type	INST6BRC-5



Terminal No.	Color Of Wire	Signal Name [Specification]
10B	GR	- [With MR20 engine or R3M engine]
10B	LA/GR	- [With QR25 Engine]
12B	BR	-
14B	W	-
15B	W	-
16B	GR	-
1B	G	-
2B	R	-
3B	V	-
6B	LAL	-

ENGINE CONTROL SYSTEM (MR ENGINE)

7B	LAV	-

Connector No.	M3
Connector Name	FUSE BLOCK (JIB)
Connector Type	NS16FW-CS



70	60	50	40	30	20	10
100	90	80	70	60	50	40

Terminal No.	Color Of Wire	Signal Name [Specification]
10C	LG	-
13C	LAG	-
14C	R	-
15C	L	-
16C	LAV	-
1C	R	-
2C	G	-
3C	Y	-
4C	LG	-
5C	GR	-
6C	LAV	-
7C	Y	-
8C	BR	- [With ISS]
9C	L	- [Without ISS]

Connector No.	M4
Connector Name	DATA LINK CONNECTOR
Connector Type	BD16FW



11	14	15	16
3	4	5	6
8			

Terminal No.	Color Of Wire	Signal Name [Specification]
3	LG	-
4	B	-
5	B	-
6	L	-
8	Y	-
11	SB	-
14	P	-
15	BR	-
16	W	-

Connector No.	M11
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-CS16-TM4



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Terminal No.	Color Of Wire	Signal Name [Specification]
1	V	-
2	Y	-
6	GR	-
7	LG	-
20	LAV	-
21	LAV	-
24	G	-
25	BR	-
73	Y	-
74	R	-
75	R	-
84	L	-
85	L	-
92	LAV	-
93	LAV	-
95	SB	-
97	BG	-
98	Y	-
99	W	-
100	LAV	-

Connector No.	M33
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Type	TH12FM-AH



31	30	29	28	27	26
24	23	22	21	20	

Terminal No.	Color Of Wire	Signal Name [Specification]
20	P	CRUISE CTRL
21	V	SPEED LIMIT
22	G	IGN
23	L	-
24	GR	-
26	BG	-
27	LAV	-
28	LAV	-
29	Y	-
30	B	-
31	R	-

Connector No.	M42
Connector Name	COMBINATION METER
Connector Type	TH12FM-AH



44	42	43	44	45	46
47	48	49	50	51	52

Terminal No.	Color Of Wire	Signal Name [Specification]
41	L	CAN/L
42	P	CAN/H
43	W	ILLUMINATION CONTROL SIGNAL
44	LAV	FUEL LEVEL SENSOR GROUND
45	LAV	BATTERY POWER SUPPLY
46	LAV	IGNITION SIGNAL [Without ISS]
46	V	IGNITION SIGNAL [With ISS]
47	SB	AV COMMUNICATION SIGNAL (V)
48	LG	AV COMMUNICATION SIGNAL (L)

49	Y	OIL LEVEL SENSOR SIGNAL
50	BG	OIL LEVEL SENSOR GROUND
51	LAL	FUEL LEVEL SENSOR SIGNAL
52	B	GROUND

Connector No.	M77
Connector Name	WIRE TO WIRE
Connector Type	TH80MW-CS16-TM4



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Terminal No.	Color Of Wire	Signal Name [Specification]
2	LAV	-
5	V	- [Without ISS]
5	W	- [With ISS]
8	G	-
9	Y	-
10	R	-
20	W	-
21	B	-
22	SHIELD	-
31	V	-
32	GR	-
33	G	-
34	LG	-
35	BG	-
36	LG	-
37	V	-
38	G	-
39	BR	-
40	L	-
41	P	-
47	Y	-
48	BG	-
51	GR	-
52	SB	-
53	R	-
54	LAL	-
55	BR	-
56	P	-
57	B	-
58	L	-

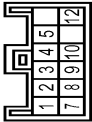
A
EC
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F
G
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I
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M
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O
P

ENGINE CONTROL SYSTEM (MR ENGINE)

Terminal No.	Wire	Signal Name [Specification]
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-
7	-	-
8	-	-
9	-	-
10	-	-
12	-	-

59	W	-
60	LA/R	-
61	P	-
62	V	-
63	LA/BR	-
64	Y	-
65	GR	-
66	BG	-
67	L	-
68	R	-
71	V	-
72	L	-
73	Y	-
76	L	-
77	V	-
78	LG	-
79	SHIELD	-
80	LA	- [With ISS]
80	LA/L	- [Without ISS]
82	GR	-
83	LG	-
84	SB	-
85	G	-
86	G	-
87	B	-
88	B	-
91	L	-
92	W	-
93	W	-
96	LG	-
97	BR	-
98	V	-
99	R	-

Connector No.	M303
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Type	TH12FW-NH



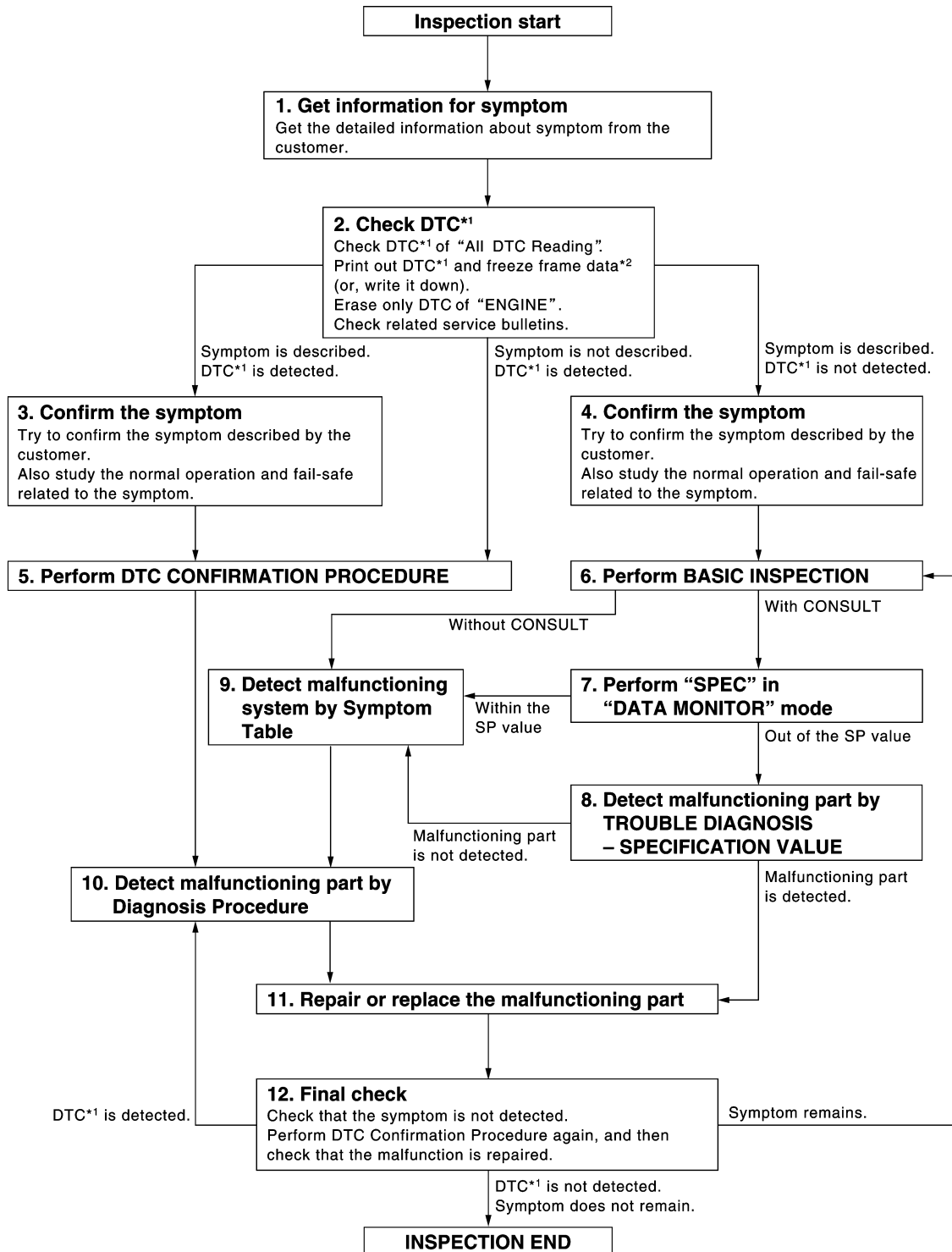
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:000000010775074

OVERALL SEQUENCE



*1: Include 1st trip DTC.

*2: Include 1st trip freeze frame data.

DIAGNOSIS AND REPAIR WORKFLOW

[MR20DD]

< BASIC INSPECTION >

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-139, "Diagnostic Work Sheet"](#).)

Malfunction information, obtained>>GO TO 2.

2.CHECK DTC

1. Check DTC of "ALL DTC Reading".
2. Perform the following procedure if DTC is displayed.
 - Record DTC and freeze frame data. (Print them out with CONSULT or GST.)
 - Erase only DTC of "ENGINE". Refer to the following.
 -  **With CONSULT:** "How to Erase DTC and 1st Trip DTC" in [EC-81, "CONSULT Function"](#).
 -  **Without CONSULT:** "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-420, "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-425, "Description"](#) and [EC-103, "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-425, "Description"](#) and [EC-103, "Fail-safe"](#).

Diagnosis Work Sheet is useful to verify the incident.

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

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then check that DTC is detected again.

If two or more DTCs are detected, refer to [EC-107, "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-44, "Intermittent Incident"](#).

< BASIC INSPECTION >

6. PERFORM BASIC INSPECTION

Perform [EC-149, "Work Procedure"](#).

Do you have CONSULT?

YES >> GO TO 7.

NO >> GO TO 9.

7. PERFORM SPEC IN DATA MONITOR MODE

Ⓢ With CONSULT

Check that "MASS AIR FLOW SENSOR (Hz)", "B/FUEL SCHDL", and "A/F ALPHA-B1" are within the SP value using "SPEC" in "DATA MONITOR" mode with CONSULT. Refer to [EC-154, "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-155, "Diagnosis Procedure"](#).

Is a malfunctioning part detected?

YES >> GO TO 11.

NO >> GO TO 9.

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to [EC-420, "Symptom Table"](#) based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptoms.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

NOTE:

The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure. For details, refer to [GI-46, "Circuit Inspection"](#).

Is a malfunctioning part detected?

YES >> GO TO 11.

NO >> Monitor input data from related sensors or check voltage of related ECM terminals using CONSULT. Refer to [EC-89, "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-1 >> Ⓢ With CONSULT: Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM. (Refer to "How to Erase DTC and 1st Trip DTC" in [EC-81, "CONSULT Function"](#).)

DIAGNOSIS AND REPAIR WORKFLOW

[MR20DD]

< BASIC INSPECTION >

NO-2 >> ⓧ Without CONSULT: Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM. (Refer to "How to Erase Self-diagnostic Results" in [EC-79, "On Board Diagnosis Function"](#).)

Diagnostic Work Sheet

INFOID:0000000010775075

EC

DESCRIPTION

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

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

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

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

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

KEY POINTS

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

SEF907L

[MR20DD]

WORKSHEET SAMPLE

MTBL0017

ADDITIONAL SERVICE WHEN REPLACING ECM

Description

INFOID:000000010775076

When replacing ECM, the following procedure must be performed. (For details, refer to [EC-141, "Work Procedure"](#).)

PROGRAMMING OPERATION

NOTE:

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

Work Procedure

INFOID:000000010775077

1. SAVE ECM DATA

④ With CONSULT

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

NOTE:

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

>> GO TO 2.

2. CHECK ECM PART NUMBER

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

NOTE:

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

Is the ECM a blank ECM?

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

3. SAVE ECM PART NUMBER

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

NOTE:

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

>> GO TO 4.

4. PERFORM ECM PROGRAMMING

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

NOTE:

- Refer to [EC-430, "Removal and Installation"](#) for replacement of ECM.
- During programming, maintain the following conditions:
 - Ignition switch: ON
 - Electric load: OFF
 - Brake pedal: Not depressed
 - Battery voltage: 12 – 13.5 V (Be sure to check the value of battery voltage by selecting "BATTERY VOLT" in "Data monitor" of CONSULT.)

>> GO TO 6.

5. REPLACE ECM

ADDITIONAL SERVICE WHEN REPLACING ECM

[MR20DD]

< BASIC INSPECTION >

Replace ECM. Refer to [EC-430. "Removal and Installation"](#).

>> GO TO 6.

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

Refer to [SEC-100. "ECM : Work Procedure"](#) (with intelligent key system) or [SEC-262. "ECM : Work Procedure"](#) (without intelligent key system).

>> GO TO 7.

7. CHECK ECM DATA STATUS

Check if the data is successfully copied from the ECM at Step 1 (before replacement) and saved in CONSULT.
Is the data saved successfully?

YES >> GO TO 8.

NO >> GO TO 9.

8. WRITE ECM DATA

 With CONSULT

1. Select "WRITING DATA FOR REPLC CPU" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
2. Follow the instruction of CONSULT display.

NOTE:

The data saved by "SAVING DATA FOR REPLC CPU" is written to ECM.

>> GO TO 10.

9. PERFORM VIN REGISTRATION

Refer to [EC-144. "Work Procedure"](#).

>> GO TO 10.

10. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Perform accelerator pedal released position learning. Refer to [EC-144. "Work Procedure"](#).

>> GO TO 11.

11. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform throttle valve closed position learning. Refer to [EC-145. "Work Procedure"](#).

>> GO TO 12.

12. PERFORM IDLE AIR VOLUME LEARNING

Perform idle air volume learning. Refer to [EC-146. "Work Procedure"](#).

>> END

VIN REGISTRATION

Description

INFOID:000000010775078

VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced.

Work Procedure

INFOID:000000010775079

1.CHECK VIN

Check the VIN of the vehicle and note it. Refer to [GI-38, "Information About Identification or Model Code"](#).

>> GO TO 2.

2.PERFORM VIN REGISTRATION **With CONSULT**

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

>> END

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ACCELERATOR PEDAL RELEASED POSITION LEARNING

< BASIC INSPECTION >

[MR20DD]

ACCELERATOR PEDAL RELEASED POSITION LEARNING

Description

INFOID:0000000010775080

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:0000000010775081

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. Repeat steps 2 to 3 for three times.

>> END

THROTTLE VALVE CLOSED POSITION LEARNING

< BASIC INSPECTION >

[MR20DD]

THROTTLE VALVE CLOSED POSITION LEARNING

Description

INFOID:0000000010775082

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:0000000010775083

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.
Check that throttle valve moves during the above 10 seconds by confirming the operating sound.

>> END

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IDLE AIR VOLUME LEARNING

Description

INFOID:0000000010775084

Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps engine idle speed within the specific range. It must be performed under 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:0000000010775085

1. PRECONDITIONING

Check 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)
- Steering wheel: Neutral (Straight-ahead position) position
- Vehicle speed: Stopped
- Transmission: Warm-up (Drive vehicle for 10 minutes.)

Do you have CONSULT?

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

2. IDLE AIR VOLUME LEARNING

Ⓢ With CONSULT

1. Perform "ACCELERATOR PEDAL RELEASED POSITION LEARNING". Refer to [EC-144, "Work Procedure"](#).
2. Perform "THROTTLE VALVE CLOSED POSITION LEARNING". Refer to [EC-145, "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" using CONSULT.
5. Touch "START" and wait 20 seconds.

Is "CMPLT" displayed on CONSULT screen?

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

3. IDLE AIR VOLUME LEARNING

ⓧ Without CONSULT

NOTE:

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

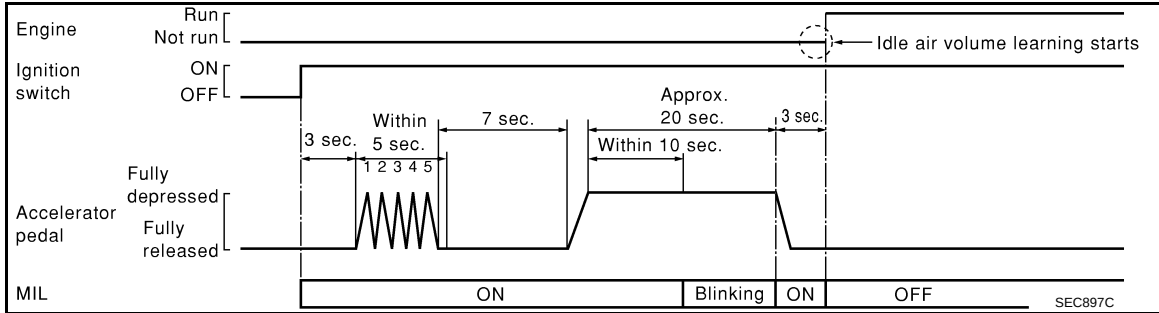
1. Perform "ACCELERATOR PEDAL RELEASED POSITION LEARNING". Refer to [EC-144, "Work Procedure"](#).
2. Perform "THROTTLE VALVE CLOSED POSITION LEARNING". Refer to [EC-145, "Work Procedure"](#).
3. Start engine and warm it up to normal operating temperature.
4. Turn ignition switch OFF and wait at least 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.

IDLE AIR VOLUME LEARNING

< BASIC INSPECTION >

[MR20DD]

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-431, "Idle Speed"](#) and [EC-431, "Ignition Timing"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART-1

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-2

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-154, "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:000000010775086

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

Work Procedure

INFOID:000000010775087

1.START

④ With CONSULT

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

⊗ Without CONSULT

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. Check DTC. Make sure DTC P0102 is detected.
7. Erase the DTC P0102. Refer to [EC-79. "On Board Diagnosis Function"](#).
8. Check DTC. Make sure DTC P0000 is detected.

>> END

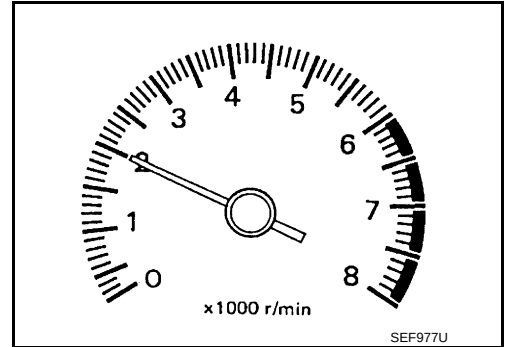
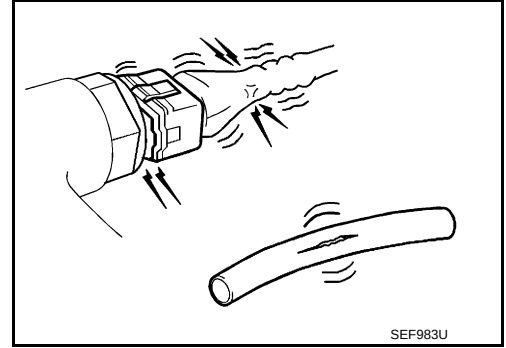
BASIC INSPECTION

Work Procedure

INFOID:000000010775088

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.
5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT or Diagnostic Test Mode II (self-diagnostic results).



Is any DTC detected?

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

2.REPAIR OR REPLACE

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

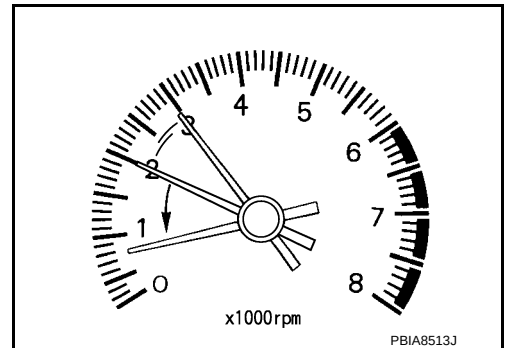
>> GO TO 3.

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-426. "Inspection"](#).
For specification, refer to [EC-431. "Idle Speed"](#).

Is the inspection result normal?

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



4.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop the engine.
2. Perform accelerator pedal released position learning. Refer to [EC-144. "Work Procedure"](#).

>> GO TO 5.

5.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

< BASIC INSPECTION >

Perform throttle valve closed position learning. Refer to [EC-145, "Work Procedure"](#).

>> GO TO 6.

6.PERFORM IDLE AIR VOLUME LEARNING

Perform idle air volume learning. Refer to [EC-146, "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-426, "Inspection"](#).

For specification, refer to [EC-431, "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 and circuit. Refer to [EC-282, "DTC Description"](#).
- Check exhaust valve timing control position sensor and circuit. Refer to [EC-286, "DTC Description"](#).
- Check crankshaft position sensor and circuit. Refer to [EC-277, "DTC Description"](#).

Is the inspection result normal?

YES >> GO TO 9.

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

9.CHECK ECM FUNCTION

Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)

>> GO TO 4.

10.CHECK IGNITION TIMING

1. Run engine at idle.

2. Check ignition timing with a timing light.

(A) : Timing indicator

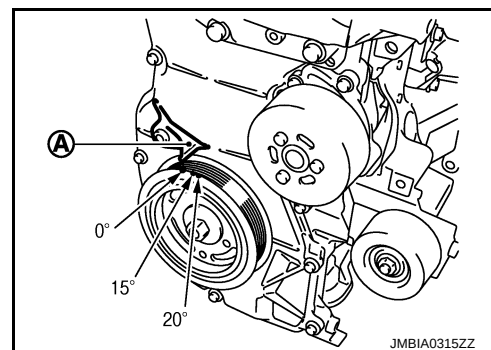
For procedure, refer to [EC-427, "Inspection"](#).

For specification, refer to [EC-431, "Ignition Timing"](#).

Is the inspection result normal?

YES >> GO TO 19.

NO >> GO TO 11.



11.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop the engine.

2. Perform accelerator pedal released position learning. Refer to [EC-144, "Work Procedure"](#).

>> GO TO 12.

12.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform throttle valve closed position learning. Refer to [EC-145, "Work Procedure"](#).

< BASIC INSPECTION >

>> GO TO 13.

13.PERFORM IDLE AIR VOLUME LEARNING

Perform idle air volume learning. Refer to [EC-146, "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-426, "Inspection"](#).

For specification, refer to [EC-431, "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.

(A) : Timing indicator

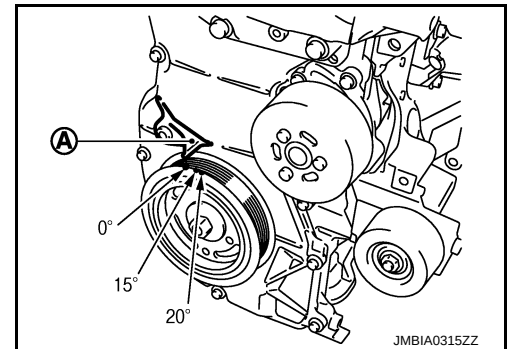
For procedure, refer to [EC-427, "Inspection"](#).

For specification, refer to [EC-431, "Ignition Timing"](#).

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-68, "Removal and Installation"](#).

Is the inspection result normal?

YES >> GO TO 17.

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

17.DETECT MALFUNCTIONING PART

Check the Following.

- Check camshaft position sensor and circuit. Refer to [EC-282, "DTC Description"](#).

- Check exhaust valve timing control position sensor and circuit. Refer to [EC-286, "DTC Description"](#).

- Check crankshaft position sensor and circuit. Refer to [EC-277, "DTC Description"](#).

Is the inspection result normal?

YES >> GO TO 18.

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

18.CHECK ECM FUNCTION

Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)

>> GO TO 4.

19.INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, perform [EC-141, "Work Procedure"](#).

>> INSPECTION END

FUEL PRESSURE CHECK

Work Procedure

INFOID:000000010775089

FUEL PRESSURE RELEASE

1. FUEL PRESSURE RELEASE

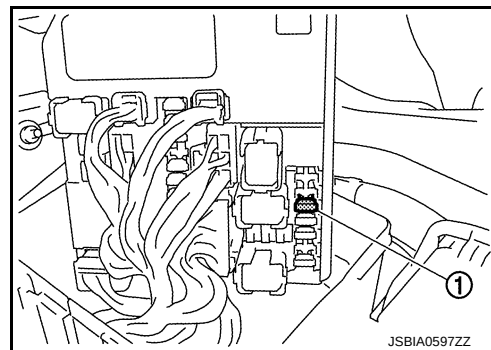
① With CONSULT

1. Turn ignition switch ON.
2. Perform "ENGINE" in "WORK SUPPORT" mode with CONSULT.
3. Start the engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.

⊗ Without CONSULT

1. Remove fuel pump fuse ① located in IPDM E/R.
2. Start the 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

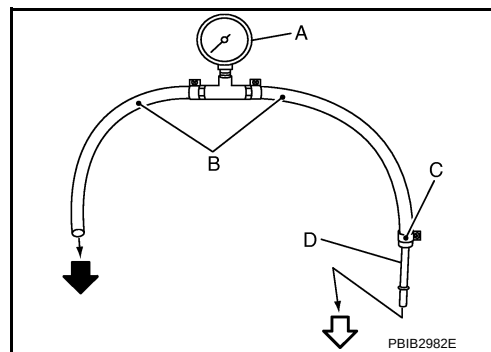
1. Release fuel pressure.
2. Connect fuel hose for fuel pressure check (B) to fuel pressure gauge (SST: ST19590000) (A). Then, connect fuel hose for fuel pressure check to fuel tube adapter (SST: KV10120000) with hose clamp (C).

← : To high pressure fuel pump

⇐ : To quick connector

CAUTION:

- Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose)
- To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
- Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
- Apply proper amount of gasoline on the hose insertion part.
- Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 N4710)
- Install hose clamp to the hose end position within 1- 2 mm (0.04 - 0.08 in) and tighten hose clamp to the specified torque.



Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m)

3. Disconnect quick connector and disconnect fuel feed hose from high pressure fuel pump. Refer to [EM-48, "Exploded View"](#).

CAUTION:

- Make sure to release fuel pressure before removal of fuel line.
- Do the following procedure in the place where ventilation is good without the combustible.

NOTE:

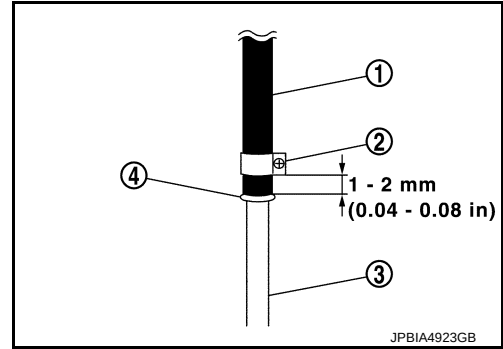
- Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because this models do not have fuel return system.

FUEL PRESSURE CHECK

[MR20DD]

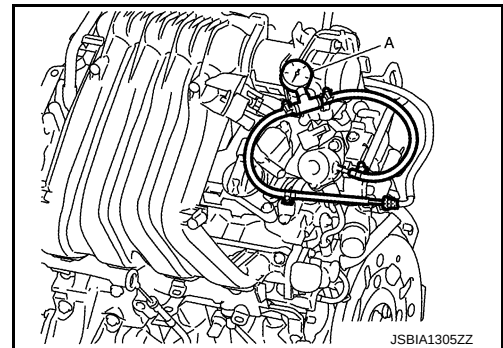
< BASIC INSPECTION >

- Use fuel tube adapter (SST: KV10120000) and fuel pressure gauge (SST: ST19590000) to check fuel pressure.
4. Install fuel hose for fuel pressure check to high pressure fuel pump with hose clamp.
- CAUTION:**
- Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
 - Apply proper amount of gasoline on the hose insertion part.
 - Insert fuel hose for fuel pressure check ① until it touches the spool ④ on high pressure fuel pump ③.
 - Use NISSAN genuine hose clamp ② (part number: 16439 N4710 or 16439 40U00).
 - Install hose clamp to the hose end position within 1- 2 mm (0.04 - 0.08 in) and tighten hose clamp to the specified torque.



Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m)

- After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 100 N (approximately 10 kg, 22 lb) to confirm fuel sub tube does not come off.
5. Install fuel pressure check adapter to quick connector of fuel feed hose.
6. Turn ignition switch ON and check for fuel leakage.
7. Start engine and check for fuel leakage.
8. Read the indication of fuel pressure gauge (A).



At idling : Approximately 500 kPa (5.0 bar, 5.1 kg/cm², 73psi)

Is the inspection result normal?

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

2.CHECK FUEL HOSE

Check fuel hose for clogging.

Is the inspection result normal?

YES >> Repair or replace the malfunctioning part.
NO >> Replace fuel filter and fuel pump assembly. Refer to [FL-11, "Exploded View"](#).

DTC/CIRCUIT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:0000000010775090

The specification (SP) value indicates the tolerance of the value that is displayed in "SPEC" of "DATA MONITOR" mode of CONSULT during normal operation of the Engine Control System. When the value in "SPEC" of "DATA MONITOR" mode is within the SP value, the Engine Control System is confirmed OK. When the value in "SPEC" of "DATA MONITOR" mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.

The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.

The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MASS AIR FLOW SENSOR (Hz) (The signal frequency of the mass air flow sensor)

Component Function Check

INFOID:0000000010775091

1.START

Make sure that all of the following conditions are satisfied.

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Atmospheric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm², 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
- After the engine is warmed up to normal operating temperature, drive vehicle until "ATF TEMP SEN" (CVT fluid temperature sensor signal) indicates more than 60°C (140°F).
- Electrical load: Not applied*
- Engine speed: Idle

*: Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

>> GO TO 2.

2.PERFORM "SPEC" OF "DATA MONITOR" MODE

With CONSULT

NOTE:

Perform "SPEC" in "DATA MONITOR" mode in maximum scale display.

1. Perform [EC-149. "Work Procedure"](#).
2. Select "B/FUEL SCHDL", "A/F ALPHA-B1" and "MASS AIR FLOW SENSOR (Hz)" in "SPEC" of "DATA MONITOR" mode with CONSULT.
3. Make sure that monitor items are within the SP value.

Is the inspection result normal?

YES >> END

NO >> Proceed to [EC-155. "Diagnosis Procedure"](#).

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

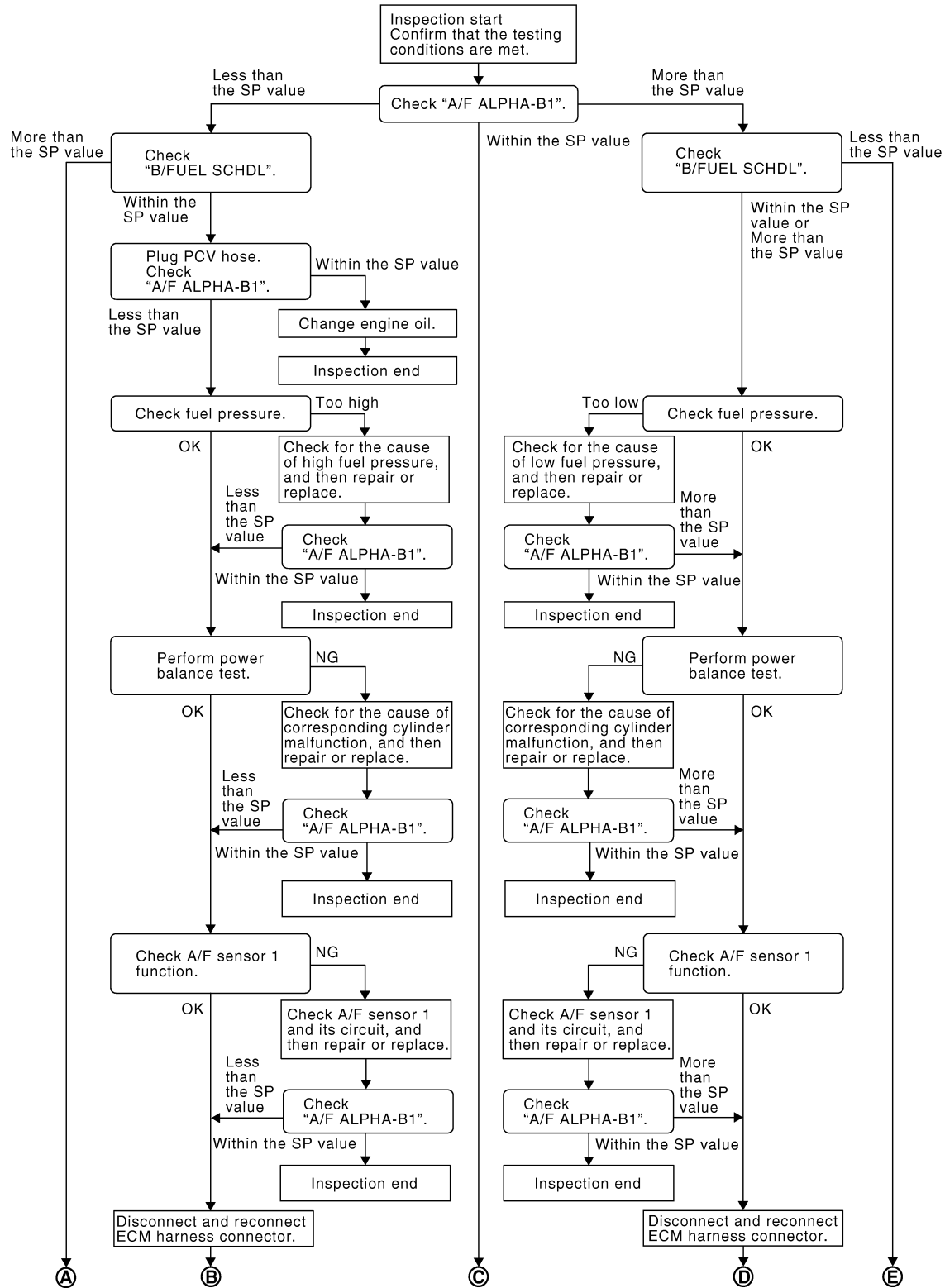
< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

Diagnosis Procedure

INFOID:000000010775092

OVERALL SEQUENCE



PBIB2318E

[MR20DD]

[illegible]

1.CHECK "A/F ALPHA-B1"

1. Start engine.
2. Confirm that the testing conditions are met. Refer to [EC-154, "Component Function Check"](#).
3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the each indication is within the SP value.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

NOTE:

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

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-152. "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", refer to [FL-12. "Removal and Installation"](#), 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", refer to [FL-12. "Removal and Installation"](#), and then GO TO 8.
NO >> Repair or replace and then GO TO 8.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

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-399, "Component Function Check"](#).)
2. Fuel injector and its circuit (Refer to [EC-399, "Component Function Check"](#).)
3. Intake air leakage
4. Low compression pressure (Refer to [EM-19, "Inspection"](#).)

Is the inspection result normal?

YES >> Replace fuel injector, refer to [EM-48, "Removal and Installation"](#), 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-214, "DTC Description"](#).
- For DTC P0131, refer to [EC-217, "DTC Description"](#).
- For DTC P0132, refer to [EC-220, "DTC Description"](#).
- For DTC P014C, P014D, refer to [EC-243, "DTC Description"](#).

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 each 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

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

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

>> GO TO 16.

16.CHECK "A/F ALPHA-B1"

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

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to [EC-420, "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 the 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. Check pin terminal and connector for damage and then reconnect it again.

>> GO TO 22.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

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-196, "DTC Description"](#). Then GO TO 29.

NO >> GO TO 23.

23.CHECK "MASS AIR FLOW SENSOR (HZ)"

Select "MASS AIR FLOW SENSOR (Hz)" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 24.

NO >> More than the SP value: Replace mass air flow sensor, refer to [EM-31, "Removal and Installation"](#), and then GO TO 29.

24.REPLACE ECM

Replace ECM. Refer to [EC-430, "Removal and Installation"](#).

>> 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 "MASS AIR FLOW SENSOR (HZ)"

Select "MASS AIR FLOW SENSOR (Hz)" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 28.

NO >> Less than the SP value: Replace mass air flow sensor, refer to [EM-31, "Removal and Installation"](#), 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

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

- Malfunctioning seal of intake air system, etc.

A

>> GO TO 30.

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

EC

Select "A/F ALPHA-B1" and "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?

C

YES >> INSPECTION END

NO >> Detect malfunctioning part according to [EC-420, "Symptom Table"](#).

30.CHECK "B/FUEL SCHDL"

D

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?

E

YES >> INSPECTION END

NO >> Detect malfunctioning part according to [EC-420, "Symptom Table"](#).

F

G

H

I

J

K

L

M

N

O

P

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:000000010775093

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that the following fuse is not fusing.

Location	Fuse No.	Capacity
IPDM E/R	#82	15 A
	#95	5 A

Is the fuse fusing?

- YES >> Replace the fuse. (Check the power supply if it fuses again.)
NO >> GO TO 2.

2.CHECK GROUND CONNECTION

Check ground connection E21 and E38. Refer to [GI-46, "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 connector.
2. Check the continuity between ECM harness connector and ground.

+		Ground	Continuity
ECM			
Connector	Terminal		
F7	11	Ground	Existed
F8	54		
	55		
	56		
E16	123		
	125		
	128		

3. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace malfunctioning part.

4.CHECK ECM POWER SUPPLY-1

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

ECM			Voltage (Approx.)
Connector	+	-	
	Terminal		
E16	121	128	Battery voltage

Is the inspection result normal?

- YES >> GO TO 5.

POWER SUPPLY AND GROUND CIRCUIT

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 6.

5.CHECK ECM POWER SUPPLY-2

Check the voltage between ECM harness connector and ground.

ECM			Condition	Voltage (Approx.)
Connector	+	−		
	Terminal			
E16	121	128	Ignition switch ON → OFF	After turning ignition switch OFF, battery voltage will exist for a few seconds and drop to approximately 0 V.

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 7.

6.CHECK ECM POWER SUPPLY CIRCUIT

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

+		-		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E16	121	F72	73	Existed

5. Also check harness for short to power.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply.

NO >> Repair or replace malfunctioning part.

7.CHECK ECM RELAY CONTROL SIGNAL

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

ECM			Condition	Voltage (Approx.)
Connector	+	–		
	Terminal			
E16	121	128	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-44, "Intermittent Incident"](#).

NO >> GO TO 8.

8.CHECK ECM RELAY CONTROL 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	
E16	121	F72	73	Existed

POWER SUPPLY AND GROUND CIRCUIT

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

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

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to [PCS-60, "Removal and Installation"](#).

NO >> Repair or replace malfunctioning part.

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			
E16	109	128	Ignition switch OFF	0 V
			Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> Refer to [GI-44, "Intermittent Incident"](#).

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	
E16	109	E12	25	Existed

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

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply.

NO >> Repair or replace malfunctioning part.

U0101 CAN COMM CIRCUIT

DTC Description

INFOID:000000010775094

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 DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U0101	LOST COMM (TCM) (Lost communication with TCM)	When ECM is not transmitting or receiving CAN communication signal of OBD (emission-related diagnosis) for 2 seconds or more.

POSSIBLE CAUSE

Harness or connectors (CAN communication line is open or shorted)

FAIL-SAFE

Not applicable

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-165, "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010775095

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

U1001 CAN COMM CIRCUIT

DTC Description

INFOID:0000000010775096

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 DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U1001	CAN COMM CIRCUIT (CAN COMM CIRCUIT)	When ECM is not transmitting or receiving CAN communication signal other than OBD (emission-related diagnosis) for 2 seconds or more.

POSSIBLE CAUSE

Harness or connectors (CAN communication line is open or shorted)

FAIL-SAFE

Not applicable

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-166, "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775097

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

U1040 ENG COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

U1040 ENG COMM CIRCUIT

DTC Description

INFOID:0000000010775098

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U1040	ENG COMM CIRCUIT (Engine communication circuit)	ECM cannot transmit a communication signal to generator.

POSSIBLE CAUSE

- Harness or connectors
(LIN communication circuit is open or shorted.)
- ECM

FAIL-SAFE

Not applicable

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 ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-167, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010775099

1.CHECK LIN COMMUNICATION CIRCUIT

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

+		-		Continuity
ECM		Alternator		
Connector	Terminal	Connector	Terminal	
F7	45	F15	2	Existed

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

Is the inspection result normal?

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

2.REPLACE GENERATOR

1. Replace alternator. Refer to [CHG-44, "MR20DD : Removal and Installation"](#).
2. Erase DTC.
3. Perform DTC confirmation procedure again. Refer to [EC-167, "DTC Description"](#).

U1040 ENG COMM CIRCUIT

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

Is DTC detected again?

YES >> Replace ECM. Refer to [EC-430, "Removal and Installation"](#).
NO >> INSPECTION END

U1044 ENG COMM CIRCUIT

DTC Description

INFOID:0000000010775100

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U1044	ENG COMM CIRCUIT (Engine communication circuit)	A signal voltage of LIN communication between ECM and generator is excessively low or excessively high.

POSSIBLE CAUSE

- Harness or connectors
(LIN communication circuit is open or shorted.)
- Generator

FAIL-SAFE

Not applicable

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 ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-169, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010775101

1. CHECK LIN COMMUNICATION CIRCUIT

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

+		-		Continuity
ECM		Alternator		
Connector	Terminal	Connector	Terminal	
F7	45	F15	2	Existed

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

Is the inspection result normal?

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

2. REPLACE GENERATOR

1. Replace alternator. Refer to [CHG-44, "MR20DD : Removal and Installation"](#).
2. Erase DTC.
3. Perform DTC confirmation procedure again. Refer to [EC-169, "DTC Description"](#).

U1044 ENG COMM CIRCUIT

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

Is DTC detected again?

YES >> Replace ECM. Refer to [EC-430, "Removal and Installation"](#).
NO >> INSPECTION END

U1050, U1051 LIN COMMUNICATION

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

U1050, U1051 LIN COMMUNICATION

DTC Description

INFOID:0000000010775102

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U1050 U1051	LIN COMMUNICATION	ECM detects LIN communication error.

POSSIBLE CAUSE

- Harness or connectors
(LIN communication circuit is open or shorted.)
- Generator
- ECM

FAIL-SAFE

Not applicable

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 ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to [EC-171. "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010775103

1.CHECK LIN COMMUNICATION CIRCUIT

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

+		-		Continuity
ECM		Alternator		
Connector	Terminal	Connector	Terminal	
F7	45	F15	2	Existed

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

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.REPLACE GENERATOR

1. Replace alternator. Refer to [CHG-44. "MR20DD : Removal and Installation"](#).
2. Erase DTC.

U1050, U1051 LIN COMMUNICATION

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

3. Perform DTC confirmation procedure again. Refer to [EC-171. "DTC Description"](#).

Is DTC detected again?

YES >> Replace ECM. Refer to [EC-430. "Removal and Installation"](#).
NO >> INSPECTION END

P0011 IVT CONTROL

DTC Description

INFOID:000000010775104

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0011	INT/V TIM CONT-B1 "A" Camshaft position - timing over-advanced or system performance bank 1)	There is a gap between angle of target and phase-control angle degree.

POSSIBLE CAUSE

- Crankshaft position sensor
- Camshaft position sensor
- Intake valve timing control solenoid valve
- Accumulation of debris to the signal plate of the camshaft
- Timing chain installation
- Foreign matter caught in the oil groove for intake valve timing control

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Device fix mode	• This mode fixes the IVT control solenoid valve and the EVT control solenoid valve in the reference position. • The intake manifold runner control valve motor is turned OFF (intake manifold runner valve opens).

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0011 is displayed with DTC P0075, first perform the trouble diagnosis for DTC P0075.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-187. "DTC Description"](#).
 NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK-1

Start the inspection.

NOTE:

- Use component function check to check the overall function of the intake valve timing control. During this check, a 1st trip DTC might not be confirmed.
- If the cause is a temporal jamming of debris, it may be back to normal during the following procedure.

Will CONSULT be used?

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

3.PERFORM COMPONENT FUNCTION CHECK-2

Ⓜ WITH CONSULT

1. Turn ignition switch ON.
2. Select "DATA MONITOR" in "ENGINE" with CONSULT.
3. Start engine and check that "INT/V TIM CONT-B1" immediately after starting displays a value within $\pm 13^{\circ}\text{CA}$.
 Perform the following procedure when the value is more than 13°CA .
 - Start engine and warm it up to the normal operating temperature.
 - Start engine and keep the engine speed at 1,000 rpm for at least 10 seconds.
 - Turn ignition switch OFF and wait at least 10 seconds and restart engine.
 - Check step 3 again.

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 4.
NO >> Proceed to [EC-174, "Diagnosis Procedure"](#).

4.PERFORM COMPONENT FUNCTION CHECK-3

1. Select "INT V/T ASSIGN ANGLE" in "ACTIVE TEST" with CONSULT.
2. Touch "START" with the engine speed is maintained at approximately 2,500 rpm.
3. "Up" and "Down" and check if it makes change of the value in "IN VTC S/V B1".

NOTE:

Intake valve timing angle is limited and not up or down over that.

Is the inspection result normal?

- YES-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
YES-2 >> Confirmation after repair: INSPECTION END
NO >> Proceed to [EC-174, "Diagnosis Procedure"](#).

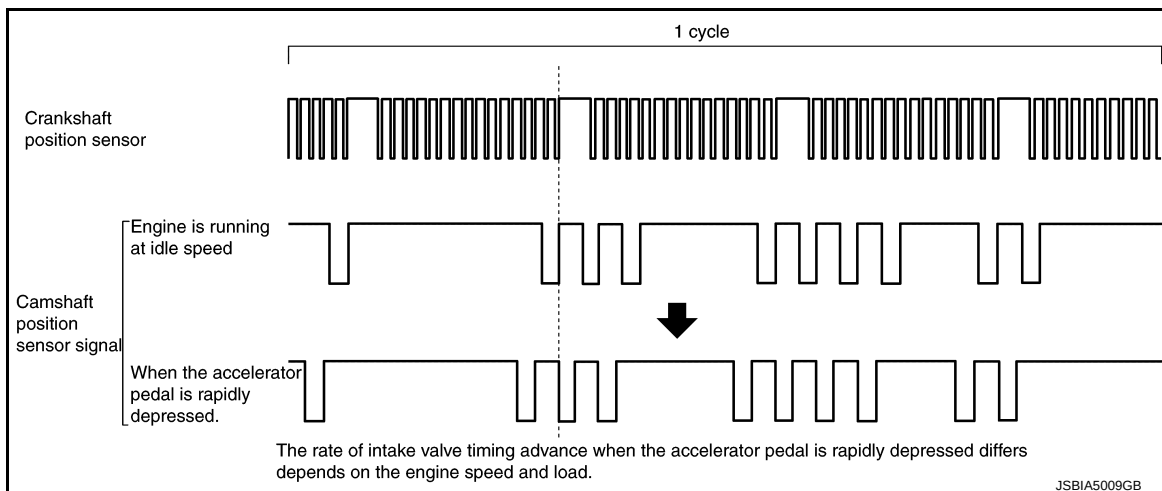
5.PERFORM COMPONENT FUNCTION CHECK-4

⊗WITHOUT CONSULT

1. Check service records for any recent repairs that may cause timing chain misalignment. If there are, check timing chain installation first.
2. Start engine and warm it up to normal operating temperature.
3. Set the oscilloscope probe between ECM harness connector terminals.

ECM			Signal name
Connector	+	−	
	Terminal		
F15	48	44	Crankshaft position sensor
	19	15	Camshaft position sensor

4. Record the wave pattern of the crankshaft position sensor signal and the camshaft position sensor signal at idling.
5. Record the wave pattern of the crankshaft position sensor signal and the camshaft position sensor signal when the accelerator pedal is depressed quickly.
6. Compare both wave patterns and confirm that the camshaft position sensor signal is shifted to the advance side.



If there is no shift, keep the engine speed at around 1,000 rpm for 10 seconds and confirm again.

Is the inspection result normal?

- YES-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
YES-2 >> Confirmation after repair: INSPECTION END
NO >> Proceed to [EC-174, "Diagnosis Procedure"](#).

Diagnosis Procedure

1.CHECK DTC PRIORITY

P0011 IVT CONTROL

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

If DTC P0011 is displayed with DTC P0075, first perform the trouble diagnosis for DTC P0075.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-187, "DTC Description"](#).
NO >> GO TO 2.

2.CHECK ENGINE OIL PRESSURE WARNING LAMP

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

Is engine oil pressure warning lamp illuminated?

- YES >> Check the engine oil level. Refer to [LU-9, "Inspection"](#).
NO >> GO TO 3.



3.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EC-176, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Replace intake valve timing control solenoid valve. Refer to [EM-67, "Exploded View"](#).

4.CHECK CRANKSHAFT POSITION SENSOR

Refer to [EC-279, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Replace crankshaft position sensor. Refer to [EM-106, "Exploded View"](#).

5.CHECK CAMSHAFT POSITION SENSOR

Refer to [EC-285, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Replace camshaft position sensor. Refer to [EM-80, "Exploded View"](#).

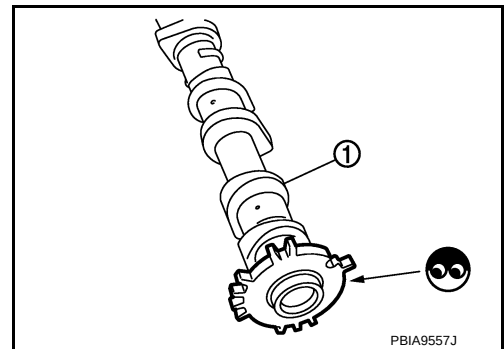
6.CHECK CAMSHAFT (INTAKE)

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 7.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to [EM-81, "Removal and Installation"](#).



7.CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misalignment.

Are there any service records that may cause timing chain misalignment?

- YES >> Check timing chain installation. Refer to [EM-78, "Inspection"](#).
NO >> GO TO 8.

8.CHECK LUBRICATION CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

Perform "Inspection of Camshaft Sprocket (INT) Oil Groove". Refer to [EM-84, "Inspection"](#).

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Clean lubrication line.

Component Inspection

INFOID:0000000010775106

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-1

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
+	−	
Terminals		
1	2	6.7 - 7.7 Ω [at 20°C (68°F)]
1	Ground	Not exist
2		

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to [EM-67, "Exploded View"](#).

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-2

1. Remove intake valve timing control solenoid valve.
2. Provide battery voltage between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check that the plunger moves as shown in the figure.

CAUTION:

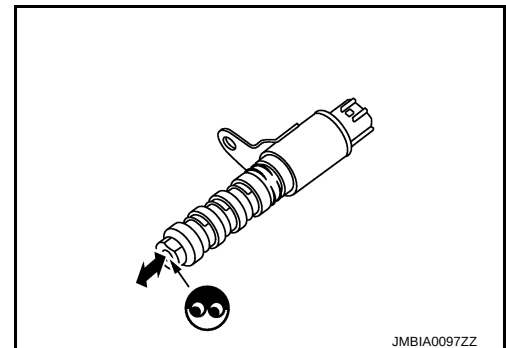
Never apply battery voltage continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

NOTE:

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

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to [EM-67, "Exploded View"](#).



P0014 EVT CONTROL

DTC Description

INFOID:0000000010775107

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0014	EXH/V TIM CONT-B1 "B" Camshaft position - timing over-advanced or system performance bank 1)	There is a gap between angle of target and phase-control angle degree.

POSSIBLE CAUSE

- Crankshaft position sensor
- Exhaust valve timing control position sensor
- Exhaust valve timing control solenoid valve
- Accumulation of debris to the signal plate of the camshaft
- Timing chain installation
- Foreign matter caught in the oil groove for exhaust valve timing control

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Device fix mode	• This mode fixes the IVT control solenoid valve and the EVT control solenoid valve in the reference position. • The intake manifold runner control valve motor is turned OFF (intake manifold runner control valve opens).

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0014 is displayed with DTC P0078, first perform the trouble diagnosis for DTC P0078.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-190. "DTC Description"](#).
 NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK

NOTE:

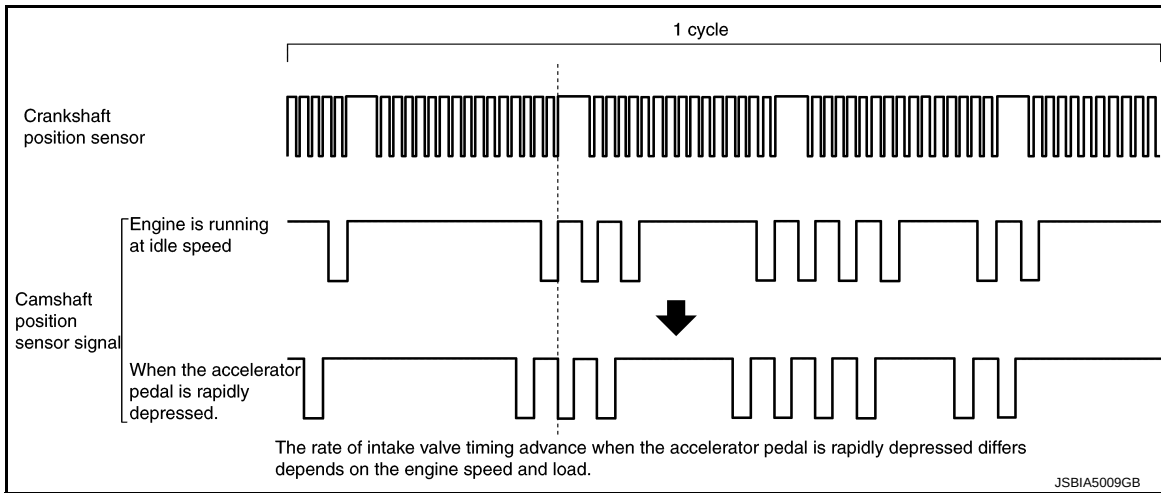
- Use component function check to check the overall function of Exhaust valve timing control. During this check, a 1st trip DTC might not be confirmed.
 - If the cause is a temporal jamming of debris, it may be back to normal during the following procedure.
1. Check service records for any recent repairs that may cause timing chain misalignment. If there are, check timing chain installation first.
 2. Start engine and warm it up to normal operating temperature.
 3. Set the oscilloscope probe between ECM and ground.

ECM			Signal names
Connector	+	−	
	Terminal		
F7	48	44	Crankshaft position sensor
	46	42	Exhaust valve timing control position sensor

4. Record the wave pattern of the crankshaft position sensor signal and the exhaust valve timing control position sensor signal at idling.
5. Record the wave pattern of the crankshaft position sensor signal and the exhaust valve timing control position sensor signal when the accelerator pedal is depressed quickly.

< DTC/CIRCUIT DIAGNOSIS >

6. Compare both wave patterns and confirm that the exhaust valve timing control position sensor signal is shifted to the back side.



Is the inspection result normal?

- YES-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
- YES-2 >> Confirmation after repair: INSPECTION END
- NO >> Proceed to [EC-178, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010775108

1.CHECK DTC PRIORITY

If DTC P0014 is displayed with DTC P0078, first perform the trouble diagnosis for DTC P0078.

Is applicable DTC detected?

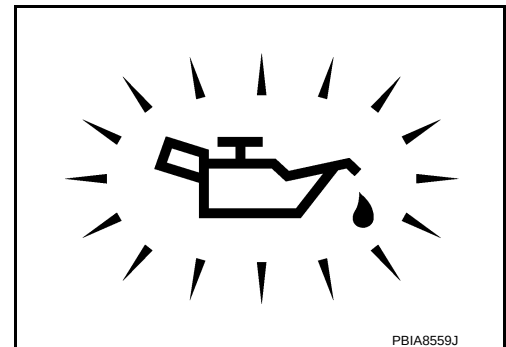
- YES >> Perform diagnosis of applicable. Refer to [EC-190, "DTC Description"](#).
- NO >> GO TO 2.

2.CHECK ENGINE OIL PRESSURE WARNING LAMP

1. Start engine.
2. Check that engine oil pressure warning lamp is not illuminated.

Is engine oil pressure warning lamp illuminated?

- YES >> Proceed to [LU-9, "Inspection"](#).
- NO >> GO TO 3.



3.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EC-191, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Replace malfunctioning exhaust valve timing control solenoid valve. Refer to [EM-67, "Exploded View"](#).

4.CHECK CRANKSHAFT POSITION SENSOR

Refer to [EC-279, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Replace malfunctioning crankshaft position sensor. Refer to [EM-106, "Exploded View"](#).

5.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR

Refer to [EC-179, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning exhaust valve timing control position sensor. Refer to [EM-80, "Exploded View"](#).

6.CHECK CAMSHAFT (EXH)

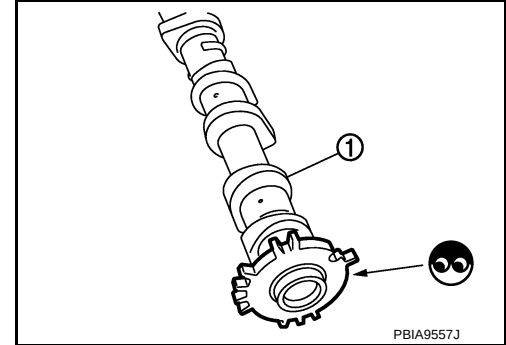
Check the following.

- Accumulation of debris to the signal plate of camshaft ① rear end
- Chipping signal plate of camshaft front end

Is the inspection result normal?

YES >> GO TO 7.

NO >> Remove debris and clean the signal plate of camshaft front end or replace camshaft. Refer to [EM-81, "Removal and Installation"](#).



7.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-78, "Inspection"](#).

NO >> GO TO 8.

8.CHECK LUBRICATION CIRCUIT

Perform "Inspection of Camshaft Sprocket (EXT) Oil Groove". Refer to [EM-84, "Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Clean lubrication line.

Component Inspection

INFOID:0000000010775109

1.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-1

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	6.7 -7.7 Ω (at 20°C)
1	Ground	Not exist
2		

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning exhaust valve timing control solenoid valve. Refer to [EM-67, "Exploded View"](#).

2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-2

1. Remove exhaust valve timing control solenoid valve.

< DTC/CIRCUIT DIAGNOSIS >

2. Provide battery voltage 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 battery voltage continuously for 5 seconds or more. Doing so may result in damage to the coil in exhaust valve timing control solenoid valve.

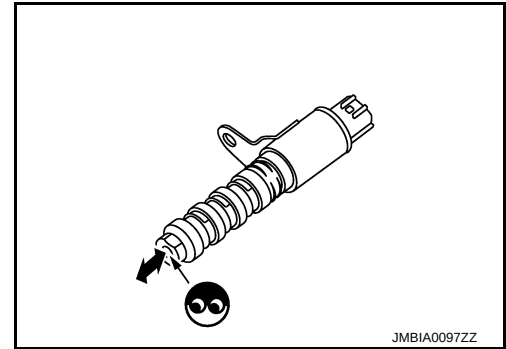
NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning exhaust valve timing control solenoid valve. Refer to [EM-67. "Exploded View"](#).



P0031, P0032 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0031, P0032 A/F SENSOR 1 HEATER

DTC Description

INFOID:0000000010775110

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0031	A/F SEN1 HTR (B1) (HO2S heater control circuit low bank 1 sensor 1)	An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.
P0032	A/F SEN1 HTR (B1) (HO2S heater control circuit high bank 1 sensor 1)	An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.

POSSIBLE CAUSE

P0031

- Harness or connectors (The A/F sensor 1 heater circuit is open or shorted.)
- The A/F sensor 1 heater

P0032

- Harness or connectors (The A/F sensor 1 heater circuit is shorted.)
- The A/F sensor 1 heater

FAIL-SAFE

Not applicable

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 11 V or more 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-181, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775111

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

1. Turn ignition switch OFF.
2. Disconnect air fuel ratio (A/F) sensor 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor 1 harness connector and ground.

+		Ground	Voltage
A/F sensor 1			
Connector	Terminal		
F27	4	Ground	Battery voltage

P0031, P0032 A/F SENSOR 1 HEATER

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning part.

2.CHECK A/F SENSOR 1 HEATER OUTPUT 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.

+		-		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F27	3	F8	93	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 malfunctioning part.

3.CHECK A/F SENSOR 1 HEATER

Refer to [EC-182, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4.REPLACE A/F SENSOR 1

Replace malfunctioning A/F sensor 1. Refer to [EM-37, "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.

>> INSPECTION END

Component Inspection

INFOID:0000000010775112

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

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

A/F sensor 1		Resistance
+	−	
Terminal		
3	4	1.80 - 2.44 Ω [at 25°C (77°F)]
	1	Not exist
	2	
4	1	
2		

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE A/F SENSOR 1

P0031, P0032 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

Replace malfunctioning A/F sensor 1. Refer to [EM-37, "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.

>> INSPECTION END

A

EC

C

D

E

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M

N

O

P

P0037, P0038 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0037, P0038 HO2S2 HEATER

DTC Description

INFOID:000000010775113

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0037	HO2S2 HTR (B1) (HO2S heater control circuit low bank 1 sensor 2)	An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.
P0038	HO2S2 HTR (B1) (HO2S heater control circuit high bank 1 sensor 2)	An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.

POSSIBLE CAUSE

P0037

- Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.)
- Heated oxygen sensor 2 heater

P0038

- Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.)
- Heated oxygen sensor 2 heater

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 11 to 16 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to [EC-184, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010775114

1.CHECK HEATED OXYGEN SENSOR 2 (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.

P0037, P0038 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

+		Ground	Voltage
HO2S2			
Connector	Terminal		
CVT models	F44	4	Ground
M/T models	F125		
			Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning part.

2.CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

+			-		Continuity
HO2S2			ECM		
Connector		Terminal	Connector	Terminal	
CVT models	F44	3	F8	89	Existed
M/T models	F125	3	F8	89	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 malfunctioning part.

3.CHECK HO2S2 HEATER

Refer to [EC-185. "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to [EX-6. "Exploded View"](#).

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads.

>> INSPECTION END

Component Inspection

INFOID:0000000010775115

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 follows.

HO2S2		Resistance
+	−	
Terminal		
4	3	3.4 - 4.4 Ω [at 25°C (77°F)]

P0037, P0038 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

HO2S2		Resistance
+	–	
Terminal		
1	2	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 malfunctioning heated oxygen sensor 2. Refer to [EX-6. "Exploded View"](#).

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.

>> INSPECTION END

P0075 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0075 IVT CONTROL SOLENOID VALVE

DTC Description

INFOID:0000000010775116

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0075	INT/V TIM V/CIR-B1 (Intake valve control solenoid circuit bank 1)	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.

POSSIBLE CAUSE

- Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.)
- Intake valve timing control solenoid valve

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Device fix mode	• This mode fixes the IVT control solenoid valve and the EVT control solenoid valve in the reference position. • The intake manifold runner control valve motor is turned OFF (intake manifold runner control valve opens).

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always 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 let it idle for 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-187, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775117

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

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 IVT control solenoid valve harness connector and ground.

+		Ground	Voltage
IVT control solenoid valve			
Connector	Terminal		
F45	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-2

P0075 IVT CONTROL SOLENOID VALVE

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

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

+		-		Continuity
IVT control solenoid valve		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F45	1	F72	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 or replace malfunctioning part.

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

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

+		-		Continuity
IVT control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F45	2	F8	94	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning part.

4.CHECK IVT CONTROL SOLENOID VALVE

Refer to [EC-176. "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning IVT control solenoid valve. Refer to [EM-67. "Exploded View"](#).

Component Inspection

INFOID:0000000010775118

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-1

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.

IVT control solenoid valve		Resistance
+	–	
Terminal		
1	2	6.7 - 7.7 Ω [at 20°C (68°F)]
1	Ground	Not exist
2		

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to [EM-67. "Exploded View"](#).

P0075 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-2

1. Remove intake valve timing control solenoid valve.
2. Provide battery voltage between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check that the plunger moves as shown in the figure.

CAUTION:

Never apply battery voltage continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

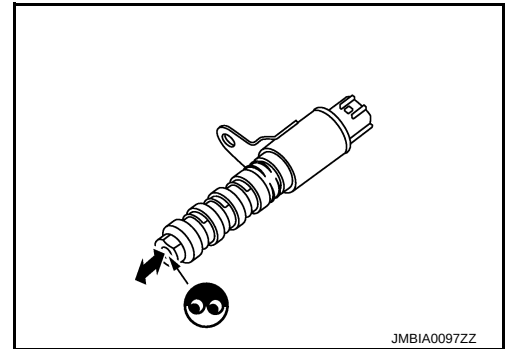
NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to [EM-67, "Exploded View"](#).



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P0078 EVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0078 EVT CONTROL SOLENOID VALVE

DTC Description

INFOID:000000010775119

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0078	EX V/T ACT/CIRC-B1 (Exhaust valve control solenoid circuit bank 1)	An improper voltage is sent to the ECM through exhaust valve timing control solenoid valve.

POSSIBLE CAUSE

- Harness or connectors
- Exhaust valve timing control solenoid valve circuit is open or shorted.
- Sensor power supply circuit 2 is shorted.
- Exhaust valve timing control solenoid valve
- Sensor power supply circuit 2 sensor

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Device fix mode	• This mode fixes the IVT control solenoid valve and the EVT control solenoid valve in the reference position. • The intake manifold runner control valve motor is turned OFF (intake manifold runner control valve opens).

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always 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 let it idle for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-190, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010775120

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 EVT control solenoid valve harness connector and ground.

+		Ground	Voltage
EVT control solenoid valve			
Connector	Terminal		
F41	1	Ground	Battery voltage

Is the inspection result normal?

P0078 EVT CONTROL SOLENOID VALVE

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

- 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.

+		-		Continuity
EVT control solenoid valve		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F41	1	F72	66	Existed

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

Is the inspection result normal?

- YES >> Perform trouble diagnosis for the power supply circuit.
NO >> Repair or replace malfunctioning part.

3.CHECK EVT 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 EVT control solenoid valve harness connector and ECM harness connector.

+		-		Continuity
EVT control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F41	2	F8	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 or replace malfunctioning part.

4.CHECK EVT CONTROL SOLENOID VALVE

Refer to [EC-191. "Component Inspection"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace malfunctioning EVT control solenoid valve. Refer to [EM-67. "Exploded View"](#).

Component Inspection

INFOID:0000000010775121

1.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-1

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.

EVT control solenoid valve		Resistance
+	–	
Terminal		
1	2	6.7 -7.7 Ω [at 20°C (68°F)]
1	Ground	Not exist.
2		

P0078 EVT CONTROL SOLENOID VALVE

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning exhaust valve timing control solenoid valve. Refer to [EM-67. "Exploded View"](#).

2. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-2

1. Remove exhaust valve timing control solenoid valve.
2. Provide battery voltage 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 battery voltage continuously for 5 seconds or more. Doing so may result in damage to the coil in exhaust valve timing control solenoid valve.

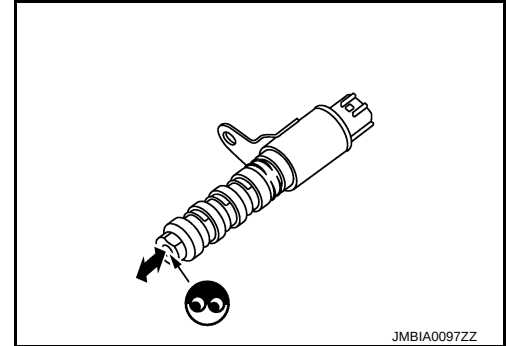
NOTE:

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"](#).



JMBIA0097ZZ

P0087, P0088, P0090 FRP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0087, P0088, P0090 FRP CONTROL SYSTEM

DTC Description

INFOID:000000010775122

DTC DETECTION LOGIC

NOTE:

DTC P0087, P0088 or P0090 may be displayed when running out of gas.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0087	LOW FUEL PRES	The following condition continues for 5 seconds or more after engine start. Target fuel pressure – Actual fuel pressure > 2.7 MPa
P0088	HIGH FUEL PRES	The following condition continues for 5 seconds or more after engine start. Actual fuel pressure – Target fuel pressure > 2.7 MPa
P0090	FUEL PRESSURE CONTROL FUNCTION	The following condition continues for 5 seconds or more after engine start. - Fuel rail pressure remains at 1.1 MPa or less. - Fuel rail pressure remains at 18.5 MPa or more.

POSSIBLE CAUSE

- Harness or connectors
 - The high pressure fuel pump circuit is open or shorted.
 - The low pressure fuel pump circuit is open or shorted.
- High pressure fuel pump
- High pressure fuel pump system
- Low pressure fuel pump
- Low pressure fuel pump system
- Fuel pressure regulator
- Fuel rail pressure sensor
- Incorrect hose connection
- Out of gas

FAIL-SAFE

Engine operating condition in fail-safe mode		
Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0087, P0088 or P0090 is displayed with DTC P1197, first perform the trouble diagnosis for DTC P1197.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-331. "DTC Description"](#).
NO >> GO TO 2.

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:

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

>> GO TO 3.

3.DTC CONFIRMATION PROCEDURE-1

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 15 seconds.

NOTE:

Warm up the engine until "COOLAN TEMP/S" on "DATA MONITOR" of CONSULT reaches at least 70°C (158°F).

3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-190, "Diagnosis Procedure"](#).
 NO >> GO TO 4.

4.DTC CONFIRMATION PROCEDURE-2

1. Cool the engine until the engine coolant temperature reaches 60°C (140°F) or less.
2. Start the engine and wait at least 40 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-190, "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775123

1.CHECK DTC PRIORITY

If DTC P0087, P0088 or P0090 is displayed with DTC P1197, first perform the trouble diagnosis for DTC P1197.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-331, "DTC Description"](#).
 NO >> GO TO 2.

2.CHECK HIGH PRESSURE FUEL PUMPRefer to [EC-194, "Component Inspection"](#).Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Replace high pressure fuel pump. Refer to [EM-43, "Removal and Installation"](#).

3.CHECK FUEL LEAKAGE

1. Start the engine.
2. Visually check that the fuel pump, fuel rail, and fuel piping have no fuel leakage.

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Repair or replace malfunctioning part.

Component Inspection

INFOID:0000000010775124

1.CHECK HIGH PRESSURE FUEL PUMP-1

1. Turn ignition switch OFF.
2. Disconnect high pressure fuel pump harness connector.
3. Check the resistance between high pressure fuel pump terminals as follows.

High pressure fuel pump		Condition		Resistance
+	–			
Terminal				
1	2	Temperature °C (°F)	20 – 30 (68 – 86)	0.46 - 0.51 Ω

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace high pressure fuel pump. Refer to [EM-43. "Removal and Installation"](#).

2. CHECK HIGH PRESSURE FUEL PUMP-2

WITH CONSULT

1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.
3. Check "FUEL PRES SEN" in "DATA MONITOR" of "ENGINE" with CONSULT.

Data monitor item	Condition	Voltage (Approx.)
FUEL PRES SEN V	Engine speed: idle	820 - 1,140 mV
	Engine speed: Revving engine from idle to 4,000 rpm	820 - 2,900 mV

WITHOUT CONSULT

1. Start the engine.
2. Check fuel rail pressure sensor signal voltage.

+		Ground	Condition	Voltage (Approx.)
Fuel rail pressure sensor				
Connector	Terminal			
F62	2	Ground	Engine speed: idle	0.82 – 1.14 V
			Engine speed: Revving engine from idle to 4,000 rpm	0.82 – 2.9 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace high pressure fuel pump. Refer to [EM-43. "Removal and Installation"](#).

P0102, P0103 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0102, P0103 MAF SENSOR

DTC Description

INFOID:000000010775125

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0102	MAF SEN/CIRCUIT-B1 (Mass or volume air flow "A" circuit low)	An excessively low voltage from the sensor is sent to ECM during engine running.
P0103	MAF SEN/CIRCUIT-B1 (Mass or volume air flow "A" circuit high)	An excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

P0102

- Harness or connectors [The mass air flow sensor (bank 1) circuit is open or shorted.]
- Intake air leaks
- Mass air flow sensor

P0103

- Harness or connectors [The mass air flow sensor (bank 1) circuit is open or shorted.]
- Mass air flow sensor

FAIL-SAFE

Engine operating condition in fail-safe mode		
Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
	Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction.
Device fix mode		• This mode fixes the IVT control solenoid valve and the EVT control solenoid valve in the reference position. • The intake manifold runner control valve motor is turned OFF (intake manifold runner control valve opens).
Combustion control mode	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).
	Idle speed control	Stops feedback control of idle speed and controls with specified speed.
	Recovery speed control at decelerating	Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.
	Idle neutral control	Stops idle neutral control.
	Ignition timing correction control	Partially controls ignition timing control.
	Retardation control	Controls ignition timing delay control in the intermediate water temperature range.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

P0102, P0103 MAF SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

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.DTC CONFIRMATION PROCEDURE-DTC P0102

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

Is DTC detected?

YES >> Proceed to [EC-197, "Diagnosis Procedure"](#).

NO >> INSPECTION END

3.DTC CONFIRMATION PROCEDURE-P0103-1

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

Is DTC detected?

YES >> Proceed to [EC-197, "Diagnosis Procedure"](#).

NO >> GO TO 4.

4.DTC CONFIRMATION PROCEDURE-DTC P0103-2

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and let it idle at least 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to [EC-197, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775126

1.INSPECTION START

Confirm the detected DTC. Refer to [EC-196, "DTC Description"](#).

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 MASS AIR FLOW 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 mass air flow (MAF) sensor harness connector and ground.

+		Ground	Voltage
MAF sensor			
Connector	Terminal		
F30	5	Ground	Battery voltage

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between mass air flow (MAF) sensor harness connector and IPDM E/R harness connector.

+		-		Continuity
MAF sensor		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F30	5	F72	73	Existed

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

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.

NO >> Repair or replace malfunctioning part.

5.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 (MAF) sensor harness connector and ECM harness connector.

+		-		Continuity
MAF sensor		ECM		
Connector	Terminal	Connector	Terminal	
F30	4	F7	20	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 malfunctioning part.

6.CHECK MASS AIR FLOW SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between mass air flow (MAF) sensor harness connector and ECM harness connector.

+		-		Continuity
MAF sensor		ECM		
Connector	Terminal	Connector	Terminal	
F30	3	F7	28	Existed

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

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace malfunctioning part.

7.CHECK INTAKE AIR TEMPERATURE SENSORRefer to [EC-207, "Component Inspection"](#).Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace mass air flow (MAF) sensor (with intake air temperature sensor). Refer to [EM-30, "Exploded View"](#).

< DTC/CIRCUIT DIAGNOSIS >

8.CHECK MASS AIR FLOW SENSOR

Refer to [EC-199, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow (MAF) sensor. Refer to [EM-30, "Exploded View"](#).

Component Inspection

INFOID:0000000010775127

1.CHECK MASS AIR FLOW SENSOR-1

WITH CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Select "MAS A/F SE-B1" in "DATE MONITOR" of "ENGINE" with CONSULT and check the indication under the following condition.

Monitor item	Condition	Indication
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 -1.2 V
	Idle to about 4,000 rpm	0.7 -1.2 V → 2.4 V*

*: Check for linear voltage rise in response to increase of engine speed.

WITHOUT CONSULT

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

ECM			Condition	Voltage
Connector	+	-		
	Terminal			
F7	28	20	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.7 -1.2 V
			Idle to about 4,000 rpm	0.7 -1.2 V → 2.4 V*

*: Check for linear voltage rise in response to increase of engine speed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH INTAKE AIR DUCT

1. Turn ignition switch OFF.
2. Check for the cause of uneven air flow through intake air duct. Refer to the following.
 - Crushed air ducts
 - Malfunctioning seal of air cleaner element
 - Uneven dirt like leaves or insects of air cleaner element
 - Intake valve deposit
 - 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-2

WITH CONSULT

P0102, P0103 MAF SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

1. Repair malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Select "MAS A/F SE-B1" in "DATE MONITOR" of "ENGINE" with CONSULT and check the indication under the following condition.

Monitor item	Condition	Indication
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 -1.2 V
	Idle to about 4,000 rpm	0.7 -1.2 V → 2.4 V*

*: Check for linear voltage rise in response to increase of engine speed.

⊗ WITHOUT CONSULT

1. Repair malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition	Voltage
Connector	+	-		
	Terminal			
F7	28	20	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.7 -1.2 V
			Idle to about 4,000 rpm	0.7 -1.2 V → 2.4 V*

*: Check for linear voltage rise in response to increase of engine speed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4. CHECK AIR FLOW SENSOR

Ⓟ WITH CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Select "MAS A/F SE-B1" in "DATE MONITOR" of "ENGINE" with CONSULT and check the indication under the following condition.

Monitor item	Condition	Indication
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 -1.2 V
	Idle to about 4,000 rpm	0.7 -1.2 V → 2.4 V*

*: Check for linear voltage rise in response to increase of engine speed.

⊗ WITHOUT CONSULT

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

P0102, P0103 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

ECM			Condition	Voltage
Connector	+	-		
	Terminal			
F7	28	20	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.7 -1.2 V
			Idle to about 4,000 rpm	0.7 -1.2 V → 2.4 V*

*: Check for linear voltage rise in response to increase of engine speed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor. Refer to [EM-30. "Exploded View"](#).

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P0107, P0108 ATMOSPHERIC PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0107, P0108 ATMOSPHERIC PRESSURE SENSOR

DTC Description

INFOID:0000000010775128

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0107	ABSL PRES SEN/CIRC	An excessively low voltage from the sensor is sent to ECM.
P0108	ABSL PRES SEN/CIRC	An excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors
 - The atmospheric pressure sensor circuit is open or shorted.
 - Sensor power supply circuit 2 is shorted.
- Atmospheric pressure sensor
- Sensor of Sensor power supply circuit 2

FAIL-SAFE

Not applicable

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 let it idle at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-202, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775129

1.CHECK ATMOSPHERIC PRESSURE SENSOR POWER SUPPLY-1

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 connectors.

Atmospheric pressure sensor			Voltage
Connector	+	-	
	Terminal		
F67	1	3	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 2.

2.CHECK ATMOSPHERIC PRESSURE SENSOR POWER SUPPLY-2

Check the voltage between atmospheric pressure sensor harness connector and ground.

P0107, P0108 ATMOSPHERIC PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

+		Ground	Voltage
Atmospheric pressure sensor			
Connector	Terminal		
F67	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 3.

3.CHECK ATMOSPHERIC PRESSURE SENSOR POWER SUPPLY 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	
F67	1	E16	101	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning part.

4.CHECK SENSOR POWER SUPPLY 2

Refer to [EC-405. "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning part.

5.CHECK ATMOSPHERIC PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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	
F67	3	E16	124	Existed

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

6.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

Check the voltage between ECM harness connector and ground.

P0107, P0108 ATMOSPHERIC PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

+		Ground	Continuity
ECM			
Connector	Terminal		
F7	11	Ground	Existed
E16	123		
	125		
	128		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace malfunctioning part.

7.CHECK ATMOSPHERIC PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

+		-		Continuity
Atmospheric pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
F67	2	E16	97	Existed

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

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace malfunctioning part.

8.CHECK ATMOSPHERIC PRESSURE SENSOR

Refer to [EC-204, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace atmospheric pressure sensor. Refer to [EC-28, "ENGINE CONTROL SYSTEM : Component Parts Location"](#).

Component Inspection

INFOID:000000010775130

1.COMPONENT FUNCTION CHECK

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

ECM		
Connector	+	-
	Terminal	
E16	97	124

NOTE:

Since this sensor is an absolute pressure sensor, values vary with ambient 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.

P0107, P0108 ATMOSPHERIC PRESSURE SENSOR

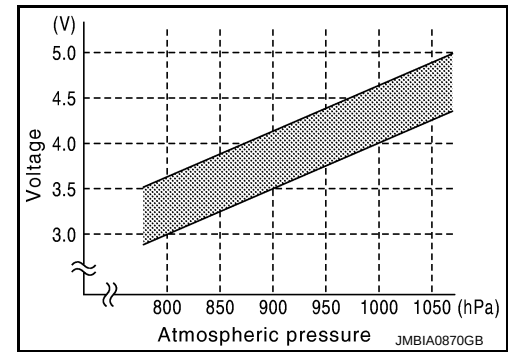
< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

Altitude (m)	Compensated pressure (hPa)
0	0
200	-24
400	-47
600	-70
800	-92
1,000	-114
1,500	-168
2,000	-218

4. Check that the voltage is within a specified range as in the following chart.

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
1,000	4.0 – 4.6
1,050	4.2 – 4.8



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace atmospheric pressure sensor. Refer to [EC-28. "ENGINE CONTROL SYSTEM : Component Parts Location"](#).

P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0112, P0113 IAT SENSOR

DTC Description

INFOID:0000000010775131

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0112	IAT SEN/CIRCUIT-B1 (Intake air temperature sensor 1 circuit low bank 1)	An excessively low voltage from the sensor is sent to ECM.
P0113	IAT SEN/CIRCUIT-B1 (Intake air temperature sensor 1 circuit high bank 1)	An excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (The intake air temperature sensor circuit is open or shorted.)
- Intake air temperature sensor

FAIL-SAFE

Not applicable

PERFORM 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 >> Proceed to [EC-206, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775132

1. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY

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

+		Ground	Voltage
MAF sensor			
Connector	Terminal		
F30	2	Ground	Approx. 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.

P0112, P0113 IAT SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

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

+		-		Continuity
MAF sensor		ECM		
Connector	Terminal	Connector	Terminal	
F30	2	F7	35	Existed

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

Is the inspection result normal?

- YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace malfunctioning part.

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 MAF sensor harness connector and ECM harness connector.

+		-		Continuity
MAF sensor		ECM		
Connector	Terminal	Connector	Terminal	
F30	1	F7	20	Existed

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

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace malfunctioning part.

4.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to [EC-207. "Component Inspection"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace mass air flow (MAF) sensor (intake air temperature sensor is built-in). Refer to [EM-30. "Exploded View"](#).

Component Inspection

INFOID:0000000010775133

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.

MAF sensor		Condition		Resistance
+	−			
Terminal				
1	2	Temperature [°C (°)]	25 (77)	1.80 - 2.20 kΩ

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace mass air flow sensor (intake air temperature sensor is built-in). Refer to [EM-30. "Exploded View"](#).

P0117, P0118 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0117, P0118 ECT SENSOR

DTC Description

INFOID:000000010775134

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0117	ECT SEN/CIRC (Engine coolant temperature sensor 1 circuit low)	An excessively low voltage from the sensor is sent to ECM.
P0118	ECT SEN/CIRC (Engine coolant temperature sensor 1 circuit high)	An excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (The engine coolant temperature sensor circuit is open or shorted.)
- Engine coolant temperature sensor

FAIL-SAFE

Engine operating condition in fail-safe mode		
Fail safe mode		Vehicle behavior
Combustion control mode	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).
	Idle speed control	Stops feedback control of idle speed and controls with specified speed.
	Recovery speed control at decelerating	Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.
	Idle neutral control	Stops idle neutral control.
Others		Engine speed will not rise more than 1,800rpm due to the fuel cut.

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. 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-208, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010775135

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature (ECT) sensor harness connector.
3. Turn ignition switch ON.

P0117, P0118 ECT SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

4. Check the voltage between ECT sensor harness connector and ground.

+		Ground	Voltage
ECT sensor			
Connector	Terminal		
F28	1	Ground	Approx. 5 V

Is the inspection result normal?

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

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR POWER SUPPLY-2

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	F7	31	Existed

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

Is the inspection result normal?

- YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace malfunctioning part.

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.

+		-		Continuity
ECT sensor		ECM		
Connector	Terminal	Connector	Terminal	
F28	2	F7	25	Existed

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

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace malfunctioning part.

4.CHECK ECT SENSOR

Refer to [EC-209, "Component Inspection"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace ECT sensor. Refer to [CO-28, "Exploded View"](#).

Component Inspection

INFOID:0000000010775136

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.

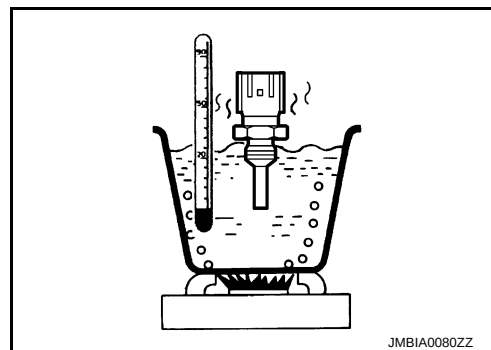
P0117, P0118 ECT SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

ECT sensor		Condition		Resistance
+	−			
Terminal				
1	2	Tempera- ture [°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 ECT sensor. Refer to [CO-28, "Exploded View"](#).

P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0122, P0123 TP SENSOR

DTC Description

INFOID:000000010775137

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0122	TP SEN 2/CIRC-B1 (Throttle/pedal position sensor/switch "A" circuit low)	An excessively low voltage from the TP sensor 2 is sent to ECM.
P0123	TP SEN 2/CIRC-B1 (Throttle/pedal position sensor/switch "A" circuit high)	An excessively high voltage from the TP sensor 2 is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (TP sensor 2 circuit is open or shorted.)
- Electric throttle control actuator (TP sensor 2)

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Others	• 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. NOTE: If throttle position sensor1 and 2 malfunction at the same time conducts following control. • ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0122 or P0123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-321, "DTC Description"](#).
NO >> GO TO 2.

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:

Before performing the following procedure, confirm that battery voltage is 8 V or more at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-211, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010775138

1.CHECK DTC PRIORITY

P0122, P0123 TP SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

If DTC P0122 or P0123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-321. "DTC Description"](#).
NO >> GO TO 2.

2.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.

+		Ground	Voltage
Electric throttle control actuator			
Connector	Terminal		
F29	2	Ground	Approx. 5 V

Is the inspection result normal?

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

3.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

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

+		-		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	2	F8	60	Existed

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

Is the inspection result normal?

- YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace malfunctioning part.

4.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.

+		-		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	4	F8	75	Existed

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

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace malfunctioning part.

5.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.

P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

+		-		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	3	F8	71	Existed

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

6.CHECK THROTTLE POSITION SENSOR

Refer to [EC-213, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to [EM-31, "Removal and Installation"](#).

Component Inspection

INFOID:0000000010775139

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform [EC-145, "Work Procedure"](#).
4. Turn ignition switch ON.
5. Set selector lever position to D.
6. Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition		Voltage
Connector	+	—			
	Terminal				
F8	63	75	Accelerator pedal	Fully re- leased	More than 0.36 V
				Fully de- pressed	Less than 4.75 V
	71			Fully re- leased	Less than 4.75 V
				Fully de- pressed	More than 0.36 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to [EM-31, "Removal and Installation"](#).

P0130 A/F SENSOR 1

DTC Description

INFOID:000000010775140

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0130	A/F SENSOR1 (B1) (O2 sensor circuit bank 1 sensor 1)	The output voltage computed by ECM according to the A/F sensor 1 signal is constant.

POSSIBLE CAUSE

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

FAIL-SAFE

Not applicable

PERFORM 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 11 V or more at idle.

Will CONSULT be used?

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

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

⑧ WITH CONSULT

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

Does the indication constantly fluctuate around 2.2 V?

- YES >> GO TO 3.
NO >> Proceed to [EC-215. "Diagnosis Procedure"](#).

3. PERFORM DTC CONFIRMATION PROCEDURE-1

1. Select "ENGINE" of "A/F SEN1" in "DTC WORK SUPPORT" mode of "A/F (B1) P0130" with CONSULT.
2. "TESTING" is displayed on the CONSULT screen when the following conditions are met.

ENG SPEED	850 - 2,300 rpm
VHCL SPEED SE	More than 64 km/h (40 mph)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	D position

CAUTION:

Always drive vehicle at a safe speed.

Is "TESTING" displayed on CONSULT screen?

- YES >> GO TO 4.
NO >> If "TESTING" is not displayed after 20 seconds, GO TO 2.

4. PERFORM DTC CONFIRMATION PROCEDURE-2

1. Release accelerator pedal fully.

NOTE:

P0130 A/F SENSOR 1

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

Never operate brake pedal when releasing the accelerator pedal.

2. Confirm that "TESTING" change to "COMPLETED".

Is "COMPLETED" displayed on CONSULT screen?

YES >> GO TO 5.

OUT OF CONDITION>>GO TO 3.

5.PERFORM DTC CONFIRMATION PROCEDURE-3

Touch "SELF - DIAG RESULT".

Is "OK" displayed on CONSULT screen?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> "NG" proceed to [EC-215, "Diagnosis Procedure"](#).

6.PERFORM COMPONENT FUNCTION CHECK

 WITHOUT CONSULT

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.

1. Start engine and warm it up to normal operating temperature.
2. Shift the lever to suitable position and drive for a few minutes at 80 km/h (50 MPH).

CAUTION:

Always drive vehicle at a safe speed.

3. Release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (31 MPH).

NOTE:

Never apply brake when releasing the accelerator pedal.

4. Repeat steps 2 and 3, 5 times.
5. Stop the vehicle, turn ignition switch OFF and wait at least 10 seconds.
6. Restart engine.
7. Repeat steps 2 and 3, 5 times.
8. Stop the vehicle and Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-215, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775141

1.CHECK AIR FUEL RATIO SENSOR 1 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect air fuel ratio (A/F) sensor 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor 1 harness connector and ground.

+		Ground	Voltage
A/F sensor 1			
Connector	Terminal		
F27	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK AIR FUEL RATIO 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.

P0130 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

+		-		Continuity
A/F sensor 1		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F27	4	F72	75	Existed

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

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.

NO >> Repair or replace malfunctioning part.

3. 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.

+		-		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F27	1	F8	64	Existed
	2		72	

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

+		Ground	Continuity
A/F sensor 1			
Connector	Terminal		
F27	1	Ground	Not existed
	2		

+		Ground	Continuity
ECM			
Connector	Terminal		
F8	64	Ground	Not existed
	72		

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning part.

4. REPLACE A/F SENSOR 1

Replace malfunctioning A/F sensor 1. Refer to [EX-6. "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.

>> INSPECTION END

P0131 A/F SENSOR 1

DTC Description

INFOID:000000010775142

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0131	A/F SENSOR1 (B1) (O2 sensor circuit low voltage bank 1 sensor 1)	The output voltage computed by ECM according to the A/F sensor 1 signal is excessively low at all times.

POSSIBLE CAUSE

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- The A/F sensor 1

FAIL-SAFE

Not applicable

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 10.5 V or more at idle.

Will CONSULT be used?

YES >> GO TO 2.

NO >> GO TO 4.

2.CHECK A/F SENSOR FUNCTION

WITH CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Select "A/F SEN1 (B1)" in "DATA MONITOR" mode of "ENGINE" system with CONSULT.
3. Check "A/F SEN1 (B1)" indication.

Is the indication constantly approx. 0 V?

YES >> Proceed to [EC-218, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.
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 approximately 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 mph)
VHCL SPEED SE	1.5 - 9.0 msec
Selector lever	D 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?

P0131 A/F SENSOR 1

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Proceed to [EC-218, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

4.PERFORM COMPONENT FUNCTION CHECK

⊗WITHOUT CONSULT

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.

1. Start engine and warm it up to normal operating temperature.
2. Shift the lever to suitable position and drive for a few minutes at 80 km/h (50 MPH).

CAUTION:

Always drive vehicle at a safe speed.

3. Release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (31 MPH).

NOTE:

Never apply brake when releasing the accelerator pedal.

4. Repeat steps 2 and 3, 5 times.
5. Stop the vehicle, turn ignition switch OFF and wait at least 10 seconds.
6. Restart engine.
7. Repeat steps 2 and 3, 5 times.
8. Stop the vehicle and Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-215, "Diagnosis Procedure"](#)
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775143

1.CHECK AIR FUEL RATIO SENSOR 1 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect air fuel ratio (A/F) sensor 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor 1 harness connector and ground.

+		Ground	Voltage
A/F sensor 1			
Connector	Terminal		
F27	4	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK AIR FUEL RATIO 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	
F27	4	F72	75	Existed

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

Is the inspection result normal?

- YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace malfunctioning part.

P0131 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

3. 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.

+		-		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F27	1	F8	64	Existed
	2		72	

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

+		Ground	Continuity
A/F sensor 1			
Connector	Terminal		
F27	1	Ground	Not existed
	2		

+		Ground	Continuity
ECM			
Connector	Terminal		
F8	64	Ground	Not existed
	72		

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning part.

4. REPLACE A/F SENSOR 1

Replace malfunctioning A/F sensor 1. Refer to [EM-37, "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.

>> INSPECTION END

P0132 A/F SENSOR 1

DTC Description

INFOID:000000010775144

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0132	A/F SENSOR1 (B1) (O2 sensor circuit high voltage bank 1 sensor 1)	The output voltage computed by ECM according to the A/F sensor 1 signal is excessively high at all times.

POSSIBLE CAUSE

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

FAIL-SAFE

Not applicable

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 10.5 V or more at idle.

Will CONSULT be used?

YES >> GO TO 2.

NO >> GO TO 4.

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

 WITH CONSULT

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

Does the indication constantly approximately 5 V?

YES >> Proceed to [EC-221, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.
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 approximately 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 mph)
VHCL SPEED SE	1.5 - 9.0 msec
Selector lever	D 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?

P0132 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

- YES >> Proceed to [EC-221, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

4.PERFORM COMPONENT FUNCTION CHECK

⊗ WITHOUT CONSULT

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.

1. Start engine and warm it up to normal operating temperature.
2. Shift the lever to suitable position and drive for a few minutes at 80 km/h (50 MPH).

CAUTION:

Always drive vehicle at a safe speed.

3. Release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (31 MPH).

NOTE:

Never apply brake when releasing the accelerator pedal.

4. Repeat steps 2 and 3, 5 times.
5. Stop the vehicle, turn ignition switch OFF and wait at least 10 seconds.
6. Restart engine.
7. Repeat steps 2 and 3, 5 times.
8. Stop the vehicle and Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-215, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775145

1.CHECK AIR FUEL RATIO SENSOR 1 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect air fuel ratio (A/F) sensor 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor 1 harness connector and ground.

+		Ground	Voltage
A/F sensor 1			
Connector	Terminal		
F27	4	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK AIR FUEL RATIO 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	
F27	4	F72	75	Existed

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

Is the inspection result normal?

- YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace malfunctioning part.

P0132 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

3. 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.

+		-		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F27	1	F8	64	Existed
	2		72	

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

+		Ground	Continuity
A/F sensor 1			
Connector	Terminal		
F27	1	Ground	Not existed
	2		

+		Ground	Continuity
ECM			
Connector	Terminal		
F8	64	Ground	Not existed
	72		

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning part.

4. REPLACE A/F SENSOR 1

Replace malfunctioning A/F sensor 1. Refer to [EM-37, "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.

>> INSPECTION END

P0137 HO2S2

DTC Description

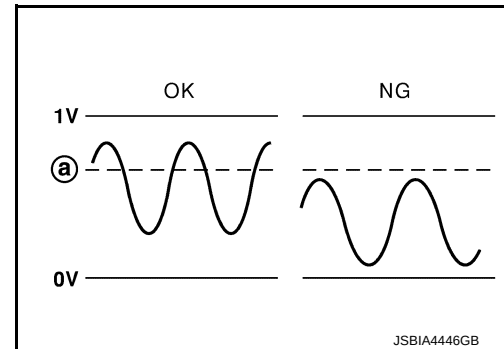
INFOID:000000010775146

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.

Ⓐ: 0.77V

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0137	HO2S2 (B1) (O2 sensor circuit low voltage bank 1 sensor 2)	The maximum voltage from the sensor does not reach the specified voltage.

POSSIBLE CAUSE

- Harness or connectors (The heated oxygen sensor 2 circuit is open or shorted.)
- Heated oxygen sensor 2
- Fuel pressure
- Fuel injector
- Intake air leaks

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

TESTING CONDITION:

Check that "COOLAN TEMP/S" indicates between 0°C to 30°C (30°F to 86°F) before conducting following procedure.

Will CONSULT be used?

YES >> GO TO 2.

NO >> GO TO 4.

2. PERFORM DTC CONFIRMATION PROCEDURE

① WITH CONSULT

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Restart 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 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 "O₂ (B1) P0137" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT.
9. Follow the instruction of CONSULT display.

NOTE:

< DTC/CIRCUIT DIAGNOSIS >

It will take at most 10 minutes until "COMPLETED" is displayed.

10. Touch "SELF-DIAG RESULTS"

Is "OK" displayed on CONSULT screen?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NG >> Proceed to [EC-225, "Diagnosis Procedure"](#).

CAN NOT BE DIAGNOSED>>GO TO 3.

3.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 2.

4.PERFORM COMPONENT FUNCTION CHECK-1

 WITHOUT CONSULT

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.

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 conditions.

ECM			Condition	Voltage
Connector	+	-		
	Terminal			
F8	57	59	Revving up to 4,000 rpm quickly under no load at least 10 times. (Depress and release the accelerator pedal as quickly as possible.)	The voltage should be above 0.77 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-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> GO TO 5.

5.PERFORM COMPONENT FUNCTION CHECK-2

Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition	Voltage
Connector	+	-		
	Terminal			
F8	57	59	Keeping engine at idle for 10 minutes.	The voltage should be above 0.77 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-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> GO TO 6.

6.PERFORM COMPONENT FUNCTION CHECK-3

Check the voltage between ECM harness connector terminals under the following conditions.

CAUTION:

Always drive vehicle at a safe speed.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F8	57	59	Coasting from 80 km/h (50 MPH) with selector lever in the D position.	The voltage should be above 0.77 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-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC-225, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010775147

1. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Start engine and warm it up to the normal operating temperature.
2. Clear the mixture ratio self-learning value. Refer to [EC-148, "Work Procedure"](#).
3. 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-249, "Diagnosis Procedure"](#).

NO >> GO TO 2.

2. CHECK HEATED OXYGEN SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

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

+			-		Continuity
HO2S2			ECM		
Connector		Terminal	Connector	Terminal	
CVT models	F44	1	F8	59	Existed
M/T models	F125				

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

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part.

3. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

+			-		Continuity
HO2S2			ECM		
Connector		Terminal	Connector	Terminal	
CVT models	F44	2	F8	57	Existed
M/T models	F125				

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

< DTC/CIRCUIT DIAGNOSIS >

+		Ground	Continuity
HO2S2			
Connector		Terminal	
CVT models	F44	2	Ground
M/T models	F125		
			Not existed

+		Ground	Continuity
ECM			
Connector	Terminal		
F8	57	Ground	Not existed

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning part.

4. CHECK HEATED OXYGEN SENSOR 2

Refer to [EC-226, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

5. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to [EX-6, "Exploded View"](#).

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.

>> INSPECTION END

Component Inspection

INFOID:0000000010775148

1. INSPECTION START

Will CONSULT be used?

Will CONSULT be used?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2-1

 WITH CONSULT

1. Select "DATA MONITOR" mode with CONSULT.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Restart engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT.
7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.
 "HO2S2 (B1)/(B2)" should be above 0.68 V at least once when the "FUEL INJECTION" is +25%.
 "HO2S2 (B1)/(B2)" should be below 0.18 V at least once when the "FUEL INJECTION" is -25%.

Is the inspection result normal?

YES >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 6.

3.CHECK HEATED OXYGEN SENSOR 2-2**⊗WITHOUT CONSULT**

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

ECM			Condition	Voltage
Connector	+	−		
	Terminal			
F8	57	59	Revving up to 4,000 rpm quickly under no load at least 10 times. (Depress and release the accelerator pedal as quickly as possible.)	The voltage should be above 0.77 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 2-3**⊗WITHOUT CONSULT**

Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition	Voltage
Connector	+	−		
	Terminal			
F8	57	59	Keeping engine at idle for 10 minutes.	The voltage should be above 0.77 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 2-4**⊗WITHOUT CONSULT**

Check the voltage between ECM harness connector terminals under the following conditions.

CAUTION:**Always drive vehicle at a safe speed.**

ECM			Condition	Voltage
Connector	+	−		
	Terminal			
F8	57	59	Coasting from 80 km/h (50 MPH) with selector lever in the D position.	The voltage should be above 0.77 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 malfunctioning heated oxygen sensor 2. Refer to [EX-6, "Exploded View"](#).

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.

>> INSPECTION END

P0138 HO2S2

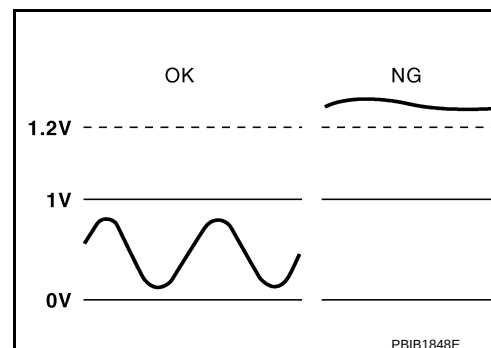
DTC Description

INFOID:000000010775149

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.

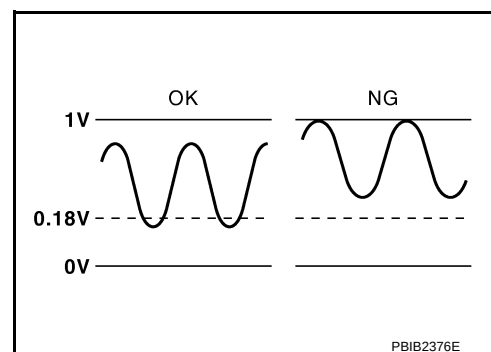
MALFUNCTION A

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



MALFUNCTION B

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



DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P0138	HO2S2 (B1) (O2 sensor circuit high voltage bank 1 sensor 2)	A	An excessively high voltage from the sensor is sent to ECM.
		B	The excessively high minimum voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

P0138-A

- Harness or connectors (The heated oxygen sensor 2 circuit is open or shorted.)
- Heated oxygen sensor 2

P0138-B

- Harness or connectors (The heated oxygen sensor 2 circuit is open or shorted.)
- Heated oxygen sensor 2
- Fuel pressure
- Fuel injector

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

< DTC/CIRCUIT DIAGNOSIS >

>> GO TO 2.

2. 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 >> Proceed to [EC-231, "Diagnosis Procedure"](#).

NO-1 >> With CONSULT: GO TO 3.

NO-2 >> Without CONSULT: GO TO 5.

3. DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-1

 WITH CONSULT

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

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Restart 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 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 "O2 (B1) P0138" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT.
9. Follow the instruction of CONSULT display.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

10. Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT screen?

OK-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

OK-2 >> Confirmation after repair: INSPECTION END

NG >> Proceed to [EC-231, "Diagnosis Procedure"](#).

CAN NOT BE DIAGNOSED >> GO TO 4.

4. DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-2

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-1

 WITHOUT CONSULT

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.

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 conditions.

ECM			Condition	Voltage
Connector	+	−		
	Terminal			
F8	57	59	Revving up to 4,000 rpm quickly under no load at least 10 times. (Depress and release the accelerator pedal as quickly as possible.)	The voltage should be above 0.77 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-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> GO TO 6.

6.PERFORM COMPONENT FUNCTION CHECK-2**⊗WITHOUT CONSULT**

Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F8	57	59	Keeping engine at idle for 10 minutes.	The voltage should be above 0.77 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-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> GO TO 7.

7.PERFORM COMPONENT FUNCTION CHECK-3

Check the voltage between ECM harness connector terminals under the following conditions.

CAUTION:**Always drive vehicle at a safe speed.**

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F8	57	59	Coasting from 80 km/h (50 MPH) with selector lever in the D position.	The voltage should be above 0.77 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-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC-225, "Diagnosis Procedure"](#).**Diagnosis Procedure**

INFOID:0000000010775150

1.INSPECTION START1. Confirm the detected malfunction (A or B). Refer to [EC-229, "DTC Description"](#).Which malfunction is detected?

A >> GO TO 2.

B >> GO TO 7.

2.CHECK HEATED OXYGEN SENSOR 2 CONNECTOR

< DTC/CIRCUIT DIAGNOSIS >

1. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
2. Check that water is not inside connectors.

There is no leakage.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

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

+		–		Continuity	
HO2S2		ECM			
Connector		Terminal	Connector	Terminal	Existed
CVT models	F44	1	F8	59	
M/T models	F125				

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning part.

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

+		–		Continuity	
HO2S2		ECM			
Connector		Terminal	Connector	Terminal	Existed
CVT models	F44	2	F8	57	
M/T models	F125				

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

+		Ground	Continuity
HO2S2			
Connector		Terminal	
CVT models	F44	2	Ground
M/T models	F125		
			Not existed

+		Ground	Continuity
ECM			
Connector	Terminal		
F8	57	Ground	Not existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace malfunctioning part.

5. CHECK HEATED OXYGEN SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

Refer to [EC-234, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to [EX-6, "Exploded View"](#).

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.

>> INSPECTION END

7. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Start engine and warm it up to the normal operating temperature.
2. Clear the mixture ratio self-learning value. Refer to [EC-148, "Work Procedure"](#).
3. 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-249, "Diagnosis Procedure"](#).

NO >> GO TO 8.

8. CHECK HEATED OXYGEN SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

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

+			-		Continuity
HO2S2			ECM		
Connector		Terminal	Connector	Terminal	Existed
CVT models	F44	1	F8	59	
M/T models	F125				

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

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace malfunctioning part.

9. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

+			-		Continuity
HO2S2			ECM		
Connector		Terminal	Connector	Terminal	
CVT models	F44	2	F8	57	Existed
M/T models	F125				

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

+		Ground	Continuity
HO2S2			
Connector		Terminal	
CVT models	F44	2	Ground
M/T models	F125		Not existed

+		Ground	Continuity
ECM			
Connector	Terminal		
F8	57	Ground	Not existed

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

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace malfunctioning part.

10. CHECK HEATED OXYGEN SENSOR 2

Refer to [EC-234, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 11.

11. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to [EX-6, "Exploded View"](#).

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.

>> INSPECTION END

Component Inspection

INFOID:0000000010775151

1. INSPECTION START

Will CONSULT be used?

Will CONSULT be used?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2-1

WITH CONSULT

1. Select "DATA MONITOR" mode with CONSULT.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Restart engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT.
7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.
 "HO2S2 (B1)/(B2)" should be above 0.68 V at least once when the "FUEL INJECTION" is +25%.
 "HO2S2 (B1)/(B2)" 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 2-2

⊗WITHOUT CONSULT

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

ECM			Condition	Voltage
Connector	+	−		
	Terminal			
F8	57	59	Revving up to 4,000 rpm quickly under no load at least 10 times. (Depress and release the accelerator pedal as quickly as possible.)	The voltage should be above 0.77 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 2-3

⊗WITHOUT CONSULT

Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F8	57	59	Keeping engine at idle for 10 minutes.	The voltage should be above 0.77 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 2-4

⊗WITHOUT CONSULT

Check the voltage between ECM harness connector terminals under the following conditions.

CAUTION:

Always drive vehicle at a safe speed.

ECM			Condition	Voltage
Connector	+	−		
	Terminal			
F8	57	59	Coasting from 80 km/h (50 MPH) with selector lever in the D position.	The voltage should be above 0.77 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

< DTC/CIRCUIT DIAGNOSIS >

Replace malfunctioning heated oxygen sensor 2. Refer to [EX-6, "Exploded View"](#).

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.

>> INSPECTION END

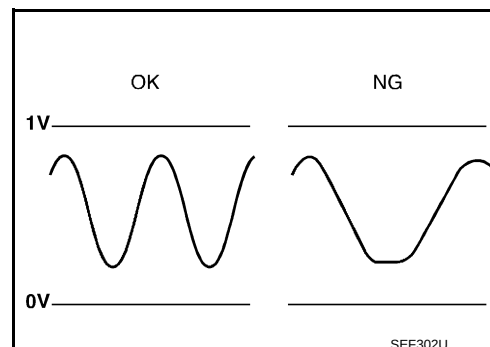
P0139 HO2S2

DTC Description

INFOID:000000010775152

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0139	HO2S2 (B1) (O2 sensor circuit slow response bank 1 sensor 2)	The switching time between rich and lean of a heated oxygen sensor 2 signal delays more than the specified time computed by ECM.

POSSIBLE CAUSE

- Harness or connectors (The sensor circuit is open or shorted.)
- Heated oxygen sensor 2
- Fuel system
- EVAP system
- Intake air system

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 7.

2. PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.

< DTC/CIRCUIT DIAGNOSIS >

5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
7. Let engine idle for 1 minute.
8. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
9. Drive the vehicle in a proper at 60 km/h (38MPH) and maintain the speed.

CAUTION:

Always drive vehicle at a safe speed.

10. Release the accelerator pedal fully at least 5 seconds.

CAUTION:

- **Enable engine brake.**
- **Always drive carefully.**
- **Never apply brake when releasing the accelerator pedal.**

11. Repeat step 9 and 10 at least 8 times.
12. Check the following item of "DATA MONITOR".

Data monitor item	Status
HO2 S2 DIAG1 (B1)	CMPLT
HO2 S2 DIAG2 (B1)	

Is "CMPLT" displayed on CONSULT screen?

YES >> GO TO 6.

NO-1: "CMPLT" is not displayed on DIAG 1>>Perform DTC confirmation procedure again.

NO-2: "CMPLT" is not displayed on DIAG 2>>GO TO 4.

4.PERFORM DTC WORK SUPPORT

1. Open engine hood.
2. Select "HO2S2 (B1) P0139" in "DTC WORK SUPPORT" mode of "ENGINE" using CONSULT.
3. Start engine and follow the instruction of CONSULT display.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

Is "COMPLETED" displayed on CONSULT screen?

YES >> GO TO 6.

NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

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

>> GO TO 3.

6.PERFORM SELF-DIAGNOSIS

ⓅWith CONSULT

Perform ECM self-diagnosis.

Is DTC "P0139" detected?

YES >> Proceed to [EC-239, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

7.PERFORM COMPONENT FUNCTION CHECK-1

ⓧWithout CONSULT

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F8	57	59	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.77 V at least once during this procedure

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> GO TO 8.

8.PERFORM COMPONENT FUNCTION CHECK-2

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F8	57	59	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.77 V at least once during this procedure

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> GO TO 9.

9.PERFORM COMPONENT FUNCTION CHECK-3

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F8	57	59	Coasting from 80 km/h (50 MPH) in D position	The voltage should be above 0.77 V at least once during this procedure

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC-225, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010775153

1.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to [EC-148, "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-248, "DTC Description"](#) or [EC-253, "DTC Description"](#).

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.

< DTC/CIRCUIT DIAGNOSIS >

+		–		Continuity	
HO2S2		ECM			
Connector	Terminal	Connector	Terminal		
CVT models	F44	1	F8	59	Existed
M/T models	F125				

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	Existed
CVT models	F44	2	F8	57	
M/T models	F125				

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

+			–	Continuity
HO2S2				
Connector		Terminal		
CVT models	F44	2	Ground	Not existed
M/T models	F125			

+		-	Continuity
ECM			
Connector	Terminal		
F8	57	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-241, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

5. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to [EX-6, "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:0000000010775154

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

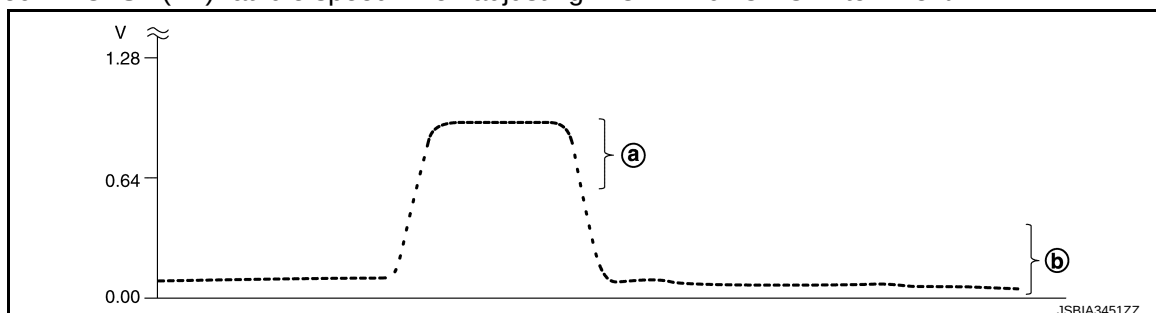
YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2-1

Ⓜ With CONSULT

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

**"HO2S2 (B1)" should be above 0.77 V ① at least once when the "FUEL INJECTION" is + 25%.****"HO2S2 (B1)" should be below 0.18 V ② 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 2-2

Ⓧ Without CONSULT

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

Connector	ECM		Condition	Voltage
	+	-		
	Terminal			
F8	57	59	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.77 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 2-3

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

ECM			Condition	Voltage
Connector	+	−		
	Terminal			
F8	57	59	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.77 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 2-4

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F8	57	59	Coasting from 80 km/h (50 MPH) in D position	The voltage should be above 0.77 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-6, "Exploded View"](#).

CAUTION:

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

>> INSPECTION END

P014C, P014D A/F SENSOR 1

DTC Description

INFOID:000000010775155

DTC DETECTION LOGIC

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

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P014C	A/F SENSOR1 (B1) (O2 sensor slow response - rich to lean bank 1 sensor 1)	The response time of a A/F sensor 1 signal delays more than the specified time computed by ECM.
P014D	A/F SENSOR1 (B1) (O2 sensor slow response - lean to rich bank 1 sensor 1)	

POSSIBLE CAUSE

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

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

Do you have CONSULT?

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

2.PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
6. Let engine idle for 1 minute.
7. Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds.
8. Fully release accelerator pedal and then let engine idle for about 1 minute.
9. Check the items status of "DATA MONITOR" as follows.

NOTE:

If "PRSENT" changed to "ABSNT", refer to [EC-154, "Component Function Check"](#).

Data monitor item	Status
A/F SEN1 DIAG3 (B1)	PRSENT

Is "PRSENT" displayed on CONSULT screen?

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

< DTC/CIRCUIT DIAGNOSIS >

3.PERFORM DTC CONFIRMATION PROCEDURE-2 **With CONSULT**

Perform DTC confirmation procedure-1 again.

Is "PRSENT" displayed on CONSULT screen?

YES >> GO TO 4.

NO >> Refer to [EC-154, "Component Function Check"](#).

4.PERFORM DTC CONFIRMATION PROCEDURE-3 **With CONSULT**

1. Wait for about 20 seconds at idle.

2. Check the items status of "DATA MONITOR" as follows.

NOTE:

If "CMPLT" changed to "INCMP", refer to [EC-154, "Component Function Check"](#).

Data monitor item	Status
A/F SEN1 DIAG2 (B1)	CMPLT

Is "CMPLT" displayed on CONSULT screen?

YES >> GO TO 5.

NO >> Refer to [EC-154, "Component Function Check"](#).

5.PERFORM SELF-DIAGNOSIS **With CONSULT**

Check the "SELF-DIAG RESULT".

Is any DTC detected?

YES >> Proceed to [EC-245, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

6.CHECK AIR-FUEL RATIO SELF-LEARNING VALUE **With GST**

1. Start engine and warm it up to normal operating temperature.

2. Select Service \$01 with GST.

3. Calculate the total value of "Short term fuel trim" and "Long term fuel trim" indications.

Is the total percentage within $\pm 15\%$?

YES >> GO TO 8.

NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.

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

>> Repair or replace malfunctioning part.

8.PERFORM DTC CONFIRMATION PROCEDURE-4

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

2. Turn ignition switch ON.

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

4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.

5. Let engine idle for 1 minute.

P014C, P014D A/F SENSOR 1

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

6. Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds.
7. Fully release accelerator pedal and then let engine idle for about 1 minute.
8. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-245, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775156

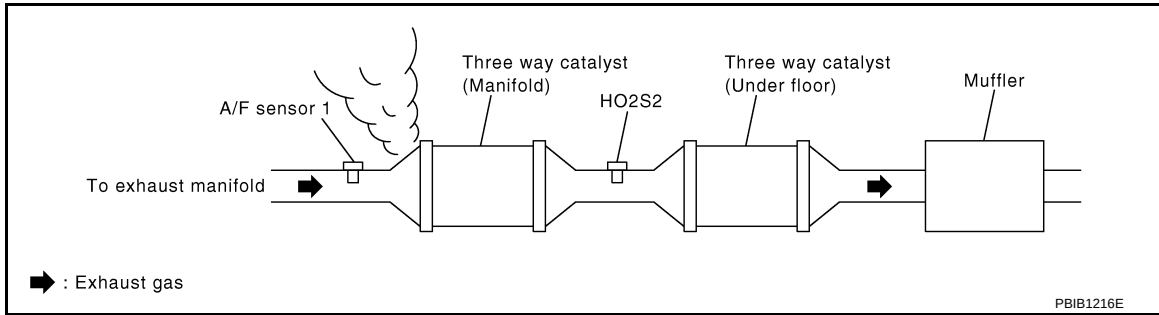
1.RETIGHTEN A/F SENSOR 1

Loosen and retighten the A/F sensor 1. Refer to [EM-37, "Exploded View"](#).

>> GO TO 2.

2.CHECK EXHAUST GAS LEAK

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



Is exhaust gas leak detected?

- YES >> Repair or replace.
- NO >> GO TO 3.

3.CHECK FOR INTAKE AIR LEAK

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

Is intake air leak detected?

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

4.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to [EC-148, "Work Procedure"](#).
2. Run engine for at least 10 minutes at idle speed.

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

- YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to [EC-248, "DTC Description"](#) or [EC-253, "DTC Description"](#).
- NO >> GO TO 5.

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

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

+		−	Voltage
A/F sensor 1			
Connector	Terminal		
F27	4	Ground	Battery voltage

P014C, P014D A/F SENSOR 1

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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

+		-		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F27	1	F8	64	Existed
	2		72	

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		
F27	1	Ground	Not existed
	2		

+		-	Continuity
ECM			
Connector	Terminal		
F8	64	Ground	Not existed
	72		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

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

Refer to [EC-182, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 10.

8.CHECK MASS AIR FLOW SENSOR

Refer to [EC-199, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace mass air flow sensor. Refer to [EM-30, "Exploded View"](#).

9.CHECK PCV VALVE

Refer to [EC-429, "Inspection"](#).

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace PCV valve. Refer to [EC-28, "ENGINE CONTROL SYSTEM : Component Parts Location"](#).

P014C, P014D A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

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

Replace air fuel ratio (A/F) sensor 1. Refer to [EM-37, "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

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P

P0171 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Description

INFOID:000000010775157

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 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 illuminates 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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0171	FUEL SYS-LEAN-B1 (System too lean bank 1)	- Fuel injection system does not operate properly. - The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)

POSSIBLE CAUSE

- Intake air leakage
- A/F sensor 1
- Fuel injector
- Exhaust gas leakage
- Incorrect fuel pressure
- Lack of fuel
- Mass air flow sensor
- Incorrect PCV hose connection

FAIL-SAFE

Engine operating condition in fail-safe mode		
Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).
Combustion control mode	Idle speed control	Stops feedback control of idle speed and controls with specified speed.
	Recovery speed control at decelerating	Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.
	Idle neutral control	Stops idle neutral control.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

P0171 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Clear the mixture ratio self-learning value. Refer to [EC-148. "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-249. "Diagnosis Procedure"](#).
NO >> Check exhaust and intake air leakage visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Keep engine idle for at least 10 minutes.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-249. "Diagnosis Procedure"](#).
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-3

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and Maintain the following conditions for at least 10 consecutive minutes. Hold the accelerator pedal as steady as possible.

Vehicle speed	50 - 100 km/h (31 - 62 MPH)

CAUTION:

Always drive vehicle at a safe speed.

3. Check 1st trip DTC.

Is 1st trip DTC detected?

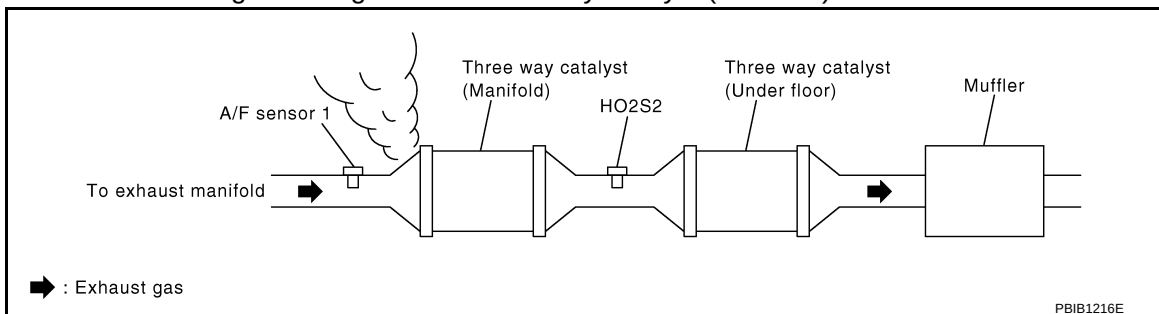
- YES >> Proceed to [EC-249. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775158

1.CHECK EXHAUST GAS LEAKAGE

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



Is exhaust gas leakage detected?

P0171 FUEL INJECTION SYSTEM FUNCTION

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Repair or replace malfunctioning part.
NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAKAGE

1. Listen for an intake air leakage after the mass air flow sensor.
2. Check PCV hose connection.

Is intake air leakage detected?

- YES >> Repair or replace malfunctioning part.
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.

+		-		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F27	1	F8	64	Existed
	2		72	

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

+		Ground	Continuity
A/F sensor 1			
Connector	Terminal		
F27	1	Ground	Not existed
	2		

+		Ground	Continuity
ECM			
Connector	Terminal		
F8	64	Ground	Not existed
	72		

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

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace malfunctioning part.

4.CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to 0. Refer to [EC-152, "Work Procedure"](#).
3. Set a fuel pressure meter and check fuel pressure. Refer to [EC-152, "Work Procedure"](#).

At idle: 500 kPa (5.1 kg/cm²)

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.

P0171 FUEL INJECTION SYSTEM FUNCTION

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> Replace "fuel filter and fuel pump assembly". Refer to [FL-12, "Removal and Installation"](#).
NO >> Repair or replace malfunctioning part.

6.CHECK MASS AIR FLOW SENSOR

④WITH CONSULT

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.

Monitor item	Condition	Indication
A/F SEN1 (B1)	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.2 V
	Idle to about 4,000 rpm	0.7 -1.2 V → 2.4 V*

*: Check for linear voltage rise in response to increase of engine speed.

⊗WITHOUT CONSULT

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition	Voltage
Connector	+	-		
	Terminal			
F7	28	20	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.7 -1.2 V
			Idle to about 4,000 rpm	0.7 -1.2 V → 2.4 V*

*: Check for linear voltage rise in response to increase of engine speed.

Is the inspection result normal?

- YES >> GO TO 7.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to [EC-197, "Diagnosis Procedure"](#).

7.CHECK FUNCTION OF FUEL INJECTOR

④WITH CONSULT

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT."
3. Check that each circuit produces a momentary engine speed drop.

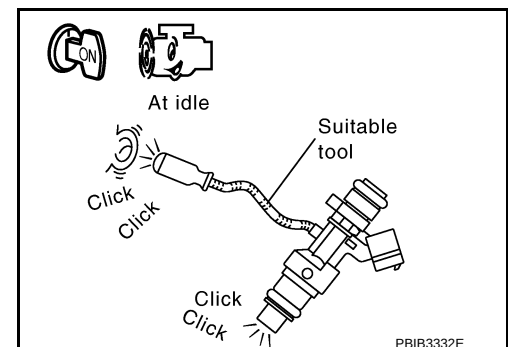
⊗WITHOUT CONSULT

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

Clicking sound should be heard.

Is the inspection result normal?

- YES >> GO TO 8.
NO >> Perform trouble diagnosis for fuel injector and circuit, refer to [EC-386, "Diagnosis Procedure"](#).



8.CHECK FUEL INJECTOR

P0171 FUEL INJECTION SYSTEM FUNCTION

[MR20DD]

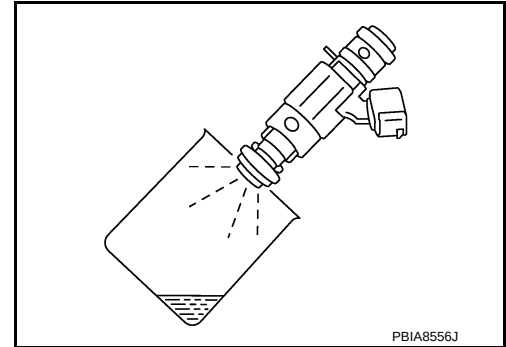
< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch OFF.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Remove fuel tube assembly. Refer to [EM-48, "Exploded View"](#).
Keep fuel hose and all fuel injectors connected to fuel tube.
4. The fuel injector harness connectors should remain connected.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each fuel injector.
7. Crank engine for about 3 seconds.

Fuel should be sprayed evenly for each fuel injector.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace fuel injectors from which fuel does not spray out evenly. Refer to [EM-48, "Removal and Installation"](#).
Always replace O-ring with new ones.



P0172 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Description

INFOID:0000000010775159

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 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 illuminates 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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0172	FUEL SYS-RICH-B1 (System too rich bank 1)	- Fuel injection system does not operate properly. - The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)

POSSIBLE CAUSE

- A/F sensor 1
- Fuel injector
- Exhaust gas leakage
- Incorrect fuel pressure
- Mass air flow sensor

FAIL-SAFE

Engine operating condition in fail-safe mode		
Fail safe mode	Vehicle behavior	
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).
	Idle speed control	Stops feedback control of idle speed and controls with specified speed.
	Recovery speed control at decelerating	Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.
	Idle neutral control	Stops idle neutral control.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

P0172 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

2.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Clear the mixture ratio self-learning value. Refer to [EC-148. "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-254. "Diagnosis Procedure"](#).
NO >> Check exhaust and intake air leakage visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Keep engine idle for at least 10 minutes.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-254. "Diagnosis Procedure"](#).
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-3

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and maintain the following conditions for at least 10 consecutive minutes. Hold the accelerator pedal as steady as possible.

Vehicle speed	50 - 100 km/h (31 - 62 MPH)

CAUTION:

Always drive vehicle at a safe speed.

3. Check 1st trip DTC.

Is 1st trip DTC detected?

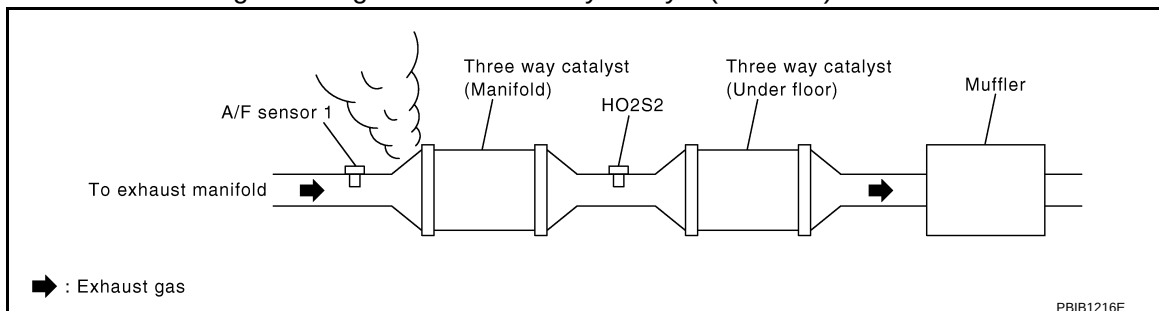
- YES >> Proceed to [EC-254. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775160

1.CHECK EXHAUST GAS LEAKAGE

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



PBIB1216E

Is exhaust gas leakage detected?

- YES >> Repair or replace malfunctioning part.

P0172 FUEL INJECTION SYSTEM FUNCTION

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAKAGE

1. Listen for an intake air leakage after the mass air flow sensor.
2. Check PCV hose connection.

Is intake air leakage detected?

YES >> Repair or replace malfunctioning part.

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.

+		-		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F27	1	F8	64	Existed
	2		72	

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

+		Ground	Continuity
A/F sensor 1			
Connector	Terminal		
F27	1	Ground	Not existed
	2		

+		Ground	Continuity
ECM			
Connector	Terminal		
F8	64	Ground	Not existed
	72		

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning part.

4.CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to 0. Refer to [EC-152, "Work Procedure"](#).
3. Set a fuel pressure meter and check fuel pressure. Refer to [EC-152, "Work Procedure"](#).

At idle: 500 kPa (5.0 bar, 5.1 kg/cm², 73 psi)

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning fuel gauge unit. Refer to [EC-152, "Work Procedure"](#).

5.CHECK MASS AIR FLOW SENSOR

 WITH CONSULT

1. Install all removed parts.

P0172 FUEL INJECTION SYSTEM FUNCTION

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

2. Start engine and warm it up to normal operating temperature.
3. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.

Monitor item	Condition	Indication
A/F SEN1 (B1)	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.2 V
	Idle to about 4,000 rpm	0.7 -1.2 V → 2.4 V*

*: Check for linear voltage rise in response to increase of engine speed.

⊗ WITHOUT CONSULT

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition	Voltage
Connector	+	-		
	Terminal			
F7	28	20	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.7 -1.2 V
			Idle to about 4,000 rpm	0.7 -1.2 V → 2.4 V*

*: Check for linear voltage rise in response to increase of engine speed.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to [EC-197, "Diagnosis Procedure"](#).

6. CHECK FUNCTION OF FUEL INJECTOR

Ⓟ WITH CONSULT

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
3. Check that each circuit produces a momentary engine speed drop.

⊗ WITHOUT CONSULT

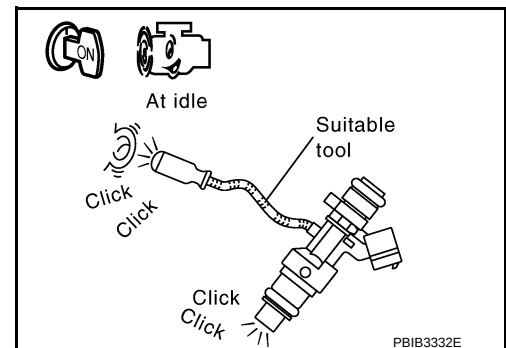
1. Start engine and let it idle.
2. Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Perform trouble diagnosis for fuel injector and circuit, refer to [EC-386, "Diagnosis Procedure"](#).



7. 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. Remove fuel tube assembly. Refer to [EM-48, "Exploded View"](#). Keep fuel hose and all fuel injectors connected to fuel tube.
4. The fuel injector harness connectors should remain connected.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each fuel injector.

P0172 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

7. Crank engine for about 3 seconds.

Fuel should be sprayed evenly for each fuel injector.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel injectors from which fuel does not spray out evenly. Refer to [EM-48, "Removal and Installation"](#). Always replace O-ring with new ones.

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P0190 FRP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0190 FRP SENSOR

DTC Description

INFOID:0000000010775161

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0190	FUEL PRES SEN/CIRC	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.

POSSIBLE CAUSE

- Harness or connectors (Fuel rail pressure sensor circuit is open or shorted.)
- Fuel rail pressure sensor circuit is open or shorted.
- Sensor power supply 2 is shorted.
- Sensor power supply 2 sensor

FAIL-SAFE

Engine operating condition in fail-safe mode		
Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).
Combustion control mode	Idle speed control	Stops feedback control of idle speed and controls with specified speed.
	Recovery speed control at decelerating	Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.
	Idle neutral control	Stops idle neutral control.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

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 engine and let it idle for at least 1 minute.
2. Check DTC or 1st trip DTC.

Is DTC or 1st trip DTC detected?

YES >> Proceed to [EC-258, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775162

1. CHECK FRP SENSOR POWER SUPPLY-1

P0190 FRP SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch OFF.
2. Disconnect FRP sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between FRP sensor harness connector terminals.

FRP sensor			Voltage
Connector	+	−	
	Terminal		
F62	1	3	Approx. 5 V

Is inspection result normal?

- YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FRP SENSOR POWER SUPPLY-2

Check the voltage between FRP sensor harness connector and ground.

+		Ground	Voltage
FRP sensor			
Connector	Terminal		
F62	1	Ground	Approx. 5 V

Is inspection result normal?

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

3.CHECK FRP SENSOR POWER SUPPLY 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	
F62	1	F7	23	Existed

Is inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace malfunctioning part.

4.CHECK SENSOR POWER SUPPLY 2

Refer to [EC-405, "Diagnosis Procedure"](#).

Is inspection result normal?

- YES >> INSPECTION END
NO >> Replace malfunctioning part.

5.CHECK FRP SENSOR GROUND CIRCUIT

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

+		-		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F62	3	F7	39	Existed

P0190 FRP SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

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

Is inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

6.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and the ground.

+		Ground	Continuity
ECM			
Connector	Terminal		
F7	11	Ground	Existed
E16	123		
	125		
	128		

Is inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace malfunctioning part.

7.CHECK FRP SENSOR SIGNAL CIRCUIT

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

+		-		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F62	2	F7	33	Existed

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

Is inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace malfunctioning part.

8.CHECK FRP SENSOR

Refer to [EC-260. "Component Inspection"](#).

Is inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace malfunctioning part.

Component Inspection

INFOID:0000000010775163

1.CHECK FRP SENSOR

Ⓔ WITH CONSULT

1. Turn ignition switch OFF.
2. Reconnect harness connector disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Select "FUEL PRES SEN V" in "DATA MONITOR" mode with CONSULT and check the indication under the following condition.

Monitor Item	Condition	Indication
FUEL PRES SEN V	Idle (Engine is warmed-up to normal operating temperature.)	820 – 1,140 mV
	Idle to about 4,000 rpm	820 – 2,900 mV

P0190 FRP SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

WITHOUT CONSULT

1. Turn ignition switch OFF.
2. Reconnect harness connector disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Check FRP sensor signal voltage.

ECM			Condition	Voltage
Connector	+	−		
	Terminal			
F7	33	39	[Engine is running] • Warm-up condition • Idle speed	Approx. 0.82 – 1.14 V
			[Engine is running] • Warm-up condition • Revving engine from idle to 4,000 rpm	Approx. 0.82 – 2.9 V

Is inspection result normal?

YES >> INSPECTION END

NO >> Replace FRP sensor. Refer to [EM-48, "Exploded View"](#).

P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0197, P0198 EOT SENSOR

DTC Description

INFOID:0000000010775164

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0197	EOT SEN/CIRC (Engine oil temperature sensor low)	An excessively low voltage from the sensor is sent to ECM.
P0198	EOT SEN/CIRC (Engine oil temperature sensor high)	An excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (The EOT sensor circuit is open or shorted.)
- Engine oil temperature sensor

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Others	Intake and exhaust valve timing control does not function.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> 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-262, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775165

1. CHECK ENGINE OIL TEMPERATURE SENSOR POWER SUPPLY CIRCUIT-1

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.

+		Ground	Voltage
EOT sensor			
Connector	Terminal		
F112	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK ENGINE OIL TEMPERATURE SENSOR POWER SUPPLY CIRCUIT-2

P0197, P0198 EOT SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

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	
F112	1	F7	32	Existed

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

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.

NO >> Repair or replace malfunctioning part.

3.CHECK EOT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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	
F112	2	F7	25	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning part.

4.CHECK ENGINE OIL TEMPERATURE SENSOR

Refer to [EC-263, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil temperature sensor. Refer to [EM-102, "Exploded View"](#).

Component Inspection

INFOID:0000000010775166

1.CHECK ENGINE OIL TEMPERATURE SENSOR

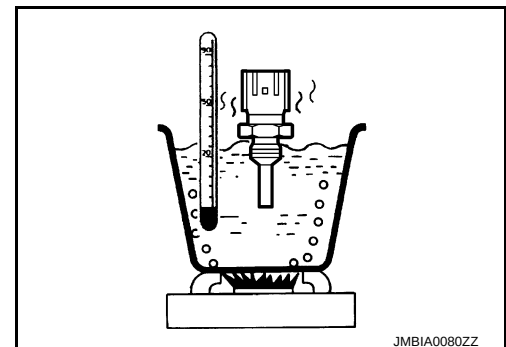
1. Turn ignition switch OFF.
2. Disconnect engine oil temperature sensor harness connector.
3. Remove engine oil temperature sensor.
4. Check resistance between engine oil temperature sensor terminals by heating with hot water as shown in the figure.

EOT sensor		Condition		Resistance
+	−			
Terminal				
1	2	Tempera- ture [°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 oil temperature sensor. Refer to [EM-102, "Exploded View"](#).



P0201, P0202, P0203, P0204 FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0201, P0202, P0203, P0204 FUEL INJECTOR

DTC Description

INFOID:0000000010775167

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0201	INJECTOR CIRC-CYL1	ECM detects No. 1 injector circuit is open or shorted.
P0202	INJECTOR CIRC-CYL2	ECM detects No. 2 injector circuit is open or shorted.
P0203	INJECTOR CIRC-CYL3	ECM detects No. 3 injector circuit is open or shorted.
P0204	INJECTOR CIRC-CYL4	ECM detects No. 4 injector circuit is open or shorted.

POSSIBLE CAUSE

- Harness or connectors (The fuel injector circuit is open or shorted.)
- Fuel injector
- ECM

FAIL-SAFE

Engine operating condition in fail-safe mode		
Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).

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. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and let it idle for at least 30 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-264, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775168

1. CHECK FUEL INJECTOR

Refer to [EC-386, "Component Function Check"](#).

Is inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace malfunctioning part.

P0222, P0223 TP SENSOR

DTC Description

INFOID:000000010775169

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0222	TP SEN 1/CIRC-B1 (Throttle/pedal position sensor/switch "B" circuit low)	An excessively low voltage from the TP sensor 1 is sent to ECM.
P0223	TP SEN 1/CIRC-B1 (Throttle/pedal position sensor/switch "B" circuit high)	An excessively high voltage from the TP sensor 1 is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (TP sensor 1 circuit is open or shorted.)
- Electric throttle control actuator (TP sensor 1)

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Others	• 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. NOTE: If throttle position sensor1 and 2 malfunction at the same time conducts following control. • ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0222 or P0223 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-321, "DTC Description"](#).
 NO >> GO TO 2.

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:

Before performing the following procedure, confirm that battery voltage is 8 V or more at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-265, "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010775170

1.CHECK DTC PRIORITY

P0222, P0223 TP SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

If DTC P0222 or P0223 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-321. "DTC Description"](#).
NO >> GO TO 2.

2.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.

+		Ground	Voltage
Electric throttle control actuator			
Connector	Terminal		
F29	2	Ground	Approx. 5 V

Is the inspection result normal?

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

3.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	2	F8	60	Existed

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

Is the inspection result normal?

- YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace malfunctioning part.

4.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.

+		-		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	4	F8	75	Existed

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

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace malfunctioning part.

5.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.

P0222, P0223 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

+		-		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	1	F8	63	Existed

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

6.CHECK THROTTLE POSITION SENSOR

Refer to [EC-267, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning electric throttle control actuator. Refer to [EM-33, "Removal and Installation"](#).

Component Inspection

INFOID:0000000010775171

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform [EC-145, "Work Procedure"](#).
4. Turn ignition switch ON.
5. Set selector lever position to D.
6. Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition	Voltage
Connector	+	—		
	Terminal			
F8	63	75	Accelerator pedal: Fully released	More than 0.36 V
			Accelerator pedal: Fully depressed	Less than 4.75 V
	71		Accelerator pedal: Fully released	Less than 4.75 V
			Accelerator pedal: Fully depressed	More than 0.36 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning electric throttle control actuator. Refer to [EM-33, "Removal and Installation"](#).

P0300, P0301, P0302, P0303, P0304 MISFIRE**DTC Description**

INFOID:000000010775172

DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function
Crankshaft position sensor	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
On the 1st trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
When a misfire condition occurs, the ECM monitors the CKP sensor 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 in any one cylinder or in multiple cylinders.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0300	MULTI CYL MISFIRE (Random/multiple cylinder misfire detected)	Multiple cylinders misfire.
P0301	CYL 1 MISFIRE (Cylinder 1 Misfire Detected)	No. 1 cylinder misfires.
P0302	CYL 2 MISFIRE (Cylinder 2 Misfire Detected)	No. 2 cylinder misfires.
P0303	CYL 3 MISFIRE (Cylinder 3 Misfire Detected)	No. 3 cylinder misfires.
P0304	CYL 4 MISFIRE (Cylinder 4 Misfire Detected)	No. 4 cylinder misfires.

POSSIBLE CAUSE

- Improper spark plug
- Insufficient compression
- Incorrect fuel pressure
- The fuel injector circuit is open or shorted.
- Fuel injector
- Intake air leakage
- The ignition signal circuit is open or shorted.
- Lack of fuel
- Signal plate
- A/F sensor 1
- Mass air flow sensor
- Incorrect PCV hose connection

FAIL-SAFE

P0300

P0300, P0301, P0302, P0303, P0304 MISFIRE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

Engine operating condition in fail-safe mode			A
Fail safe mode		Vehicle behavior	
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.	EC
	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).	C
Combustion control mode	Idle speed control	Stops feedback control of idle speed and controls with specified speed.	D
	Recovery speed control at decelerating	Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.	E
	Idle neutral control	Stops idle neutral control.	F

P0301, P0302, P0303, P0304

Not applicable

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.

Will CONSULT be used?

YES >> GO TO 2.

NO >> GO TO 4.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

 WITH CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for about 35 minutes.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-270, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-2

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and drive the vehicle under 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.
Similar conditions to (1st trip) Freeze Frame Data mean that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data $\pm$ 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data $\pm$ 10 km/h (6 MPH)
Base fuel schedule	Base fuel schedule in the freeze frame data $\pm$ 10%
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).

Driving time varies according to the engine speed in the freeze frame data.

< DTC/CIRCUIT DIAGNOSIS >

Engine speed	Time
Around 1,000 rpm	Approximately 20 minutes
Around 2,000 rpm	Approximately 10 minutes
More than 3,000 rpm	Approximately 7 minutes

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-270, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

4.PERFORM DTC CONFIRMATION PROCEDURE-3

☒ WITHOUT CONSULT

1. Start engine and warm it up to normal operating temperature.

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

3. Restart engine and let it idle for about 35 minutes.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-270, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775173

1.CHECK FOR INTAKE AIR LEAKAGE AND PCV HOSE

1. Start engine and run it at idle speed.

2. Listen for the sound of the intake air leakage.

3. Check PCV hose connection.

Is intake air leakage detected?

YES >> Discover air leakage location and repair. Refer to [EM-54, "Exploded View"](#).

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: GO TO 3.

YES-2 >> Without CONSULT: GO TO 4.

NO >> Repair or replace malfunctioning part. Refer to [EX-6, "Exploded View"](#).

3.PERFORM POWER BALANCE TEST

☒ WITH CONSULT

1. Start engine.

2. Perform "POWER BALANCE" "ACTIVE TEST" mode with CONSULT.

3. Check 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

☒ WITHOUT CONSULT

1. Start engine.

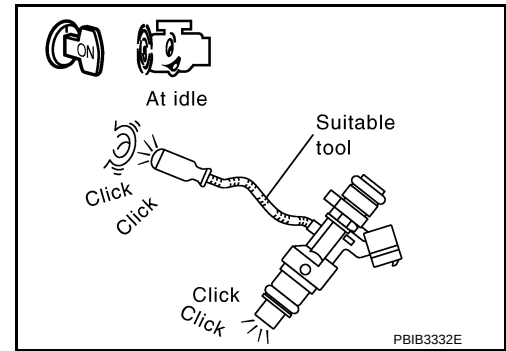
< DTC/CIRCUIT DIAGNOSIS >

2. Listen to each fuel injector operation.

Clicking sound should be heard.

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Perform trouble diagnosis for fuel injector, refer to [EC-386, "Diagnosis Procedure"](#).



5. CHECK FUNCTION OF IGNITION COIL-1

CAUTION:

Perform the following procedure in a place with no combustible objects and good ventilation.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
NOTE:
 Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it 2 or 3 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. Refer to [EM-54, "Exploded View"](#).
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 approximately 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

- Never place the spark plug and the ignition coil within 50 cm (19.7 in) each other. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made.

NOTE:

When the gap is less than 13 mm (0.52 in), a spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

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

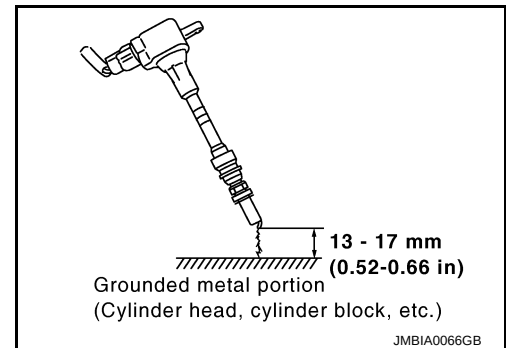
6. CHECK FUNCTION OF IGNITION COIL-2

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

Spark should be generated.

Is the inspection result normal?

- YES >> GO TO 7.
 NO >> Check ignition coil, power transistor and their circuits. Refer to [EC-399, "Diagnosis Procedure"](#).



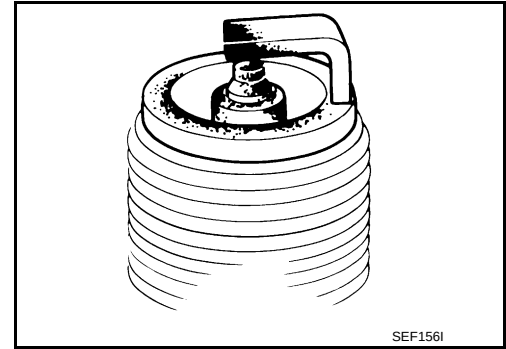
< DTC/CIRCUIT DIAGNOSIS >

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). Refer to [EM-54, "Exploded View"](#).
 NO >> Repair or clean spark plug. Then GO TO 8.

**8. CHECK FUNCTION OF IGNITION COIL-3**

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

Spark should be generated.

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Replace spark plug(s) with standard type one(s). Refer to [EM-54, "Exploded View"](#).

9. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to [EM-19, "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. Refer to [EC-152, "Work Procedure"](#).
3. Set a fuel pressure meter and check fuel pressure. Refer to [EC-152, "Work Procedure"](#).

At idle: Approx. 500 kPa (5.0 bar, 5.1 kg/cm², 73 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-12, "Removal and Installation"](#).
 NO >> Repair or replace malfunctioning part.

12. CHECK IDLE SPEED AND IGNITION TIMING

Check idle speed and ignition timing.

Idle speed: For procedure, refer to [EC-426, "Inspection"](#), for specification, refer to [EC-431, "Idle Speed"](#).

Ignition timing: For procedure, refer to [EC-427, "Inspection"](#), for specification, refer to [EC-431, "Ignition Timing"](#).

Is the inspection result normal?

- YES >> GO TO 13.
 NO >> Perform basic inspection. Refer to [EC-149, "Work Procedure"](#).

13. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.

P0300, P0301, P0302, P0303, P0304 MISFIRE

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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	
F27	1	F8	64	Existed
	2		72	

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

+		Ground	Continuity
A/F sensor 1			
Connector	Terminal		
F27	1	Ground	Not existed
	2		

+		Ground	Continuity
ECM			
Connector	Terminal		
F8	64	Ground	Not existed
	72		

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

Is the inspection result normal?

YES >> GO TO 14.

NO >> Repair or replace malfunctioning part.

14.CHECK A/F SENSOR 1 HEATER

Refer to [EC-182. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace malfunctioning A/F sensor 1. Refer to [EM-37. "Exploded View"](#).

15.CHECK MASS AIR FLOW SENSOR OUTPUT VOLTAGE

WITH CONSULT

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Select "MAS A/F SE-B1" in "DATA MONITOR" mode with CONSULT and check the indication under the following condition.

Monitor item	Condition	Indication
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 - 1.2 V
	Idle to about 4,000 rpm	0.7 - 1.2 V → 2.4 V*

*: Check for linear voltage rise in response to increase of engine speed.

WITHOUT CONSULT

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check the voltage between ECM harness connector terminals.

P0300, P0301, P0302, P0303, P0304 MISFIRE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F7	28 (Mass air flow sensor signal)	20 (sensor ground)	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.2 V
			Idle to about 4,000 rpm	0.7 - 1.2 V → 2.4 V*

*: Check for linear voltage rise in response to increase of engine speed.

Is the inspection result normal?

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-197, "Diagnosis Procedure"](#).

16.CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in [EC-420, "Symptom Table"](#).

Is the inspection result normal?

YES >> GO TO 17.

NO >> Repair or replace malfunctioning part.

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-81, "CONSULT Function"](#).

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

P0327, P0328 KS

DTC Description

INFOID:0000000010775174

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0327	KNOCK SEN/CIRC-B1 (Knock sensor 1 circuit low bank 1 or single sensor)	An excessively low voltage from the sensor is sent to ECM.
P0328	KNOCK SEN/CIRC-B1 (Knock sensor 1 circuit high bank 1 or single sensor)	An excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (The knock sensor circuit is open or shorted.)
- Knock sensor

FAIL-SAFE

Not applicable

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 >> Proceed to [EC-275, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775175

1. CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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	F7	36	Existed

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

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning part.

< DTC/CIRCUIT DIAGNOSIS >

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

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

+		-		Continuity
Knock sensor		ECM		
Connector	Terminal	Connector	Terminal	
F12	1	F7	40	Existed

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

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part.

3.CHECK KNOCK SENSOR

Refer to [EC-276, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning knock sensor. Refer to [EM-106, "Exploded View"](#).

Component Inspection

INFOID:0000000010775176

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.

Knock sensor		Resistance
+	−	
Terminal		
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 malfunctioning knock sensor. Refer to [EM-106, "Exploded View"](#).

P0335 CKP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0335 CKP SENSOR

DTC Description

INFOID:0000000010775177

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0335	CKP SEN/CIRCUIT (Crankshaft position sensor "A" 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.

POSSIBLE CAUSE

- Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.]
- Crankshaft position sensor (POS)
- Signal plate

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Device fix mode	- This mode fixes the IVT control solenoid valve and the EVT control solenoid valve in the reference position. - The intake manifold runner control valve motor is turned OFF (intake manifold runner control valve opens).

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0335 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-321, "DTC Description"](#).
NO >> GO TO 2.

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:

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

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and let it idle for at least 5 seconds.
If engine does not start, crank engine for at least 2 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-277, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775178

1.CHECK DTC PRIORITY

If DTC P0335 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-321, "DTC Description"](#).

P0335 CKP SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2.CHECK CKP SENSOR (POS) POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CKP sensor (POS) harness connector and ground.

CKP sensor (POS)				Condition	Voltage
Connector		+	–		
		Terminal			
CVT models	F20	1	2	Ignition switch: ON	Approx. 5 V
				Ignition switch: OFF	Approx. 0 V
M/T models	F126			Ignition switch: ON	Approx. 5 V
				Ignition switch: OFF	Approx. 0 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 6.

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

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	
CVT models	F20	3	F7	48	Existed
M/T models	F126				

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning part.

4.CHECK CKP SENSOR (POS)

Refer to [EC-279, "Component Inspection"](#).

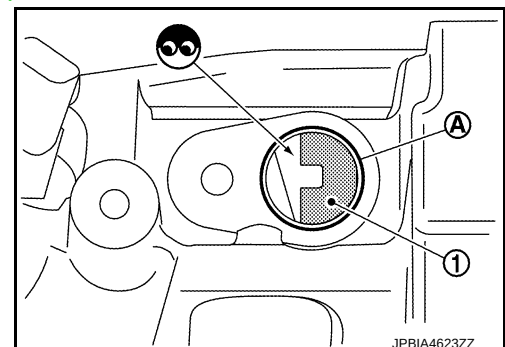
Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace crankshaft position sensor (POS). Refer to [EM-106, "Exploded View"](#).

5.CHECK GEAR TOOTH

1. Remove crankshaft position sensor (POS). Refer to [EM-106, "Exploded View"](#).
2. Look into the mounting hole ① of the crankshaft position sensor (POS) to check that there is no missing gear tooth in the signal plate ①.



P0335 CKP SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the signal plate. Refer to [EM-65, "Exploded View"](#).

6.CHECK CKP SENSOR (POS) POWER SUPPLY CIRCUIT-2

Check the voltage between CKP sensor (POS) harness connector and ground.

+		Ground	Condition	Voltage	
CKP sensor (POS)					
Connector	Terminal				
CVT models	F20	1	Ground	Ignition switch: ON	Approx. 5 V
				Ignition switch: OFF	Approx. 0 V
M/T models	F126			Ignition switch: ON	Approx. 5 V
				Ignition switch: OFF	Approx. 0 V

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 8.

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

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		
CVT models	F20	2	F7	44	Existed
M/T models	F126				

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace malfunctioning part.

8.CHECK CKP SENSOR (POS) POWER SUPPLY CIRCUIT-3

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		
CVT models	F20	1	F7	21	Existed
M/T models	F126				

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace malfunctioning part.

Component Inspection

INFOID:0000000010775179

1.CHECK CRANKSHAFT POSITION SENSOR (POS)-1

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect crankshaft position sensor (POS) harness connector.

P0335 CKP SENSOR

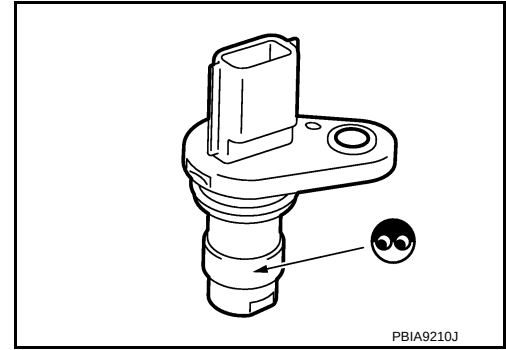
[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

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-106, "Exploded View"](#).



2. CHECK CRANKSHAFT POSITION SENSOR (POS)-2

Check resistance between crankshaft position sensor (POS) terminals as follows.

CKP sensor (POS)		Resistance
+	–	
Terminal		
1	2	Except 0 Ω [at 25°C (77°F)]
	3	
2	3	

Is the inspection result normal?

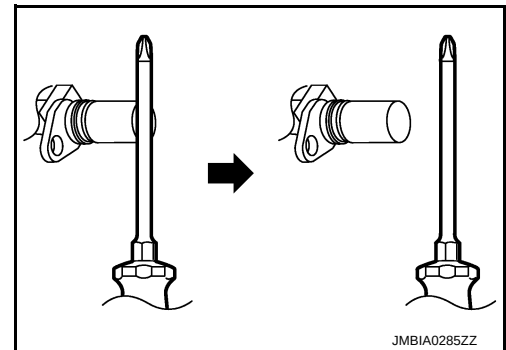
- YES >> GO TO 3.
NO >> Replace crankshaft position sensor (POS). Refer to [EM-65, "Exploded View"](#).

3. CHECK CRANKSHAFT POSITION SENSOR (POS)-3

1. Reconnect crankshaft position sensor (POS) harness connector.
2. Turn ignition switch ON.
3. As shown in the figure, check the voltage between ECM terminals under following conditions with metal bar such as screw driver.

NOTE:

Use the metal bar which is not magnetized.



ECM			Condition	Voltage
Connector	+	—		
	Terminal			
F7	48	44	When moves the metal bar to the direction of sensor's normal rotation	0 - 1 V
			When moves the metal bar to the direction of sensor's re-versed rotation	4 - 5 V

CAUTION:

Do not give a shock to the sensor tip.

Is the inspection result normal?

- YES >> INSPECTION END

P0335 CKP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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NO >> Replace crankshaft position sensor (POS) 1. Refer to [EM-65. "Exploded View"](#).

- A
- EC
- C
- D
- E
- F
- G
- H
- I
- J
- K
- L
- M
- N
- O
- P

P0340 CMP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0340 CMP SENSOR

DTC Description

INFOID:000000010775180

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0340	CMP SEN/CIRC-B1 (Camshaft position sensor "A" circuit bank 1 or single sensor)	- 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.

POSSIBLE CAUSE

- Harness or connectors
- The camshaft position sensor circuit is open or shorted.
- Sensor power supply circuit 2 is shorted.
- Camshaft position sensor (PHASE)
- Exhaust valve timing control position sensor
- Camshaft (INT)
- Camshaft (EXT)
- Starter motor
- Starting system circuit
- Dead (Weak) battery
- Sensor power supply circuit 2 sensor

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Device fix mode	- This mode fixes the IVT control solenoid valve and the EVT control solenoid valve in the reference position. - The intake manifold runner control valve motor is turned OFF (intake manifold runner control valve opens).

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always 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. DTC CONFIRMATION PROCEDURE-1

1. Start engine and let it idle for at least 5 seconds.
If engine does not start, crank engine for at least 2 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-283, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3. DTC CONFIRMATION PROCEDURE-2

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-283, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

P0340 CMP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775181

1.CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

YES >> GO TO 2.

NO >> Check starting system. Refer to [STR-19, "Work Flow"](#).

2.CHECK CMP SENSOR (PHASE) POWER SUPPLY CIRCUIT-1

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 terminals.

CMP sensor (PHASE)			Voltage
Connector	+	−	
	Terminal		
F105	1	2	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

3.CHECK CMP SENSOR (PHASE) POWER SUPPLY CIRCUIT-2

Check the voltage between CMP sensor (PHASE) harness connector and ground.

+		Ground	Voltage
CMP sensor (PHASE)			
Connector	Terminal		
F105	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 4.

4.CHECK CMP SENSOR (PHASE) POWER SUPPLY CIRCUIT-3

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	
F105	1	F7	43	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace malfunctioning part.

5.CHECK CMP SENSOR (PHASE) POWER SUPPLY CIRCUIT-4

Refer to [EC-405, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning part.

P0340 CMP SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

6. 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.

+		-		Continuity
CMP sensor (PHASE)		ECM		
Connector	Terminal	Connector	Terminal	
F105	2	F7	15	Existed

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

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace malfunctioning part.

7. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

Check the continuity between ECM harness connector and ground.

+		Ground	Continuity
ECM			
Connector	Terminal		
F7	11	Ground	Existed
E16	123		
	125		
	128		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace malfunctioning part.

8. 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.

+		-		Continuity
CMP sensor (PHASE)		ECM		
Connector	Terminal	Connector	Terminal	
F105	3	F7	19	Existed

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

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace malfunctioning part.

9. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC-285, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace camshaft position sensor (PHASE). Refer to [EM-80, "Exploded View"](#).

10. CHECK CAMSHAFT (INT)

Check the following.

P0340 CMP SENSOR

[MR20DD]

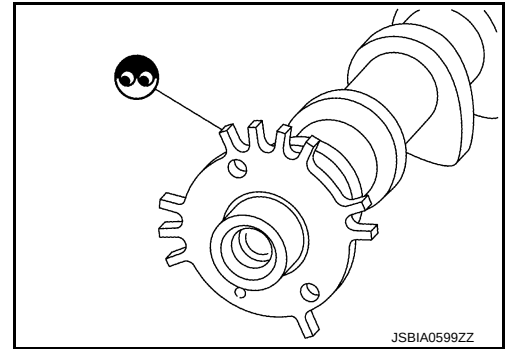
< DTC/CIRCUIT DIAGNOSIS >

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to [EM-80, "Exploded View"](#).



INFOID:0000000010775182

Component Inspection

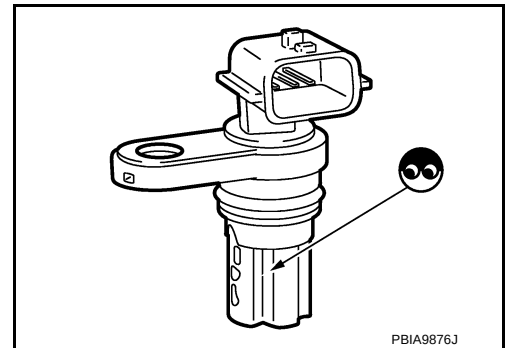
1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-1

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

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace camshaft position sensor (PHASE). Refer to [EM-80, "Exploded View"](#).



2.CHECK CAMSHAFT POSITION SENSOR (PHASE)-2

Check resistance camshaft position sensor (PHASE) terminals as follows.

CMP sensor (PHASE)		Resistance
+	—	
Terminal		
1	2	Except 0 Ω [at 25°C (77°F)]
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace camshaft position sensor (PHASE). Refer to [EM-80, "Exploded View"](#).

P0365 EXHAUST VALVE TIMING CONTROL POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0365 EXHAUST VALVE TIMING CONTROL POSITION SENSOR

DTC Description

INFOID:000000010775183

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0365	CMP SEN/CIRC-B1 (Camshaft position sensor circuit bank 1)	- EVT control position sensor signal is not sent to ECM during engine cranking. - EVT control position sensor signal is not sent to ECM during engine running. - The pulse signal sent from the EVT control position sensor to ECM is not in the normal pattern during engine running.

Possible Cause

- Harness or connectors
 - Exhaust valve timing control position sensor circuit is open or shorted.
 - Sensor power supply 2 circuit is shorted.
- Exhaust valve timing control position sensor
- Exhaust camshaft
- Starter motor
- Starting circuit
- Battery deterioration
- Sensor power supply 1 circuit sensors

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Device fix mode	• This mode fixes the IVT control solenoid valve and the EVT control solenoid valve in the reference position. • The intake manifold runner control valve motor is turned OFF (intake manifold runner control valve opens).

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

1. Start engine and let it idle for at least 5 seconds.
If engine does not start, crank engine for at least 2 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-287, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-2

1. Keep the engine speed at more than 800 rpm for at least 5 seconds.
2. Check 1st trip DTC.

P0365 EXHAUST VALVE TIMING CONTROL POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

Is 1st trip DTC detected?

- YES >> Proceed to [EC-287, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775184

1.CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

- YES >> GO TO 2.
NO >> Check starting system. Refer to [STR-19, "Work Flow"](#).

2.CHECK EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect exhaust valve timing (EVT) control position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVT control position sensor harness connector terminals.

EVT control position sensor			Voltage (Approx.)
Connector	+	−	
	Terminals		
F104	1	2	5 V

Is the inspection result normal?

- YES >> GO TO 8.
NO >> GO TO 3.

3.CHECK EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT-2

Check the voltage between EVT control position sensor harness connector and ground.

+		-	Voltage (Approx.)
EVT control position sensor			
Connector	Terminal		
F104	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 6.
NO >> GO TO 4.

4.CHECK EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT-3

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

+		-		Continuity
EVT control position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F104	1	F7	24	Existed

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK SENSOR POWER SUPPLY 1 CIRCUIT

P0365 EXHAUST VALVE TIMING CONTROL POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

Refer to [EC-322, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning parts.

6. CHECK EVT CONTROL POSITION SENSOR GROUND CIRCUIT

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

+		-		Continuity
EVT control position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F104	2	F7	42	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F7	11	Ground	Existed
E16	123		
	125		
	128		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

8. CHECK EVT CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between EVT control position sensor harness connector and ECM harness connector.

+		-		Continuity
EVT control position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F104	3	F7	46	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9. CHECK EVT CONTROL POSITION SENSOR

Refer to [EC-289, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace EVT control position sensor. Refer to [EM-80, "Exploded View"](#).

P0365 EXHAUST VALVE TIMING CONTROL POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

10.CHECK CAMSHAFT (EXT)

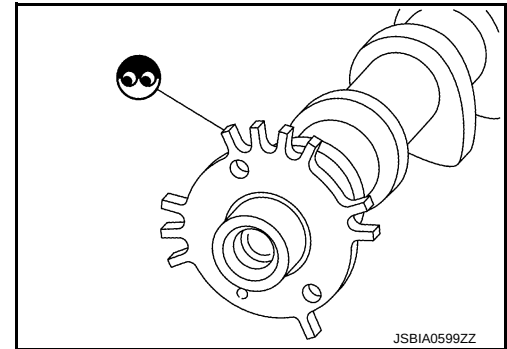
Check the following.

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to [EM-80, "Exploded View"](#).



INFOID:0000000010775185

Component Inspection

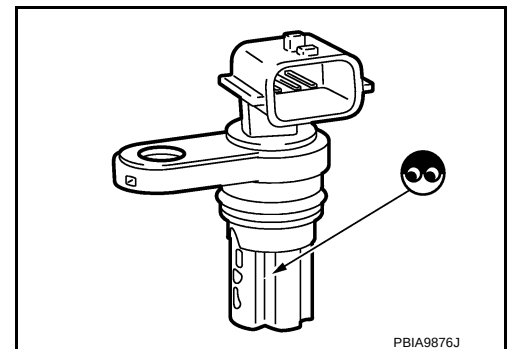
1.EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR-1

1. Turn ignition switch OFF.
2. Loosen the sensor mounting bolt.
3. Disconnect the EVT control position sensor harness connector.
4. Remove the EVT control position sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the EVT control position sensor. Refer to [EM-80, "Exploded View"](#).



2.EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR-2

Check resistance between EVT control position sensor terminals as shown below.

EVT control position sensor		Resistance
+	–	
Terminals		
1	2	Except 0 Ω [at 25°C (77°F)]
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the EVT control position sensor. Refer to [EM-80, "Exploded View"](#).

P0420 THREE WAY CATALYST FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0420 THREE WAY CATALYST FUNCTION

DTC Description

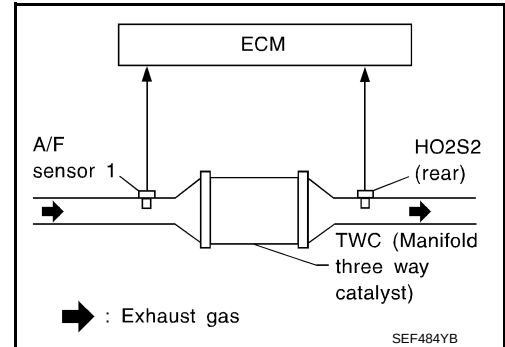
INFOID:000000010775186

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0420	TW CATALYST SYS-B1 (Catalyst system efficiency below threshold bank 1)	- Three way catalyst (manifold) does not operate properly. - Three way catalyst (manifold) does not have enough oxygen storage capacity.

POSSIBLE CAUSE

- Three way catalyst (manifold)
- Exhaust tube
- Intake air leaks
- Exhaust air leaks
- Fuel injector
- Fuel injector leaks
- Spark plug
- Improper ignition timing

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

TESTING CONDITION:

Do not hold engine speed for more than the specified minutes below.

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

Will CONSULT be used?

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

2. PERFORM DTC CONFIRMATION PROCEDURE-1

Ⓢ With CONSULT

1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. 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 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).

P0420 THREE WAY CATALYST FUNCTION

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

7. Open engine hood.
8. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode of "ENGINE" using CONSULT.
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 screen?

CMPLT >> GO TO 4.

INCMP >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

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".
NOTE:
It will take approximately 5 minutes.
If "CMPLT" is not displayed after 5 minutes, turn ignition switch OFF and cool down the engine. Retry from step 1 when "COOLAN TEMP/S" indication reaches to 70°C (158°F).

Does the indication change to "CMPLT"

YES >> GO TO 4.

NO >> GO TO 2.

4.PERFORM DTC CONFIRMATION PROCEDURE-3

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-291, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

 Without CONSULT

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.

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			
F8	57	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 V → 0 - 0.3 V → 0.6 - 1.0 V

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC-291, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000010775187

1.CHECK EXHAUST SYSTEM

Visually check exhaust tubes, three way catalyst and muffler for dent.

P0420 THREE WAY CATALYST FUNCTION

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

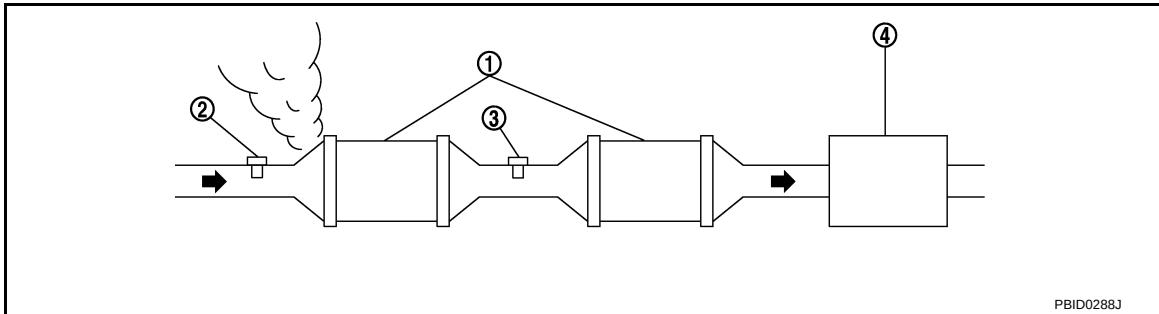
Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts. Refer to [EX-6, "Exploded View"](#).

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).



1: Three way catalyst

2: A/F sensor 1

3: HO2S2

4: Muffler

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts. Refer to [EX-6, "Exploded View"](#).

3.CHECK INTAKE AIR LEAK AND PCV HOSE

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts. Refer to [EX-6, "Exploded View"](#).

4.CHECK IGNITION TIMING AND IDLE SPEED

Check the following items. Refer to [EC-149, "Work Procedure"](#).

For specification, refer to [EC-431, "Ignition Timing"](#)

For specification, refer to [EC-431, "Idle Speed"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Follow the [EC-149, "Work Procedure"](#).

5.CHECK FUEL INJECTOR

Check the fuel injector. Refer to [EC-386, "Component Function Check"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform [EC-386, "Diagnosis Procedure"](#).

6.CHECK FUNCTION OF IGNITION COIL-1

CAUTION:

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

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

NOTE:

Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.

P0420 THREE WAY CATALYST FUNCTION

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

7. Remove ignition coil and spark plug of the cylinder to be checked. Refer to [EM-54, "Exploded View"](#).
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.

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-2

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-399, "Diagnosis Procedure"](#).

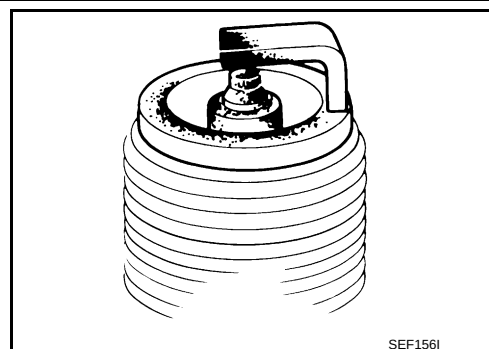
8.CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [EM-54, "Exploded View"](#).

NO >> Repair or clean spark plug. Refer to [EM-54, "Exploded View"](#). Then GO TO 9.



9.CHECK FUNCTION OF IGNITION COIL-3

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-54, "Exploded View"](#).

10.CHECK FUEL INJECTOR

P0420 THREE WAY CATALYST FUNCTION

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch OFF.
2. Cool down the engine and make sure that there is no combustible objects around.
3. Reconnect all harness connectors.
4. Remove fuel tube ASSY. Refer to [EM-48, "Exploded View"](#). Keep fuel hose and all fuel injectors connected to fuel tube.
5. Reconnect all fuel injector harness connectors disconnected.
6. Disconnect all ignition coil harness connectors.
7. Prepare pans or saucers under each fuel injector.
8. Crank engine for about 3 seconds.

The fuel does not drip from the fuel injector.

Is the inspection result normal?

- YES >> Replace three way catalyst (manifold). Refer to [EM-37, "Removal and Installation"](#).
- NO >> Replace the fuel injector(s) from which fuel is dripping. Refer to [EM-48, "Exploded View"](#). Always replace O-ring and trip with new one.

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Description

INFOID:0000000010775188

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0444	PURG VOLUME CONT/V (Evaporative emission system purge control valve circuit open)	An excessively low voltage signal is sent to ECM through the EVAP canister purge volume control solenoid valve.

POSSIBLE CAUSE

- Harness or connectors (EVAP canister purge volume control solenoid valve circuit is open or shorted.)
- EVAP canister purge volume control solenoid valve

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 13 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-295, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775189

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		
F32	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

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	
F32	1	F72	73	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 malfunctioning part.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE INPUT SIGNAL CIRCUIT

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

+		-		Continuity
EVAP canister purge volume control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F32	2	F8	77	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

- YES-1 >> With CONSULT: GO TO 4.
YES-2 >> Without CONSULT: GO TO 5.
NO >> Repair or replace malfunctioning part.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Ⓔ With CONSULT

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
4. Check that engine speed varies according to the valve opening.

Is the inspection result normal?

- YES >> Refer to [EC-296, "Component Inspection"](#).
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-296, "Component Inspection"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to [EM-33, "Exploded View"](#).

Component Inspection

INFOID:0000000010775190

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Ⓔ With CONSULT

1. Turn ignition switch OFF.

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Start the engine.
5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
6. Touch "Qd" or "Qu" on CONSULT screen to adjust "PURG VOL C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve as per the following conditions.

Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed

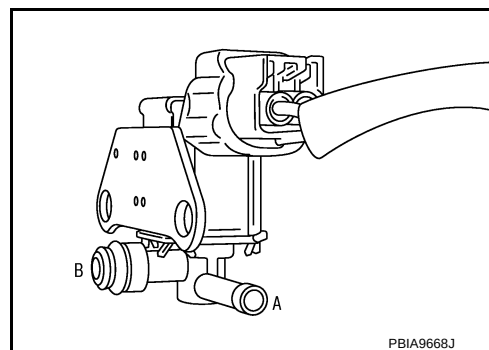
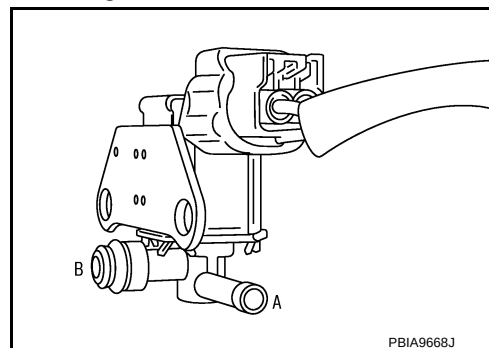
⊗ Without CONSULT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Check air passage continuity of EVAP canister purge volume control solenoid valve as per the following conditions.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Replace EVAP canister purge volume control solenoid valve. Refer to [EM-33. "Exploded View"](#).



P0500 VSS

DTC Description

INFOID:000000010775191

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 DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0500	VEHICLE SPEED SENSOR A (Vehicle speed sensor "A")	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).

POSSIBLE CAUSE

- Combination meter
- ABS actuator and electric unit (control unit)
- Wheel sensor
- TCM
- Output speed sensor

FAIL-SAFE

Engine operating condition in fail-safe mode		
Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).
	Idle speed control	Stops feedback control of idle speed and controls with specified speed.
	Recovery speed control at decelerating	Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.
	Idle neutral control	Stops idle neutral control.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0500 is displayed with DTC UXXXX or P0607, first perform the trouble diagnosis for DTC UXXXX or P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-109, "DTC Index"](#).
NO >> GO TO 2.

2. PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 10 V or more at idle.

>> GO TO 3.

3.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-299, "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775192

1.CHECK DTC PRIORITY

If DTC P0500 is displayed with DTC UXXXX or P0607, first perform the trouble diagnosis for DTC UXXXX or P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-109, "DTC Index"](#).
 NO >> GO TO 2.

2.CHECK DTC WITH TCM

Check DTC with TCM. Refer to [TM-288, "DTC Index"](#).

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Perform trouble shooting relevant to DTC indicated.

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

Check DTC with ABS actuator and electric unit (control unit). Refer to [BRC-84, "DTC Index"](#).

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> Perform trouble shooting relevant to DTC indicated.

4.CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to [MWI-86, "CONSULT Function"](#).

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Perform trouble shooting relevant to DTC indicated.

5.CHECK INPUT SPEED SENSOR

Check input speed sensor. Refer to [TM-335, "Diagnosis Procedure"](#).

Is the inspection result normal?

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

6.CHECK WHEEL SENSOR

Check wheel sensor. Refer to [BRC-127, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Repair or replace malfunctioning part.

P0506 ISC SYSTEM

DTC Description

INFOID:000000010775193

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 DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0506	ISC SYSTEM	The idle speed is less than the target idle speed by 100 rpm or more.

POSSIBLE CAUSE

- Electric throttle control actuator
- Intake air leaks

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

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

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-109, "DTC Index"](#).
 NO >> GO TO 2.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test. When the target idle speed is not the specified value, perform [EC-426, "Inspection"](#) before conducting DTC Confirmation Procedure.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.
- Always perform at a temperature above -10°C (14°F).

NOTE:

In the highlands of over 2,400m altitude, DTC may be detected without abnormality, but that case is not abnormal if the DTC is not detected when "DTC confirmation procedure" is performed at under 2,400m altitude.

>> GO TO 3.

3. 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 let it idle for at least 1 minutes.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-301, "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

INFOID:000000010775194

1.CHECK DTC PRIORITY

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

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC-109. "DTC Index"](#).

NO >> GO TO 2.

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 the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part.

3.REPLACE ECM

1. Stop the engine.
2. Replace ECM. Refer to [EC-430. "Removal and Installation"](#).

>> INSPECTION END

A

EC

C

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M

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P

P0507 ISC SYSTEM

DTC Description

INFOID:000000010775195

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 DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0507	ISC SYSTEM	The idle speed is more than the target idle speed by 200 rpm or more.

POSSIBLE CAUSE

- Electric throttle control actuator
- Intake air leak
- PCV system

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC-109, "DTC Index"](#).

NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test. When the target idle speed is not the specified value, perform [EC-426, "Inspection"](#) before conducting DTC Confirmation Procedure.

TESTING CONDITION:

- **Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.**
- **Always perform at a temperature above -10°C (14°F).**

NOTE:

In the highlands of over 2,400m altitude, DTC may be detected without abnormality, but that case is not abnormal if the DTC is not detected when "DTC confirmation procedure" is performed at under 2,400m altitude.

>> GO TO 3.

3.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 let it idle for at least 1 minutes.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-303, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010775196

1.CHECK DTC PRIORITY

If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC-109, "DTC Index"](#).

NO >> GO TO 2.

2.CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.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 the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.REPLACE ECM

1. Stop engine.

2. Replace ECM. Refer to [EC-430, "Removal and Installation"](#).

>> INSPECTION END

A

EC

C

D

E

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P

P0520 EOP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0520 EOP SENSOR

DTC Description

INFOID:0000000010775197

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0520	EOP SENSOR/SWITCH (Engine oil pressure sensor/switch circuit)	- A voltage signal transmitted from the engine oil pressure sensor is lower than 0.3 V. - A voltage signal transmitted from the engine oil pressure sensor is higher than 5.02 V.

POSSIBLE CAUSE

- Harness or connectors
 - EOP sensor circuit is open or shorted.
 - Sensor power supply 2 circuit is shorted.
- EOP sensor
- Sensor power supply 2 circuit

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.CHECK ENGINE OIL LEVEL

Check engine oil level. Refer to [LU-9, "Inspection"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform [LU-9, "Inspection"](#).

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 5 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to [EC-308, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775198

1.CHECK EOP SENSOR POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect engine oil pressure (EOP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EOP sensor harness connector terminals.

EOP sensor			Voltage (Approx.)
Connector	+	−	
	Terminal		
F106	3	1	5 V

P0520 EOP SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK EOP SENSOR POWER SUPPLY CIRCUIT-2

Check the voltage between EOP sensor harness connector and ground.

+		-	Voltage (Approx.)
EOP sensor			
Connector	Terminal		
F106	3	Ground	5 V

Is the inspection result normal?

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

3.CHECK EOP SENSOR POWER SUPPLY CIRCUIT-3

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	
F106	3	F7	23	Existed

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace malfunctioning part.

4.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform [EC-405, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace malfunctioning part.

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	
F106	1	F7	39	Existed

Is the inspection result normal?

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

6.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

P0520 EOP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

+		-	Continuity
ECM			
Connector	Terminal		
F7	1	Ground	Existed
E16	123		
	125		
	128		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace malfunctioning part.

7.CHECK EOP SENSOR INPUT 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	
F106	2	F7	29	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace malfunctioning part.

8.CHECK EOP SENSOR

Check eop sensor. Refer to [EC-306, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EOP sensor. Refer to [EM-106, "Exploded View"](#).

Component Inspection

INFOID:000000010775199

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		Resistance
+	—	
Terminal		
1	2	4 - 10 kΩ
	3	2 - 8 kΩ
2	1	4 - 10 kΩ
	3	1 - 3 kΩ
3	1	2 - 8 kΩ
	2	1 - 3 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EOP sensor. Refer to [EM-106, "Exploded View"](#).

P0524 ENGINE OIL PRESSURE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0524 ENGINE OIL PRESSURE

DTC Description

INFOID:000000010775200

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0524	ENGINE OIL PRESSURE (Engine oil pressure too low)	ECM detects that an EOP sensor signal voltage applied to ECM remains lower than the specified value continuously for 10 seconds or more when the engine speed is 1,000 rpm or more.

POSSIBLE CAUSE

- Decrease in engine oil pressure
- Decrease in engine oil level
- Engine oil condition
- EOP sensor
- Engine body

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Others	• ECM illuminates engine oil pressure warning lamp on the combination meter. • Engine speed will not rise more than 4,000rpm due to the fuel cut. • Fail-safe is canceled when ignition switch OFF → ON.

DTC CONFIRMATION PROCEDURE

CAUTION:

If **EC-308, "Diagnosis Procedure"** is unfinished, be sure to perform Step 3 and 4.

1.PRECONDITIONING-1

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

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

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is 10 V or more at idle.

>> GO TO 2.

2.PRECONDITIONING-2

Is "Diagnosis Procedure" of DTC P0524 finished?

YES >> GO TO 5.

NO >> GO TO 3.

3.CHECK ENGINE OIL LEVEL

Check engine oil level. Refer to **LU-9, "Inspection"**.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Proceed to **EC-308, "Diagnosis Procedure"**.

4.CHECK ENGINE OIL PRESSURE

 With CONSULT

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.

P0524 ENGINE OIL PRESSURE

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

3. Start the engine and check that "EOP SENSOR" changes, according to engine speeds.

Monitor item	Condition		Value (Approx.)
EOP SENSOR	- Engine oil temperature: 80°C (176°F) - Selector lever: P or N position - Air conditioner switch: OFF - No load	Engine speed: Idle	1,450 mV or more
		Engine speed: 2,000 rpm	2,850 mV or more

⊗ Without CONSULT

Check engine oil level. Refer to [LU-9, "Inspection"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Proceed to [EC-308, "Diagnosis Procedure"](#).

5.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Maintain the following conditions for at least 10 consecutive seconds.

Selector lever position	N or P position
Engine coolant temperature	70°C (158°F) or more
Engine speed	1,700 rpm or more

NOTE:

With engine speed set around 4,000 rpm, the phenomenon can be reproduced more easily.

3. Check DTC.

Is DTC detected?

YES >> Proceed to [EC-308, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775201

1.CHECK ENGINE OIL LEVEL

1. Turn ignition switch OFF.
2. Check engine oil level. Refer to [LU-9, "Inspection"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 4.

2.CHECK ENGINE OIL PRESSURE

Ⓟ With CONSULT

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Start the engine and check that "EOP SENSOR" changes, according to engine speeds.

Monitor item	Condition		Value (Approx.)
EOP SENSOR	- Engine oil temperature: 80°C (176°F) - Selector lever: P or N position - Air conditioner switch: OFF - No load	Engine speed: Idle	1,450 mV or more
		Engine speed: 2,000 rpm	2,850 mV or more

⊗ Without CONSULT

Check engine oil pressure. Refer to [LU-9, "Inspection"](#).

Is the inspection result normal?

P0524 ENGINE OIL PRESSURE

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 3.
NO >> Check oil pump. Refer to [LU-16, "Exploded View"](#).

3.CHECK EOP SENSOR

Check EOP sensor. Refer to [EC-306, "Component Inspection"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace EOP sensor. Refer to [LU-16, "Exploded View"](#).

4.CHECK ENGINE OIL LEAKAGE

Check engine oil leakage. Refer to [LU-9, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace malfunctioning part.

5.CHECK CAUSE OF ENGINE OIL CONSUMPTION

Check the following item.

Step	Inspection item	Equipment	Standard	Reference
1	PCV valve	EC-429, "Inspection"		
2	Exhaust front tube	Visual	- No blocking - No abnormal sounds	—
3	Oil pump ASSY	Visual	- No blocking - No abnormal sounds	—
4	- Piston - Piston pin - Piston ring	- Piston to piston pin oil clearance EM-115, "Inspection" - Piston ring side clearance EM-115, "Inspection" - Piston ring end gap EM-115, "Inspection"		
5	Cylinder block	- Cylinder block top surface distortion EM-115, "Inspection" - Piston to cylinder bore clearance EM-115, "Inspection"		

>> Repair or replace malfunctioning part.

Component Inspection

INFOID:0000000010775202

1.CHECK EOP SENSOR

- Turn ignition switch OFF.
- Disconnect EOP sensor harness connector.
- Check resistance between EOP sensor connector terminals.

EOP sensor		Resistance
+	—	
Terminal		
1	2	4 - 10 kΩ
	3	2 - 8 kΩ
2	1	4 - 10 kΩ
	3	1 - 3 kΩ
3	1	2 - 8 kΩ
	2	1 - 3 kΩ

Is the inspection result normal?

P0524 ENGINE OIL PRESSURE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

YES >> INSPECTION END

NO >> Replace EOP sensor. Refer to [EM-106, "Exploded View"](#).

P0603, P062F ECM

DTC Description

INFOID:000000010775203

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0603	ECM BACK UP/CIRCUIT [Internal Control Module Keep Alive Memory (KAM) Error]	ECM buck up system does not function properly.
P062F	CONTROL MODULE (Internal control module EEPROM error)	EEPROM (built-in microcomputer) system internal ECM does not function properly.

POSSIBLE CAUSE

DTC P0603

- Harness or connectors (ECM power supply circuit is open or shorted.)
- ECM

DTC P062F

ECM

FAIL-SAFE

P0603

Engine operating condition in fail-safe mode		
Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
	Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction.

P062F

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Perform the following procedure before performing DTC Confirmation Procedure.

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P062F

1. Start engine and wait at least 10 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Repeat steps 1 and 2 for 4 times.
4. Turn ignition switch ON.
5. Erase DTC.
6. Turn ignition switch OFF and wait at least 10 seconds.
7. Start engine and wait for 10 seconds.
8. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-312, "Diagnosis Procedure"](#).

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0603

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON and wait at least 10 seconds.
3. Turn ignition switch OFF and wait at least 5 minutes.
4. Turn ignition switch ON and wait at least 10 seconds.
5. Repeat steps 3 and 4 for 5 times.
6. Turn ignition switch ON.
7. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-312, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010775204

1.INSPECTION START

Check that the battery negative terminal is not disconnected during ignition switch ON.

Is the inspection result normal?

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

2.ERASE DTC

1. Start the engine and let it idle at least 10 seconds.
2. Turn ignition switch OFF.
3. Repeat steps 1 and 2 for 4 times.
4. Erase DTC.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start the engine and let it idle for 10 seconds.
7. Check 1st trip DTC.

Is DTC P062F detected again?

YES >> Replace ECM. Refer to [EC-430, "Removal and Installation"](#).
NO >> INSPECTION END

3.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to [EC-162, "Diagnosis Procedure"](#).

Is the inspection result normal?

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

4.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to [EC-311, "DTC Description"](#).

Is the DTC P0603 or P062F detected again?

YES >> Replace ECM. Refer to [EC-430, "Removal and Installation"](#).
NO >> INSPECTION END

P0604 ECM

DTC Description

INFOID:0000000010775205

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0604	ECM [Internal control module random access memory (RAM) error]	Malfunction in the internal RAM of ECM.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Others	(Computing part of ECM does not operate normally.) ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

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. Turn ignition switch ON (engine stopped) and wait at least 20 minutes.

CAUTION:

Never start engine during this procedure.

2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-313, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775206

1. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to [EC-313, "DTC Description"](#).

Is the 1st trip DTC P0604 displayed again?

YES >> Replace ECM. Refer to [EC-430, "Removal and Installation"](#).

NO >> INSPECTION END

P0605 ECM

DTC Description

INFOID:0000000010775207

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0605	ECM [Internal control module read only memory (ROM) error]	Malfunction in the internal ROM of ECM.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Others	(Computing part of ECM does not operate normally.) ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON (engine stopped) and wait least 20 minutes.

CAUTION:

Never start engine during this procedure.

2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-314, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010775208

1. INSPECTION START

1. Erase self-diagnostic results. Refer to [EC-81, "CONSULT Function"](#).
2. Perform "DTC Confirmation Procedure". Refer to [EC-314, "DTC Description"](#).

Does 1st trip DTC P0605 duplicated?

YES >> Replace ECM. Refer to [EC-430, "Removal and Installation"](#).

NO >> INSPECTION END

P0606 ECM

DTC Description

INFOID:000000010775209

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0606	CONTROL MODULE (Control module processor)	Malfunction in ECM processor.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Others	(Computing part of ECM does not operate normally.) ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

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

1. Turn ignition switch ON (engine stopped) and wait at least 10 seconds.

CAUTION:

Never start engine during this procedure.

2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-316, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Start engine.
2. Rev up the engine quickly to approximately 3,000 rpm under unloaded condition and completely release the accelerator pedal.
3. Let the engine idle and wait at least 10 seconds.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-316, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775210

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure for 3 times. Refer to [EC-315, "DTC Description"](#).

Is the 1st trip DTC P0606 displayed again?

- YES >> Replace ECM. Refer to [EC-430, "Removal and Installation"](#).
NO >> INSPECTION END

P0607 ECM

DTC Description

INFOID:0000000010775211

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 DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0607	ECM (Control module performance)	When detecting error during the initial diagnosis of CAN controller of ECM.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Engine operating condition in fail-safe mode		
Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
	Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

- YES >> Proceed to [EC-317, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775212

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform "DTC Confirmation Procedure". Refer to [EC-317, "DTC Description"](#).

Is 1st trip DTC detected?

- YES >> Replace ECM. Refer to [EC-430, "Removal and Installation"](#).
- NO >> INSPECTION END

P0611 ECM PROTECTION**DTC Description**

INFOID:0000000010775213

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 DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0611	FIC MODULE	ECM overheat protection control is activated.

POSSIBLE CAUSE

ECM overheating

FAIL-SAFE

Not applicable

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-318, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010775214

1.INSPECTION START

1. "DTC Confirmation Procedure". Refer to [EC-318, "DTC Description"](#).
2. Check 1st trip DTC.

Is the 1st trip DTC P0611 detected?

YES >> Proceed to [EC-318, "DTC Description"](#).

NO >> Explain the customer about the activation of the protection function.

P062B ECM

DTC Description

INFOID:0000000010775215

This DTC is detected when the ECM-integrated injector driver unit has a malfunction.

DTC Logic

INFOID:0000000010775216

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P062B	ECM (Internal control module fuel injector control performance)	Injector driver unit is malfunctioning.

POSSIBLE CAUSE

- Harness or connectors (Fuel injector circuit is open or shorted.)
- Battery power supply
- ECM (Injector driver unit)

FAIL-SAFE

Engine operating condition in fail-safe mode		
Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).

NOTE:

Fail-safe mode may not start depending on malfunction type of ECM.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more 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-319, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010775217

1. CHECK FUEL INJECTOR

Check fuel injector. Refer to [EC-386, "Component Function Check"](#).

Is inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

- 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-319, "DTC Logic"](#).
4. Check 1st trip DTC.

Is the DTC P062B displayed again?

- YES >> Replace ECM. Refer to [EC-430, "Removal and Installation"](#).
NO >> INSPECTION END

P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0643 SENSOR POWER SUPPLY

DTC Description

INFOID:000000010775218

ECM supplies a voltage of 5 V to some of the sensors systematically divided into 2 groups, respectively. Accordingly, when a short circuit develops in a sensor power source, a malfunction may occur simultaneously in the sensors belonging to the same group as the short-circuited sensor.

Sensor power supply 1

- CKP sensor (POS)
- APP sensor 1
- Exhaust valve timing control position sensor
- Electric throttle control actuator

NOTE:

If sensor power supply 1 circuit is malfunctioning, DTC P0643 is displayed.

Sensor power supply 2

- Atmospheric pressure sensor
- Refrigerant pressure sensor
- Fuel rail pressure sensor
- CMP sensor
- APP sensor 2
- Engine oil pressure sensor

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0643	SENSOR POWER/CIRC (Sensor reference voltage "A" circuit high)	ECM detects that the voltage of sensor power supply 1 is excessively low or high.

POSSIBLE CAUSE

- Harness or connectors
- APP sensor 1 circuit is shorted.
- CKP sensor (POS) circuit is shorted.
- Intake manifold runner control valve position sensor circuit is shorted.
- TP sensor circuit is shorted.
- Refrigerant pressure sensor circuit is shorted.
- Accelerator pedal position sensor
- CKP sensor (POS)
- Intake manifold runner control valve position sensor
- Throttle position sensor
- Refrigerant pressure sensor

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

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-322, "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775219

1.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.

+		-	Voltage (Approx.)	
APP sensor				
Connector	Terminal			
CVT models	E110	4	Ground	5 V
M/T models	E167			

Is the inspection result normal?

- YES >> Proceed to [EC-373, "Component Inspection"](#).
 NO >> GO TO 2.

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
F7	21	Crankshaft position sensor	CVT models	F20	1
			M/T models	F126	
	24	Exhaust valve timing control position sensor	F104		1
F8	60	Throttle position sensor	F29		2
E16	122	APP sensor 1	CVT models	E110	4
			M/T models	E167	

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Repair or replace malfunctioning part.

3.CHECK COMPONENTS

Check the following.

- Exhaust valve timing control position sensor (Refer to [EC-407, "Diagnosis Procedure"](#))
- Crankshaft position sensor (Refer to [EC-279, "Component Inspection"](#))
- Throttle position sensor (Refer to [EC-213, "Component Inspection"](#))

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Repair or replace malfunctioning part.

P0850 REVERSE/NEUTRAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P0850 REVERSE/NEUTRAL POSITION SWITCH

CVT

CVT : DTC Description

INFOID:0000000010775220

Transmission range switch is turn ON when the selector lever is P or N.
ECM detects the position because the continuity of the line (the ON) exists.

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0850	P-N POS SW/CIRCUIT (Park/neutral switch input circuit)	The signal of transmission range switch is not changed in the process of engine starting and driving.

POSSIBLE CAUSE

- Harness or connectors (Park/neutral position signal circuit is open or shorted.)
- Transmission range switch

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

With CONSULT

NOTE:

Checks whole function of the park / neutral position signal circuit by this procedure. During this check, 1st trip DTC may not be confirmed.

1. Turn ignition switch ON.
2. Select "P/N POSI SW" in "DATA MONITOR" mode of "ENGINE" using CONSULT. Then check the "P/N POSI SW" signal as per the following conditions.

Selector lever position	Known-good signal
P or N position	ON
Except above position	OFF

Without CONSULT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground as per the following conditions.

+		−	Condition		Voltage (Approx.)
ECM					
Connector	Terminal				
F7	14	Ground	Selector lever	P or N	Battery voltage
				Except above	0 V

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC-323, "CVT : Diagnosis Procedure"](#).

CVT : Diagnosis Procedure

INFOID:0000000010775221

1.CHECK TRANSMISSION RANGE SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect transmission range switch harness connector.
3. Turn ignition switch ON.

P0850 REVERSE/NEUTRAL POSITION SWITCH

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

4. Check the voltage between transmission range switch harness connector and ground.

+		-	Voltage
Transmission range switch			
Connector	Terminal		
F22	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform the trouble diagnosis for power supply circuit.

2.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	
F22	2	F7	14	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 TRANSMISSION RANGE SWITCH

Check the transmission range switch. Refer to [TM-325, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace transaxle assembly. Refer to [TM-450, "Removal and Installation"](#).

6M/T

6M/T : DTC Description

INFOID:0000000010775222

Reverse / neutral position switch is turn ON when the selector lever is R or N.
ECM detects the position because the continuity of the line (the ON) exists.

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0850	P-N POS SW/CIRCUIT (Reverse / neutral switch input circuit)	The signal of reverse / neutral position switch is not changed in the process of engine starting and driving.

POSSIBLE CAUSE

- Harness or connectors (Reverse / neutral position signal circuit is open or shorted.)
- Reverse / neutral position switch

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

 With CONSULT

NOTE:

P0850 REVERSE/NEUTRAL POSITION SWITCH

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

Checks whole function of the reverse / neutral position signal circuit by this procedure. During this check, 1st trip DTC may not be confirmed.

1. Turn ignition switch ON.
2. Select "P/N POSI SW" in "DATA MONITOR" mode of "ENGINE" using CONSULT. Then check the "P/N POSI SW" signal as per the following conditions.

Selector lever position	Known-good signal
R or N position	ON
Except above position	OFF

Without CONSULT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground as per the following conditions.

+		-	Condition		Voltage (Approx.)
ECM					
Connector	Terminal				
F7	14	Ground	Selector lever	R or N	Battery voltage
				Except above	0 V

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC-325, "6M/T : Diagnosis Procedure"](#).

6M/T : Diagnosis Procedure

INFOID:0000000010775223

1.CHECK REVERSE / NEUTRAL POSITION SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect reverse / neutral position switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between reverse / neutral position switch harness connector and ground.

+		–	Voltage
Reverse / neutral position switch			
Connector	Terminal		
F46	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK REVERSE / NEUTRAL POSITION SWITCH SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between reverse / neutral position switch harness connector and ECM harness connector.

+		-		Continuity
Reverse / neutral position switch		ECM		
Connector	Terminal	Connector	Terminal	
F46	3	F7	14	Existed

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

Is the inspection result normal?

YES >> GO TO 3.

P0850 REVERSE/NEUTRAL POSITION SWITCH

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

3.CHECK REVERSE / NEUTRAL POSITION SWITCH

Check the reverse / neutral position switch. Refer to [TM-24, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace reverse / neutral position switch. Refer to [TM-41, "Removal and Installation"](#).

P1078 EVT CONTROL POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P1078 EVT CONTROL POSITION SENSOR

DTC Description

INFOID:0000000010775224

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1078	EXH TIM SEN/CIRC-B1 (Exhaust timing sensor circuit bank 1)	An excessively high or low voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors
- Exhaust valve timing control position sensor circuit is open or shorted.
- Sensor power supply 2 circuit is shorted.
- Exhaust valve timing control position sensor
- Accumulation of debris to the signal plate of the camshaft
- Sensor power supply 2 circuit

FAIL-SAFE

Not applicable

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-327. "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-44. "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775225

1.CHECK EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect exhaust valve timing (EVT) control position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVT control position sensor harness connector terminals.

EVT control position sensor			Voltage (Approx.)
Connector	+	−	
	Terminal		
F104	1	2	5 V

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> GO TO 2.

P1078 EVT CONTROL POSITION SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

2.CHECK EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT-2

Check the voltage between EVT control position sensor harness connector and ground.

+		-	Voltage (Approx.)
EVT control position sensor			
Connector	Terminal		
F104	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 3.

3.CHECK EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT-3

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

+		-		Continuity
EVT control position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F104	1	F7	24	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning part.

4.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform [EC-405. "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace malfunctioning part.

5.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	
F104	2	F7	42	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

6.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

P1078 EVT CONTROL POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

+		-	Continuity
ECM			
Connector	Terminal		
F7	11	Ground	Existed
F8	54		
	55		
	56		
E16	123		
	125		
	128		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace malfunctioning part.

7.CHECK EVT CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between EVT control position sensor harness connector and ECM harness connector.

+		-		Continuity
EVT control position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F104	3	F7	46	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace malfunctioning part.

8.CHECK EVT CONTROL POSITION SENSOR

Check the EVT control position sensor. Refer to [EC-329, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVT control position sensor. Refer to [EM-80, "Exploded View"](#).

9.CHECK EXHAUST CAMSHAFT

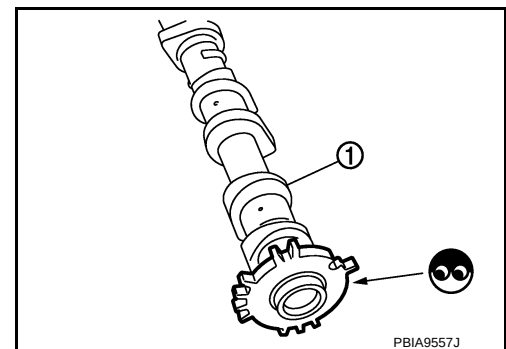
Check the following.

- 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 >> INSPECTION END

NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to [EM-81, "Removal and Installation"](#).



Component Inspection

INFOID:0000000010775226

1.EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR-1

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.

P1078 EVT CONTROL POSITION SENSOR

[MR20DD]

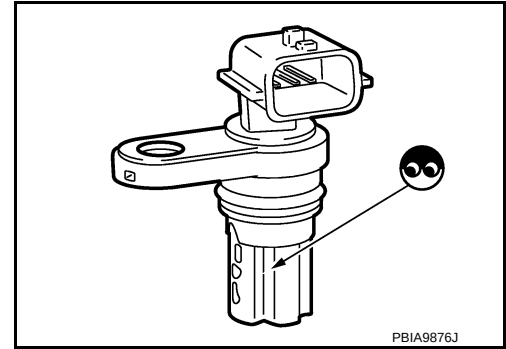
< DTC/CIRCUIT DIAGNOSIS >

3. Disconnect EVT control position sensor harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace EVT control position sensor. Refer to [EM-80, "Exploded View"](#).



2. EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR-2

Check the resistance between EVT control position sensor terminals as shown below.

EVT control position sensor		Resistance
+	–	
Terminal		
1	2	Except 0 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-80, "Exploded View"](#).

P1197 OUT OF GAS

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P1197 OUT OF GAS

DTC Description

INFOID:000000010775227

This diagnosis result is detected when the fuel level of the fuel tank is extremely low and the engine does not run normally.

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1197	FUEL RUN OUT	- Fuel rail pressure remains at 1.1 MPa (11 bar, 11.2 kg/cm², 159.5 psi) or less for 5 seconds or more with the fuel level too low. - Fuel rail pressure remains 2.7 MPa (27 bar, 27.5 kg/cm², 392 psi) lower than a target fuel pressure for 5 seconds or more with the fuel level too low.

POSSIBLE CAUSE

- Fuel cut
- Harness or connectors (Fuel pump circuit is open or shorted.)
- Fuel pump
- Fuel pressure regulator
- Fuel pump system
- Harness or connectors (High pressure fuel pump circuit is open or shorted.)
- High pressure fuel pump
- High pressure fuel pump system
- Fuel rail pressure sensor
- Hose disconnection

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Others	Engine torque is limited.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

Start the engine.

Does the engine start?

YES >> GO TO 3.

NO >> Proceed to [EC-332. "Diagnosis Procedure"](#).

3. PERFORM DTC CONFIRMATION PROCEDURE-2

- Start engine and warm it up to normal operating temperature.

NOTE:

For best results, warm up the engine until "COOLANT TEMP/S" on "DATA MONITOR" mode of "ENGINE" using CONSULT reaches at least 70°C (158°F).

< DTC/CIRCUIT DIAGNOSIS >

2. Keep the engine speed at 3,500 rpm for 5 seconds and let it idle at least 1 minute.
3. Check 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-332, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775228

1. REFUEL THE VEHICLE

1. Refuel 10 liter (8 Imp qt).

CAUTION:

Never refuel more than 10 liter.

2. Start the engine and keep the engine speed at 3,000 rpm for 30 seconds.

NOTE:

For best results, warm up the engine until "COOLAN TEMP/S" on "DATA MONITOR" mode of "ENGINE" using CONSULT reaches at least 70°C (158°F).

3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Turn ignition switch ON.
7. Erase DTC.
8. Start engine and let it idle for at least 60 seconds.
9. Perform DTC Confirmation Procedure, again. Refer to [EC-331, "DTC Description"](#).

Is 1st trip DTC detected?

YES >> GO TO 2.

NO >> INSPECTION END

2. CHECK FUEL PUMP

Check fuel pump. Refer to [EC-391, "Component Function Check"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part.

3. CHECK HIGH PRESSURE FUEL PUMP

Check high pressure fuel pump. Refer to [EC-394, "Component Function Check"](#).

Is the inspection result normal?

YES >> Check fuel hose connection.

NO >> Repair or replace malfunctioning part.

P1212 TCS COMMUNICATION LINE

DTC Description

INFOID:0000000010775229

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 DETECTION LOGIC

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1212	TCS/CIRC (TCS/CIRC)	ECM can not receive the information from "ABS actuator and electric unit (control unit)" continuously.

POSSIBLE CAUSE

- Harness or connectors (CAN communication line is open or shorted.)
- ABS actuator and electric unit (control unit)
- Dead (Weak) battery

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1212 is displayed with DTC UXXXX or P0607, first perform the trouble diagnosis for DTC UXXXX or P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-109, "DTC Index"](#).
 NO >> GO TO 2.

2.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 3.

3.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-333, "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775230

1.CHECK DTC PRIORITY

If DTC P1212 is displayed with DTC UXXXX or P0607, first perform the trouble diagnosis for DTC UXXXX or P0607.

Is applicable DTC detected?

P1212 TCS COMMUNICATION LINE

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Perform diagnosis of applicable. Refer to [EC-109, "DTC Index"](#).
NO >> GO TO 2.

2.PERFORM BASIC INSPECTION TO CHECK THE BRAKE CONTROL SYSTEM

Perform basic inspection to check the brake control system. Refer to [BRC-95, "Work Flow"](#).

- >> Repair or replace malfunctioning part.

P1217 ENGINE OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P1217 ENGINE OVER TEMPERATURE

DTC Description

INFOID:000000010775231

DTC DETECTION LOGIC

NOTE:

ECM controls cooling fan to the maximum speed when receives the signal abnormality of each sensor, CAN and IPDM E/R, and severed wire short circuit abnormality.

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1217	ENG OVER TEMP (Engine over temperature)	Engine coolant temperature reaches an abnormally high temperature.

CAUTION:

When a malfunction is indicated, be sure to exchange the coolant and engine oil.

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

POSSIBLE CAUSE

- Harness or connectors (Cooling fan circuit is open or shorted.)
- IPDM E/R
- Cooling fan relay
- Cooling fan motor
- Cooling fan
- Radiator hose
- Radiator
- Radiator cap
- Water pump
- Thermostat
- Water control valve
- Amount of engine coolant

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Others	Engine speed will not rise more than 1,800rpm due to the fuel cut.

PERFORM DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1217 is displayed with DTC UXXXX or P0607, first perform the trouble diagnosis for DTC UXXXX or P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-109. "DTC Index"](#).
NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK-1

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.

P1217 ENGINE OVER TEMPERATURE

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

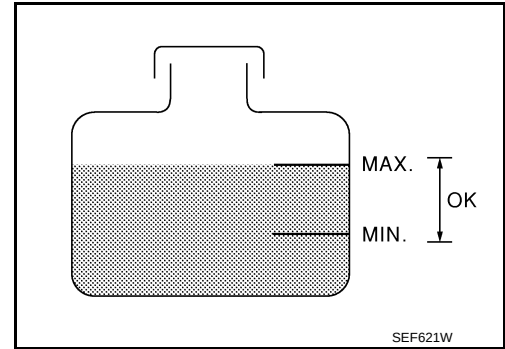
Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.

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

- YES >> Proceed to [EC-336, "Diagnosis Procedure"](#).
NO >> GO TO 3.



3.PERFORM COMPONENT FUNCTION CHECK-2

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

- YES >> Proceed to [EC-336, "Diagnosis Procedure"](#).
NO >> GO TO 4.

4.PERFORM COMPONENT FUNCTION CHECK-3

ⓅWith CONSULT

1. Turn ignition switch ON.
2. Select "FAN DUTY CONTROL" in "ACTIVE TEST" mode of "ENGINE" using CONSULT. Refer to [EC-81, "CONSULT Function"](#).
3. Check that cooling fan speed varies according to the percentage.

Is the inspection result normal?

- YES-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
YES-2 >> Confirmation after repair: INSPECTION END
NO >> Proceed to [EC-336, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010775232

1.CHECK DTC PRIORITY

If DTC P1217 is displayed with DTC UXXXX or P0607, first perform the trouble diagnosis for DTC UXXXX or P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-109, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK COOLING FAN OPERATION

ⓅWith CONSULT

1. Turn ignition switch ON.
2. Select "FAN DUTY CONTROL" in "ACTIVE TEST" mode of "ENGINE" using CONSULT. Refer to [EC-81, "CONSULT Function"](#).
3. Check that cooling fan speed varies according to the percentage.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Proceed to [EC-409, "Diagnosis Procedure"](#).

3.CHECK COOLING SYSTEM FOR LEAK-1

Check cooling system for leak. (Refer to [CO-13, "Inspection"](#).)

Is leakage detected?

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

4.CHECK COOLING SYSTEM FOR LEAK-2

Check the following for leak.

- Hose
- Radiator

P1217 ENGINE OVER TEMPERATURE

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

- Water pump

>> Repair or replace malfunctioning part.

5.CHECK RADIATOR CAP

Check radiator cap. (Refer to [CO-20, "Inspection"](#))

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace radiator cap. Refer to [CO-17, "Exploded View"](#).

6.CHECK THERMOSTAT

Check thermostat. (Refer to [CO-27, "Inspection"](#).)

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace thermostat. Refer to [CO-26, "Removal and Installation"](#).

7.CHECK WATER CONTROL VALVE

Check water control valve. (Refer to [CO-29, "Inspection"](#).)

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace water control valve. Refer to [CO-28, "Removal and Installation"](#).

8.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. (Refer to [EC-204, "Component Inspection"](#).)

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace engine coolant temperature sensor. Refer to [CO-28, "Exploded View"](#).

9.OVERHEATING CAUSE ANALYSIS

If the cause cannot be isolated, check the [CO-11, "Troubleshooting Chart"](#).

>> INSPECTION END

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P1225 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P1225 TP SENSOR

DTC Description

INFOID:000000010775233

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1225	CTP LEARNING-B1 (Closed throttle position learning bank 1)	Closed throttle position learning value is excessively low.

POSSIBLE CAUSE

Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE

Not applicable

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-338, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010775234

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct. Refer to [EM-31, "Removal and Installation"](#).
3. Check if foreign matter is caught between the throttle valve and the housing

Is the inspection result normal?

YES >> GO TO 2.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to [EC-145, "Work Procedure"](#).

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to [EM-33, "Removal and Installation"](#).

>> INSPECTION END

P1226 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P1226 TP SENSOR

DTC Description

INFOID:000000010775235

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1226	CTP LEARNING-B1 (Closed throttle position learning bank 1)	Closed throttle position learning is not performed successfully, repeatedly.

POSSIBLE CAUSE

Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE

Not applicable

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. Repeat steps 2 and 3 for 32 times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-339, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010775236

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct. Refer to [EM-31, "Removal and Installation"](#).
3. Check if foreign matter is caught between the throttle valve and the housing

Is the inspection result normal?

YES >> GO TO 2.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to [EC-145, "Work Procedure"](#).

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to [EM-33, "Removal and Installation"](#).

>> INSPECTION END

P155D GENERATOR

DTC Description

INFOID:0000000010775237

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P155D	GENERATOR	- ECM receives mechanical malfunction signal sent from generator. - ECM receives electrical malfunction signal sent from generator.

POSSIBLE CAUSE

Generator

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Start the engine and let it idle at least 10 seconds.
- Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-340, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775238

1. CHECK CHARGING SYSTEM

Perform trouble diagnosis for charging system. Refer to [EC-162, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> Replace generator. Refer to [CHG-44, "MR20DD : Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P1564 ASCD STEERING SWITCH

DTC Description

INFOID:000000010775239

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1564	ASCD SW (ASCD switch)	ECM detects that input signal from the ASCD steering switch is out of the specified range.

POSSIBLE CAUSE

- Harness or connectors (ASCD steering switch circuit is open or shorted.)
- ASCD steering switch
- ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-314, "DTC Description"](#).
NO >> GO TO 2.

2.PRECONDITIONING

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

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

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
3. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press ACCEL/RES switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press COAST/SET switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-341, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010775240

1.CHECK DTC PRIORITY

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-314, "DTC Description"](#).
NO >> GO TO 2.

2.CHECK ASCD STEERING SWITCH CIRCUIT

 With CONSULT

P1564 ASCD STEERING SWITCH

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

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

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
		Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
		Released	OFF
RESUME/ACC SW	ACCEL/RES switch	Pressed	ON
		Released	OFF
SET SW	COAST/SET switch	Pressed	ON
		Released	OFF

⊗ Without CONSULT

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

ECM			Condition	Voltage (Approx.)
Connector	+	-		
	Terminal			
E16	110	111	MAIN switch: Pressed	0 V
			CANCEL switch: Pressed	1.0 V
			COAST/SET switch: Pressed	2.0 V
			ACCEL/RES switch: Pressed	3.0 V
			All ASCD steering switches: Released	4.0 V

Is the inspection result normal?

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

3.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	28	E16	111	Existed

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

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> Repair or replace malfunctioning part.

4.CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT

1. Check the continuity between ECM harness connector and combination switch.

P1564 ASCD STEERING SWITCH

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

+		-		Continuity
Combination switch (Spiral cable)		ECM		
Connector	Terminal	Connector	Terminal	
M33	27	E16	110	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 malfunctioning part.

5.CHECK ASCD STEERING SWITCH

Check ASCD steering switch. Refer to [EC-343, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD steering switch. Refer to [ST-12, "Removal and Installation"](#).

Component Inspection

INFOID:0000000010775241

1.CHECK ASCD STEERING SWITCH

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Check the resistance between combination switch harness connector terminals as per the following conditions.

Combination switch (Spiral cable)			Condition	Resistance (Approx.)
Connector	+	−		
	Terminal			
M303	8	9	MAIN switch: Pressed	0 Ω
			CANCEL switch: Pressed	250 Ω
			COAST/SET switch: Pressed	660 Ω
			ACCEL/RES switch: Pressed	1,480 Ω
			All ASCD steering switches: Released	4,000 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD steering switch. Refer to [ST-12, "Removal and Installation"](#).

P1568 SIGNAL INVALID**DTC Description**

INFOID:0000000010775242

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1568	ICC COMMAND VALUE (Intelligent cruise control command value)	ECM detects that a throttle valve opening angle request signal sent from chassis control module is difference from the specified value calculated by ECM.

POSSIBLE CAUSE

- Chassis control module
- ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE**1.CHECK DTC PRIORITY**

If DTC P1568 is displayed with DTC UXXXX, first perform the confirmation procedure for DTC UXXXX.

Is applicable DTC detected?

- YES >> Perform diagnosis for detected DTC. Refer to [EC-109, "DTC Index"](#).
 NO >> GO TO 2.

2.PRECONDITIONING

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

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

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

- YES >> Proceed to [EC-344, "Diagnosis Procedure"](#).
 NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010775243

1.CHECK DTC PRIORITY

If DTC P1568 is displayed with DTC UXXXX, first perform the confirmation procedure for DTC UXXXX.

Is applicable DTC detected?

- YES >> Perform diagnosis for detected DTC. Refer to [EC-109, "DTC Index"](#).
 NO >> GO TO 2.

2.CHECK SELF-DIAGNOSTIC RESULT OF CHASSIS CONTROL MODULE

Check that the chassis control module does not detect any DTC.

Is any DTC detected?

- YES >> GO TO 3.
 NO >> Replace chassis control module. Refer to [DAS-278, "Removal and Installation"](#).

3.REPLACE CHASSIS CONTROL MODULE

P1568 SIGNAL INVALID

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

1. Replace chassis control module. Refer to [DAS-278, "Removal and Installation"](#).
2. Perform DTC Confirmation Procedure again.

Is DTC P1568 detected again?

YES >> Replace ECM. Refer to [EC-430, "Removal and Installation"](#).
NO >> INSPECTION END

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P1572 ASCD BRAKE SWITCH

DTC Description

INFOID:000000010775244

DTC DETECTION LOGIC

NOTE:

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
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.
		B	Brake pedal position switch signal is not sent to ECM for extremely long time while the vehicle is driving.

POSSIBLE CAUSE

- 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

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1572 is displayed with DTC P0605, perform the trouble diagnosis for DTC P0605.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-314, "DTC Description"](#).
 NO >> GO TO 2.

2.PRECONDITIONING

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

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

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.

Will CONSULT be used?

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

3.PERFORM DTC CONFIRMATION PROCEDURE-1 With CONSULT

1. Start engine.
2. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Press MAIN switch and make sure that CRUISE indicator is displayed in combination meter.
4. Drive the vehicle for at least 5 consecutive seconds as per the following conditions.

P1572 ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

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	Except P or N position

5. Check DTC.

Is DTC detected?

YES >> Proceed to [EC-348, "Diagnosis Procedure"](#).

NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-2

 With CONSULT

1. Drive the vehicle and maintain the following condition for at least 5 seconds.

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	Except P or N position
Driving condition	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-348, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

 Without CONSULT

NOTE:

Use component function check to check the overall function of Brake pedal position switch and Stop lamp switch circuit. During this check, a DTC might not be confirmed.

1. Turn ignition switch ON.

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

ECM			Condition	Voltage (Approx.)
Connector	+	-		
	Terminal			
E16	115	128	Slightly depressed	Battery voltage
			Fully released	0 V
	116	128	Slightly depressed	0 V
			Fully released	Battery voltage

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC-348, "Diagnosis Procedure"](#).

P1572 ASCD BRAKE SWITCH

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

INFOID:000000010775245

1.CHECK DTC PRIORITY

If DTC P1572 is displayed with DTC P0605, perform the trouble diagnosis for DTC P0605.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC-314. "DTC Description"](#).

NO >> GO TO 2.

2.CHECK BRAKE PEDAL POSITION SWITCH CIRCUIT

④ With CONSULT

1. Turn ignition switch ON.
2. Select "BRAKE SW1" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Check "BRAKE SW1" indication as per the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
		Fully released	ON

⊗ Without CONSULT

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

ECM			Condition		Voltage (Approx.)
Connector	+	—			
	Terminal				
E16	116	128	Brake pedal	Slightly de- pressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 4.

3.CHECK STOP LAMP SWITCH CIRCUIT

④ With CONSULT

1. Select "BRAKE SW2" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
2. Check "BRAKE SW2" indication as per the following conditions.

Monitor item	Condition		Indication
BRAKE SW2	Brake pedal	Slightly depressed	ON
		Fully released	OFF

⊗ Without CONSULT

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

ECM			Condition	Voltage (Approx.)
Connector	+	−		
	Terminal			

P1572 ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

E16	115	128	Brake pedal	Slightly depressed	Battery voltage
				Fully released	0 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 7.

4.CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY CIRCUIT

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		
CVT models	E124	1	Ground	Battery voltage
M/T models	E119	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> Perform the trouble diagnosis for power supply circuit.

5.CHECK BRAKE PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between brake pedal position switch harness connector and ECM harness connector.

+			-		Continuity
Brake pedal position switch			ECM		
Connector		Terminal	Connector	Terminal	
CVT models	E124	2	E16	116	Existed
M/T models	E119	2	E16	116	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 malfunctioning part.

6.CHECK BRAKE PEDAL POSITION SWITCH

Check the brake pedal position switch. Refer to [EC-350. "Component Inspection \(Brake Pedal Position Switch\)"](#).

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace brake pedal position switch. Refer to [BR-21. "Removal and Installation"](#).

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.

P1572 ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

+			–	Voltage
Stop lamp switch				
Connector		Terminal		
CVT models	E115	1	Ground	Battery volatage
M/T models	E120	1		

Is the inspection result normal?

YES >> GO TO 8.

NO >> Perform the trouble diagnosis for power supply circuit.

8.CHECK STOP LAMP SWITCH 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	
CVT models	E115	2	E16	115	Existed
M/T models	E120	2			

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

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace malfunctioning part.

9.CHECK STOP LAMP SWITCH

Check the stop lamp switch. Refer to [EC-351. "Component Inspection \(Stop Lamp Switch\)".](#)

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to [BR-21. "Exploded View".](#)

Component Inspection (Brake Pedal Position Switch)

INFOID:0000000010775246

1.CHECK BRAKE PEDAL POSITION SWITCH-1

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.

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 BRAKE PEDAL POSITION SWITCH-2

1. Adjust brake pedal position switch installation. Refer to [BR-22. "Inspection and Adjustment".](#)
2. Check the continuity between brake pedal position switch terminals as per the following conditions.

P1572 ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

Brake pedal position switch		Condition		Continuity
+	–			
Terminal				
1	2	Brake pedal	Fully released	Existed
			Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace brake pedal position switch. Refer to [BR-21, "Removal and Installation"](#).

Component Inspection (Stop Lamp Switch)

INFOID:0000000010775247

1.CHECK STOP LAMP SWITCH-1

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
+	–			
Terminal				
1	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-2

1. Adjust stop lamp switch installation. Refer to [BR-22, "Inspection and Adjustment"](#).
2. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch		Condition		Continuity
+	–			
Terminal				
1	2	Brake pedal	Fully released	Not existed
			Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to [BR-21, "Removal and Installation"](#).

P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P1574 ASCD VEHICLE SPEED SENSOR

DTC Description

INFOID:000000010775248

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from CVT C/U. The ECM uses these signals for ASCD control. Refer to [EC-64, "AUTOMATIC SPEED CONTROL DEVICE \(ASCD\) : System Description"](#) for ASCD functions.

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1574	ASCD VHL SPD SEN (ASCD vehicle speed sensor)	ECM detects a difference between two vehicle speed signals is out of the specified range.

POSSIBLE CAUSE

- Harness or connectors (CAN communication line is open or shorted.)
- Combination meter
- Wheel sensor
- ABS actuator and electric unit (control unit)
- ECM
- TCM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1574 is displayed with DTC U1001, P0500, P0605 or P0607, first perform the trouble diagnosis for DTC U1001, P0500, P0605 or P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-109, "DTC Index"](#).
NO >> GO TO 2.

2.PRECONDITIONING

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

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

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

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-353, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

Diagnosis Procedure

INFOID:000000010775249

1.CHECK DTC PRIORITY

If DTC P1574 is displayed with DTC U1001, P0500, P0605 or P0607, first perform the trouble diagnosis for DTC U1001, P0500, P0605 or P0607.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC-109, "DTC Index"](#).

NO >> GO TO 2.

2.CHECK DTC WITH TCM

Check DTC with TCM. Refer to [TM-272, "CONSULT Function"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform trouble shooting relevant to DTC indicated.

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

Check DTC with ABS actuator and electric unit (control unit). Refer to [BRC-70, "CONSULT Function"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Perform trouble shooting relevant to DTC indicated.

4.CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to [MWI-86, "CONSULT Function"](#).

>> INSPECTION END

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P1805 BRAKE SWITCH

DTC Description

INFOID:000000010775250

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1805	BRAKE SW/CIRCUIT (Brake switch circuit)	A stop lamp switch signal is not sent to ECM for extremely long time while the vehicle is driving.

POSSIBLE CAUSE

- Harness or connectors (Stop lamp switch circuit is open or shorted.)
- Stop lamp switch

FAIL-SAFE

ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.

Vehicle condition	Driving condition
When engine is idling	Normal
When accelerating	Poor acceleration

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC. Refer to [EC-79, "On Board Diagnosis Function"](#).
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-354, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010775251

1.CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Depress the brake pedal and check the stop lamp when releasing.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH POWER SUPPLY

1. Disconnect stop lamp switch harness connector.
2. Check the voltage between stop lamp switch harness connector and ground.

P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

+			-	Voltage
Stop lamp switch				
Connector		Terminal		
CVT models	E115	1	Ground	Battery voltage
M/T models	E120	1		

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform the trouble diagnosis for power supply circuit.

3.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect stop lamp switch harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between stop lamp switch harness connector and ECM harness connector.

+			-		Continuity
Stop lamp switch			ECM		
Connector		Terminal	Connector	Terminal	
CVT models	E115	2	E16	115	Existed
M/T models	E120	2			

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning part.

4.CHECK STOP LAMP SWITCH

Check stop lamp switch. Refer to [EC-355, "Component Inspection \(Stop Lamp Switch\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to [BR-21, "Exploded View"](#).

Component Inspection (Stop Lamp Switch)

INFOID:0000000010775252

1.CHECK STOP LAMP SWITCH-1

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
+	–			
Terminal				
1	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-2

1. Adjust stop lamp switch installation. Refer to [BR-22, "Inspection and Adjustment"](#).
2. Check the continuity between stop lamp switch terminals as per the following conditions.

P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

Stop lamp switch		Condition		Continuity
+	–			
Terminal				
1	2	Brake pedal	Fully released	Not existed
			Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to [BR-21, "Removal and Installation"](#).

P2008 INTAKE MANIFOLD RUNNER CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P2008 INTAKE MANIFOLD RUNNER CONTROL VALVE

DTC Description

INFOID:000000010775253

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2008	TUMBLE CONT/V (Intake manifold runner control valve)	Intake manifold runner control valve motor signal circuit is open.

POSSIBLE CAUSE

- Harness or connectors (Intake manifold runner control valve motor circuit is open.)
- Intake manifold runner control valve motor

FAIL-SAFE

Engine operating condition in fail-safe mode		
Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
	Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction.
Device fix mode		• This mode fixes the IVT control solenoid valve and the EVT control solenoid valve in the reference position. • The intake manifold runner control valve motor is turned OFF (intake manifold runner control valve opens).
Combustion control mode	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).
	Idle speed control	Stops feedback control of idle speed and controls with specified speed.
	Recovery speed control at decelerating	Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.
	Idle neutral control	Stops idle neutral control.
	Ignition timing correction control	Partially controls ignition timing control.
	Retardation control	Controls ignition timing delay control in the intermediate water temperature range.

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.

P2008 INTAKE MANIFOLD RUNNER CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Revving engine from idle up to 4,000 rpm under no load after warming up, then return to idling.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-358, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775254

1.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR POWER SUPPLY-1

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	Connector	Terminal	
F8	81	E16	128	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR POWER SUPPLY-2

Check the voltage between ECM harness connector and ground.

+		-	Voltage
ECM			
Connector	Terminal		
F8	81	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> Perform the trouble diagnosis for power supply circuit.

3.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect intake manifold runner control valve motor harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between intake manifold runner control valve motor harness connector and ECM harness connector.

+		-		Continuity
Intake manifold runner control valve motor		ECM		
Connector	Terminal	Connector	Terminal	
F114	1	F8	81	Existed
			85	Not existed
	2		81	Not existed
			85	Existed

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

P2008 INTAKE MANIFOLD RUNNER CONTROL VALVE

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace malfunctioning part.

4.CHECK ECM GROUND

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

+		-	Continuity
ECM			
Connector	Terminal		
F7	11	Ground	Existed
F8	54		
	55		
	56		
E16	123		
	125		
	128		

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Repair or replace ground circuit.

5.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE

Check intake manifold runner control valve. refer to [EC-359, "Component Inspection"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace intake manifold. Refer to [EM-33, "Removal and Installation"](#).

Component Inspection

INFOID:0000000010775255

1.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE

With CONSULT

1. Turn ignition switch OFF.
2. Remove intake manifold. Refer to [EM-33, "Removal and Installation"](#).
3. Check if foreign matter is caught between the throttle valve and the housing.
4. Connect intake manifold runner control valve motor harness connector.
5. Turn ignition switch ON.
6. Select "INTAKE MANIFOLD RUNNER CONTROL VALVE (OPEN/CLOSE)" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
7. Touch "OPERATE", or "CONTINUE" to check the intake manifold runner control valve.

Without CONSULT

1. Turn ignition switch OFF.
2. Remove intake manifold. Refer to [EM-33, "Removal and Installation"](#).
3. Check if foreign matter is caught or there is any breakage between the intake manifold runner control valve.
4. Apply battery voltage to the intake manifold runner control valve motor terminals as follows within 2 seconds and check a movement.

Intake manifold runner control valve motor		Movement
Terminal		
(+)	(-)	
1	2	Close
2	1	Open

P2008 INTAKE MANIFOLD RUNNER CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

CAUTION:

Do not apply battery voltage continuously more than 30 seconds. It may damage the intake manifold runner control valve motor.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake manifold. Refer to [EM-33, "Removal and Installation"](#).

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

DTC Description

INFOID:000000010775256

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2100	ETC MOT PWR-B1 (Throttle actuator "A" control motor circuit/ open)	ECM detects a voltage of power source for throttle control motor is excessively low.
P2103	ETC MOT PWR-B1 (Throttle actuator "A" control motor circuit high)	ECM detect the throttle control motor relay is stuck ON.

POSSIBLE CAUSE

- Harness or connectors (Throttle control motor relay circuit is open.)
- Throttle control motor relay

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

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.

With DTC is detected?

- P2100 >> GO TO 2.
P2103 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE-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-362, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE-DTC P2103

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

Is DTC detected?

- YES >> Proceed to [EC-362, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

Diagnosis Procedure

INFOID:000000010775257

1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY

1. Turn ignition switch OFF.
2. Check the voltage between ECM harness connectors.

+		-		Voltage (Approx.)
ECM				
Connector	Terminal	Connector	Terminal	
F8	65	E16	128	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	
F8	65	F72	72	Existed

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

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace malfunctioning part.

3. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL

1. Check the voltage between ECM harness connectors.

+		-		Condition		Voltage (Approx.)
ECM						
Connector	Terminal	Connector	Terminal			
F8	80	E16	128	Ignition switch	OFF	0 V
					ON	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

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	
F8	80	F72	67	Existed

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

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace malfunctioning part.

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P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

DTC Description

INFOID:000000010775258

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2101	ETC FNCTN/CIRC-B1 (Throttle actuator "A" control motor circuit range/performance)	Electric throttle control function does not operate properly.

POSSIBLE CAUSE

- Crankshaft position sensor (POS)
- Throttle control motor circuit is open or shorted.
- Throttle control motor relay circuit is open or shorted.
- Electric throttle control actuator

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2101 is displayed with DTC P2100 or P2119, first perform the trouble diagnosis for DTC P2100 or P2119.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-109, "DTC Index"](#).
NO >> GO TO 2.

2.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 3.

3.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-364, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010775259

1.CHECK DTC PRIORITY

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

If DTC P2101 is displayed with DTC P2100 or P2119, first perform the trouble diagnosis for DTC P2100 or P2119.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-109, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL

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

+		-		Condition		Voltage (Approx.)
ECM						
Connector	Terminal	Connector	Terminal			
F8	80	E16	128	Ignition switch	OFF	0 V
					ON	Battery voltage

Is the inspection result normal?

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

3.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Disconnect IPDM E/R harness connector.
- Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		-		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F8	80	F72	67	Existed

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

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace malfunctioning part.

4.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

- Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		-		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F8	65	F72	72	Existed

- 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 malfunctioning part.

5.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT

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

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

+		-		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	5	F8	69	Not existed
			73	Existed
	6		69	Existed
			73	Not existed

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

6.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct. Refer to [EM-31, "Removal and Installation"](#).
2. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to [EC-145, "Work Procedure"](#).

7.CHECK THROTTLE CONTROL MOTOR

Check the throttle control motor. Refer to [EC-366, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to [EM-33, "Removal and Installation"](#).

Component Inspection

INFOID:0000000010775260

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.)
+	−	
Terminal		
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-33, "Removal and Installation"](#).

P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P2118 THROTTLE CONTROL MOTOR

DTC Description

INFOID:000000010775261

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2118	ETC MOT-B1 (Throttle actuator control motor current range/performance)	ECM detects short in throttle control motor signal circuit.

POSSIBLE CAUSE

- Harness or connectors (Throttle control motor circuit is shorted.)
- Electric throttle control actuator (Throttle control motor)

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

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-367, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010775262

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.

P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

+		-		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	5	F8	69	Not existed
			73	Existed
	6		69	Existed
			73	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 malfunctioning part.

2.CHECK THROTTLE CONTROL MOTOR

Check the throttle control motor. Refer to [EC-368. "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to [EM-33. "Removal and Installation"](#).

Component Inspection

INFOID:0000000010775263

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.)
+	−	
Terminal		
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-33. "Removal and Installation"](#).

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Description

INFOID:000000010775264

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P2119	ETC ACTR-B1 (Throttle actuator control throttle body range/performance)	A	Electric throttle control actuator does not function properly due to the return spring malfunction.
		B	Throttle valve opening angle in fail-safe mode is not in specified range.
		C	ECM detects the throttle valve is stuck open.

POSSIBLE CAUSE

Electric throttle control actuator

FAIL-SAFE

Engine operating condition in fail-safe mode		
Fail safe mode		Vehicle behavior
Traveling con- trol mode	Accelerator an- gle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
	Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction.
Others		ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. NOTE: For pattern A and B refer to A and B of P2119 DTC detection logic. For C of P2119 DTC detection logic ECM behaves as above.

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 position and wait at least 3 seconds.
3. Set selector lever to P 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 position and wait at least 3 seconds.
7. Set selector lever to P 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-370, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch ON and wait at least 1 second.
2. Set selector lever to D position and wait at least 3 seconds.
3. Set selector lever to P position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-370, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775265

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct. Refer to [EM-31, "Removal and Installation"](#).
3. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to [EC-145, "Work Procedure"](#).

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to [EM-33, "Removal and Installation"](#).

>> INSPECTION END

P2122, P2123 APP SENSOR**DTC Description**

INFOID:000000010775266

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2122	APP SEN 1/CIRC (Throttle/pedal position sensor/switch "D" circuit low)	An excessively low voltage from the APP sensor 1 is sent to ECM.
P2123	APP SEN 1/CIRC (Throttle/pedal position sensor/switch "D" circuit high)	An excessively high voltage from the APP sensor 1 is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (APP sensor 1 circuit is open or shorted.)
- Accelerator pedal position sensor (APP sensor 1)

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Others	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. Therefore, the acceleration will be poor. NOTE: If accelerator pedal position sensor 1 and 2 malfunction at the same time conducts following control. • ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE**1.CHECK DTC PRIORITY**

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-321. "DTC Description"](#).
- NO >> GO TO 2.

2.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-372. "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-44. "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010775267

1.CHECK DTC PRIORITY

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC-321, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT-1

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

+		Terminal	-	Voltage (Approx.)
APP sensor				
Connector				
CVT models	E110	4	Ground	5 V
M/T models	E167			

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT-2

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

+			-		Continuity
APP sensor			ECM		
Connector		Terminal	Connector	Terminal	Existed
CVT models	E110	4	E16	122	
M/T models	E167				

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 malfunctioning part.

4.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	Existed
CVT models	E110	2	E16	127	
M/T models	E167				

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace malfunctioning part.

P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

5.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	
CVT models	E110	3	E16	126	Existed
M/T models	E167				

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

6.CHECK APP SENSOR

Check the APP sensor. Refer to [EC-373, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal assembly. Refer to [ACC-4, "Removal and Installation"](#).

Component Inspection

INFOID:0000000010775268

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 (Approx.)
Connector	+	–			
	Terminal				
E16	126	127	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 [ACC-4, "Removal and Installation"](#).

P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P2127, P2128 APP SENSOR

DTC Description

INFOID:0000000010775269

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2127	APP SEN 2/CIRC (Throttle/pedal position sensor/switch "E" circuit low)	An excessively low voltage from the APP sensor 2 is sent to ECM.
P2128	APP SEN 2/CIRC (Throttle/pedal position sensor/switch "E" circuit high)	An excessively high voltage from the APP sensor 2 is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors
- APP sensor 2 circuit is open or shorted.
- Sensor power supply 2 circuit is shorted.
- Accelerator pedal position sensor (APP sensor 2)
- Sensor power supply 2 circuit

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Others	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. Therefore, the acceleration will be poor. NOTE: If accelerator pedal position sensor 1 and 2 malfunction at the same time conducts following control. • ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

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.

>> 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-375, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

P2127, P2128 APP SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

INFOID:000000010775270

1.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-1

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

APP sensor				Voltage (Approx.)
Connector		+	−	
		Terminal		
CVT models	E110	5	1	5 V
M/T models	E167			

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 2.

2.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-2

Check the voltage between APP sensor harness connector and ground.

+		-	Voltage (Approx.)	
APP sensor				
Connector	Terminal			
CVT models	E110	5	Ground	5 V
M/T models	E167			

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 3.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-3

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	
CVT models	E110	5	E16	118	Existed
M/T models	E167				

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning part.

4.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform [EC-405. "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace malfunctioning part.

5.CHECK APP SENSOR 2 GROUND CIRCUIT

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

P2127, P2128 APP SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

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

+		-		Continuity	
APP sensor		ECM			
Connector	Terminal	Connector	Terminal		
CVT models	E110	1	E16	120	Existed
M/T models	E167				

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

6.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F7	11	Ground	Existed
E16	123		
	125		
	128		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace malfunctioning part.

7.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
CVT models	E110	6	E16	119	Existed
M/T models	E167				

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

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace malfunctioning part.

8.CHECK APP SENSOR

Check the APP sensor. Refer to [EC-376. "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal assembly. Refer to [ACC-4. "Removal and Installation"](#).

Component Inspection

INFOID:0000000010775271

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.

P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

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

ECM			Condition		Voltage (Approx.)
Connector	+	−			
	Terminal				
E16	126	127	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 [ACC-4. "Removal and Installation"](#).

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

P2135 TP SENSOR

DTC Description

INFOID:0000000010775272

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2135	TP SENSOR-B1 (Throttle/pedal position sensor/switch "A"/ "B" voltage correlation)	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.

POSSIBLE CAUSE

- Harness or connector (TP sensor 1 or 2 circuit is open or shorted.)
- Electric throttle control actuator (TP sensor 1 or 2)

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Others	• 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. NOTE: If throttle position sensor1 and 2 malfunction at the same time conducts following control. • ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-321, "DTC Description"](#).
NO >> GO TO 2.

2.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-378, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010775273

1.CHECK DTC PRIORITY

P2135 TP SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-321. "DTC Description"](#).
NO >> GO TO 2.

2.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	2	Ground	5 V

Is the inspection result normal?

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

3.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 ECM harness connector.

+		-		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	2	F8	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 malfunctioning part.

4.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	F8	75	Existed

4. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace malfunctioning part.

5.CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT

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

P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

+		-		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	1	F8	63	Existed
	3		71	

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

6.CHECK THROTTLE POSITION SENSOR

Check the throttle position sensor. Refer to [EC-380, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to [EM-33, "Removal and Installation"](#).

Component Inspection

INFOID:0000000010775274

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-145, "Work Procedure"](#).
4. Turn ignition switch ON.
5. Set selector lever to D position.
6. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition		Voltage
Connector	+	—			
	Terminal				
F8	63	75	Accelerator pedal	Fully re- leased	More than 0.36 V
				Fully de- pressed	Less than 4.75 V
	71			Fully re- leased	Less than 4.75 V
				Fully de- pressed	More than 0.36 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to [EM-33, "Removal and Installation"](#).

P2138 APP SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

P2138 APP SENSOR

DTC Description

INFOID:000000010775275

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2138	APP SENSOR (Throttle/pedal position sensor/switch "D"/ "E" voltage correlation)	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.

POSSIBLE CAUSE

- Harness or connector
- APP sensor 1 or 2 circuit is open or shorted.
- Sensor power supply 2 circuit is shorted.
- Accelerator pedal position sensor (APP sensor 1 or 2)
- Sensor power supply 2 circuit

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Others	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. Therefore, the acceleration will be poor. NOTE: If accelerator pedal position sensor 1 and 2 malfunction at the same time conducts following control. • ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-321. "DTC Description"](#).
NO >> GO TO 2.

2.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-382. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

P2138 APP SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

INFOID:000000010775276

1.CHECK DTC PRIORITY

If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC-321. "DTC Description"](#).

NO >> GO TO 2.

2.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.

APP sensor				Voltage (Approx.)
Connector		+	−	
		Terminal		
CVT models	E110	4	2	5 V
M/T models	E167			

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

Check the voltage between APP sensor harness connector and ground.

+		-	Voltage (Approx.)	
APP sensor				
Connector	Terminal			
CVT models	E110	4	Ground	5 V
M/T models	E167			

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace malfunctioning part.

4.CHECK APP SENSOR 2 POWER SUPPLY-1

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

APP sensor				Voltage (Approx.)
Connector		+	−	
		Terminal		
CVT models	E110	5	1	5 V
M/T models	E167			

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 5.

5.CHECK APP SENSOR 2 POWER SUPPLY-2

Check the voltage between APP sensor harness connector and ground.

P2138 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

+		-	Voltage (Approx.)	
APP sensor				
Connector	Terminal			
CVT models	E110	5	Ground	5 V
M/T models	E167			

Is the inspection result normal?

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

6.CHECK APP SENSOR 2 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		
CVT models	E110	5	E16	118	Existed
M/T models	E167				

Is the inspection result normal?

- YES >> GO TO 7.
NO >> Repair or replace malfunctioning part.

7.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform [EC-405. "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Repair or replace malfunctioning part.

8.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	Existed
CVT models	E110	2	E16	127	
M/T models	E167				

4. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 10.
NO >> Repair or replace malfunctioning part.

9.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.

P2138 APP SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

+		-		Continuity	
APP sensor		ECM			
Connector	Terminal	Connector	Terminal		
CVT models	E110	1	E16	120	Existed
M/T models	E167				

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace malfunctioning part.

10. CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F7	11	Ground	Existed
F8	54		
	55		
	56		
E16	123		
	125		
	128		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace malfunctioning part.

11. 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	
CVT models	E110	3	E16	126	Existed
		6		119	
M/T models	E167	3		126	
		6		119	

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

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace malfunctioning part.

12. CHECK APP SENSOR

Check the APP sensor. Refer to [EC-385, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal assembly. Refer to [ACC-4, "Removal and Installation"](#).

Component Inspection

INFOID:000000010775277

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				
E16	126	127	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 [ACC-4, "Removal and Installation"](#).

FUEL INJECTOR

Component Function Check

INFOID:000000010775278

1.INSPECTION START

Turn ignition switch to START.

Are any cylinders ignited?

- YES >> GO TO 2.
NO >> Proceed to [EC-386, "Diagnosis Procedure"](#).

2.CHECK FUEL INJECTOR FUNCTION

Ⓟ With CONSULT

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
3. Check that each circuit produces a momentary engine speed drop.

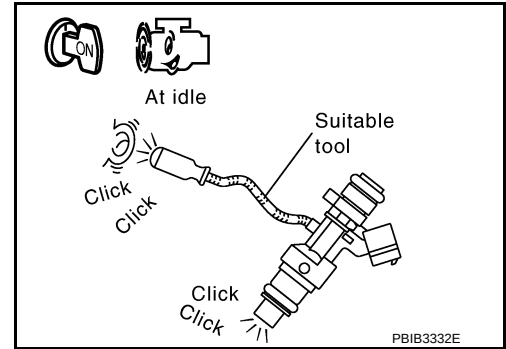
ⓧ Without CONSULT

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

Clicking sound should be heard.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Proceed to [EC-386, "Diagnosis Procedure"](#).



Diagnosis Procedure

INFOID:000000010775279

1.CHECK FUEL INJECTOR POWER SUPPLY

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	F37	1	Ground	Battery voltage
2	F38	1		
3	F39	1		
4	F40	1		

Is the inspection result normal?

- YES >> GO TO 9.
NO >> GO TO 2.

2.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

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

FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

+			-		Continuity
Fuel injector			ECM		
Cylinder	Connector	Terminal	Connector	Terminal	
1	F37	1	F7	1	Existed
2	F38	1		2	
3	F39	1		3	
4	F40	1		4	

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part.

3.CHECK FUEL INJECTOR DRIVER POWER SUPPLY

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

+		-	Voltage
ECM			
Connector	Terminal		
F8	49	Ground	Battery voltage
	53		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-44, "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	
F8	49	F26	5	Existed
	53		7	

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace malfunctioning part.

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		
F26	3	Ground	Battery voltage
	6		

FUEL INJECTOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform trouble diagnosis for power supply circuit.

6.CHECK FUEL INJECTOR RELAY POWER SUPPLY (EXCITATION COIL SIDE)

1. Install all removed parts.
2. Turn ignition switch ON.
3. Check the voltage between fuel injector relay harness connector and ground.

+		-	Voltage
Fuel injector relay			
Connector	Terminal		
F26	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7.CHECK FUEL INJECTOR RELAY POWER SUPPLY (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 relay harness connector.

+		-		Continuity
IPDM E/R		Fuel injector relay		
Connector	Terminal	Connector	Terminal	
F72	66	F26	1	Existed

5. Also check harness for short to power.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.

NO >> Repair or replace malfunctioning part.

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		
F26	2	Ground	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace malfunctioning part.

9.CHECK FUEL INJECTOR GROUND CIRCUIT

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

FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

+			-		Continuity
Fuel injector			ECM		
Cylinder	Connector	Terminal	Connector	Terminal	
1	F37	2	F7	5	Existed
2	F38	2		6	
3	F39	2		7	
4	F40	2		8	

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair or replace malfunctioning part.

10.CHECK FUEL INJECTOR RELAY

Check fuel injector relay. Refer to [EC-389, "Component Inspection \(Fuel Injector Relay\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

NO >> Replace fuel injector relay.

11.CHECK FUEL INJECTOR

Check fuel injector. Refer to [EC-389, "Component Inspection \(Fuel Injector\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

NO >> Replace fuel injector. Refer to [EM-48, "Exploded View"](#).

Component Inspection (Fuel Injector)

INFOID:0000000010775280

1.CHECK FUEL INJECTOR

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

Fuel injector		Resistance (Approx.)
+	–	
Terminal		
1	2	1.44 – 1.73 Ω [at 10 – 60°C (50 –140°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel injector relay. Refer to [EC-28, "ENGINE CONTROL SYSTEM : Component Parts Location"](#).

Component Inspection (Fuel Injector Relay)

INFOID:0000000010775281

1.CHECK FUEL INJECTOR RELAY

1. Turn ignition switch OFF.
2. Remove fuel injector relay. Refer to [EC-28, "ENGINE CONTROL SYSTEM : Component Parts Location"](#).

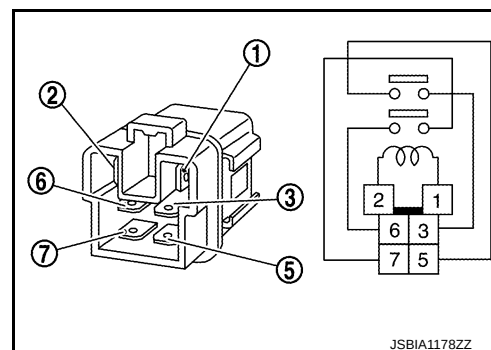
FUEL INJECTOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

3. Check the continuity between fuel injector relay terminals as per the following conditions.

+	—	Condition	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 [EC-28, "ENGINE CONTROL SYSTEM : Component Parts Location"](#).

LOW PRESSURE FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

LOW PRESSURE FUEL PUMP

Component Function Check

INFOID:000000010775282

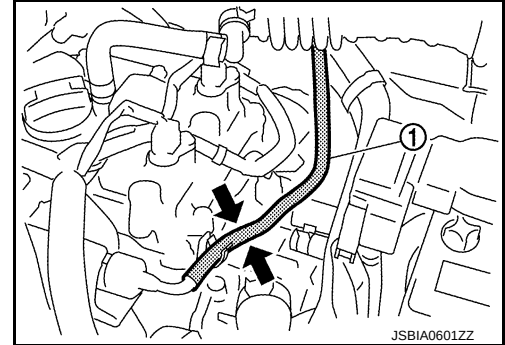
1.CHECK LOW PRESSURE FUEL PUMP FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose ① with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Proceed to [EC-391, "Diagnosis Procedure"](#).



Diagnosis Procedure

INFOID:000000010775283

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.

+		−		Voltage
ECM				
Connector	Terminal	Connector	Terminal	
F8	87	E16	128	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	
F8	87	F72	76	Existed

4. Also check harness for short to power.

Is the inspection result normal?

- YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace malfunctioning part.

3.CHECK FUEL PUMP POWER SUPPLY

1. Turn ignition switch OFF.
2. Reconnect ECM harness connector.
3. Disconnect "fuel level sensor unit and fuel pump" harness connector.
4. Turn ignition switch ON.
5. Check the voltage between "fuel level sensor unit and fuel pump" harness connector and ground.

LOW PRESSURE FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

+		-	Voltage
Fuel level sensor unit and fuel pump			
Connector	Terminal		
B40	1	Ground	Battery voltage should exist 1 second after ignition switch is turn ON.

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.CHECK FUEL PUMP POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between “fuel level sensor unit and fuel pump” harness connector and IPDM E/R harness connector.

+		-		Continuity
Fuel level sensor unit and fuel pump		IPDM E/R		
Connector	Terminal	Connector	Terminal	
B40	1	E11	24	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.

NO >> Repair or replace malfunctioning part.

5.CHECK FUEL PUMP GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between “fuel level sensor unit and fuel pump” harness connector and ground.

+		-	Continuity
Fuel level sensor unit and fuel pump			
Connector	Terminal		
B40	3	Ground	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 malfunctioning part.

6.CHECK FUEL PUMP

Check fuel pump. Refer to [EC-392, "Component Inspection \(Fuel Pump\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

NO >> Replace “fuel level sensor unit and fuel pump”. Refer to [FL-12, "Removal and Installation"](#).

Component Inspection (Fuel Pump)

INFOID:0000000010775284

1.CHECK FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.
3. Check the resistance between “fuel level sensor unit and fuel pump” terminals as follows.

LOW PRESSURE FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

Fuel level sensor unit and fuel pump		Resistance
+	−	
Terminal		
1	3	0.2 - 5.0 Ω [at 25°C (77°F)]

A
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Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace “fuel level sensor unit and fuel pump”. Refer to [FL-12, "Removal and Installation"](#).

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HIGH PRESSURE FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

HIGH PRESSURE FUEL PUMP

Component Function Check

INFOID:000000010775285

1.CHECK HIGH PRESSURE FUEL PUMP FUNCTION

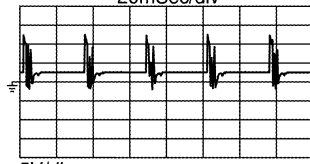
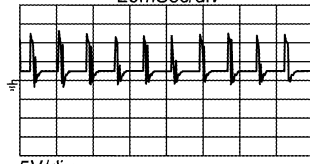
④ With CONSULT

1. Start engine.
2. Select "FUEL PRES SEN V" in "DATA MONITOR" mode of "ENGINE" using CONSULT and check the indication as per the following conditions.

Monitor item	Condition	Indication
FUEL PRES SEN V	At idle	820 - 1,140 mV
	Revving engine up to 4,000 rpm quickly.	820 - 2,900 mV

⊗ Without CONSULT

1. Start engine.
2. Check the voltage between ECM terminals as per the following conditions.

ECM			Condition	Voltage
Voltage	+	-		
	Terminal			
F8	51	54	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	Battery voltage (11 - 14 V) ★ 20mSec/div  5V/div JPBIA4722ZZ
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Battery voltage (11 - 14 V) ★ 20mSec/div  5V/div JPBIA4723ZZ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-394, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000010775286

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		
F8	50	Ground	Battery voltage

HIGH PRESSURE FUEL PUMP

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

Is the 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 high pressure fuel pump 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	
F8	50	F58	5	Existed

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part.

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		
F58	3	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. Install all removed parts.
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		
F58	1	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 relay harness connector.

HIGH PRESSURE FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

+		-		Continuity
IPDM E/R		High pressure fuel pump relay		
Connector	Terminal	Connector	Terminal	
F72	66	F58	1	Existed

5. 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 malfunctioning part.

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		
F58	2	Ground	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace malfunctioning part.

7.CHECK HIGH PRESSURE FUEL PUMP RELAY

Check high pressure fuel pump relay. Refer to [EC-398, "Component Inspection \(High Pressure Fuel Pump Relay\)"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace high pressure fuel pump relay. Refer to [EC-119, "Wiring Diagram"](#) for connector number, [PG-91, "LHD : Engine Room Harness"](#) for relay location.

8.CHECK HIGH PRESSURE FUEL PUMP CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and high pressure fuel pump relay 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	
F8	51	F115	1	Existed
	52		2	

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace malfunctioning part.

9.CHECK HIGH PRESSURE FUEL PUMP

Check high pressure fuel pump. Refer to [EC-397, "Component Inspection \(High Pressure Fuel Pump\)"](#).

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace high pressure fuel pump. Refer to [FL-11, "Exploded View"](#).

HIGH PRESSURE FUEL PUMP

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

10. CHECK HIGH PRESSURE FUEL PUMP INSTALLATION

1. Turn ignition switch OFF.
2. Check high pressure fuel pump for improper attachment or looseness.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair or replace malfunctioning part.

11. CHECK CAMSHAFT

1. Remove camshaft. Refer to [EM-81, "Removal and Installation"](#).
2. Check camshaft. Refer to [EM-84, "Inspection"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

NO >> Replace camshaft. Refer to [EM-81, "Removal and Installation"](#).

Component Inspection (High Pressure Fuel Pump)

INFOID:0000000010775287

1. CHECK HIGH PRESSURE FUEL PUMP-1

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

High pressure fuel pump		Condition		Resistance
+	-			
Terminal				
1	2	Temperature [°C (°F)]	20 - 30 (68 - 86)	0.46 - 0.51 Ω

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace high pressure fuel pump. Refer to [EM-43, "Exploded View"](#).

2. CHECK HIGH PRESSURE FUEL PUMP-2

Ⓜ With CONSULT

1. Reconnect high pressure fuel pump harness connector.
2. Start engine.
3. Select "FUEL PRES SEN V" in "DATA MONITOR" mode of "ENGINE" using CONSULT and check the indication as per the following conditions.

Monitor item	Condition	Indication
FUEL PRES SEN V	At idle	820 - 1,140 mV
	Revvng engine up to 4,000 rpm quickly.	820 - 2,900 mV

ⓧ Without CONSULT

1. Start engine.
2. Check fuel rail pressure sensor signal voltage.

ECM			Condition	Voltage (Approx.)
Connector	+	-		
	Terminal			
F7	33	39	[Engine is running] • Warm-up condition • Idle speed	0.82 - 1.14 V
			[Engine is running] • Warm-up condition • Engine speed: Revving engine from idle to 4,000 rpm	0.82 - 2.9 V

HIGH PRESSURE FUEL PUMP

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

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

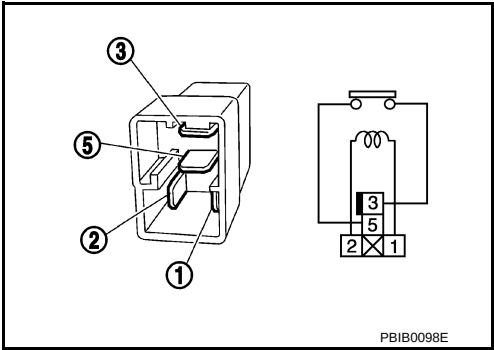
Component Inspection (High Pressure Fuel Pump Relay)

INFOID:0000000010775288

1.CHECK HIGH PRESSURE FUEL PUMP RELAY

1. Turn ignition switch OFF.
2. Remove high pressure fuel pump relay. Refer to [EC-28, "ENGINE CONTROL SYSTEM : Component Parts Location"](#).
3. Check the continuity between high pressure fuel pump relay terminals.

+	—	Condition	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 [EC-28, "ENGINE CONTROL SYSTEM : Component Parts Location"](#).

IGNITION SIGNAL

Component Function Check

INFOID:0000000010775289

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES-1 >> With CONSULT: GO TO 2.

YES-2 >> Without CONSULT: GO TO 3.

NO >> Proceed to [EC-399, "Diagnosis Procedure"](#).

2.CHECK IGNITION SIGNAL FUNCTION-1

 With CONSULT

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode of "ENGINE" with CONSULT.

2. Check that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

YES >> INSPECTION END

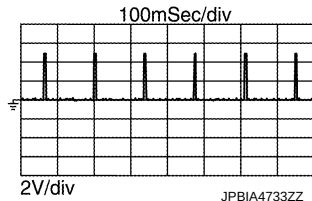
NO >> Proceed to [EC-399, "Diagnosis Procedure"](#).

3.CHECK IGNITION SIGNAL FUNCTION-2

 Without CONSULT

1. Let engine idle.

2. Read the voltage signal between ECM harness connector terminals with an oscilloscope.

ECM				Voltage signal
+		-		
Connector	Terminal	Connector	Terminal	
F8	78	E16	128	100mSec/div  2V/div JP8IA4733ZZ
	82			
	86			
	90			

NOTE:

The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-399, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010775290

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		
F213	1	Ground	Battery voltage

Is the inspection result normal?

IGNITION SIGNAL

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

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	
F72	66	F213	1	Existed

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

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace malfunctioning part.

3.CHECK CONDENSER GROUND CIRCUIT

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

+		-	Continuity
Condenser			
Connector	Terminal		
F213	2	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

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

4.CHECK CONDENSER

Check condenser. Refer to [EC-207, "Component Inspection"](#).

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 >> Repair or replace malfunctioning part.

IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

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	Ground	Existed
1	F33	2		
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 malfunctioning part.

7.CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT

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

+			-		Continuity
Ignition coil			ECM		
Cylinder	Connector	Terminal	Connector	Terminal	Existed
1	F33	1	F8	78	
2	F34	1		82	
3	F35	1		86	
4	F36	1		90	

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

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace malfunctioning part.

8.CHECK IGNITION COIL WITH POWER TRANSISTOR

Check ignition coil with power transistor. Refer to [EC-401, "Component Inspection \(Ignition Coil With Power Transistor\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

NO >> Replace malfunctioning ignition coil with power transistor. Refer to [EM-54, "Exploded View"](#).

Component Inspection (Ignition Coil With Power Transistor)

INFOID:000000010775291

1.CHECK IGNITION COIL WITH POWER TRANSISTOR-1

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

Ignition coil		Resistance Ω [at 25°C (77°F)]
+	–	
Terminal		

IGNITION SIGNAL

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

1	2	Except 0 or ∞ Ω
	3	Except 0 Ω
2	3	

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning ignition coil with power transistor. Refer to [EM-54, "Exploded View"](#).

2.CHECK IGNITION COIL WITH POWER TRANSISTOR-2

CAUTION:

Perform the following procedure in a place with no combustible objects and good ventilation.

1. Reconnect all harness connectors disconnected.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

NOTE:

Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

3. Start engine.
4. After engine stalls, crank it 2 or 3 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. Refer to [EM-54, "Exploded View"](#).
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 approximately 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

- During the operation, always stay 0.5 m (19.7 in) or more 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-54, "Exploded View"](#).

Component Inspection (Condenser)

INFOID:000000010775292

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 MΩ [at 25°C (77°F)]
+	–	
Terminal		
1	2	Above 1

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace condenser.

ELECTRICAL LOAD SIGNAL

Description

INFOID:0000000010775293

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred from BCM via the CAN communication through IPDM E/R to ECM.

Component Function Check

INFOID:0000000010775294

1.CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

1. Turn ignition switch ON.
2. Select "DATA MONITOR" of "ENGINE" with CONSULT.
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 >> Proceed to [EC-403, "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 >> Proceed to [EC-403, "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 >> Proceed to [EC-403, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010775295

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to [EC-403, "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 rear window defogger system. Refer to [DEF-25, "Work Flow"](#).

>> INSPECTION END

3.CHECK HEADLAMP SYSTEM

Check headlamp system. Refer to [EXL-95, "Work Flow"](#) (LED type), [EXL-297, "Work Flow"](#) (halogen type).

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Check heater fan control system. Refer to [HAC-69, "Work Flow"](#) (With automatic air conditioning) [HAC-183, "Work Flow"](#) (With manual air conditioning).

>> INSPECTION END

SENSOR POWER SUPPLY 2 CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

SENSOR POWER SUPPLY 2 CIRCUIT

Description

INFOID:000000010775296

ECM supplies a voltage of 5 V to some of the sensors systematically divided into 2 groups, respectively. Accordingly, when a short circuit develops in a sensor power source, a malfunction may occur simultaneously in the sensors belonging to the same group as the short-circuited sensor.

Sensor power supply 1

- CKP sensor (POS)
- APP sensor 1
- Exhaust valve timing control position sensor
- Electric throttle control actuator

NOTE:

If sensor power supply 1 circuit is malfunctioning, DTC P0643 is displayed.

Sensor power supply 2

- Atmospheric pressure sensor
- Refrigerant pressure sensor
- Fuel rail pressure sensor
- CMP sensor
- APP sensor 2
- Engine oil pressure sensor

Diagnosis Procedure

INFOID:000000010775297

1. CHECK ACCELERATOR PEDAL POSITION SENSOR 2 POWER SUPPLY CIRCUIT-1

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

+		Terminal	-	Voltage (Approx.)
APP sensor				
Connector				
CVT models	E110	5	Ground	5 V
M/T models	E167			

Is the inspection result normal?

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

2. CHECK ACCELERATOR PEDAL POSITION SENSOR 2 POWER SUPPLY CIRCUIT-2

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

+			-		Continuity
APP sensor			ECM		
Connector		Terminal	Connector	Terminal	
CVT models	E110	5	E16	118	Existed
M/T models	E167				

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace malfunctioning part.

3. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

SENSOR POWER SUPPLY 2 CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

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

+		-			
ECM		Sensor			
Connector	Terminal	Name	Connector		Terminal
E16	101	Atmospheric pressure sensor	E67		1
	118	APP sensor 2	CVT models	E110	5
			M/T models	E167	
F7	23	Refrigerant pressure sensor	F42		3
		Engine oil pressure sensor	F106		3
		Fuel rail pressure sensor	F62		1
	43	CMP sensor	F105		1

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning part.

4.CHECK COMPONENTS

Check the following.

- Refrigerant pressure sensor (Refer to [EC-407, "Diagnosis Procedure"](#))
- Fuel rail pressure sensor (Refer to [EC-260, "Component Inspection"](#))
- Engine oil pressure sensor (Refer to [EC-306, "Component Inspection"](#))
- Atmospheric pressure sensor (Refer to [EC-204, "Component Inspection"](#))
- CMP sensor (Refer to [EC-285, "Component Inspection"](#))
- Exhaust valve timing control position sensor (Refer to [EC-329, "Component Inspection"](#))

Is the inspection result normal?

YES >> Proceed to [GI-44, "Intermittent Incident"](#).

NO >> Replace malfunctioning part.

REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

REFRIGERANT PRESSURE SENSOR

Component Function Check

INFOID:0000000010775298

1.CHECK REFRIGERANT PRESSURE SENSOR 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 terminals under the following conditions.

ECM			Voltage
Connector	+	−	
	Terminal		
F7	34	39	1.0 - 4.0 V

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Proceed to [EC-407, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010775299

1.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch 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		
F42	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 ON.
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	
F42	3	F7	23	Existed

4. Also check harness for short to power.

Is the inspection result normal?

- YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace malfunctioning part.

3.CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT

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

REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

+		-		Continuity
Refrigerant pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
F42	1	F7	39	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning part.

4.CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT

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

+		-		Continuity
Refrigerant pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
F42	2	F7	34	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace malfunctioning part.

5.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor. Refer to [HAC-225, "Removal and Installation"](#).

NO >> Repair or replace malfunctioning part.

COOLING FAN

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

COOLING FAN

Component Function Check

INFOID:0000000010775300

1.CHECK COOLING FAN FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Perform "COOLING FAN (DUAL)" in "ACTIVE TEST" mode of "IPDM E/R" using CONSULT.
3. Touch "LOW", "HI" on the CONSULT screen.
4. Check that cooling fan operates.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-409, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010775301

1.CHECK COOLING FAN RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relays-2, -3.
3. Turn ignition switch ON.
4. Check the voltage between cooling fan relays-2, -3 harness connectors and ground.

+		-	Voltage
Cooling fan relay			
Connector	Terminal		
F56 (cooling fan relay-2)	1	Ground	Battery voltage
F57 (cooling fan relay-3)			

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble diagnosis for power supply circuit.

2.CHECK COOLING FAN MOTOR CIRCUIT-1

Check the voltage between cooling fan relays-2, -3 harness connectors and ground.

+		-	Voltage
Cooling fan relay			
Connector	Terminal		
F56 (cooling fan relay-2)	3	Ground	Battery voltage
F57 (cooling fan relay-3)			

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 4.

3.CHECK COOLING FAN RELAY OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connectors.
3. Check the continuity between cooling fan relay-2, -3 harness connectors and IPDM E/R harness connector.

COOLING FAN

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

+		-		Continuity
Cooling fan relay		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F56 (cooling fan relay-2)	2	F74	107	Existed
F57 (cooling fan relay-3)			106	

4. 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.

4.CHECK COOLING FAN MOTOR POWER SUPPLY CIRCUIT

1. Disconnect cooling fan motor-1 harness connector.
2. Check the voltage between cooling fan motor-1 harness connector and ground.

+		-	Voltage
Cooling fan motor-1			
Connector	Terminal		
F52	1	Ground	Battery voltage
	2		

Is the inspection result normal?

YES >> GO TO 5.

NO >> Perform trouble diagnosis for power supply circuit.

5.CHECK COOLING FAN MOTOR CIRCUIT-2

1. Check the continuity between cooling fan relay-2, -3 harness connectors and cooling fan motor-1, -2 harness connectors.

+		-		Continuity
Cooling fan relay		Cooling fan motor-1		
Connector	Terminal	Connector	Terminal	
F56 (cooling fan relay-2)	3	F52	3	Exisited
			4	
F57 (cooling fan relay-3)			3	
			4	

2. 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.

6.CHECK COOLING FAN MOTOR CIRCUIT-3

1. Check the continuity between IPDM E/R harness connector and cooling fan motor-2 harness connector.

+		-		Continuity
IPDM E/R		Cooling fan motor-2		
Connector	Terminal	Connector	Terminal	
F73	85	F53	1	Existed
			2	

COOLING FAN

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

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 COOLING FAN MOTOR CIRCUIT-4

1. Check the continuity between cooling fan relay-3 harness connectors and ground.

+		-	Continuity
Cooling fan relay-3			
Connector	Terminal		
F57	5	Ground	Existed

2. 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 COOLING FAN MOTOR CIRCUIT-5

1. Check the continuity between cooling fan relay-2 harness connectors and cooling fan motor-2 harness connector.

+		-		Continuity
Cooling fan relay-2		Cooling fan motor-2		
Connector	Terminal	Connector	Terminal	
F56	5	F53	1	Existed
			2	

2. 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 COOLING FAN MOTOR CIRCUIT-6

1. Check the continuity between cooling fan motor-2 harness connector and ground.

+		-	Continuity
Cooling fan motor-2			
Connector	Terminal		
F53	3	Ground	Existed
	4		

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

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace error-detected parts.

10.CHECK COOLING FAN RELAY-2 AND -3

Refer to [EC-412. "Component Inspection \(Cooling Fan Relay\)".](#)

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace malfunctioning cooling fan relay.

11.CHECK COOLING FAN MOTORS-1 AND -2

Refer to [EC-412. "Component Inspection \(Cooling Fan Motor\)".](#)

COOLING FAN

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace malfunctioning cooling fan motor. Refer to [CO-21, "Removal and Installation"](#).

12.CHECK INTERMITTENT INCIDENT

Perform [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to [PCS-60, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

Component Inspection (Cooling Fan Motor)

INFOID:0000000010775302

1.CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector.
3. Supply cooling fan motor terminals with battery voltage and check operation.

Cooling fan motor		Condition
Terminal		
+	—	
1	3 and 4	A
2	3 and 4	
1 and 2	3	
1 and 2	4	
1, 2	3, 4	B

Check that cooling fan speed of condition B is higher than that of A.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace cooling fan motor. Refer to [CO-21, "Removal and Installation"](#).

Component Inspection (Cooling Fan Relay)

INFOID:0000000010775303

1.CHECK COOLING FAN RELAYS

1. Turn ignition switch OFF.
2. Remove cooling fan relay-2, -3.
3. Check the continuity between cooling fan relay-2, -3 terminals as per the following conditions.

Cooling fan relay-2, -3		Conditions	Continuity
+	—		
Terminal			
3	5	12V 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.

MALFUNCTION INDICATOR LAMP (MIL)

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

MALFUNCTION INDICATOR LAMP (MIL)

Component Function Check

INFOID:0000000010775304

1.CHECK MIL FUNCTION

1. Turn ignition switch ON.
2. Check that MIL illuminates.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Proceed to [EC-413, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010775305

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. Refer to [EC-165, "Diagnosis Procedure"](#).

2.CHECK COMBINATION METER FUNCTION

Perform self-diagnosis for combination meter. Refer to [MWI-105, "DTC Index"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Perform the trouble diagnosis for the detected DTC.

3.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace combination meter. Refer to [MWI-151, "Removal and Installation"](#).
NO >> Repair or replace malfunctioning part.

INFORMATION DISPLAY (ASCD)

Component Function Check

INFOID:000000010775306

1.CHECK INFORMATION DISPLAY

1. Start engine.
2. Press 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/COAST 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-414, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000010775307

1.CHECK DTC

1. Check that DTC UXXXX is not displayed.

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Perform trouble diagnosis for DTC UXXXX. Refer to [EC-109, "DTC Index"](#).

2.CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to [MWI-86, "CONSULT Function"](#).

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Perform trouble diagnosis for DTC indicated.

3.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace combination meter. Refer to [MWI-151, "Removal and Installation"](#).
 NO >> Repair or replace error-detected parts.

CLUTCH PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

CLUTCH PEDAL POSITION SWITCH

Description

INFOID:0000000010775308

Clutch pedal position switch signal is applied to the ECM through the clutch pedal position switch when the clutch pedal is depressed.

Component Function Check

INFOID:0000000010775309

1.CHECK FOR CLUTCH PEDAL POSITION SWITCH FUNCTION

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

ECM			Condition		Voltage
Connector	+	-			
	Terminal	Terminal			
E16	108	128	Clutch pedal	Slightly depressed	Battery voltage
				Fully released	Approx. 0 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Refer to [EC-415. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010775310

1.CHECK CLUTCH PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect clutch pedal position switch harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between clutch pedal position switch harness connector and ECM harness connector.

Clutch pedal position switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E111	1	E16	108	Existed

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

Is the inspection result normal?

YES >> GO TO 2.

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

2.CHECK CLUTCH PEDAL POSITION SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between clutch pedal position switch harness connector and ground.

Clutch pedal position switch		Ground	Continuity
Connector	Terminal		
E111	2	Ground	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness for open and short between clutch pedal position switch and ground

CLUTCH PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

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

4.CHECK CLUTCH PEDAL POSITION SWITCH

Refer to [EC-416. "Component Inspection \(Clutch Pedal Position Switch\)"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace clutch pedal assembly.

5.CHECK INTERMITTENT INCIDENT

Refer to [GI-44. "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection (Clutch Pedal Position Switch)

INFOID:0000000010775311

1.CHECK CLUTCH PEDAL POSITION SWITCH-1

1. Turn ignition switch OFF.
2. Disconnect clutch pedal position switch harness connector
3. Check the continuity between clutch pedal position switch terminal under the following conditions.

Terminal	Condition		Continuity
1 and 2	Clutch pedal	Slightly depressed	Not existed
		Fully released	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK CLUTCH PEDAL POSITION SWITCH-2

1. Adjust clutch pedal position switch installation. Refer to [CL-9. "Inspection and Adjustment"](#).
2. Check the continuity between clutch pedal position switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Slightly depressed	Not existed
		Fully released	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace clutch pedal assembly.

ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

ASCD BRAKE SWITCH

Component Function Check

INFOID:0000000010775312

1.CHECK BRAKE PEDAL POSITION SWITCH FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Select "BRAKE SW" in "DATA MONITOR" mode with CONSULT.
3. Check "BRAKE SW" indication as per the following conditions.

Monitor item	Condition		Indication
BRAKE SW 1	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT

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

ECM			Condition		Voltage (Approx.)
Connector	+	−			
	Terminal				
E16	116	128	Brake pedal	Slightly de- pressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-417, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010775313

1.CHECK BRAKE PEDAL POSITION SWITCH CIRCUIT

With CONSULT

1. Turn ignition switch ON.
2. Select "BRAKE SW 1" in "DATA MONITOR" mode of "ENGINE" with CONSULT.
3. Check "BRAKE SW 1" indication as per the following conditions.

Monitor item	Condition		Indication
BRAKE SW 1	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT

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

ECM			Condition		Voltage (Approx.)
Connector	+	−			
	Terminal				
E16	116	128	Brake pedal	Slightly de- pressed	0 V
				Fully released	Battery voltage

ASCD BRAKE SWITCH

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).
NO >> GO TO 2.

2.CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
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		
CVT models	E124	1	Ground	Battery voltage
M/T models	E119	1		

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Perform trouble diagnosis for power supply circuit.

3.CHECK BRAKE PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between brake pedal position switch harness connector and ECM harness connector.

+			-		Continuity
Brake pedal position switch			ECM		
Connector		Terminal	Connector	Terminal	
CVT models	E124	2	E16	116	Existed
M/T models	E119	2	E16	116	Existed

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

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace malfunctioning part.

4.CHECK BRAKE PEDAL POSITION SWITCH

Check brake pedal position switch. Refer to [EC-418, "Component Inspection \(Brake Pedal Position Switch\)"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).
NO >> Replace brake pedal position switch. Refer to [BR-21, "Removal and Installation"](#).

Component Inspection (Brake Pedal Position Switch)

INFOID:0000000010775314

1.CHECK BRAKE PEDAL POSITION SWITCH-1

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.

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.

ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

2.CHECK BRAKE PEDAL POSITION SWITCH-2

1. Adjust brake pedal position switch installation. Refer to [BR-22. "Inspection and Adjustment"](#).
2. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition		Continuity
+	–			
Terminal				
1	2	Brake pedal	Fully released	Existed
			Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace brake pedal position switch. Refer to [BR-21. "Removal and Installation"](#).

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SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM

Symptom Table

INFOID:000000010775318

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-391
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-152
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-386
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-428
	Fuel rail pressure sensor circuit	1	1	2	2	2		2	2			2			EC-258
	High pressure fuel pump circuit			4		3									EC-394
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-429
	Incorrect idle speed adjustment						1	1	1	1		1			EC-426
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-364 , EC-369
	Intake manifold runner control valve circuit				4	4									EC-357
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-427
	Ignition circuit	1	1	2	2	2		2	2			2			EC-399
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-162

ENGINE CONTROL SYSTEM

< SYMPTOM DIAGNOSIS >

[MR20DD]

	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	
Main power supply and ground circuit	1	1	2	2	2		2	2			2			EC-162
Engine coolant temperature sensor circuit				3		3			3					EC-208
Air fuel ratio (A/F) sensor 1 circuit				3										EC-214 , EC-217 , EC-220
Throttle position sensor circuit						2			2					EC-211 , EC-265 , EC-338 , EC-339 , EC-378
Accelerator pedal position sensor circuit			3	2	1									EC-371 , EC-374 , EC-381
Knock sensor circuit			2								3			EC-275
Engine oil temperature sensor circuit			4		2						3			EC-262
Crankshaft position sensor circuit	2	2												EC-277
Camshaft position sensor (PHASE) circuit	3	2												EC-282
Vehicle speed signal circuit		2	3		3						3			EC-298
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-313 , EC-314
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-173 , EC-187
Exhaust valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-177 , EC-190
Exhaust valve timing control position sensor circuit	5	5	5	5	5		5	5			5			EC-327
M/T models: Reverse/neutral position signal circuit CVT models: Transmission range switch			3		3		3	3			3			EC-323
Refrigerant pressure sensor circuit		2				3			3		4			EC-407
Electrical load signal circuit							3							EC-403

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ENGINE CONTROL SYSTEM

< SYMPTOM DIAGNOSIS >

[MR20DD]

	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-69 , HAC-183
ABS actuator and electric unit (control unit)			4											BRC-70

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	OVERHEATSWATER 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-22
	Fuel piping			5	5	5		5	5		5	FL-9			
	Vapor lock													—	
	Valve deposit	5													—
	Poor fuel (Heavy weight gasoline, Low octane)			5	5	5		5	5			5		—	

ENGINE CONTROL SYSTEM

< SYMPTOM DIAGNOSIS >

[MR20DD]

		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	OVERHEATSWATER 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		5			EM-32
	Air cleaner														EM-32
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)	EM-32													
	Electric throttle control actuator				EM-32										
	Air leakage from intake manifold/Collector/Gasket				—										
Cranking	Battery	1	1	1		1		1	1			1		PG-124	
	Generator circuit													CHG-14 , CHG-40	
	Starter circuit	3								1			CHG-40		
	Signal plate	6											EM-115		
	M/T models: Reverse/neutral position signal circuit CVT models: Transmission range switch	4											TM-24 , TM-325		
Engine	Cylinder head	5	5	5	5	5		5	5		4	5	3		EM-99
	Cylinder head gasket														
	Cylinder block	6	6	6	6		6	6		6	4		EM-115		
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														

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ENGINE CONTROL SYSTEM

< SYMPTOM DIAGNOSIS >

[MR20DD]

		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 mecha- nism	Timing chain	5	5	5	5	5		5	5			5	3		EM-78
	Camshaft														EM-84
	Intake valve timing control														EC-176
	Exhaust valve timing control														EC-179
	Intake valve														EM-99
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EM-39, EX-7
	Three way catalyst														
Lubrica- tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gal- lery/Oil cooler	5	5	5	5	5		5	5			5			EM-42, EM-105, LU-12
	Oil level (Low)/Filthy oil														LU-9
Cooling	Radiator/Hose/Radia- tor filler cap	5	5	5	5	5		5	5		4	5			CO-13, CO-16
	Thermostat									5					CO-27
	Water pump														CO-24
	Water gallery														CO-29
	Cooling fan									5					CO-23
	Coolant level (Low)/ Contaminated coolant														CO-13

1 - 6: The numbers refer to the order of inspection.

NORMAL OPERATING CONDITION

Description

INFOID:000000010775319

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the status of that the engine speed is above 2,500 rpm under no load (at 0 km/h and the selector lever position is P or N) takes more than the specified time, 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 falls below 2,000 rpm.

NOTE:

This function is different from deceleration control listed under direct injection gasoline system, [EC-51. "DIG \(DIRECT INJECTION GASOLINE\) SYSTEM : System Description"](#).

Fuel cut when the accelerator pedal is fully depressed.

When starts the engine with fully depressing the accelerator pedal, in order to eliminate the spark plug fouling, performs fuel cut while cranking and prevent the engine from starting. The fuel cut continues until the accelerator pedal is released.

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PERIODIC MAINTENANCE

IDLE SPEED

Inspection

INFOID:000000010775320

1. CHECK IDLE SPEED

④ With CONSULT

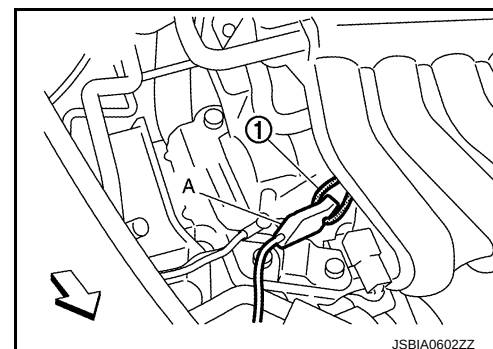
Check idle speed in "DATA MONITOR" mode of "ENGINE" using CONSULT.

⊗ Without CONSULT

Attach induction type (current detection type) rev counter (A) to loop wire ① as shown and check idle speed.

⇐ : Vehicle front

>> INSPECTION END



IGNITION TIMING

Inspection

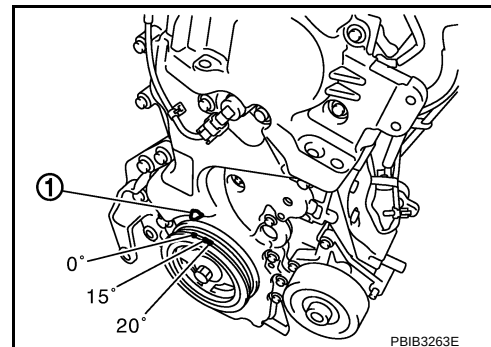
INFOID:000000010775321

1.CHECK IGNITION TIMING

1. Attach timing light to wire loop as shown.
2. Check ignition timing.

① : Timing indicator

>> INSPECTION END



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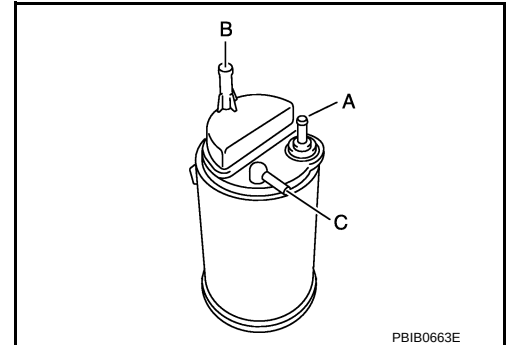
P

EVAPORATIVE EMISSION SYSTEM

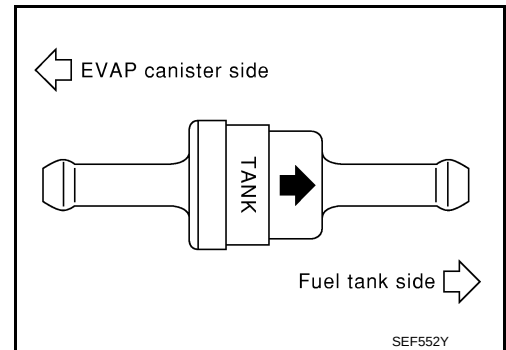
Inspection

INFOID:000000010775322

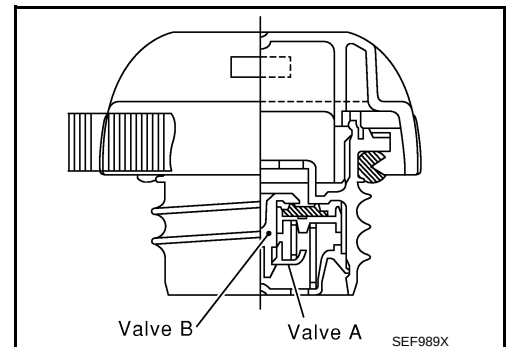
1. Visually inspect EVAP vapor lines for improper attachment and for cracks, damage, loose connections, chafing and deterioration.
2. Check EVAP canister as follows:
 - a. Block port (B). Orally blow air through port (A). Check that air flows freely through port (C).
 - b. Block port. Orally blow air through port. Check that air flows freely through port.
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.

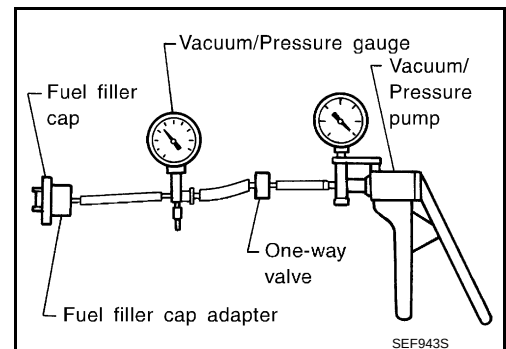


- b. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.153 - 0.200 bar, 0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)

Vacuum: -6.0 to -3.4 kPa (-0.06 bar to -0.034bar, -0.061 to -0.035 kg/cm², -0.87 to -0.49 psi)

- c. If out of specification, replace fuel filler cap as an assembly.



POSITIVE CRANKCASE VENTILATION

Inspection

INFOID:000000010775323

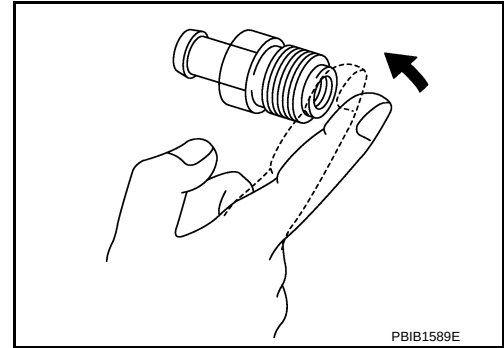
1.CHECK PCV VALVE

1. Start the engine and let it idle.
2. Replace PCV valve from the rocker cover. Refer to [EM-54, "Exploded View"](#).
3. Check that a properly working valve makes a hissing noise as air passes through it.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace PCV valve. Refer to [EM-54, "Exploded View"](#).



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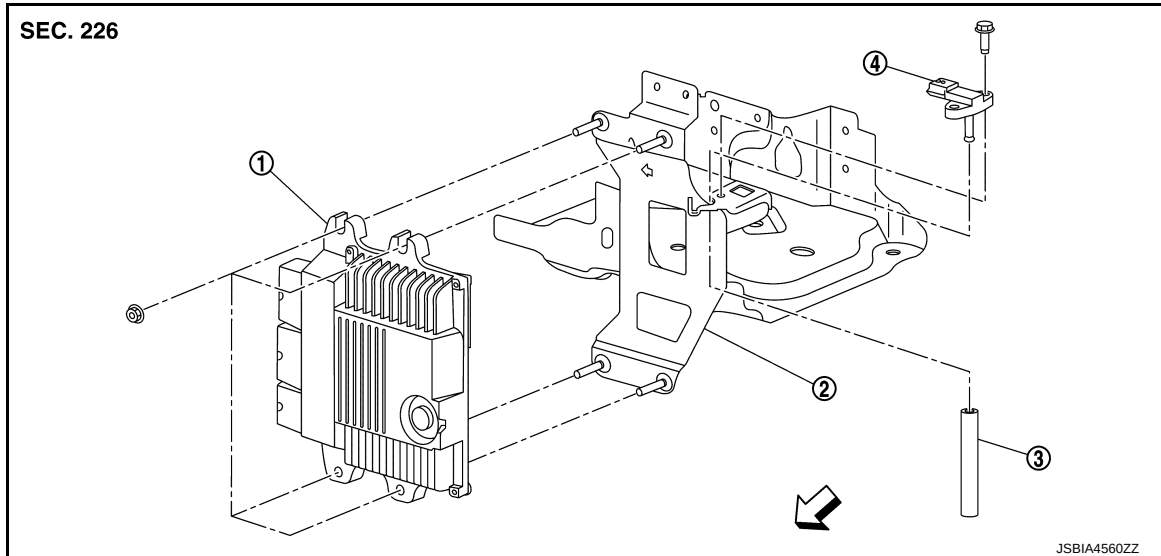
REMOVAL AND INSTALLATION

ECM

Removal and Installation

INFOID:000000010775324

EXPLODED VIEW



① ECM

② Battery tray

③ hose

④ Atmospheric pressure sensor

↶ : Vehicle front

CAUTION:

Perform **ADDITIONAL SERVICE WHEN REPLACING ECM**. Refer to [EC-141, "Work Procedure"](#).

REMOVAL

1. Remove air duct.
2. Remove the resonator. Refer to [EM-30, "Exploded View"](#).
3. Disconnect atmospheric pressure sensor harness connector.
4. Remove mounting bolts and the atmospheric pressure sensor .
5. Remove the hose from the atmospheric pressure sensor .
6. Disconnect ECM harness connectors. Refer to [PG-7, "Harness Connector"](#) (lever locking type).
7. Remove ECM mounting nuts, and then remove ECM.

INSTALLATION

Install in the reverse order of removal.

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR20DD]

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:0000000010775325

Condition	Specification
No load* (in P or N position)	650 ± 50 rpm (CVT models) 700 ± 50 rpm (M/T models)

*: 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:0000000010775326

Condition	Specification
No load* (in P or N position)	0 ± 2° BTDC

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

INFOID:0000000010775327

Condition	Specification
At idle	5 – 35 %
At 2,500 rpm	5 – 35 %

Mass Air Flow Sensor

INFOID:0000000010775328

Condition	Specification
At idle	1.0 – 4.0 g/s
At 2,500 rpm	2.0 – 12.0 g/s

HOW TO USE THIS MANUAL

HOW TO USE THIS SECTION

Information

INFOID:0000000011058852

Both “VDC” and “ESP” are used in this manual. These indicate the same system.

PRECAUTION

PRECAUTIONS

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

INFOID:000000010986193

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.

WARNING:

Always observe the following items for preventing accidental activation.

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, 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:

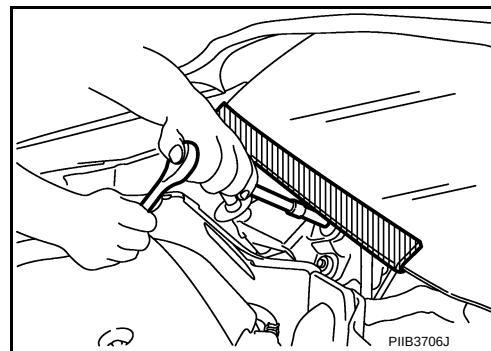
Always observe the following items for preventing accidental activation.

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

Precaution for Procedure without Cowl Top Cover

INFOID:000000010986194

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



Precautions for Removing Battery Terminal

INFOID:000000010988406

- With the adoption of Auto ACC function, ACC power is automatically supplied by operating the intelligent key or remote keyless entry or by opening/closing the driver side door. In addition, ACC power is supplied even after the ignition switch is turned to the OFF position, i.e. ACC power is supplied for a certain fixed time.

PRECAUTIONS

[QR25DE]

< PRECAUTION >

- When disconnecting the 12V battery terminal, turn off the ACC power before disconnecting the 12V battery terminal, observing "How to disconnect 12V battery terminal" described below.

NOTE:

Some ECUs operate for a certain fixed time even after ignition switch is turned OFF and ignition power supply is stopped. If the battery terminal is disconnected before ECU stops, accidental DTC detection or ECU data damage may occur.

- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.

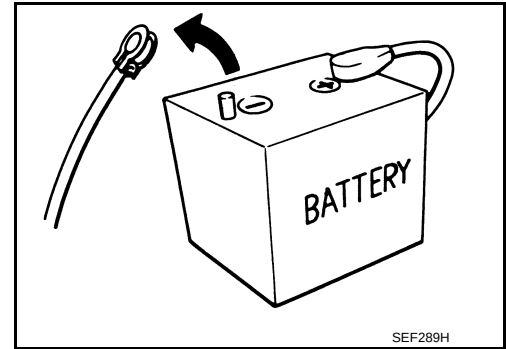
NOTE:

If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.

- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.

NOTE:

The removal of 12V battery may cause a DTC detection error.



HOW TO DISCONNECT 12V BATTERY TERMINAL

Disconnect 12V battery terminal according to Instruction 1 or Instruction 2 described below.

For vehicles parked by ignition switch OFF, refer to Instruction 2.

INSTRUCTION 1

- Open the hood.
- Turn key switch to the OFF position with the driver side door opened.
- Get out of the vehicle and close the driver side door.
- Wait at least 3 minutes. For vehicle with the engine listed below, remove the battery terminal after a lapse of the specified time.

D4D engine	: 20 minutes
HRA2DDT	: 12 minutes
K9K engine	: 4 minutes
M9R engine	: 4 minutes
R9M engine	: 4 minutes
V9X engine	: 4 minutes

CAUTION:

While waiting, never operate the vehicle such as locking, opening, and closing doors. Violation of this caution results in the activation of ACC power supply according to the Auto ACC function.

- Remove 12V battery terminal.

CAUTION:

After installing 12V battery, always check self-diagnosis results of all ECUs and erase DTC.

INSTRUCTION 2 (FOR VEHICLES PARKED BY IGNITION SWITCH OFF)

- Unlock the door with intelligent key or remote keyless entry.

NOTE:

At this moment, ACC power is supplied.

- Open the driver side door.
- Open the hood.
- Close the driver side door.
- Wait at least 3 minutes.

CAUTION:

While waiting, never operate the vehicle such as locking, opening, and closing doors. Violation of this caution results in the activation of ACC power supply according to the Auto ACC function.

- Remove 12V battery terminal.

CAUTION:

After installing 12V battery, always check self-diagnosis results of all ECUs and erase DTC.

PRECAUTIONS

< PRECAUTION >

[QR25DE]

On Board Diagnostic (OBD) System of Engine and CVT

INFOID:000000010986196

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.

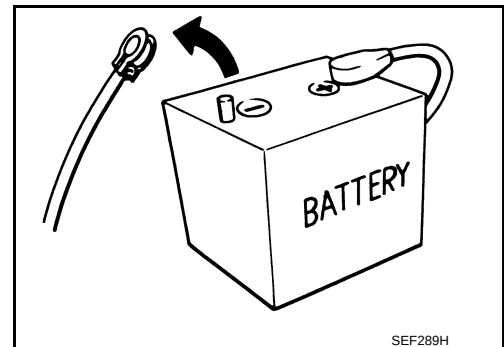
CAUTION:

- 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-7, "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.

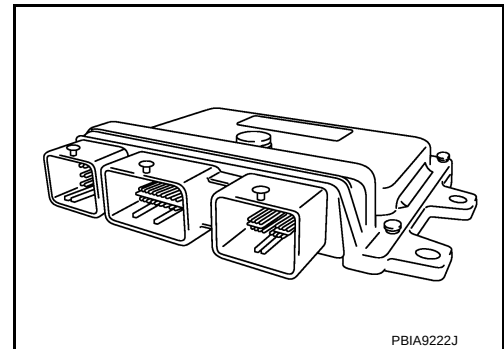
General Precautions

INFOID:000000010986197

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



- Do not disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.
The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.
 - Diagnostic trouble codes
 - 1st trip diagnostic trouble codes
 - Freeze frame data
 - 1st trip freeze frame data
 - System readiness test (SRT) codes
 - Test values

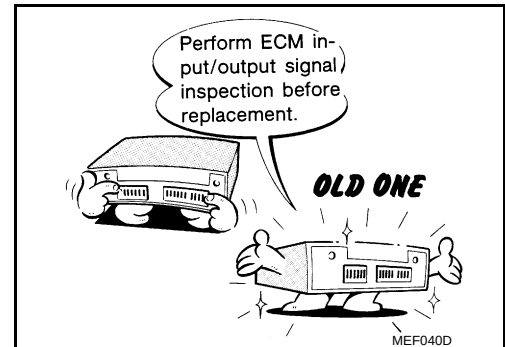
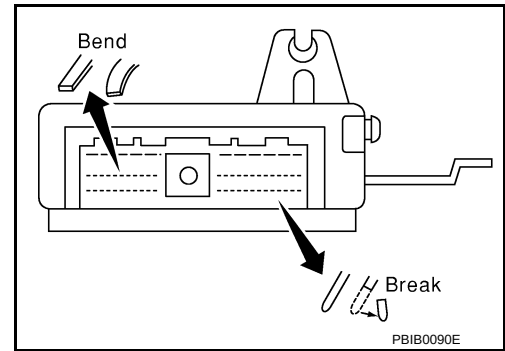


PRECAUTIONS

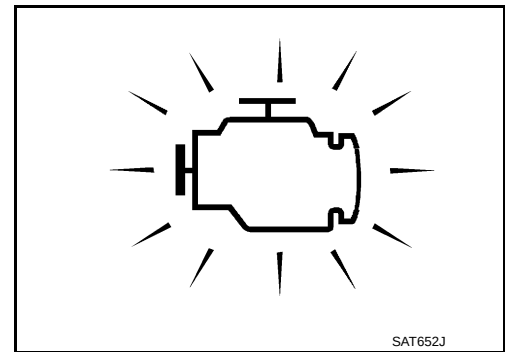
[QR25DE]

< PRECAUTION >

- 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-501, "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.

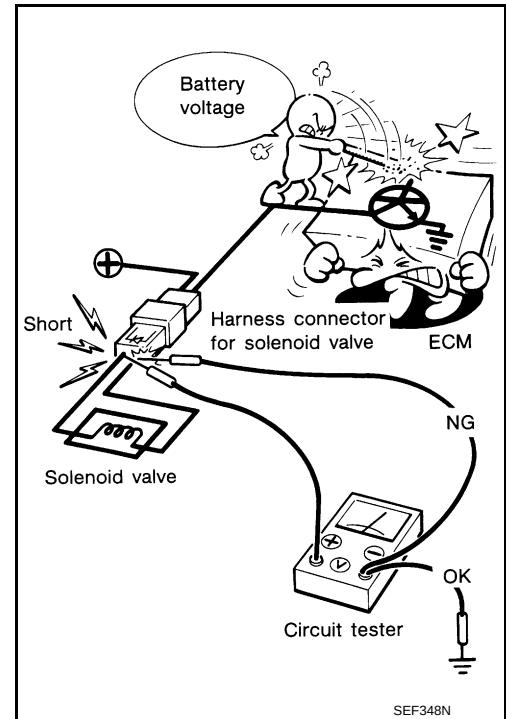


PRECAUTIONS

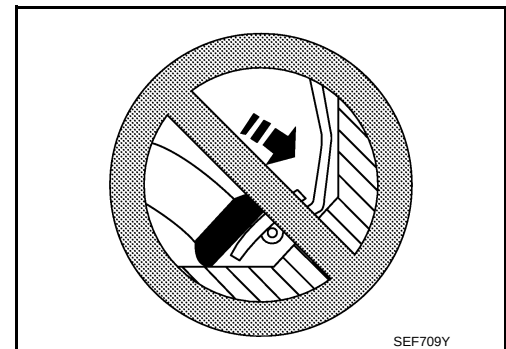
[QR25DE]

< PRECAUTION >

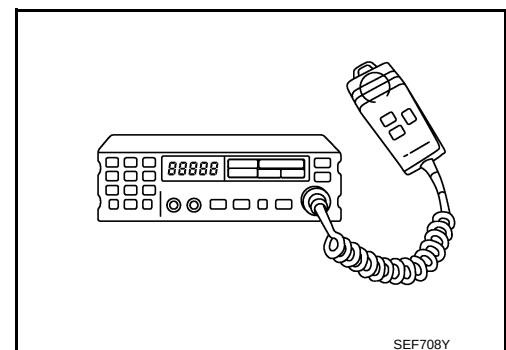
- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.



- 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 >

[QR25DE]

PREPARATION

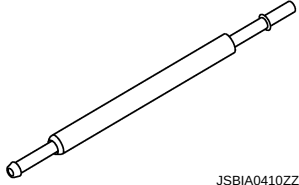
PREPARATION

Special Service Tools

INFOID:0000000010986198

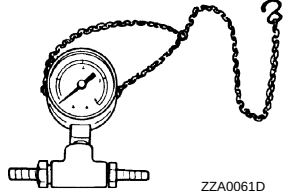
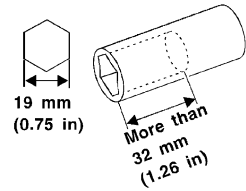
NOTE:

The actual shapes of the may differ from those illustrated here.

Tool number (SPX-North America No.) Tool name	Description
KV10120000 Fuel tube adapter	Measures fuel pressure
 JSBIA0410ZZ	

Commercial Service Tools

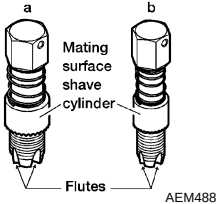
INFOID:0000000010986199

Tool name (SPX-North America No.)	Description
Fuel pressure gauge	Measuring fuel pressure
 ZZA0061D	
Fuel filler cap adapter i.e.: (MLR-8382)	Checks fuel tank vacuum relief valve opening pressure
 S-NT815	
Socket wrench	Removes and installs engine coolant temperature sensor
 19 mm (0.75 in) More than 32 mm (1.26 in) S-NT705	

PREPARATION

< PREPARATION >

[QR25DE]

Tool name (SPX-North America No.)	Description	A
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12) 	Reconditions the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor	EC
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specifica- tion MIL-A-907) 	Lubricates oxygen sensor thread cleaning tool when reconditioning exhaust system threads.	D E F

G

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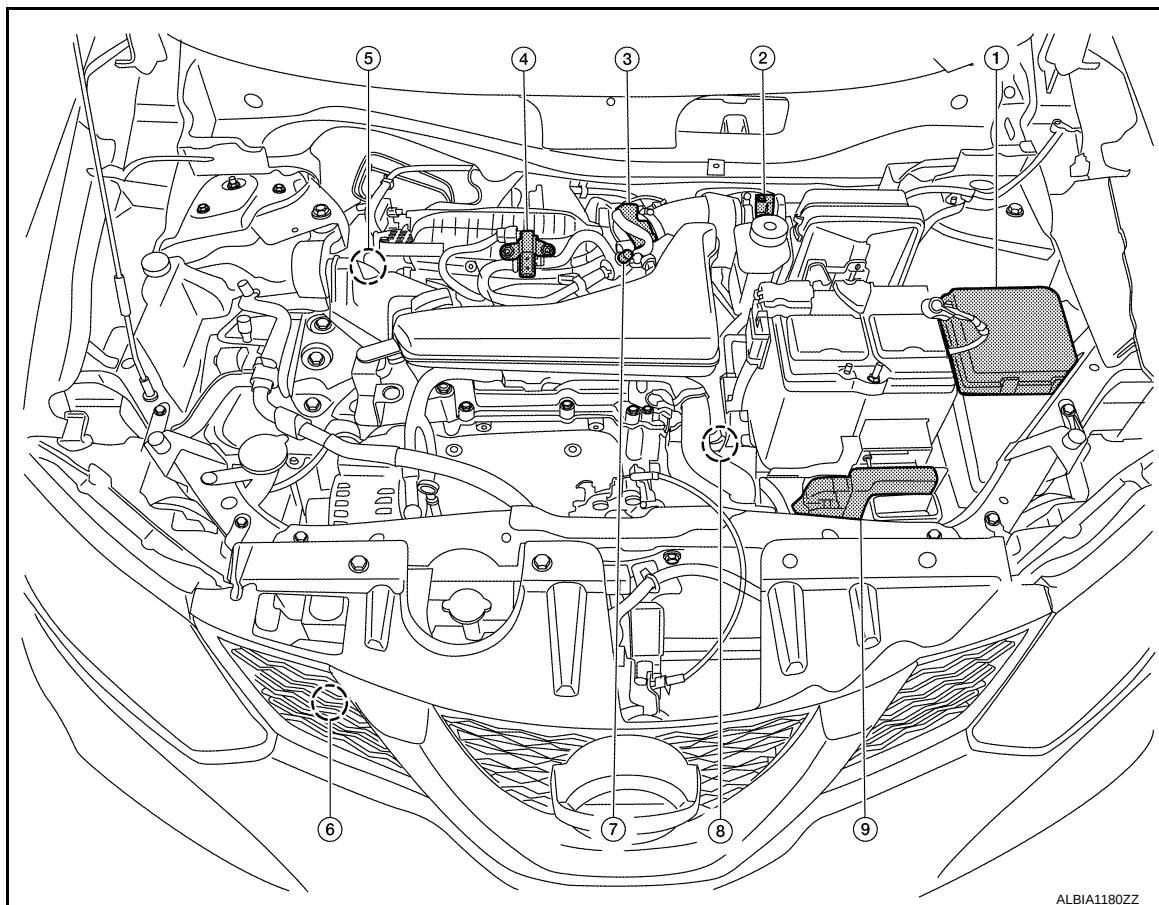
SYSTEM DESCRIPTION

COMPONENT PARTS

Component Parts Location

INFOID:0000000110986200

ENGINE ROOM COMPARTMENT



ALBIA1180ZZ

No.	Component	Function
①	IPDM E/R	- IPDM E/R control the internal relays and the actuators. - Refer to PCS-7, "RELAY CONTROL SYSTEM : System Description". - When CAN communication with ECM is impossible, IPDM E/R performs fail-safe control. - Refer to PCS-8, "RELAY CONTROL SYSTEM : Fail-safe".
②	Mass air flow sensor (with intake air temperature sensor)	EC-446, "Mass Air Flow Sensor (With Intake Air Temperature Sensor)"
③	Electric throttle control actuator (with built in throttle position sensor and throttle control motor)	EC-444, "Electric Throttle Control Actuator"
④	EVAP canister purge volume control solenoid valve	EC-452, "EVAP Canister Purge Volume Control Solenoid Valve"
⑤	Intake manifold runner control valve position sensor	EC-449, "Intake Manifold Runner Control Valve"
⑥	Refrigerant pressure sensor	EC-453, "Refrigerant Pressure Sensor"
⑦	EVAP service port*	When perform the EVAP leak check, positive pressure is delivered to the EVAP system through the EVAP service port.

COMPONENT PARTS

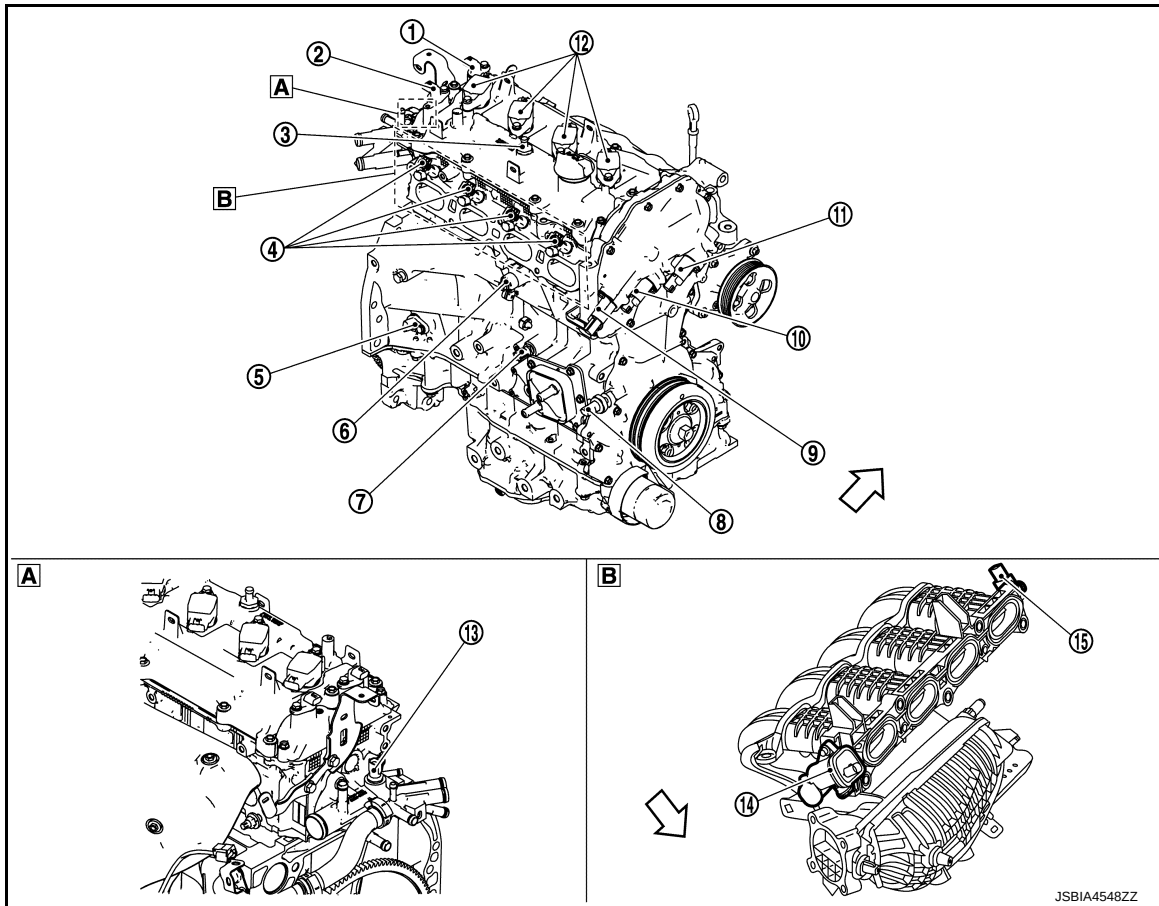
< SYSTEM DESCRIPTION >

[QR25DE]

No.	Component	Function
⑧	Transmission range switch	- The transmission range switch is installed to upper part of transaxle case. - ECM detects the selector lever position because the continuity of the transmission range switch line (the ON) exists.
⑨	ECM	EC-444, "ECM"

*: Not applicable

ENGINE COMPARTMENT



A Engine rear side

B Intake side

↖ : Vehicle front

No.	Component	Function
①	Exhaust valve timing control position sensor	EC-449, "Exhaust Valve Timing Control Position Sensor"
②	Camshaft position sensor (PHASE)	EC-448, "Camshaft Position Sensor (PHASE)"
③	PCV valve	The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
④	Fuel injector	EC-445, "Fuel Injector"
⑤	Crankshaft position sensor (POS)	EC-447, "Crankshaft Position Sensor (POS)"
⑥	Knock sensor	EC-451, "Knock Sensor"
⑦	Engine oil temperature sensor	EC-451, "Engine Oil Temperature Sensor"
⑧	Engine oil pressure sensor	EC-451, "Engine Oil Pressure Sensor"

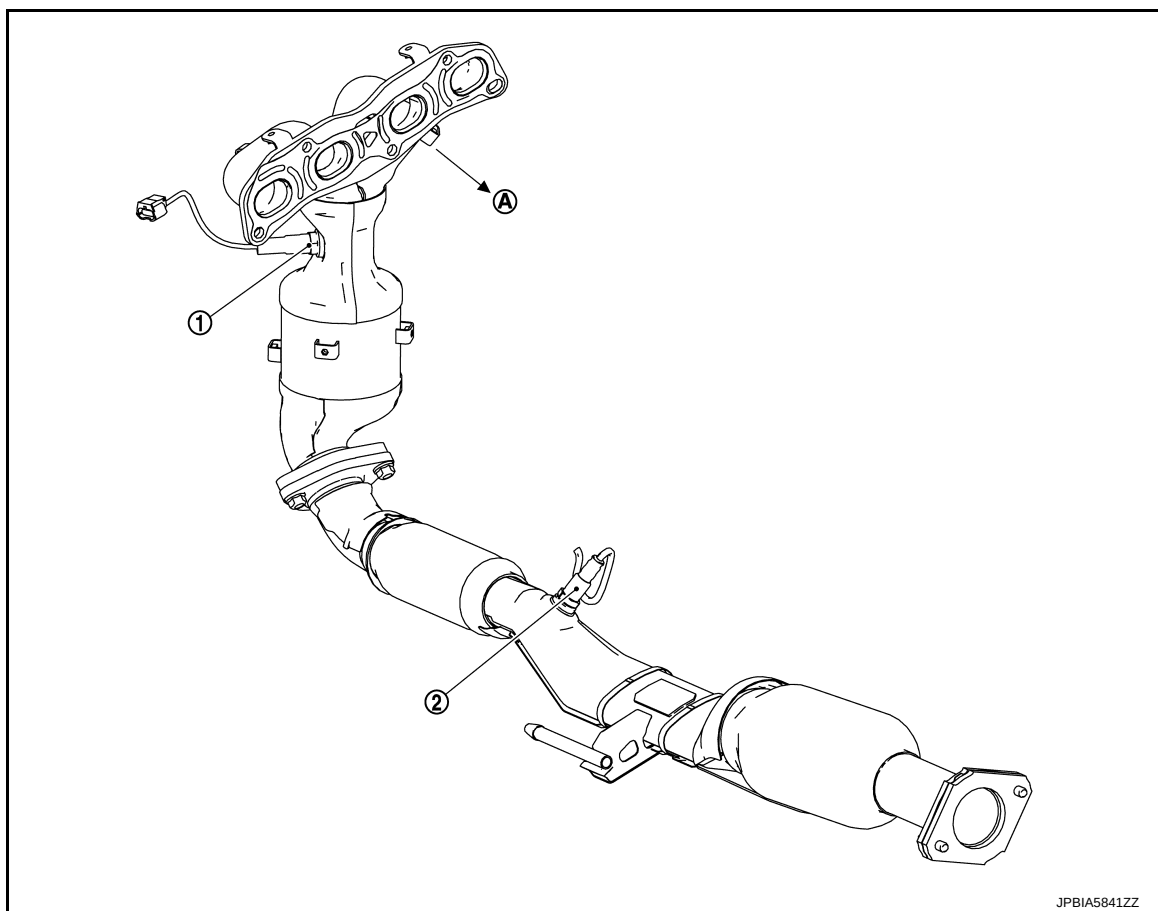
COMPONENT PARTS

< SYSTEM DESCRIPTION >

[QR25DE]

No.	Component	Function
⑨	Intake valve timing intermediate lock control solenoid valve	EC-448, "Intake Valve Timing Intermediate Lock Control Solenoid Valve"
⑩	Intake valve timing control solenoid valve	EC-448, "Intake Valve Timing Control Solenoid Valve"
⑪	Exhaust valve timing control solenoid valve	EC-449, "Exhaust Valve Timing Control Solenoid Valve"
⑫	Ignition coil (with power transistor)	EC-445, "Ignition Coil With Power Transistor"
⑬	Engine coolant temperature sensor	EC-447, "Engine Coolant Temperature Sensor"
⑭	Intake manifold runner control valve actuator	EC-449, "Intake Manifold Runner Control Valve"
⑮	Intake manifold runner control valve position sensor	

EXHAUST COMPARTMENT



Ⓐ To engine assembly

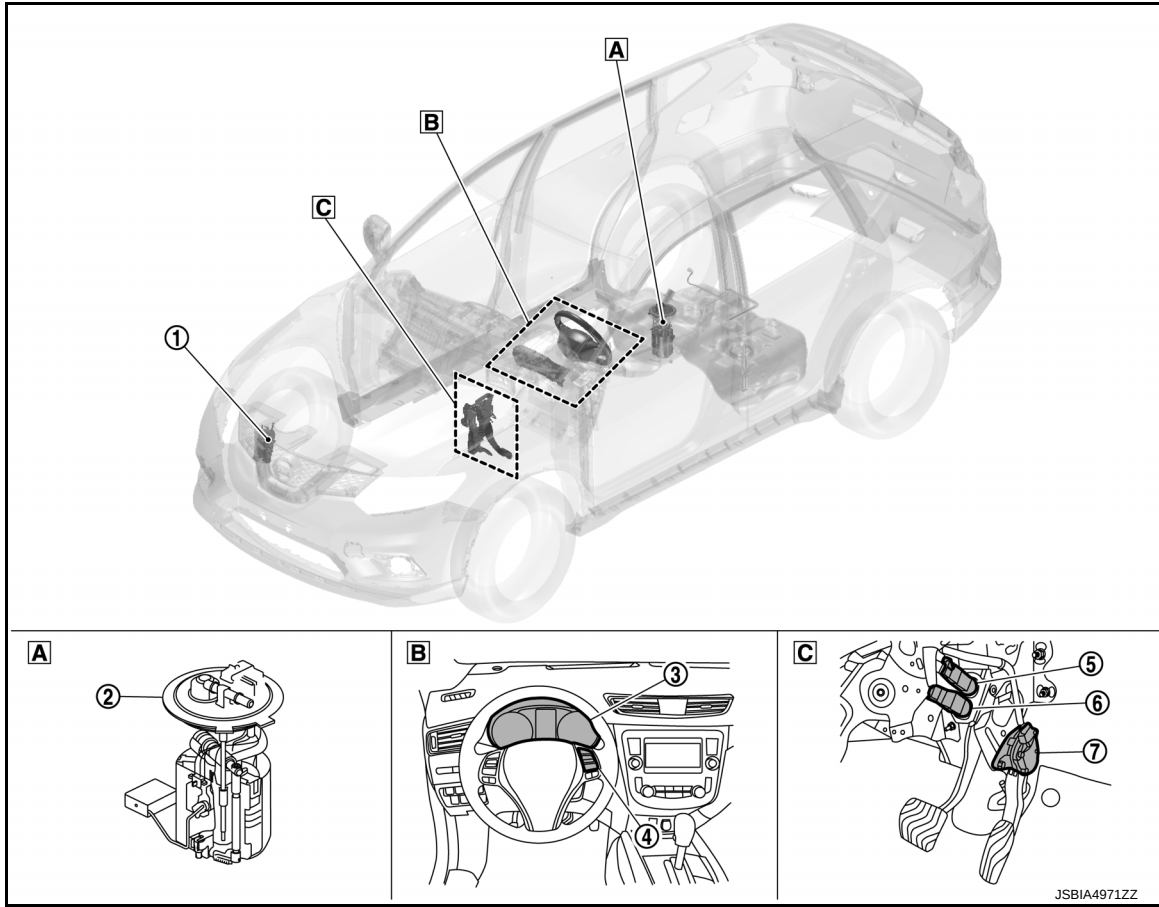
No.	Component	Function
①	Air fuel ratio (A/F) sensor 1	EC-450, "Air Fuel Ratio (A/F) Sensor 1"
②	Heated oxygen sensor 2	EC-450, "Heated Oxygen Sensor 2"

BODY COMPARTMENT

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[QR25DE]



A Inside fuel tank area

B Instrument panel area

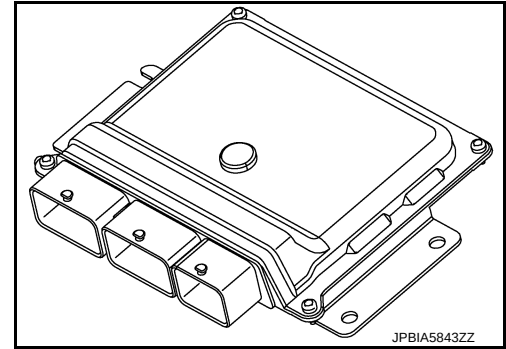
C Periphery of pedals

No.	Component		Function
①	EVAP canister		EC-452, "EVAP Canister"
②	Fuel level sensor unit and fuel pump		EC-445, "Fuel Level Sensor Unit and Fuel Pump"
③	Combination meter	Malfunction indicator lamp (MIL)	MWI-50, "WARNING LAMPS/INDICATOR LAMPS : Malfunction Indicator Lamp (MIL)"
		Information display	EC-453, "Information Display"
④	ASCD steering switch		EC-453, "ASCD Steering Switch"
⑤	Stop lamp switch		EC-453, "Stop Lamp Switch & Brake Pedal Position Switch"
⑥	Brake pedal position switch		
⑦	Accelerator pedal position sensor		EC-444, "Accelerator Pedal Position Sensor"

ECM

INFOID:000000010986201

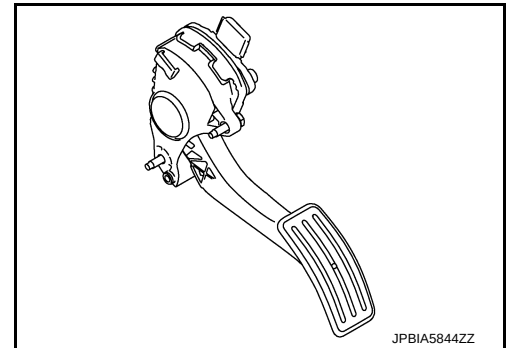
The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



Accelerator Pedal Position Sensor

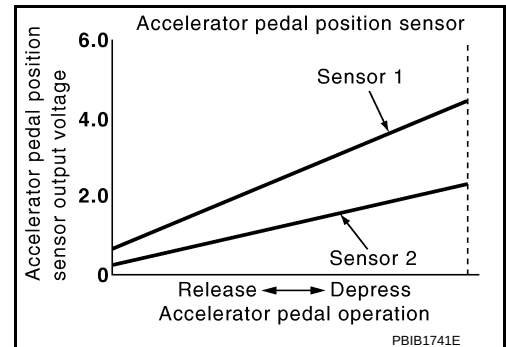
INFOID:000000010986202

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.

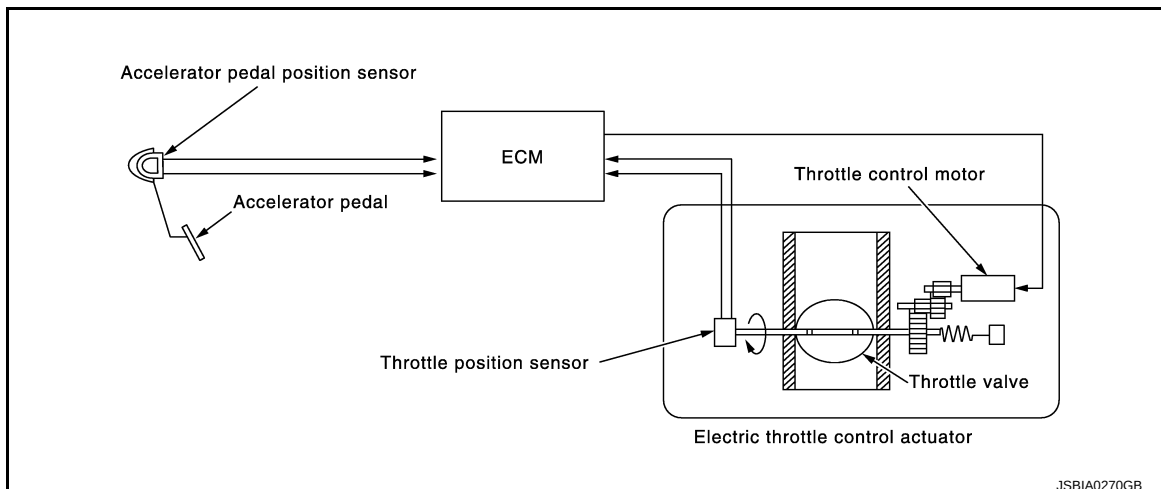
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



Electric Throttle Control Actuator

INFOID:000000010986203

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



JS8IA0270GB

THROTTLE CONTROL MOTOR RELAY

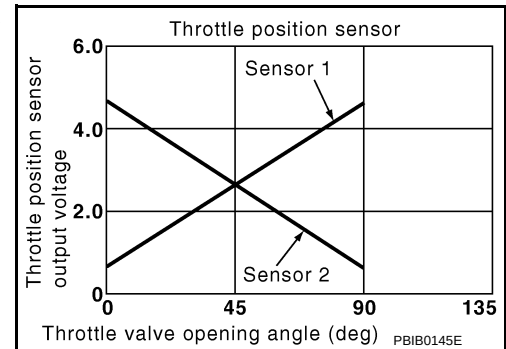
Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the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

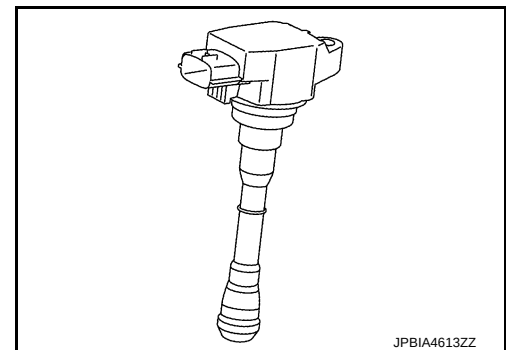
The throttle position sensor responds to the throttle valve movement. The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the 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:0000000010986204

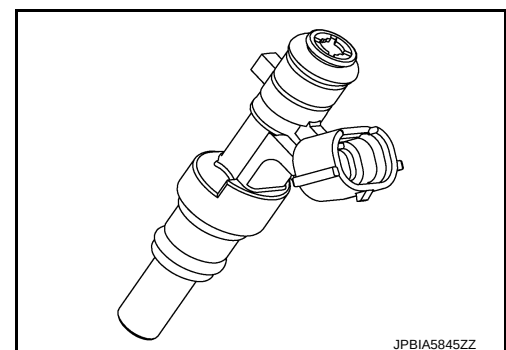
The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.



Fuel Injector

INFOID:0000000010986205

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 Level Sensor Unit and Fuel Pump

INFOID:0000000010986206

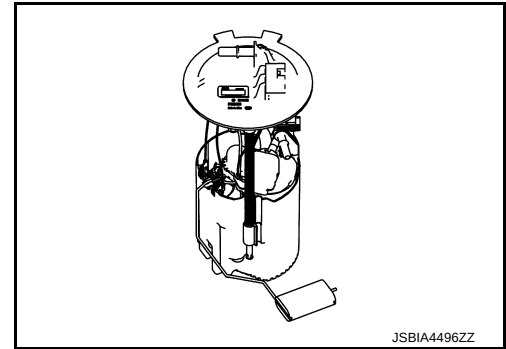
FUEL PUMP

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[QR25DE]

The ECM activates the fuel pump for 1 second after the ignition switch is turned ON to improve engine start ability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It sends the control signal to the fuel pump control module, 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 LEVEL SENSOR

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM via the CAN communication line.

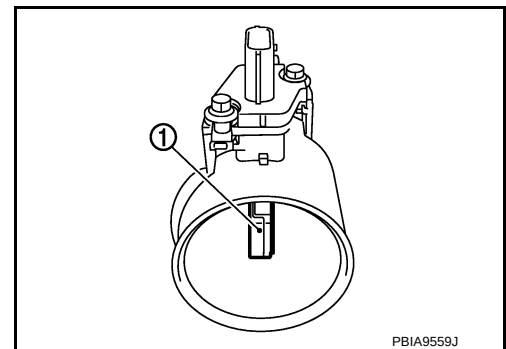
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

Mass Air Flow Sensor (With Intake Air Temperature Sensor)

INFOID:000000010986207

MASS AIR FLOW SENSOR

The mass air flow sensor① is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The MAF sensor controls the temperature of the heater in sensing element to a certain amount. The temperature distribution around the heater changes according to the increase in intake air volume. The change is detected by a thermistor and the air volume data is sent to ECM by the MAF sensor.



INTAKE AIR TEMPERATURE SENSOR

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.

<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)
25 (77)	1.9 – 2.1
80 (176)	3.2 – 3.4

*: These data are reference values on the diagnosis tool.

COMPONENT PARTS

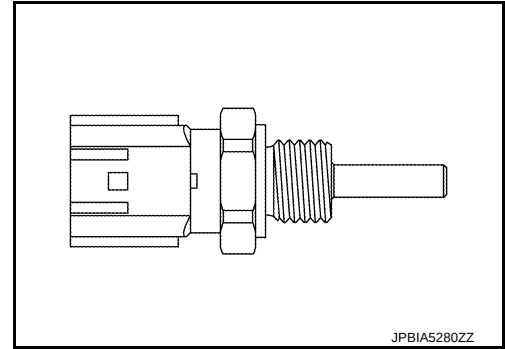
< SYSTEM DESCRIPTION >

[QR25DE]

Engine Coolant Temperature Sensor

INFOID:000000010986208

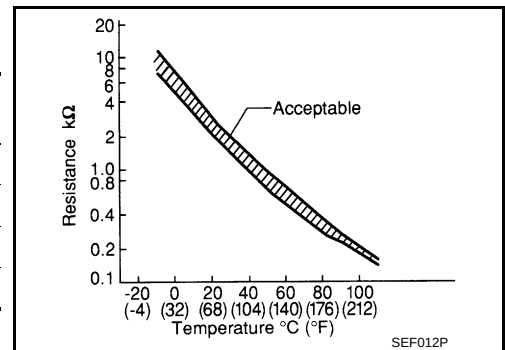
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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

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



Crankshaft Position Sensor (POS)

INFOID:000000010986209

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.

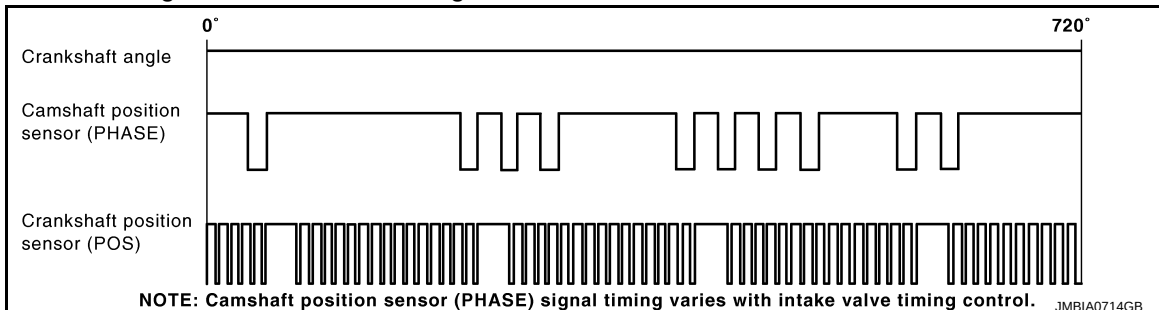
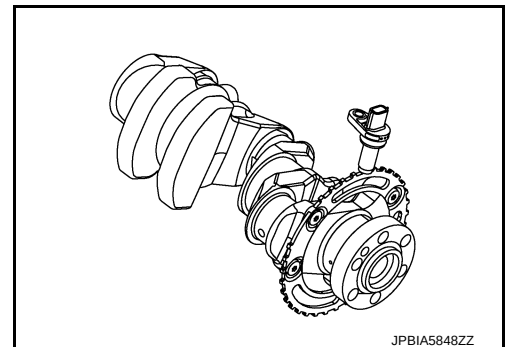
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

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:000000010986210

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.

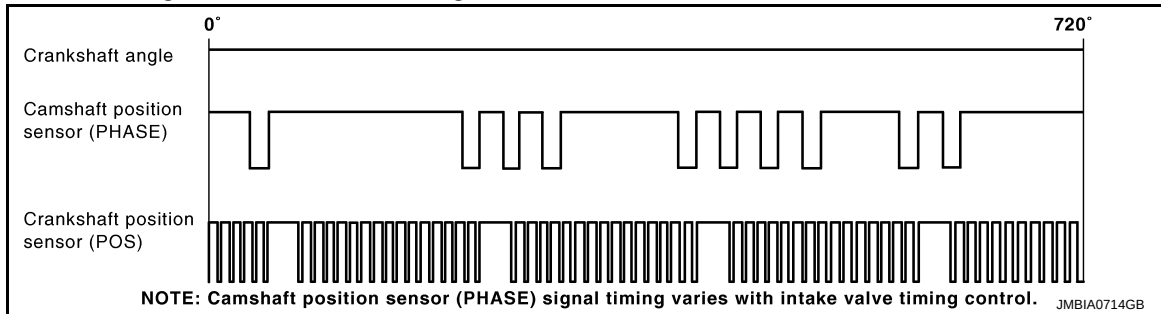
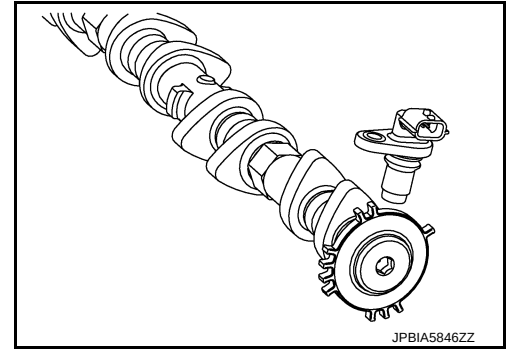
The sensor consists of a permanent magnet and Hall IC.

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:000000010986211

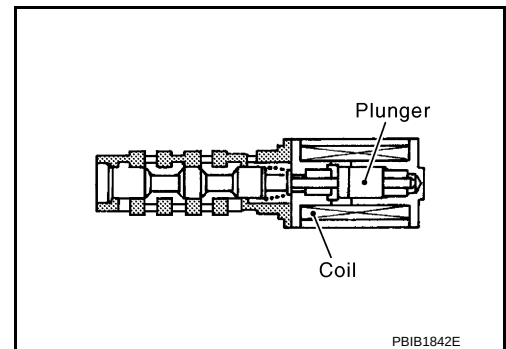
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.

The longer pulse width advances valve angle.

The shorter pulse width retards valve angle.

When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.



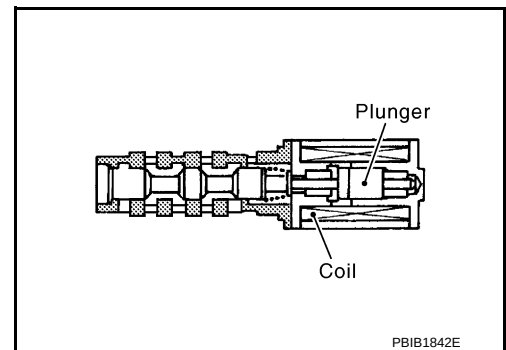
Intake Valve Timing Intermediate Lock Control Solenoid Valve

INFOID:000000010986212

Intake valve timing intermediate lock control solenoid valve is activated by ON/OFF signals from the ECM.

The intake valve timing intermediate lock control solenoid valve opens/closes the path of oil pressure acting on the lock key in the camshaft sprocket (INT).

- When the solenoid valve becomes ON, oil pressure to the lock key is trained to perform intermediate lock.
- When the solenoid valve becomes OFF, oil pressure is acted on the lock key to release the intermediate lock.



Exhaust Valve Timing Control Position Sensor

INFOID:000000010986213

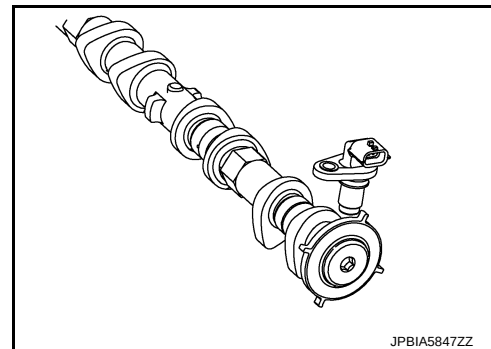
Exhaust valve timing control position sensor detects the protrusion of the signal plate installed to the exhaust camshaft front end. This sensor signal is used for sensing a position of the exhaust camshaft.

The sensor consists of a permanent magnet and Hall IC.

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

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

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



Exhaust Valve Timing Control Solenoid Valve

INFOID:000000010986214

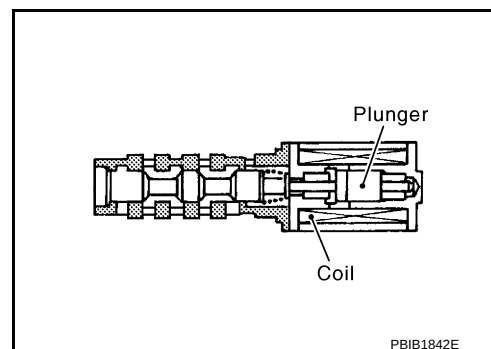
Exhaust valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

The exhaust valve timing control solenoid valve changes the oil amount and direction of flow through exhaust valve timing control unit or stops oil flow.

The longer pulse width retards valve angle.

The shorter pulse width advances valve angle.

When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the exhaust valve angle at the control position.



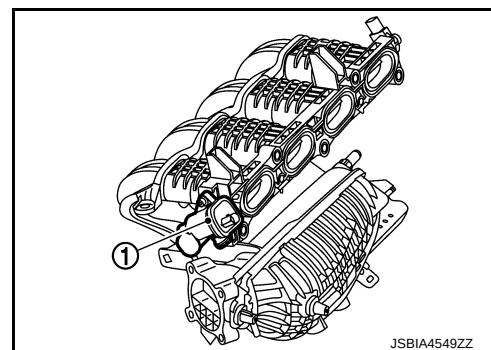
Intake Manifold Runner Control Valve

INFOID:000000010986215

Intake manifold runner control valve① is integrated to intake manifold.

Intake manifold runner control valve is mounted each port of the intake manifold and opened/closed by the intake manifold runner control valve motor.

ECM controls the intake manifold runner control valve motor, according to signals of engine speed, water temperature, etc. and stabilizes combustion by generating a strong tumble flow.



INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR

Intake manifold runner control valve motor is connected to the rear end of the valve shaft.

The motor opens or closes the valve by the output signal of the ECM.

INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR

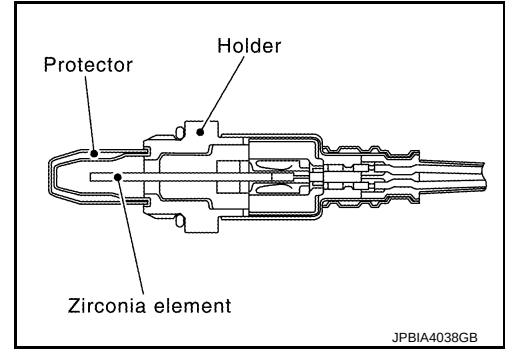
Intake manifold runner control valve position sensor is connected to the front end of the valve shaft.

The sensor consists of variable resistor. It senses the valve shaft movement and feeds the voltage signals to the ECM.

Air Fuel Ratio (A/F) Sensor 1

INFOID:0000000010986216

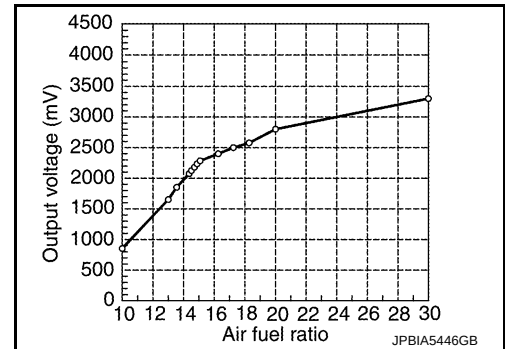
The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.



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 approximately 760°C (1,400°F).



A/F SENSOR 1 HEATER

A/F sensor 1 heater is integrated in the sensor.

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

Heated Oxygen Sensor 2

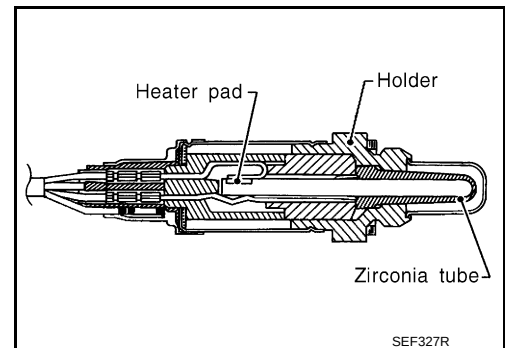
INFOID:0000000010986217

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.

Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



HEATED OXYGEN SENSOR 2 HEATER

Heated oxygen sensor 2 heater is integrated in the sensor.

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

COMPONENT PARTS

< SYSTEM DESCRIPTION >

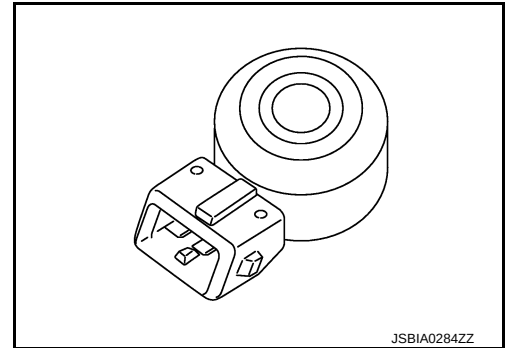
[QR25DE]

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

Knock Sensor

INFOID:0000000010986218

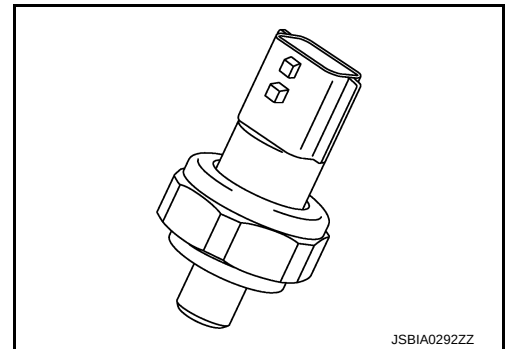
The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.



Engine Oil Pressure Sensor

INFOID:0000000010986219

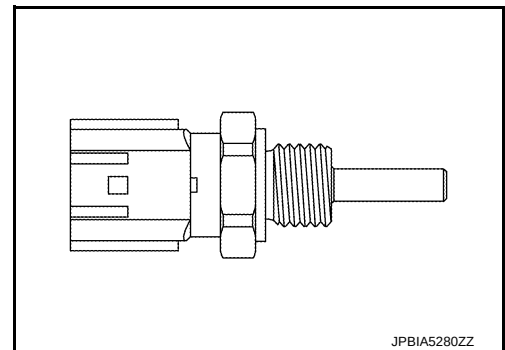
The engine oil pressure (EOP) sensor is detects engine oil pressure and transmits a voltage signal to the ECM.



Engine Oil Temperature Sensor

INFOID:0000000010986220

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.



COMPONENT PARTS

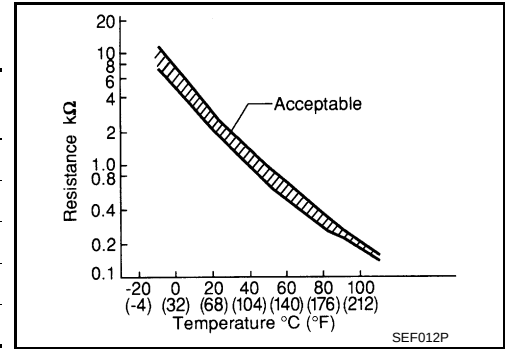
< SYSTEM DESCRIPTION >

[QR25DE]

<Reference data>

Engine oil temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	1.0	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

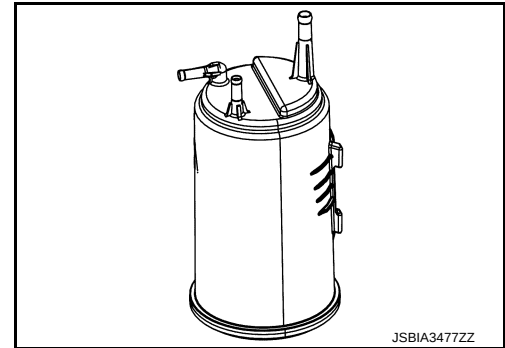
INFOID:0000000010986221

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 4-step control [HIGH/MIDDLE/LOW/OFF]. Cooling fan operates at each speed when the current flows in the cooling fan motor. Refer to [EC-472. "COOLING FAN CONTROL : System Description"](#) for cooling fan operation.

EVAP Canister

INFOID:0000000010986222

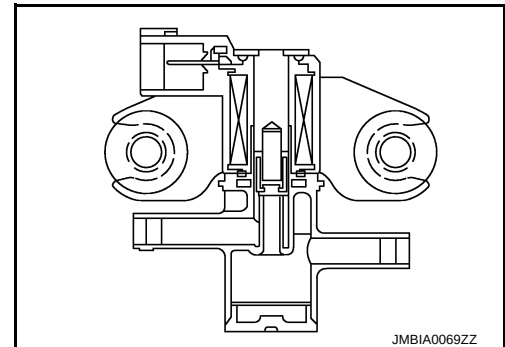
EVAP canister stores the generated fuel vapors in the sealed fuel tank to activated charcoals of EVAP canister when the engine is not operating or when refueling to the fuel tank.



EVAP Canister Purge Volume Control Solenoid Valve

INFOID:0000000010986223

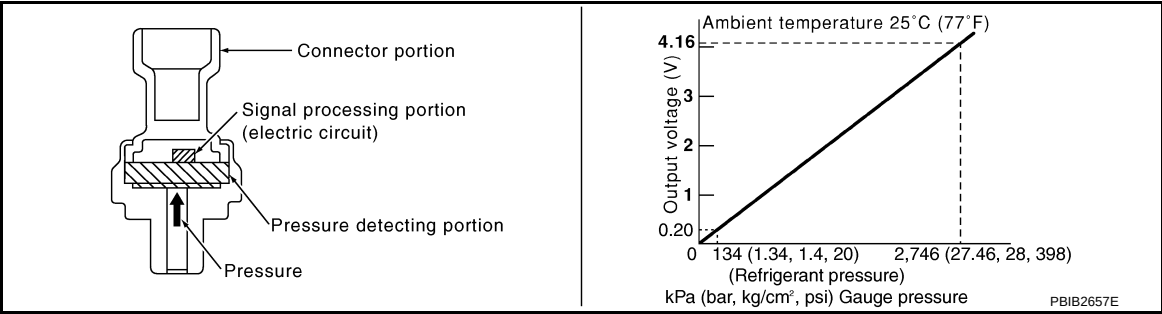
The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will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



Refrigerant Pressure Sensor

INFOID:0000000010986224

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:0000000010986225

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

ASCD Steering Switch

INFOID:0000000010986226

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

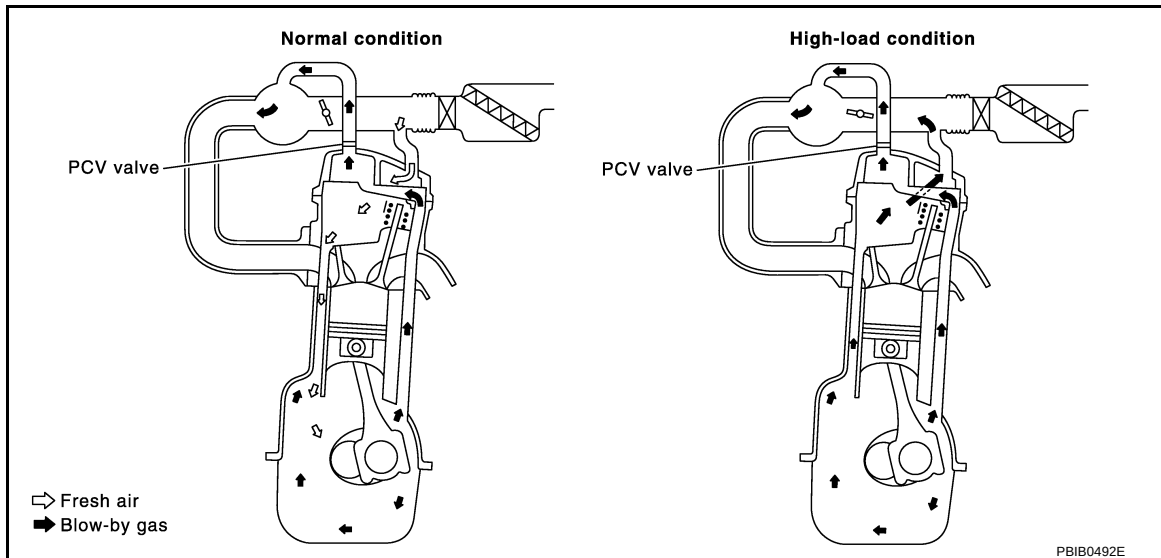
INFOID:0000000010986227

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

STRUCTURE AND OPERATION

Positive Crankcase Ventilation

INFOID:000000010986228



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.

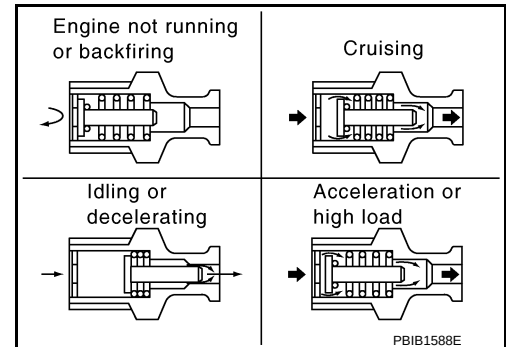
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

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 DESCRIPTION >

SYSTEM

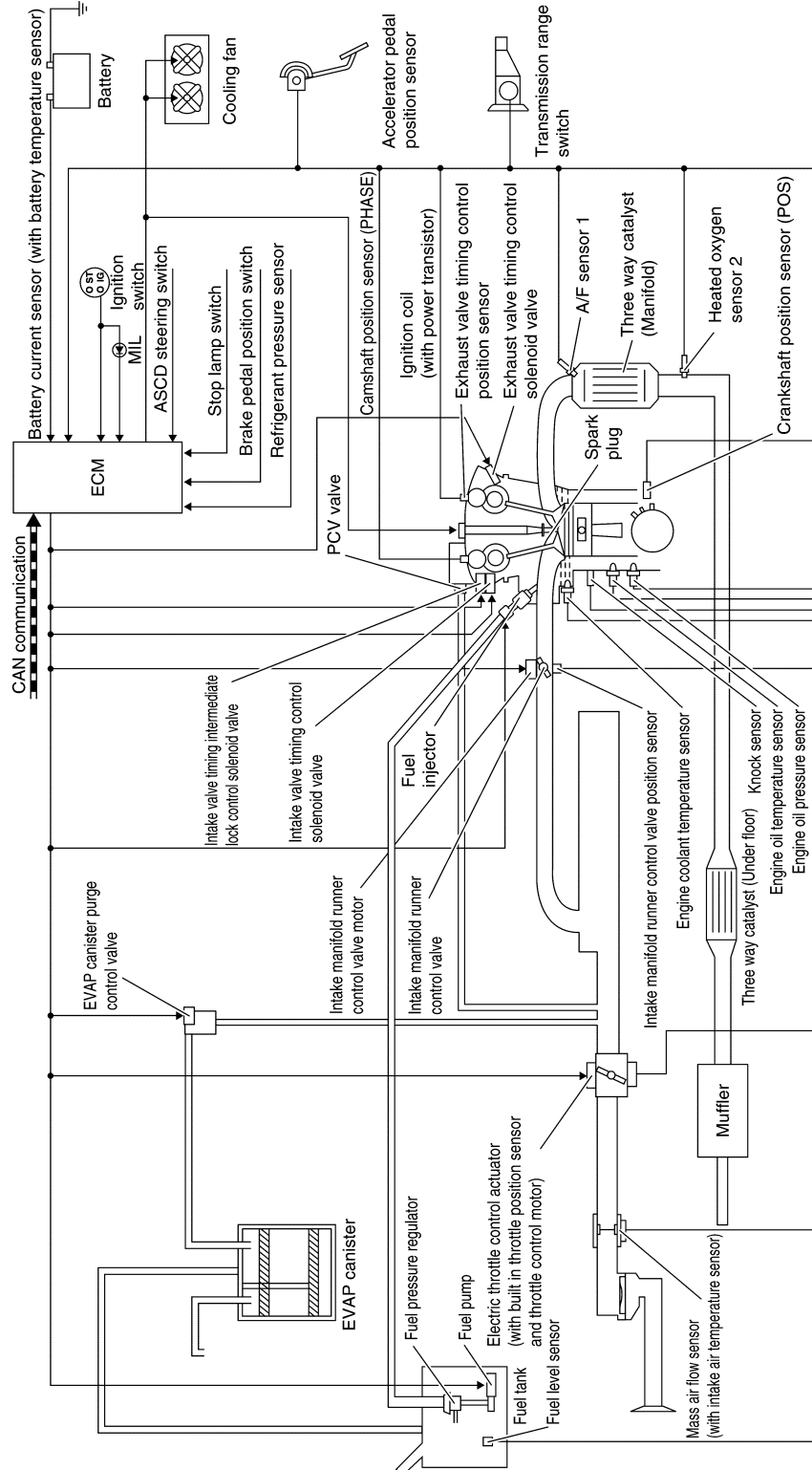
ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : System Description

INFOID:0000000010986229

EC

SYSTEM DIAGRAM



JSBIA4970GB

SYSTEM DESCRIPTION

SYSTEM

< SYSTEM DESCRIPTION >

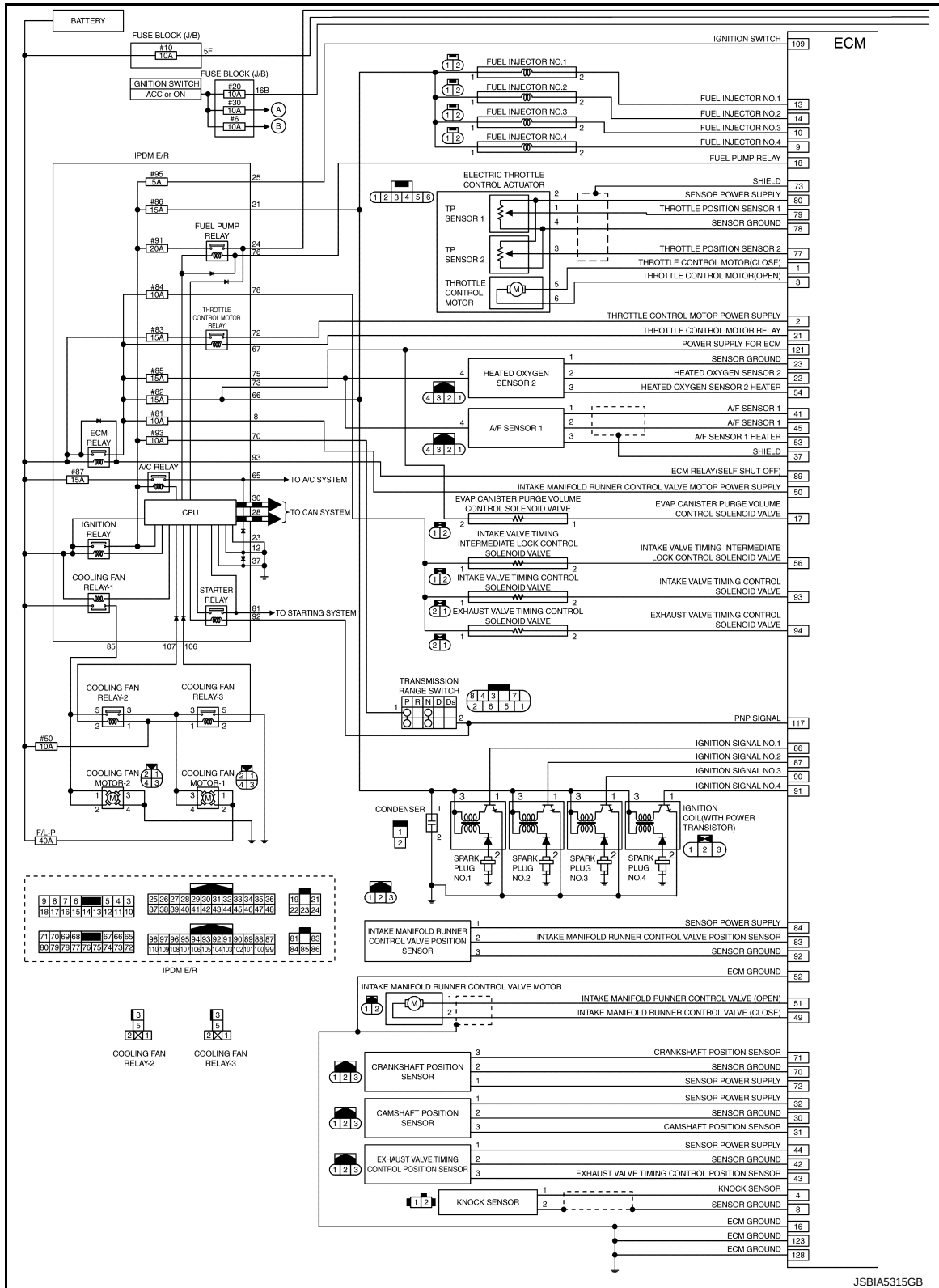
[QR25DE]

ECM controls the engine by various functions.

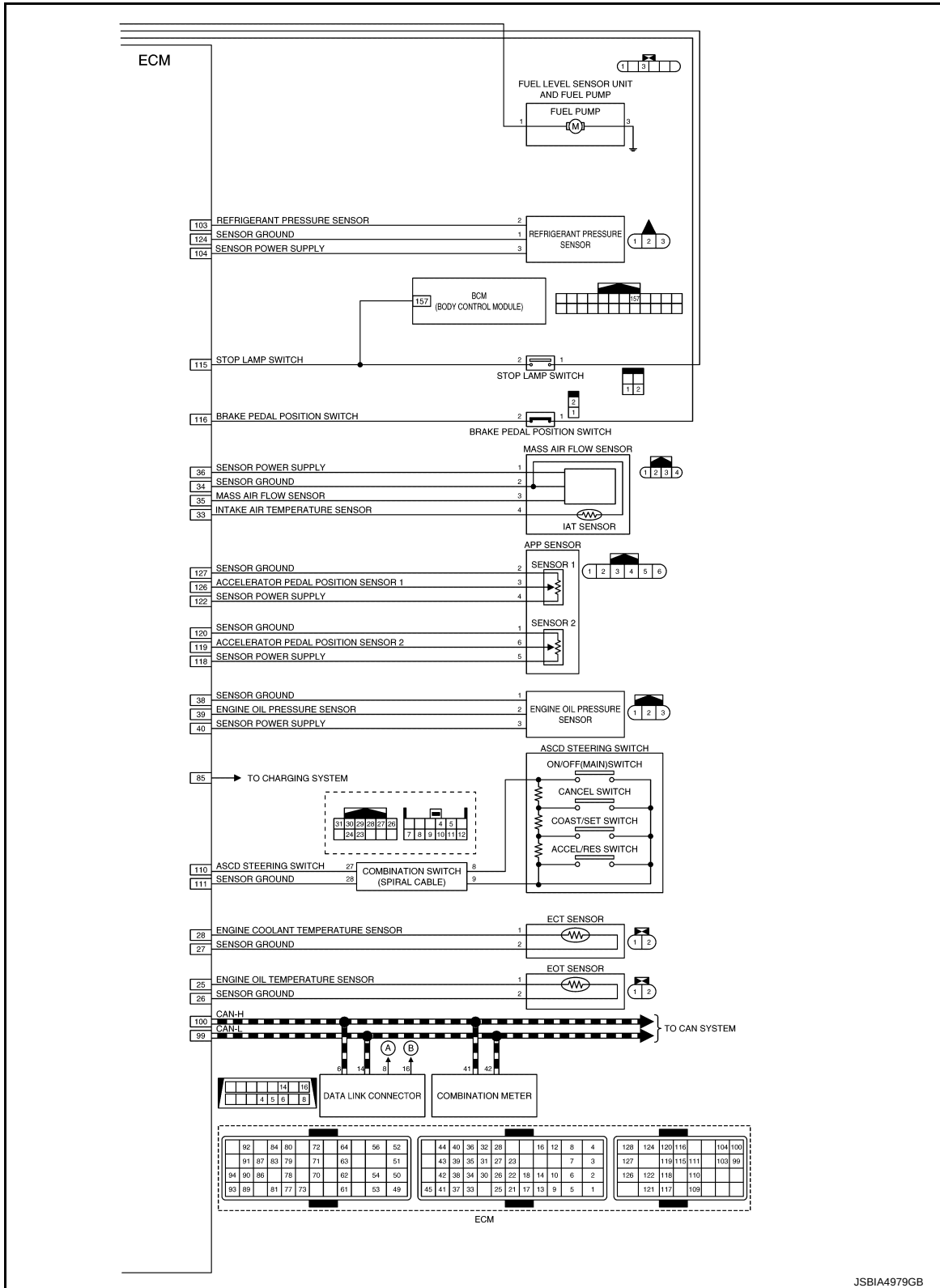
Function	Reference
Multiport fuel injection system	EC-461. "MULTIPORT FUEL INJECTION SYSTEM : System Description (with automatic air conditioner)"
Electric ignition system	EC-465. "ELECTRIC IGNITION SYSTEM : System Description"
Intake valve timing control	EC-466. "INTAKE VALVE TIMING CONTROL : System Description"
Exhaust valve timing control	EC-469. "EXHAUST VALVE TIMING CONTROL : System Description"
Intake manifold runner control	EC-470. "INTAKE MANIFOLD RUNNER CONTROL : System Description"
Engine protection control	EC-470. "ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description"
Air conditioning cut control	EC-471. "AIR CONDITIONING CUT CONTROL : System Description"
Power generation voltage variable control	EC-471. "POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : System Description"
Cooling fan control	EC-472. "COOLING FAN CONTROL : System Description"
Automatic speed control device (ASCD)	EC-473. "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description"
CAN communication	EC-477. "CAN COMMUNICATION : System Description"
ECO mode	EC-478. "ECO MODE CONTROL : System Description"

ENGINE CONTROL SYSTEM : Circuit Diagram

INFOID:000000010986230



JSBIA5315GB



JSBIA4979GB

ENGINE CONTROL SYSTEM : Fail Safe

INFOID:000000010986231

NON DTC RELATED ITEM

SYSTEM

< SYSTEM DESCRIPTION >

[QR25DE]

Detected items	Engine operating condition in fail-safe mode	Remarks	Reference page
Malfunction indicator lamp circuit	Engine speed will not rise more than 2,500 rpm due to the fuel cut	When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system. Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail safe function. The fail safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.	EC-791, "Component Function Check"

DTC RELATED ITEM

Description

When a DTC is detected, ECM executes a mode (in the Fail-safe mode) applicable to the DTC. The fail-safe mode has the preset traveling control mode (accelerator angle variation and engine output limit) and device fix mode.

Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
	Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction.
Device fix mode		- This mode fixes the IVT control solenoid valve and the EVT control solenoid valve in the reference position. - The intake manifold runner control valve motor is turned OFF (intake manifold runner control valve opens).

Fail Safe Pattern

Pattern	Fail safe mode	
A	Traveling control mode	Accelerator angle variation control
B		Engine output control
C	Device fix mode	

Fail Safe List

×:Applicable —: Not applicable

DTC No.	Detected items	Vehicle behavior			
		Pattern			Others
		A	B	C	
P0011	Intake valve timing control	—	—	×	ECM activates the IVT intermediate lock control solenoid valve to bring the cam sprocket into an intermediate lock condition.
P0014 P0078	Exhaust valve timing control	—	—	×	—
P0102 P0103	Mass air flow sensor circuit	×	×	×	—
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.

SYSTEM

< SYSTEM DESCRIPTION >

[QR25DE]

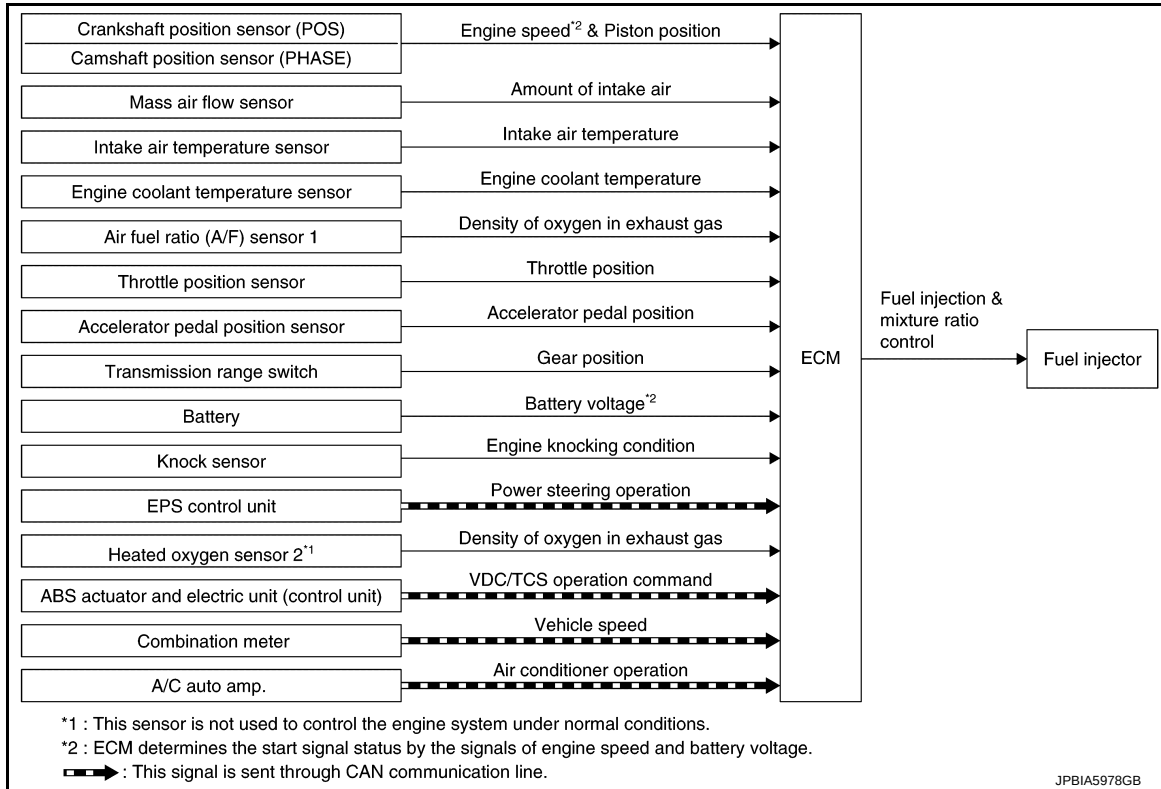
DTC No.	Detected items	Vehicle behavior			
		Pattern			Others
		A	B	C	
P0171 P0172	Fuel injection system	×	—	—	—
P0197 P0198	Engine oil temperature sensor	—	—	—	Exhaust valve timing control does not function.
P0300 P0301 P0302 P0303 P0304	Misfire	×	—	—	—
P0500	Vehicle speed sensor	×	—	—	—
P0524	Engine oil pressure	—	—	—	- ECM illuminates oil pressure warning lamp on the combination meter. - Engine speed will not rise more than 4,000rpm due to the fuel cut. - Fail-safe is canceled when ignition switch OFF → ON.
P0603	ECM power supply circuit	—	×	—	—
P0605	ECM	—	—	—	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.
P1078	Exhaust valve timing control position sensor circuit	×	—	×	—
P1568	Signal invalid	—	—	—	Active trace control does not function.
P1805	Brake switch	—	—	—	ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.
					Vehicle condition
					When engine is idling
					When accelerating
P2004	Intake manifold runner control valve	—	×	×	—
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	—	×	—	—
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.

MULTIPOINT FUEL INJECTION SYSTEM

MULTIPOINT FUEL INJECTION SYSTEM : System Description (with automatic air conditioner)

INFOID:000000010986232

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

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

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

<Fuel increase>

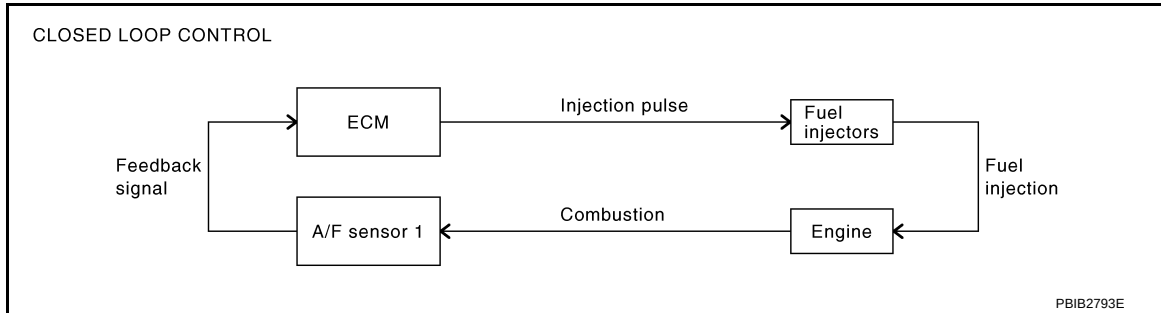
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

< SYSTEM DESCRIPTION >

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses 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-450. "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
- 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.

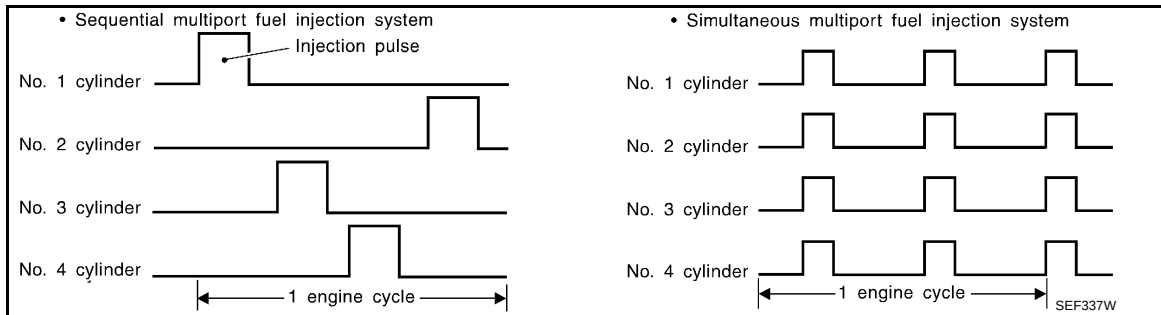
"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.

"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.

< SYSTEM DESCRIPTION >

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.

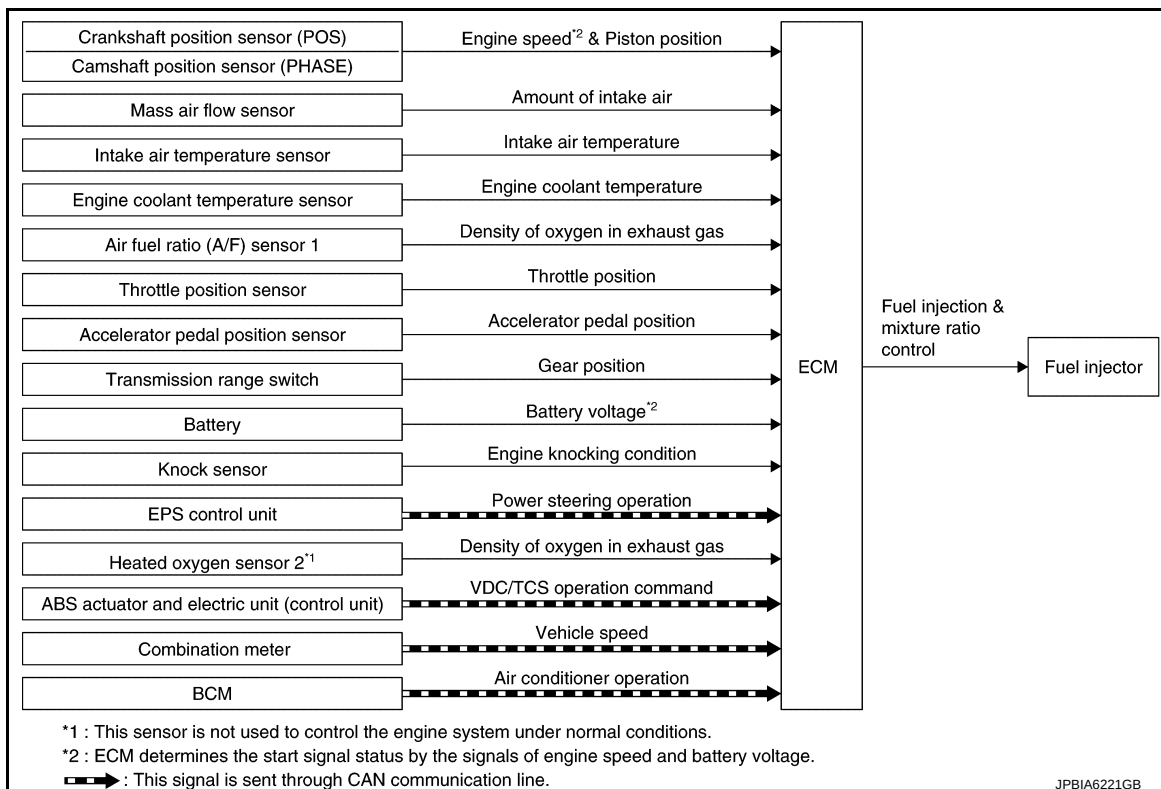
FUEL SHUT-OFF

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.

MULTIPOINT FUEL INJECTION SYSTEM : System Description (with manual air conditioner)

INFOID:000000010986233

SYSTEM DIAGRAM



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

< SYSTEM DESCRIPTION >

by input signals (for engine speed and intake air) from the crankshaft position sensor (POS), camshaft position sensor (PHASE) and the mass air flow sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

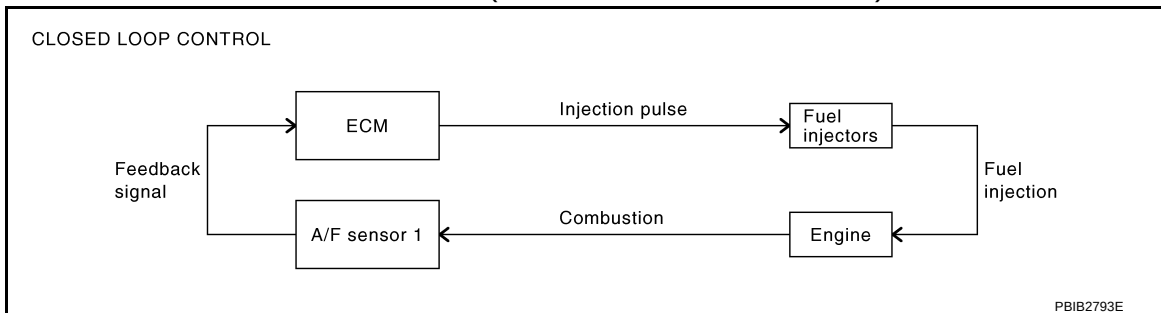
<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses 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-450, "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
- 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.

SYSTEM

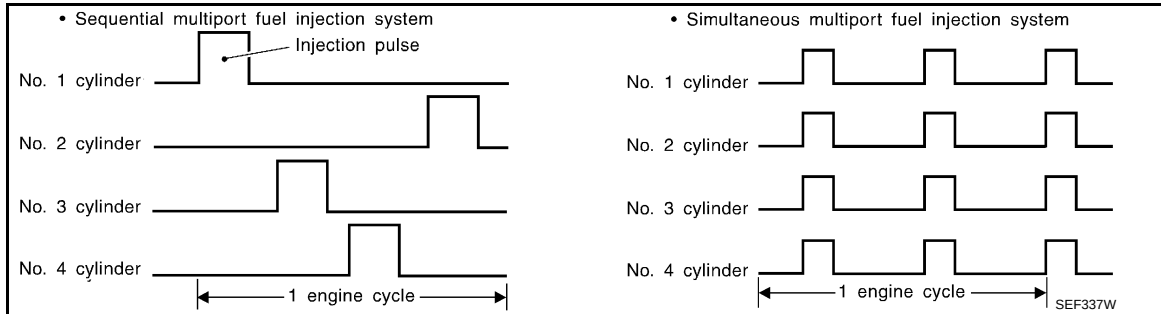
< SYSTEM DESCRIPTION >

[QR25DE]

"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 Multipoint 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 Multipoint 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

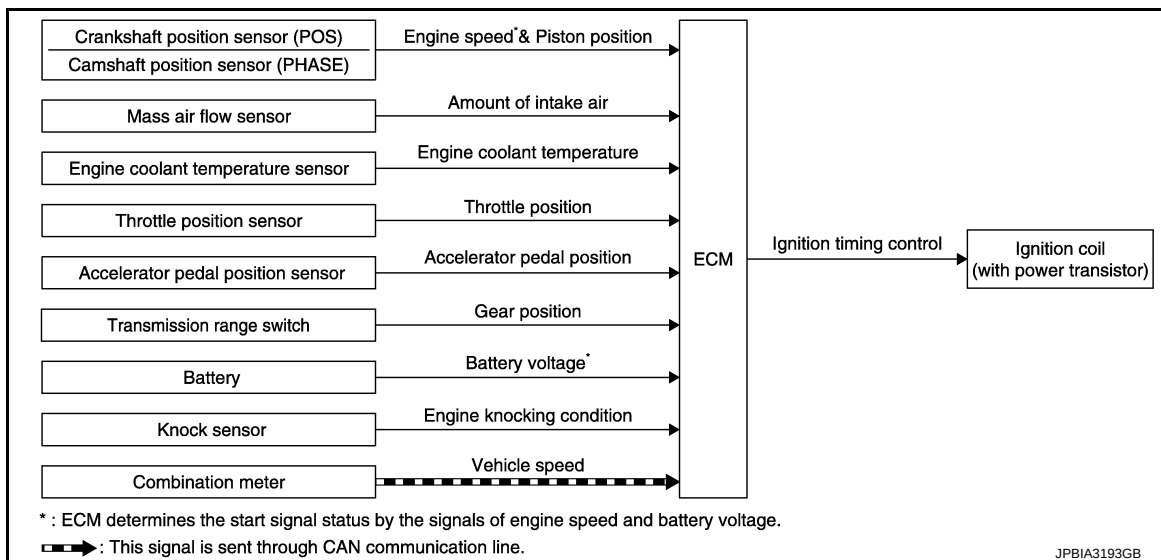
Fuel to each cylinder is cut off during deceleration, operation of the engine at excessively high speeds or operation of the vehicle at excessively high speeds.

ELECTRIC IGNITION SYSTEM

ELECTRIC IGNITION SYSTEM : System Description

INFOID:000000010986234

SYSTEM DIAGRAM



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.

SYSTEM

[QR25DE]

< SYSTEM DESCRIPTION >

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.

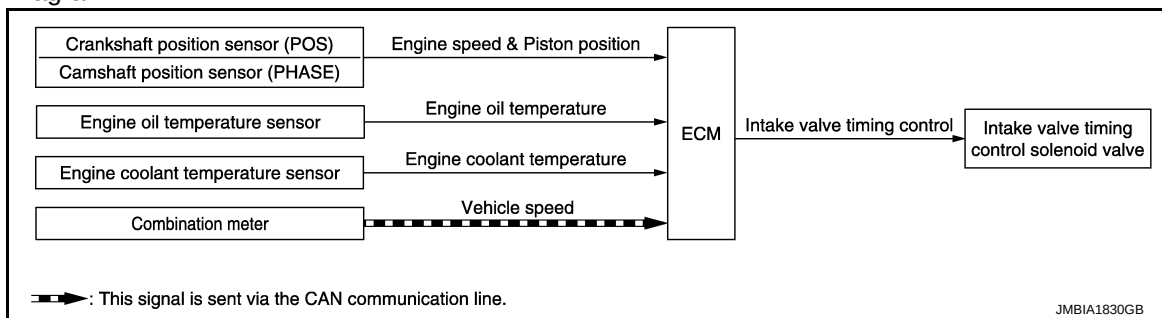
INTAKE VALVE TIMING CONTROL

INTAKE VALVE TIMING CONTROL : System Description

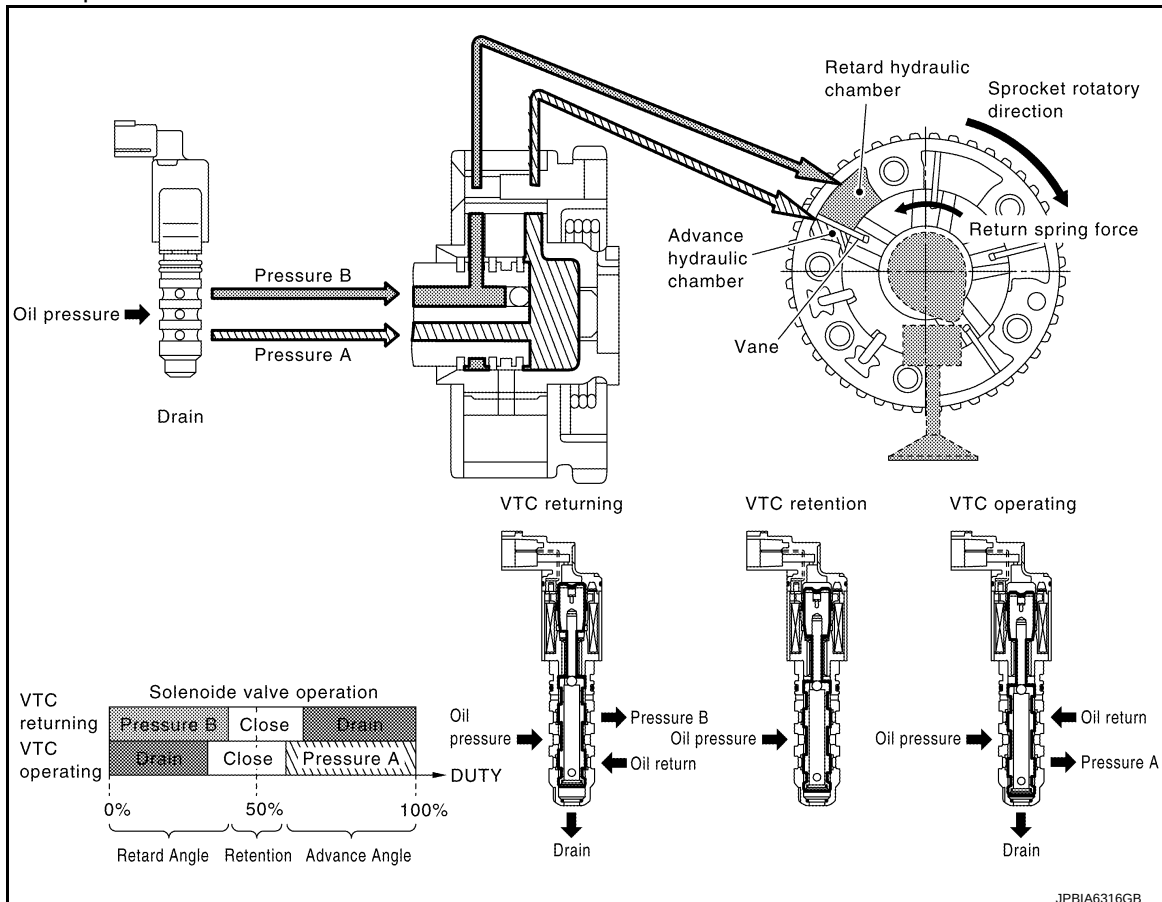
INFOID:0000000010986235

INTAKE VALVE TIMING CONTROL

System Diagram



System Description

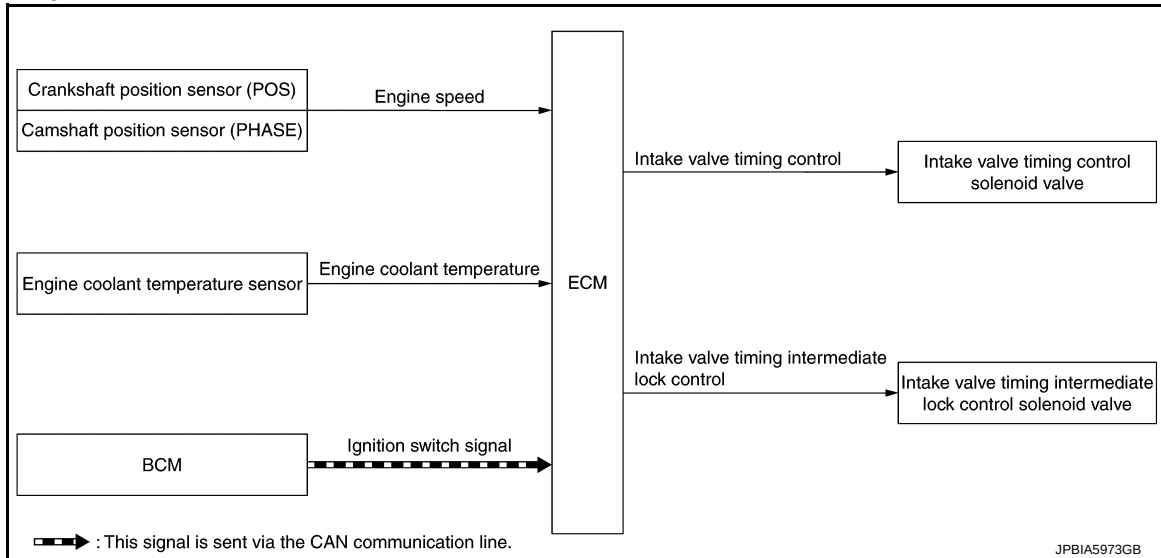


This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

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.

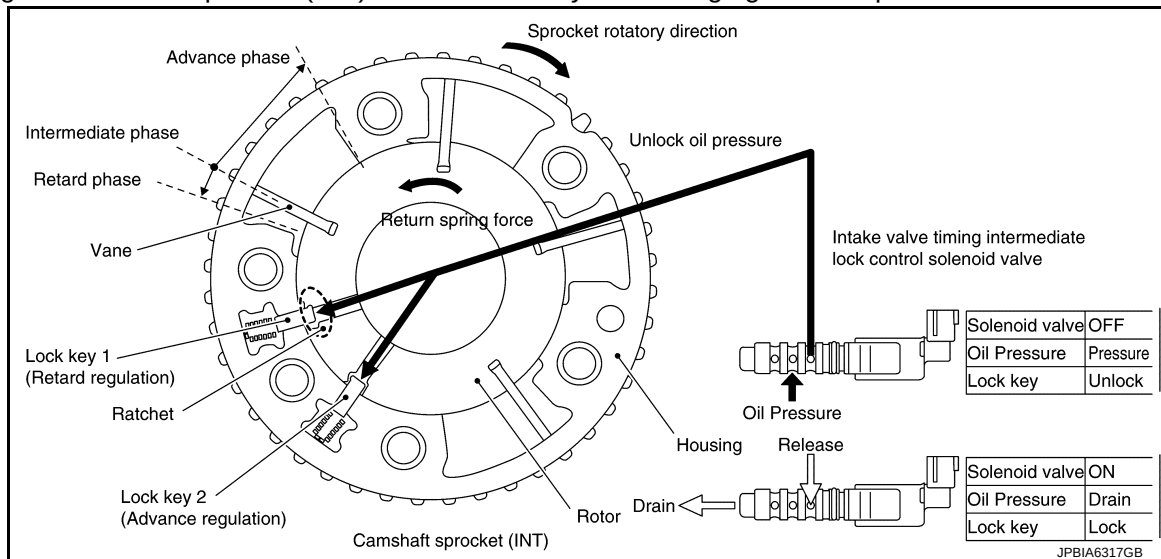
INTAKE VALVE TIMING INTERMEDIATE LOCK CONTROL

System Diagram



System Description

The intake valve timing intermediate lock control improves the cleaning ability of exhaust gas at cold starting by fixing the camshaft sprocket (INT) with two lock keys and bringing the cam phase into intermediate phase.



Cam phase is fixed at the intermediate phase by two lock keys in the camshaft sprocket (INT). Lock key 1 controls retard position and lock key 2 controls advance position.

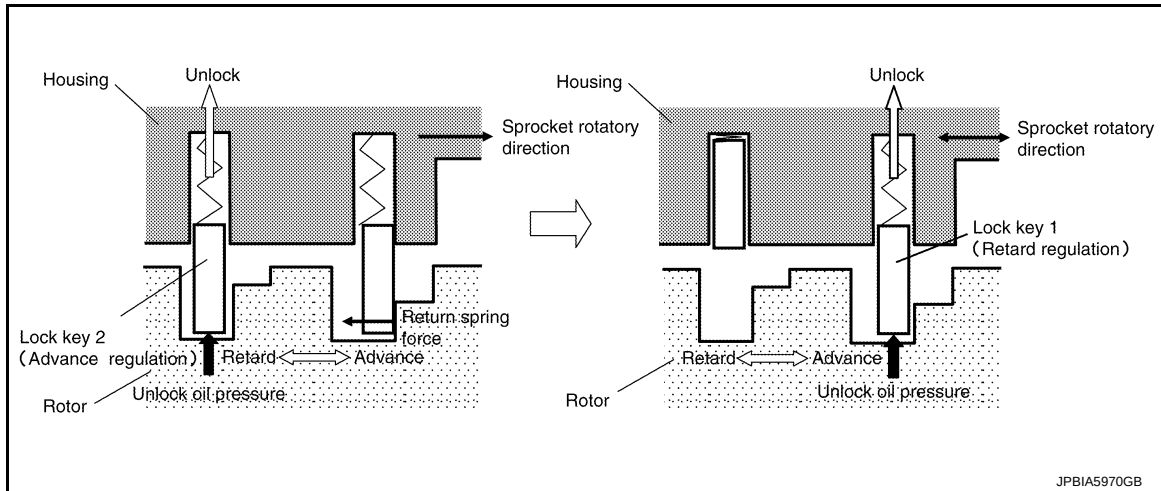
ECM controls the intermediate phase lock by opening/closing the intake valve timing intermediate lock control solenoid valve to control oil pressure acting on the lock key and locking/unlocking the lock key.

Lock/Unlock Activation

When ECM activates the intake valve timing intermediate lock control solenoid valve, oil pressure generated in the oil pump is drained through the oil pressure path in the control valve. Since oil pressure is not acted on the lock key, the lock key position is fixed by the spring tension and the cam phase is fixed at the intermediate phase.

When ECM deactivates the intake valve timing intermediate lock control solenoid valve, unlocking oil pressure acts on each lock key. Lock key 1 is not released because it is under load due to sprocket rotational force. For

this reason, lock key 2 is released first by being pushed up by unlocking oil pressure. When lock key 2 is released, some clearance is formed between lock key 1 and the rotor due to sprocket rotational force and return spring force. Accordingly, lock key 1 is pushed up by unlocking oil pressure and the intermediated phase lock is released.



When stopping the engine

When the ignition switch is turned from idle state to OFF, ECM receives an ignition switch signal from BCM via CAN communication and activates the intake valve timing intermediate lock control solenoid valve and drains oil pressure acting on the lock key before activating the intake valve timing control solenoid valve and operating the cam phase toward the advance position.

The cam phase is fixed by the lock key when shifting to the intermediated phase and ECM performs Lock judgment to stop the engine.

When starting the engine

When starting the engine by cold start, ECM judges the locked/unlocked state when ignition switch is turned ON. When judged as locked state (fixed at the intermediate phase), the intake valve timing intermediate lock control solenoid valve is activated. Since oil pressure does not act on the lock key even when the engine is started, the cam phase is fixed at the intermediate phase and the intake valve timing control is not performed. When the engine stops without locking the cam phase at the intermediate phase due to an engine stall and the state is not judged as locked, the intake valve timing intermediate lock control solenoid valve and the intake valve timing control solenoid valve are activated and the cam phase shifts to the advanced position to be locked at the intermediate phase. Even when not locked in the intermediate lock phase due to no oil pressure or low oil pressure, a ratchet structure of the camshaft sprocket (INT) rotor allows the conversion to the intermediate phase in stages by engine vibration.

When engine coolant temperature is more than 60°C, the intake valve timing is controlled by deactivating the intake valve timing intermediate lock control solenoid valve and releasing the intermediate phase lock.

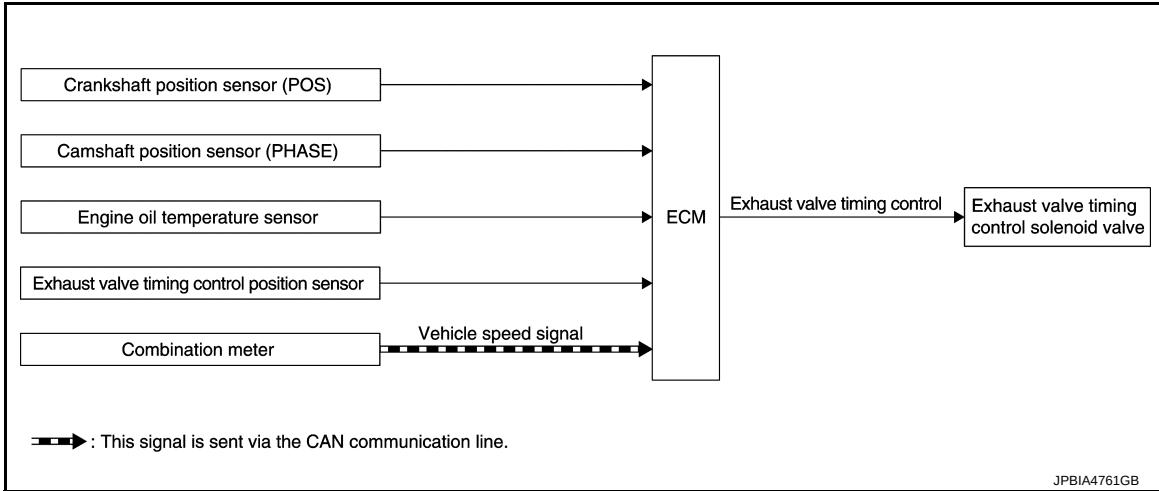
When the engine is started after warming up, ECM releases the intermediate phase lock immediately after the engine start and controls the intake valve timing.

EXHAUST VALVE TIMING CONTROL

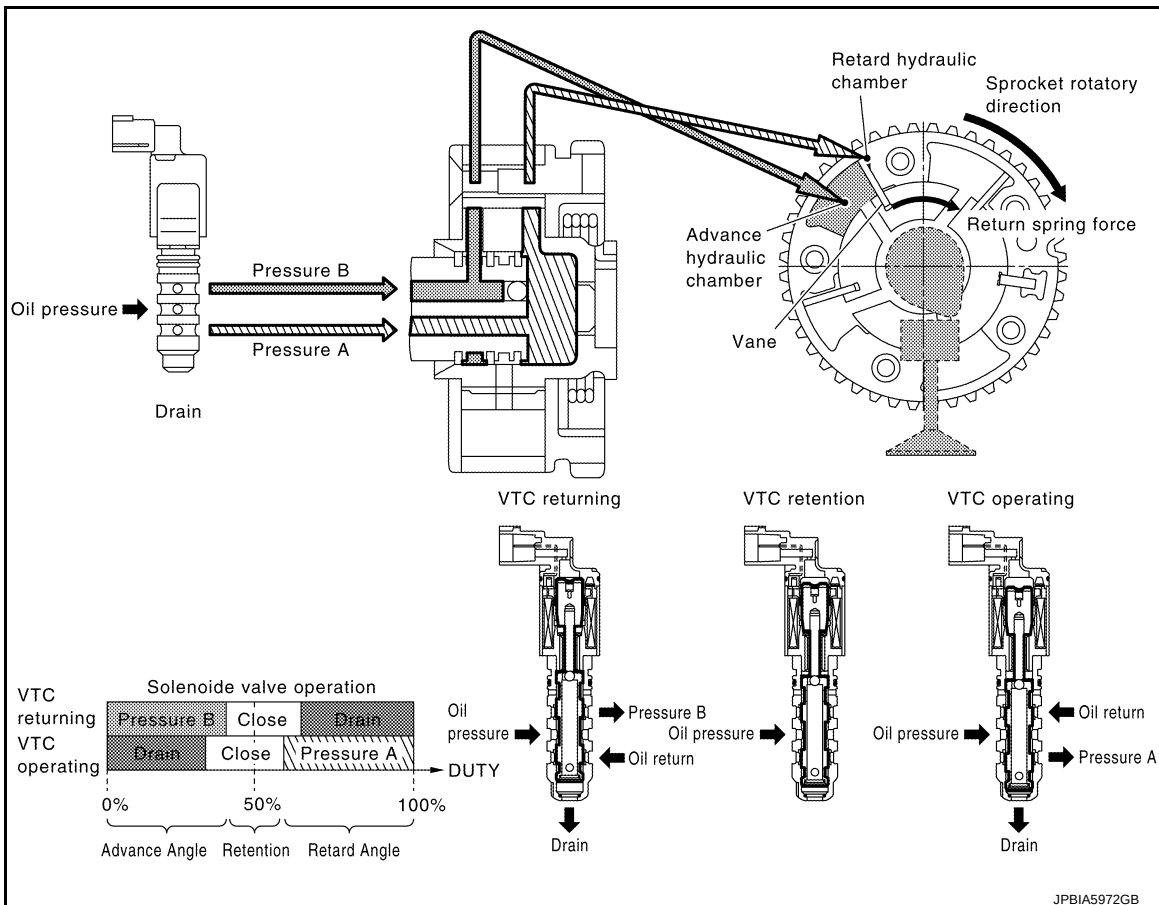
EXHAUST VALVE TIMING CONTROL : System Description

INFOID:000000010986236

SYSTEM DIAGRAM



SYSTEM DESCRIPTION



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

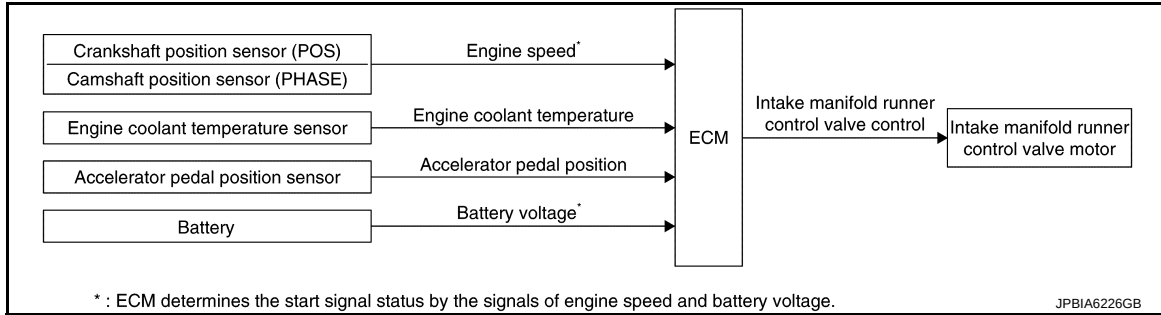
The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine oil temperature. Then, the ECM sends ON/OFF pulse duty signals to the exhaust valve timing (EVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing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

INTAKE MANIFOLD RUNNER CONTROL

INTAKE MANIFOLD RUNNER CONTROL : System Description

INFOID:0000000010986237

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

Intake manifold runner control valve has a valve portion in the intake passage of each cylinder. While idling and during low engine coolant temperature, the intake manifold runner control valve closes. Thus the velocity of the air in the intake passage increases, promoting the vaporization of the fuel and producing a intake manifold runner in the combustion chamber.

Because of this operation, this system tends to increase the burning speed of the gas mixture, improve exhaust emission, and increase the stability in running conditions.

Also, except when idling and during low engine coolant temperature, this system opens the intake manifold runner control valve.

In this condition, this system tends to increase power by improving intake efficiency via reduction of intake flow resistance.

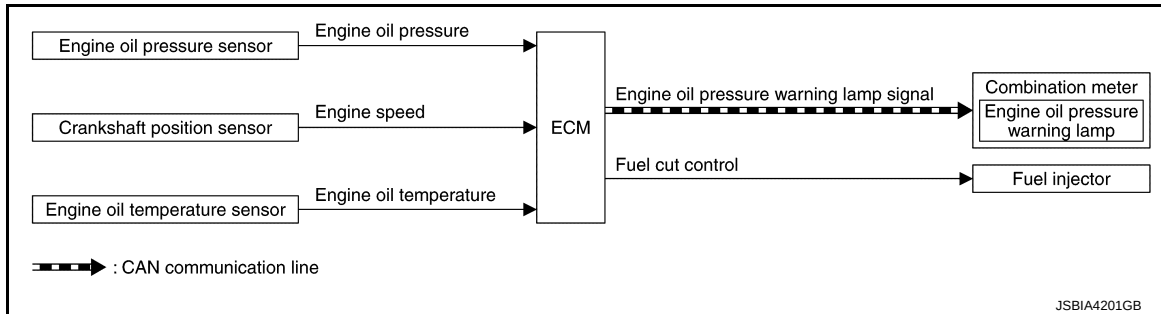
The intake manifold runner control valve is operated by the ECM.

ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE

ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description

INFOID:0000000010986238

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

- The engine protection control at low engine oil pressure warns the driver of a decrease in engine oil pressure by the engine 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 engine oil pressure warning lamp signal to the combination meter. The combination meter turns ON the engine oil pressure warning lamp, according to the signal.

Decrease in engine oil pressure	Engine speed	Combination meter	Fuel cut
		Engine oil pressure warning lamp	
Detection	Less than 1,000 rpm	ON*	NO
	1,000 rpm or more	ON	YES

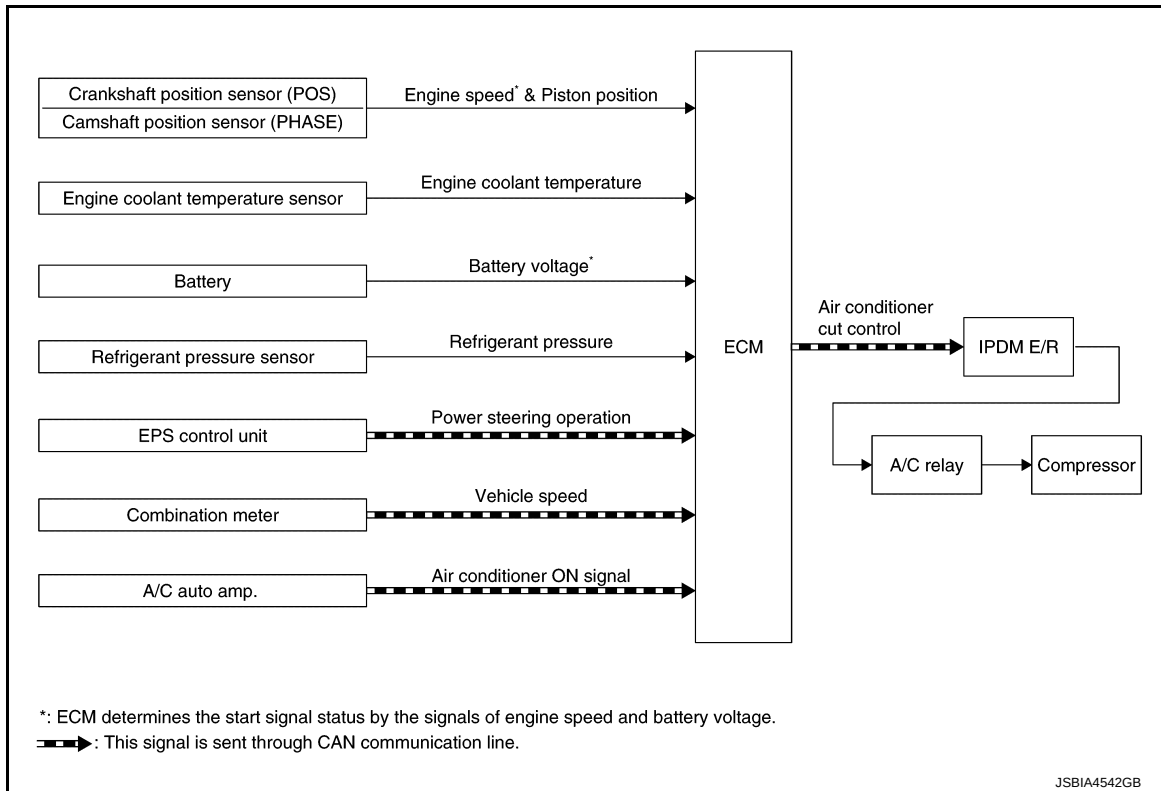
*: When detecting a normal engine oil pressure, ECM turns OFF the engine oil pressure warning lamp.

AIR CONDITIONING CUT CONTROL

AIR CONDITIONING CUT CONTROL : System Description

INFOID:000000010986239

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

This system improves engine operation when the air conditioner is used.

Under the following conditions, the air conditioner is turned off.

- 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.

POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM

POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : System Description

INFOID:000000010986240

DESCRIPTION

ECM transmits a target power generation voltage signal received from IPDM E/R to the generator via LIN communication.

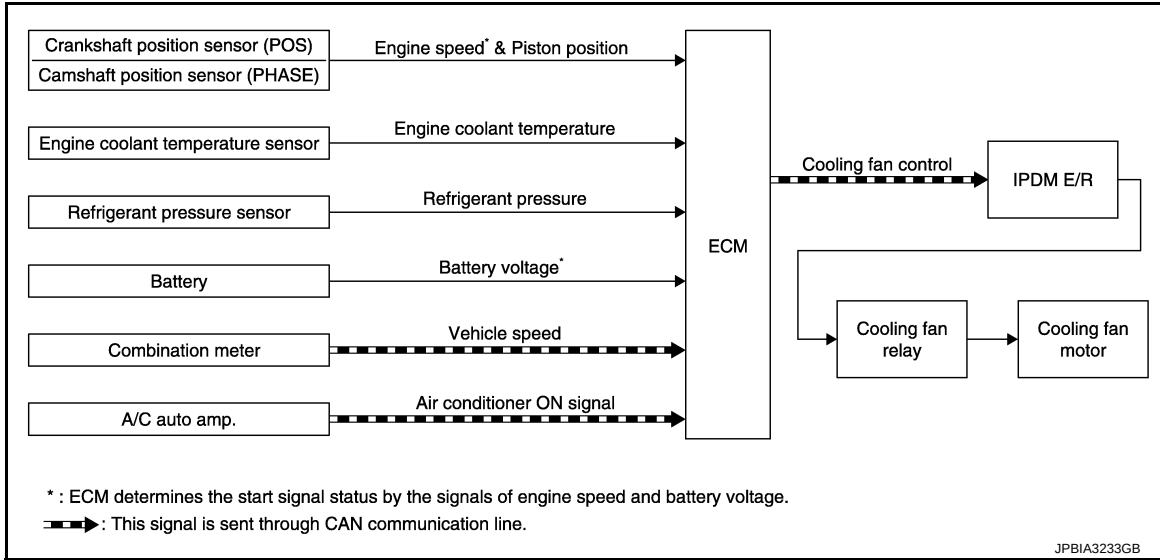
The generator includes a self-diagnosis function and transmits a diagnosis signal to ECM via LIN communication when detecting a malfunction. When ECM receives a diagnosis signal, ECM detects DTC and transmits a charge warning lamp request signal to the combination meter to turn ON the charge warning lamp.

COOLING FAN CONTROL

COOLING FAN CONTROL : System Description

INFOID:000000010986241

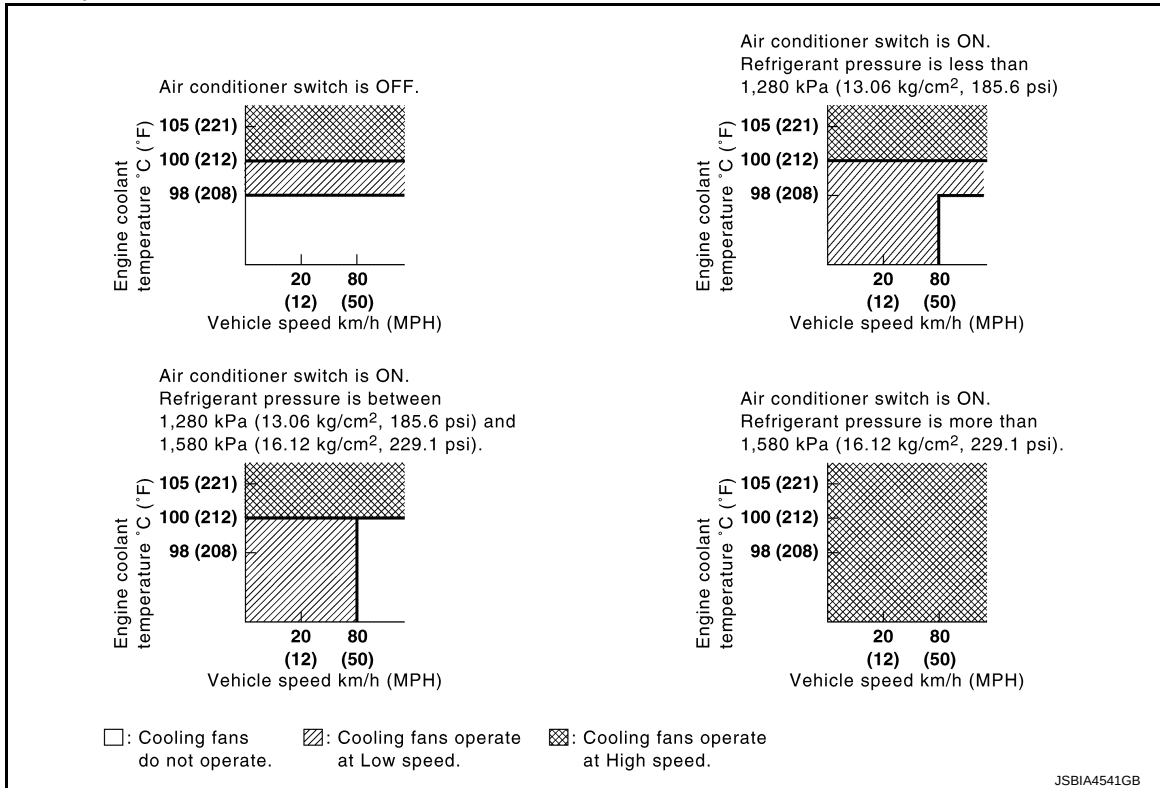
SYSTEM DIAGRAM



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

SYSTEM

< SYSTEM DESCRIPTION >

[QR25DE]

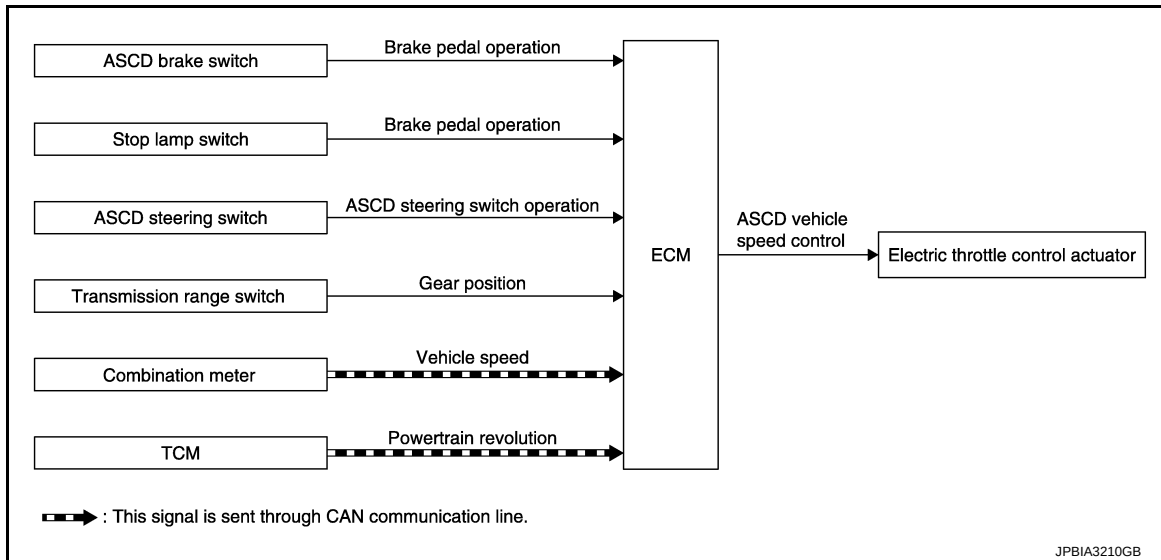
Cooling fan speed	Cooling fan relay		
	1	2	3
Low (LOW)	OFF	ON	OFF
High (HI)	ON	OFF	ON

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description

INFOID:0000000010986242

SYSTEM DIAGRAM



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 171 km/h (106 MPH).

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

The ASCD operation status is indicated by ASCD indicator on the information display. If any malfunction occurs in ASCD system, ASCD indicator blinks and ASCD control is deactivated.

NOTE:

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

SET OPERATION

Press MAIN switch. (ASCD indicator is indicated on the information display.)

When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 171 km/h (106 MPH), press SET/COAST switch. (Then ASCD indicator is indicated on the information display.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.

And then ASCD will keep the new set speed.

CANCEL OPERATION

- When any of following conditions exist, cruise operation will be canceled.
- MAIN switch is pressed (Set speed will be cleared)
- 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
- Selector lever is in N, P or R range
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- VDC system is operated
- Actual vehicle speed decreased to approximately 13 km/h or less

SYSTEM

< SYSTEM DESCRIPTION >

[QR25DE]

- When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking ASCD indicator.
- Engine coolant temperature is excessively higher than the normal operating temperature, ASCD indicator may blink slowly.
(When the engine coolant temperature decreases to the normal operating temperature, ASCD indicator will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ACCELERATE switch.)
- Malfunction for some self-diagnoses regarding ASCD control
(When ASCD is operating, all of ASCD operations will be canceled and vehicle speed memory will be erased.)

COAST OPERATION

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

RESUME OPERATION

When the RESUME/ACCELERATE switch is pressed after cancel operation other than 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
- Selector lever is in other than P and N positions
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 171 km/h (106 MPH)

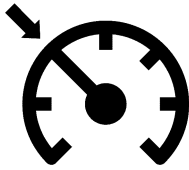
INFORMATION DISPLAY (COMBINATION METER)

INFORMATION DISPLAY (COMBINATION METER) : ASCD Indicator

INFOID:0000000010986243

ASCD INDICATOR

For detail of ASCD function, refer to [EC-473. "AUTOMATIC SPEED CONTROL DEVICE \(ASCD\) : System Description"](#).

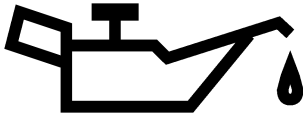
Symbol	Message
	-- Km/h
JSCIA0831ZZ	

INFORMATION DISPLAY (COMBINATION METER) : Engine Oil Pressure Warning

INFOID:0000000010986244

DESIGN/PURPOSE

When engine oil pressure is low, the engine oil pressure warning lamp informs the driver of low oil pressure to prevent damage to the engine.

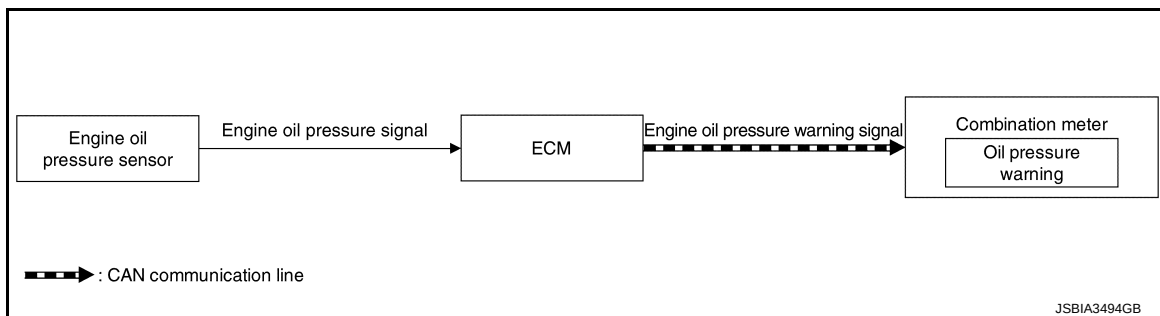
Symbol	Message
 JPNIA1881ZZ	Low Oil Pressure Stop Vehicle

BULB CHECK

The bulb turns ON after turning ON the ignition switch (engine stop) and turns OFF after restarting the engine.

OPERATION AT COMBINATION METER CAN COMMUNICATION CUT-OFF OR UNUSUAL SIGNAL

For the operation for CAN communications blackout or abnormal signal reception, refer to [EC-513](#), "Fail Safe".

SYSTEM DIAGRAM**SIGNAL PATH**

- ECM reads the resistance value of an engine oil pressure sensor and transmits the engine oil pressure warning signal to combination meter via CAN communication.
- The information display (on combination meter) is SHOWN/HIDDEN the engine oil pressure warning, according to the oil pressure switch signal received from ECM.

LIGHTING CONDITION

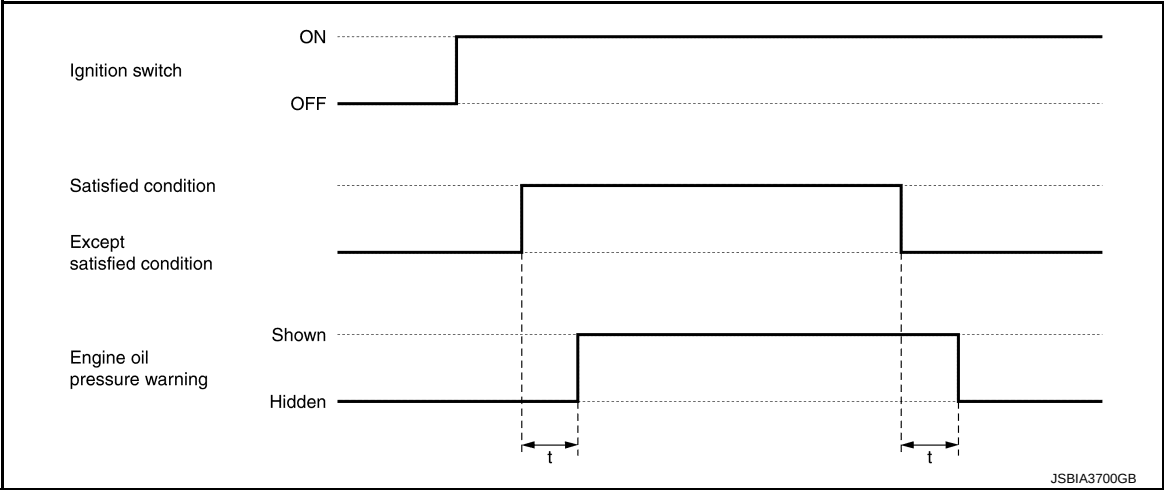
When all of the following conditions are satisfied:

- Ignition switch: ON
- Engine running
- Engine oil pressure is less than the specified value.

SHUTOFF CONDITION

- Ignition switch: OFF
- Engine stop
- Engine oil pressure is the specified value or more.

TIMING CHART



t : 100 ms

WARNING/INDICATOR/CHIME LIST

WARNING/INDICATOR/CHIME LIST : Warning lamps/Indicator lamps

INFOID:0000000010986245

NOTE:

Regarding the arrangement. Refer to [MWI-10. "METER SYSTEM : Design"](#).

Item	Design	Reference
Malfunction indicator lamp (MIL)		Regarding the function. Refer to MWI-50. "WARNING LAMPS/INDICATOR LAMPS : Malfunction Indicator Lamp (MIL)" .

WARNING/INDICATOR/CHIME LIST : Warning/Indicator (On Information Display)

INFOID:0000000010986246

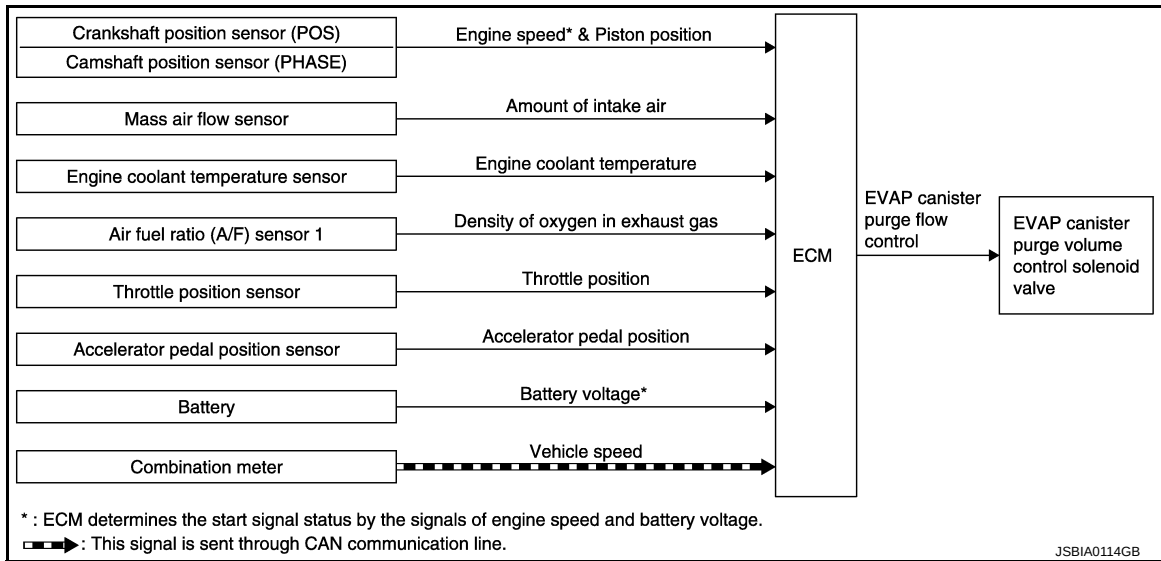
Item	Reference
Engine oil pressure warning	Refer to EC-474. "INFORMATION DISPLAY (COMBINATION METER) : Engine Oil Pressure Warning" .
ASCD indicator	Refer to EC-474. "INFORMATION DISPLAY (COMBINATION METER) : ASCD Indicator" .

EVAPORATIVE EMISSION SYSTEM

EVAPORATIVE EMISSION SYSTEM : System Description

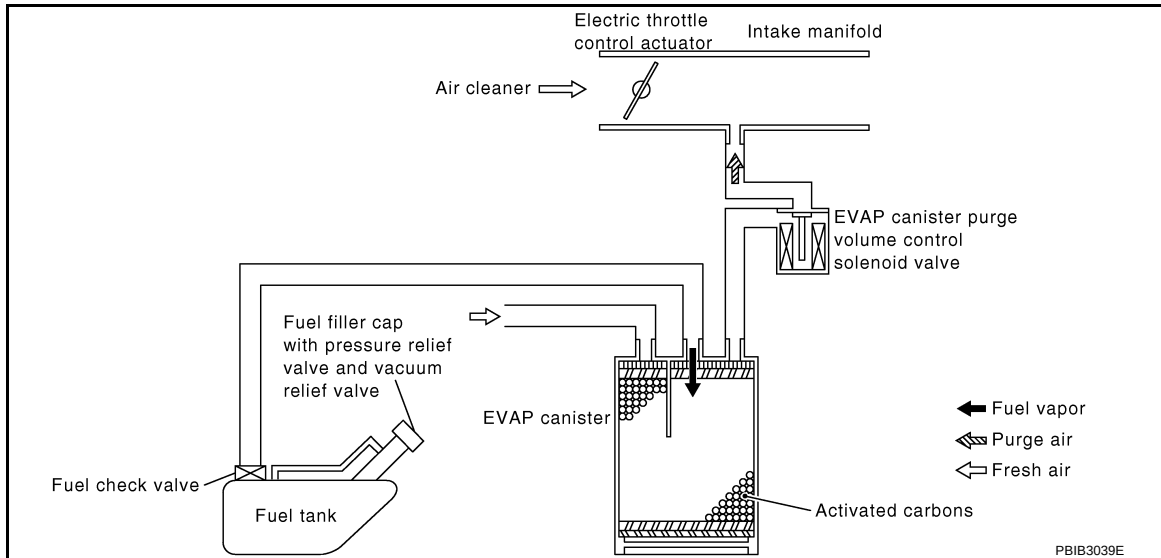
INFOID:000000010986247

SYSTEM DIAGRAM



*: 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.

CAN COMMUNICATION

CAN COMMUNICATION : System Description

INFOID:000000010986248

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

SYSTEM

< SYSTEM DESCRIPTION >

[QR25DE]

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-8, "System Description"](#), about CAN communication for detail.

ECO MODE CONTROL

ECO MODE CONTROL : System Description

INFOID:0000000010986249

SYSTEM DESCRIPTION

ECM receives an ECO mode signal from TCM via CAN communication and improves the fuel economy by controlling the throttle movement to less than usual.

For details of ECO mode system, refer to [DMS-7, "ECO MODE CONTROL : System Description"](#).

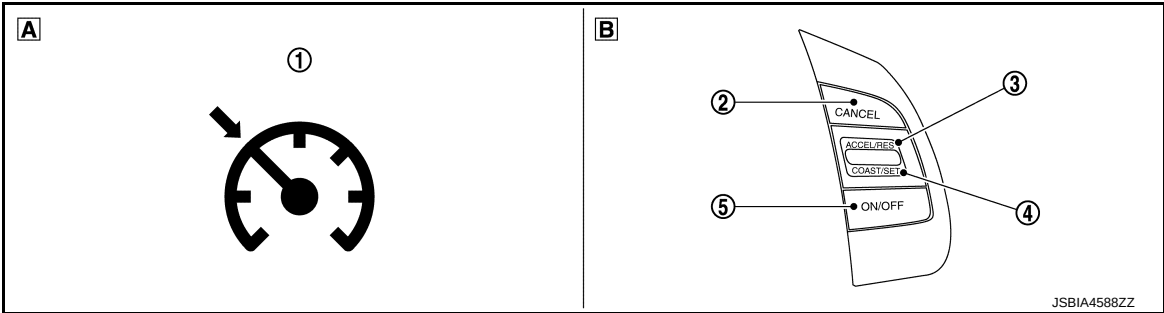
OPERATION

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

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

INFOID:0000000010986250

SWITCHES AND INDICATORS



- A** On the combination meter **B** On the steering wheel
- ① ASCD indicator ② CANCEL switch ③ RES / + switch (RESUME/ACCELERATE)
- ④ SET / - switch (SET/COAST) ⑤ MAIN switch

SET SPEED RANGE

ASCD system can be set the following vehicle speed.

Minimum speed (Approx.)	Maximum speed (Approx.)
40 km/h (25 MPH)	171 km/h (106 MPH)

SWITCH OPERATION

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

Refer to [EC-473, "AUTOMATIC SPEED CONTROL DEVICE \(ASCD\) : System Description"](#) for ASCD operating instructions.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000010986251

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

GST (Generic Scan Tool)

INFOID:0000000010986252

When GST is connected with a data link connector equipped on the vehicle side, it will communicate with the control module equipped in the vehicle and then enable various kinds of diagnostic tests. Refer to [EC-480, "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:000000010986253

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

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL illuminates. The MIL illuminates at the same time when the DTC is stored. <2nd trip> The "trip" in the "Two Trip Detection Logic" means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to illuminate or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Illuminated	Blinking	Illuminated				
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0304 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0304 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses (Refer to EC-517, "DTC Index" .)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

INFOID:000000010986254

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-517, "DTC Index"](#). These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT.

1st trip DTC is specified in Service \$07 of SAE J1979/ISO 15031-5. 1st trip DTC detection occurs without illuminating the MIL and therefore does not warn the driver of a malfunction.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to [EC-542, "Work Flow"](#). Then perform DTC Confirmation Procedure or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT or GST. The 1st trip freeze frame data can only be displayed on the CONSULT screen.

DIAGNOSIS SYSTEM (ECM)

[QR25DE]

< SYSTEM DESCRIPTION >

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

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 – P0304 Fuel Injection System Function — DTC: P0171, P0172
2		Except the above items
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:0000000010986255

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

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

COUNTER SYSTEM CHART

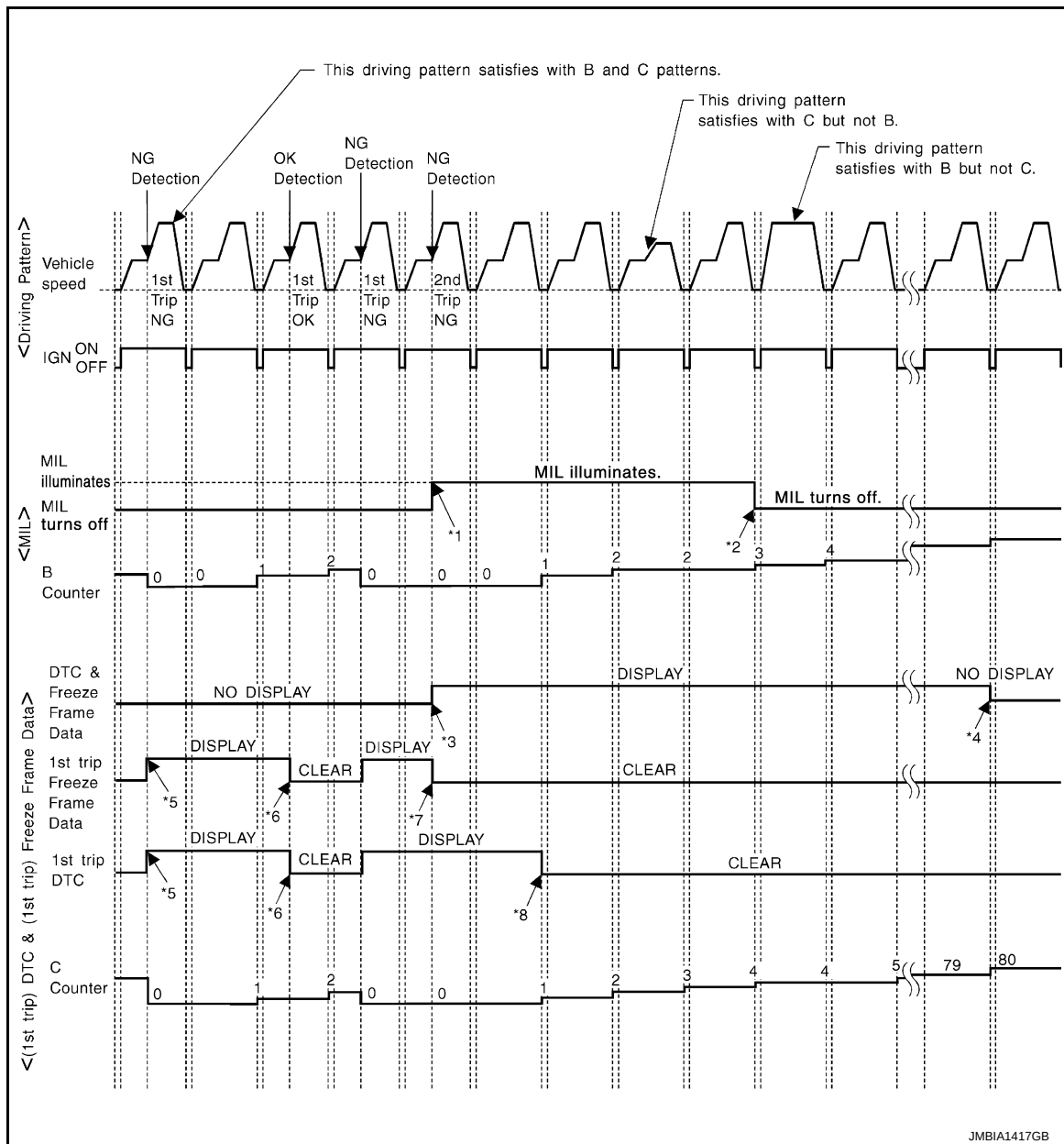
Items	Fuel Injection System	Misfire	Other
MIL (turns OFF)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2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

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

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

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

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



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

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

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

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

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

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

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

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

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

Driving Pattern B

Refer to [EC-485, "DIAGNOSIS DESCRIPTION : Driving Pattern"](#).

< SYSTEM DESCRIPTION >

Driving Pattern C

Refer to [EC-485. "DIAGNOSIS DESCRIPTION : Driving Pattern".](#)

Example:

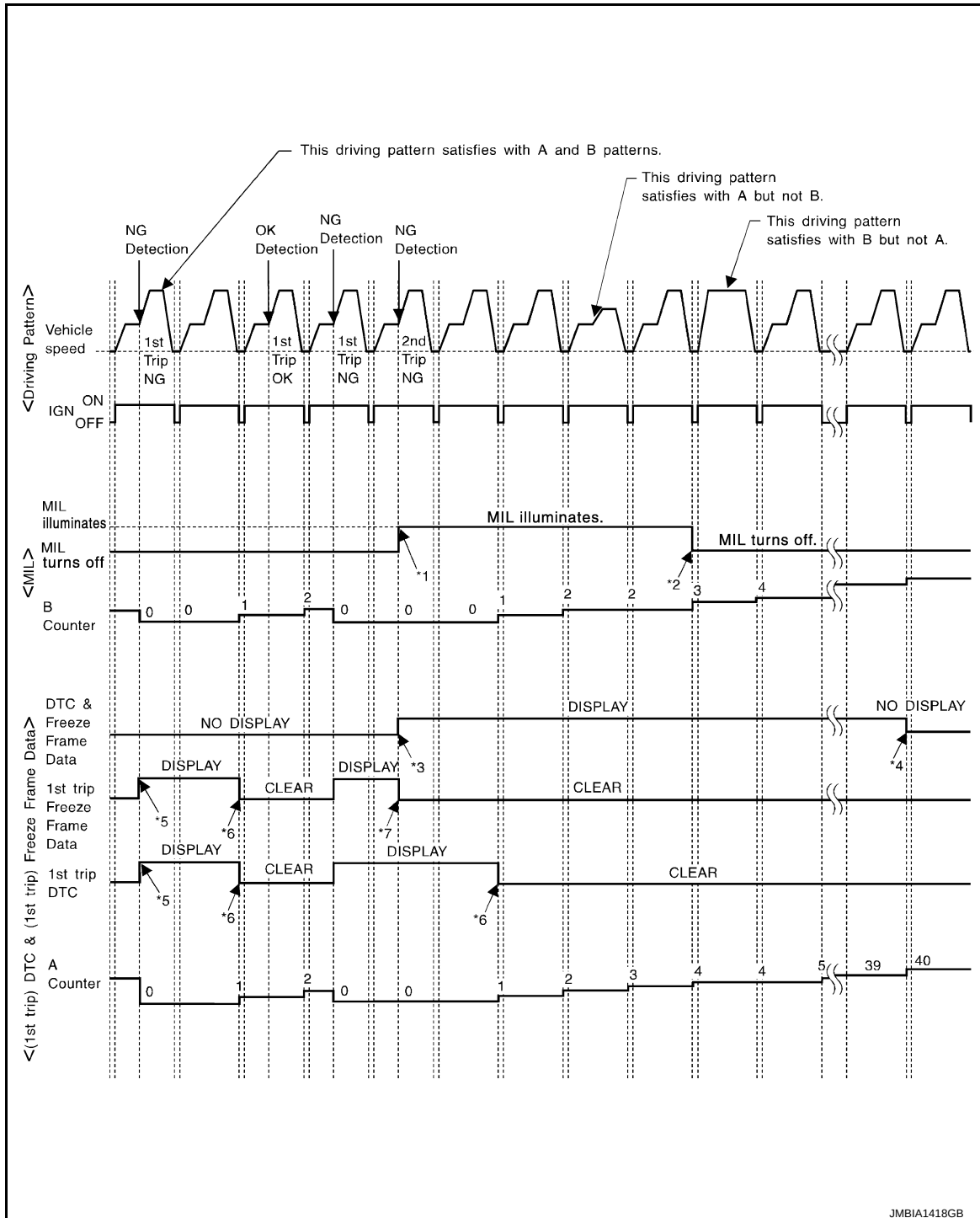
If the stored freeze frame data is as per the following:

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

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

Driving Pattern A

Refer to [EC-485, "DIAGNOSIS DESCRIPTION : Driving Pattern"](#).

Driving Pattern B

Refer to [EC-485, "DIAGNOSIS DESCRIPTION : Driving Pattern"](#).

DIAGNOSIS DESCRIPTION : Driving Pattern

INFOID:000000010986256

CAUTION:

Always drive at a safe speed.

DRIVING PATTERN A

Driving pattern A means a trip satisfying the following conditions.

- Engine speed reaches 400 rpm or more.
- Engine coolant temperature rises by 20°C (36°F) or more after starting the engine.
- Engine coolant temperature reaches 70°C (158°F) or more.
- The ignition switch is turned from ON to OFF.

NOTE:

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

DRIVING PATTERN B

Driving pattern B means a trip satisfying the following conditions.

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

NOTE:

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

DRIVING PATTERN C

Driving pattern C means operating vehicle as per the following:

The following conditions should be satisfied at the same time:

Engine speed: (Engine speed in the freeze frame data) ± 375 rpm

< SYSTEM DESCRIPTION >

Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]

Engine coolant temperature condition:

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

NOTE:

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

DRIVING PATTERN D

Driving pattern D means a trip satisfying the following conditions.

- The state of driving at 40 km/h (25 MPH) reaches 300 seconds or more in total.
- Idle speed lasts 30 seconds or more.
- A lapse of 600 seconds or more after engine start.

NOTE:

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

DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code

INFOID:0000000010986257

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.

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

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Self-diagnosis result		Example					
		Diagnosis	Ignition cycle				
			← ON →	OFF	← ON →	OFF	
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)	EC
		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)	C
		P0402	— (0)	— (0)	OK (1)	— (1)	
		P1402	OK (1)	OK (2)	— (2)	— (2)	
		SRT of EGR	"INCMP"	"INCMP"	"CMPLT"	"CMPLT"	
NG exists	Case 3	P0400	OK	OK	—	—	D
		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:000000010986258

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.

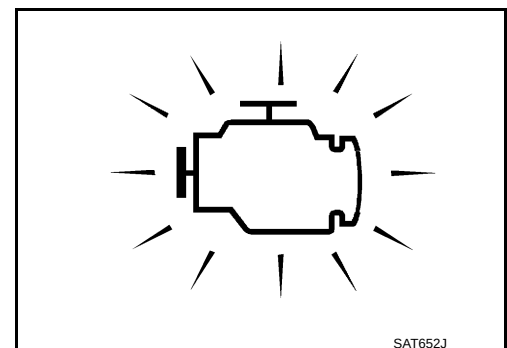
1. The MIL illuminates when ignition switch is turned ON (engine is not running).

NOTE:

Check the MIL circuit if MIL does not illuminate. Refer to [EC-791, "Diagnosis Procedure"](#).

2. When the engine is started, the MIL should go off.

NOTE:



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DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[QR25DE]

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:0000000010986259

ON BOARD DIAGNOSIS ITEM

The on board diagnostic system has the following functions.

Diagnostic test mode	Function
Bulb check	MIL can be checked.
SRT status	ECM can read if SRT codes are set.
Malfunction warning	If ECM detects a malfunction, it illuminates or blinks MIL to inform the driver that a malfunction has been detected.
Self-diagnostic results	DTCs or 1st trip DTCs stored in ECM can be read.
Accelerator pedal released position learning	ECM can learn the accelerator pedal released position. Refer to EC-553, "Work Procedure" .
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to EC-554, "Work Procedure" .
Idle air volume learning	ECM can learn the idle air volume. Refer to EC-555, "Work Procedure" .
Mixture ratio self-learning value clear	Mixture ratio self-learning value can be erased. Refer to EC-557, "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-791, "Diagnosis Procedure"](#).

SRT STATUS MODE

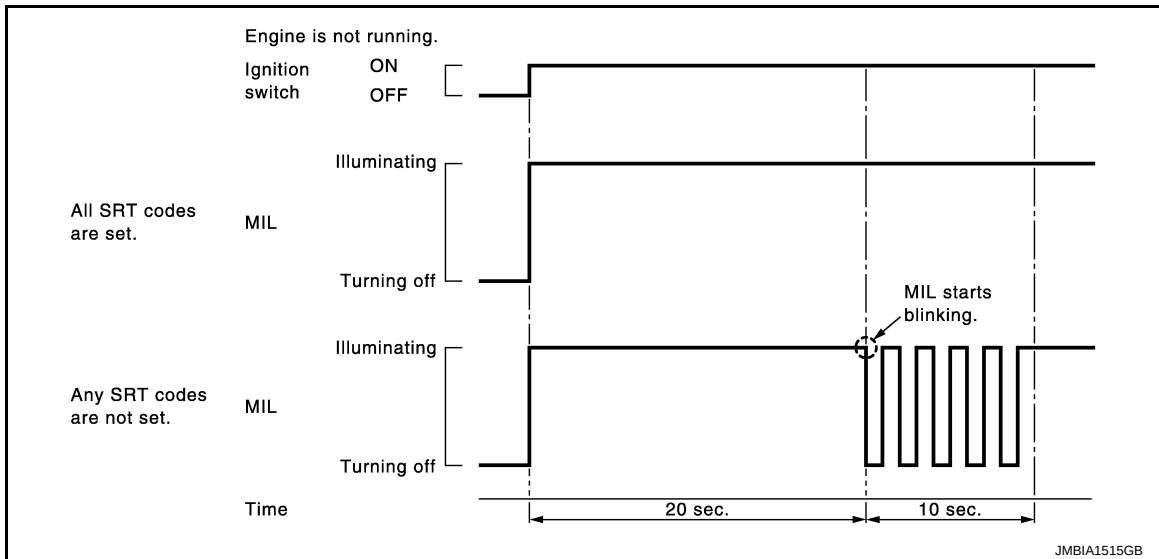
Description

This function allows to read if ECM has completed the self-diagnoses of major emission control systems and components. For SRT, refer to [EC-486, "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

- Turn ignition switch ON.
- Check that MIL illuminates.
If it remains OFF, check MIL circuit. Refer to [EC-791, "Diagnosis Procedure"](#).
- 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.
- Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
 - Repeat the following procedure quickly five times within 5 seconds.
 - Fully depress the accelerator pedal.
 - Fully release the accelerator pedal.
 - 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.

- Fully release the accelerator pedal.
ECM has entered to "Self-diagnostic results" mode.

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DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[QR25DE]

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. Refer to [EC-517, "DTC Index"](#).

How to Erase Self-diagnostic Results

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

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

NOTE:

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

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

CONSULT Function

INFOID:0000000010986260

FUNCTION

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

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

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

SELF DIAGNOSTIC RESULT MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to [EC-517, "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.

DIAGNOSIS SYSTEM (ECM)

[QR25DE]

< SYSTEM DESCRIPTION >

How to Erase DTC and 1st Trip DTC

NOTE:

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

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	The engine control component part/control system has a trouble code that is displayed as PXXXX. (Refer to EC-517, "DTC Index".)
FUEL SYS-B1	"Fuel injection system status" at the moment a malfunction is detected is displayed. - One of the following mode is displayed. - Mode2: Open loop due to detected system malfunction - Mode3: Open loop due to driving conditions (power enrichment, deceleration enrichment) - Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control - Mode5: Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	"Long-term fuel trim" at the moment a malfunction is detected is displayed. - The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
S-FUEL TRM-B1 [%]	"Short-term fuel trim" at the moment a malfunction is detected is displayed. - The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH·P/S [%]	The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed.
FUEL SYS-B2	These items are displayed but are not applicable to this model.
L-FUEL TRM-B2 [%]	
S-FUEL TRM-B2 [%]	
INT MANI PRES [kPa]	
COMBUST CONDITION	

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

DATA MONITOR MODE

NOTE:

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

Monitored Item

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[QR25DE]

Monitored item	Unit	Monitor Item Selection		Description	Remarks	
		ECU INPUT SIGNALS	MAIN SIGNALS			
ENG SPEED	rpm	×	×	Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	- Accuracy becomes poor if engine speed drops below the idle rpm. - If the signal is interrupted while the engine is running, an abnormal value may be indicated.	A C D
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".	E
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.	F G H
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.	I J
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.		K
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.	L M
VHCL SPEED SE	km/h or mph	×	×	The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.		N
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.	O P
ACCEL SEN 2						
TP SEN 1-B1	V	×	×	The throttle position sensor signal voltage is displayed.	TP SEN 2-B1 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.	
TP SEN 2-B1		×	×			
FUEL T/TMP SE	°C or °F			The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.		

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[QR25DE]

Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU IN-PUT SIG-NALS	MAIN SIG-NALS		
EVAP SYS PRES	V			The signal voltage of EVAP control system pressure sensor is displayed.	
FUEL LEVEL SE	V	×		The signal voltage of the fuel level sensor is displayed.	
START SIGNAL	On/Off			Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS	On/Off	×	×	Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG	On/Off	×	×	Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
PW/ST SIGNAL	On/Off	×	×	[ON/OFF] condition of the power steering system (determined by the signal sent from EPS control unit) is indicated.	
LOAD SIGNAL	On/Off	×	×	- Indicates [ON/OFF] condition from the electrical load signal. - On: Rear window defogger switch is ON and/or lighting switch is in 2nd position. - Off: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW	On/Off	×	×	Indicates [ON/OFF] condition from ignition switch signal.	
HEATER FAN SW	On/Off	×		Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW	On/Off			Indicates [ON/OFF] condition from the stop lamp switch signal.	
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.	
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 advance angle.	

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[QR25DE]

Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU IN-PUT SIG-NALS	MAIN SIG-NALS		
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.	
SWRL CONT S/V	On/Off			- The control condition of the intake manifold runner control valve (determined by ECM according to the input signals) is indicated. - On: Closed - Off: Open	
AIR COND RLY	On/Off			The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY	On/Off			Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
VENT CONT/V	On/Off			- The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated. - On: Closed - Off: Open	
THRTL RELAY	On/Off			Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
COOLING FAN	Hi/Mid/Low/Off			- Indicates the condition of the cooling fan (determined by ECM according to the input signals). - Hi: High speed operation - Mid: Middle speed operation - Low: Low speed operation - Off: Stop	
HO2S2 HTR (B1)	On/Off			Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
I/P PULLY SPD	rpm			Indicates the engine speed computed from the input speed sensor signal.	
VEHICLE SPEED	km/h or mph			The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
IDL A/V LEARN	YET/CMPLT			- 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 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.	

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DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[QR25DE]

Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU IN-PUT SIG-NALS	MAIN SIG-NALS		
A/F S1 HTR(B1)	%			- Air fuel ratio (A/F) sensor 1 heater control value computed by ECM according to the input signals. - The current flow to the heater becomes larger as the value increases.	
VHCL SPEED SE	km/h or mph			The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
SET VHCL SPD	km/h or mph			The preset vehicle speed is displayed.	
MAIN SW	On/Off			Indicates [ON/OFF] condition from 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.	
AT OD MONITOR	On/Off			Indicates [ON/OFF] condition of CVT O/D according to the input signal from the TCM.	
AT OD CANCEL	On/Off			Indicates [ON/OFF] condition of CVT O/D cancel request signal.	
CRUISE LAMP	On/Off			Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP	On/Off			Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	
A/F ADJ-B1	—			Indicates the correction of factor stored in ECM. The factor is calculated from the difference between the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 signal.	
TUMBLE POS SEN	V			The intake manifold runner control valve position sensor signal voltage is displayed.	

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[QR25DE]

Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU IN-PUT SIG-NALS	MAIN SIG-NALS		
P/N POSI SW	On/Off	×	×	Indicates [ON/OFF] condition from the park/neutral position (PNP) signal.	
INT/A TEMP SE	°C or °F	×	×	The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
AC PRESS SEN	V			The signal voltage from the refrigerant pressure sensor is displayed.	
VTC DTY EX B1	%			- The control value of the exhaust valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. - The advance angle becomes larger as the value increases.	
EOP SENSOR	mV			The signal voltage of engine oil pressure sensor is displayed.	
EVAP LEAK DIAG	YET/CMPLT			- Indicates the condition of EVAP leak diagnosis. - YET: EVAP leak diagnosis has not been performed yet. - CMPLT: EVAP leak diagnosis has been performed successfully.	
EVAP DIAG READY	ON/OFF			- Indicates the ready condition of EVAP leak diagnosis. - ON: Diagnosis has been ready condition. - OFF: Diagnosis has not been ready condition.	
THRTL STK CNT B1*	—			—	
A/F SEN1 DIAG1(B1)	INCMP/CM-PLT			- Indicates DTC P015A or P015B self-diagnosis condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
A/F SEN1 DIAG2(B1)	INCMP/CM-PLT			- Indicates DTC P014C or P014D self-diagnosis condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
A/F SEN1 DIAG3(B1)	ABSNT/PRSNT			- Indicates DTC P014C, P014D, P015A or P015B self-diagnosis condition. - ABSNT: The vehicle condition is not within the diagnosis range. - PRSNT: The vehicle condition is within the diagnosis range.	
HO2 S2 DIAG1 (B1)	INCMP/CM-PLT			- Indicates DTC P0139 self-diagnosis (delayed response) condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
HO2 S2 DIAG2 (B1)	INCMP/CM-PLT			- Indicates DTC P0139 self-diagnosis (slow response) condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	

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DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[QR25DE]

Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU IN-PUT SIG-NALS	MAIN SIG-NALS		
SYSTEM 1 DIAGNOSIS A B1	INCMP/CM-PLT			- Indicates DTC P117A self-diagnosis condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
SYSTEM 1 DIAGNOSIS B B1	ABSNT/PRSNT			- Indicates DTC P117A self-diagnosis condition. - ABSNT: Self-diagnosis standby - PRSNT: Under self-diagnosis	
MASS AIR FLOW SENSOR (Hz)	Hz			The signal frequency 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".
A/F-S ATMSPHRC CRCT B1	—			Displays a determined value of atmospheric correction factor necessary for correcting an A/F sensor signal input to ECM. The signal used for the correction is an A/F sensor signal transmitted while driving under atmospheric pressure.	
A/F-S ATMSPHRC CRCT UP B1	count			Displays the number of updates of the A/F sensor atmospheric correction factor.	

*: The item is indicated, but not used.

NOTE:

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

WORK SUPPORT MODE

Work Item

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

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[QR25DE]

Work item	Condition	Usage
SELF-LEARNING CONT	The coefficient of self-learning control mixture ratio returns to the original coefficient.	When clearing mixture ratio self-learning value
CLSD THL POS LEARN	Ignition on and engine stopped.	When learning the throttle valve closed position
SAVING DATA FOR REPLC CPU	In this mode, save data that is in ECM.	When ECM is replaced.
WRITING DATA FOR REPLC CPU	In this mode, write data stored by "SAVE DATA FOR CPU REPLC" in work support mode to ECM.	When ECM is replaced.

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

ACTIVE TEST MODE

Test Item

Test item	Condition	Judgment	Check item (Remedy)
FUEL INJECTION	- Engine: Return to the original trouble condition - Change the amount of fuel injection using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	- Harness and connectors - Fuel injector - Air fuel ratio (A/F) sensor 1
ENG COOLANT TEMP	- Engine: Return to the original trouble condition - Change the engine coolant temperature using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	- Harness and connectors - Engine coolant temperature sensor - Fuel injector
PURG VOL CONT/V	- Engine: After warming up, run engine at 1,500 rpm. - Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT.	Engine speed changes according to the opening percent.	- Harness and connectors - Solenoid valve
FUEL/T TEMP SEN	Change the fuel tank temperature using CONSULT.		
FUEL PUMP RELAY	- Ignition switch: ON (Engine stopped) - Turn the fuel pump relay "ON" and "OFF" using CONSULT and listen to operating sound.	Fuel pump relay makes the operating sound.	- Harness and connectors - Fuel pump relay
TUMBLE CONTROL VALVE	- Ignition switch: ON - Turn intake manifold runner control valve "ON" and "OFF" using CONSULT and listen to operating sound.	Intake Manifold Runner control valve motor makes an operating sound.	- Harness and connectors - Intake Manifold Runner control valve motor
IGNITION TIMING	- Engine: Return to the original trouble condition - Timing light: Set - Retard the ignition timing using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	Perform Idle Air Volume Learning.
POWER BALANCE	- Engine: After warming up, idle the engine. - A/C switch OFF - Selector lever: P or N - Cut off each fuel injector signal one at a time using CONSULT.	Engine runs rough or stops.	- Harness and connectors - Compression - Fuel injector - Power transistor - Spark plug - Ignition coil
VENT CONTROL/V	- Ignition switch: ON (Engine stopped) - Turn solenoid valve "ON" and "OFF" using CONSULT and listen to operating sound.	Solenoid valve makes an operating sound.	- Harness and connectors - Solenoid valve

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[QR25DE]

Test item	Condition	Judgment	Check item (Remedy)
INT V/T ASSIGN ANGLE	- Engine: Return to the original trouble condition - Change intake valve timing using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	- Harness and connectors - Intake valve timing control solenoid valve
EXH V/T ASSIGN ANGLE	- Engine: Return to the original trouble condition - Change exhaust valve timing using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	- Harness and connectors - Exhaust valve timing control solenoid valve

DTC WORK SUPPORT MODE

Test Item

Test mode	Test item	Corresponding DTC No.	Reference page
A/F SEN1	A/F SEN1(B1) P1276	P0130	EC-618
HO2S2	HO2S2(B1) P1146	P0138	EC-634
	HO2S2(B1) P1147	P0137	EC-628

SRT & P-DTC MODE

SRT STATUS Mode

For items whose SRT codes are set, "CMPLT" is displayed on the CONSULT screen; for items whose SRT codes are not set, "INCMP" is displayed.

SRT WORK SUPPORT Mode

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

ECU DIAGNOSIS INFORMATION

ECM

Reference Value

INFOID:0000000010986261

VALUES ON THE DIAGNOSIS TOOL

NOTE:

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

● Numerical values in the following table are reference values.

● These values are input/output values that ECM receives/transmits and may differ from actual operations.

Example:

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

Monitor Item	Condition		Values/Status
ENG SPEED	• Run engine and compare CONSULT value with the tachometer indication.		Almost the same speed as the tachometer indication.
B/FUEL SCHDL	See EC-566, "Diagnosis Procedure" .		
A/F ALPHA-B1	See EC-566, "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 2.2 V
HO2S2 (B1)	• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		0 - 0.3 V ↔ Approx. 0.6 - 1.0 V
HO2S2 MNTR(B1)	• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		LEAN ↔ RICH
VHCL SPEED SE	• Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14 V
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0 V
		Accelerator pedal: Fully depressed	4.2 - 4.8 V
ACCEL SEN 2*	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0 V
		Accelerator pedal: Fully depressed	4.2 - 4.8 V
TP SEN 1-B1	• Ignition switch: ON (Engine stopped) • Selector lever: D	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	Accelerator pedal: Fully released	Less than 4.75 V
		Accelerator pedal: Fully depressed	More than 0.36 V
FUEL T/TMP SE	• Ignition switch: ON		Indicates fuel tank temperature
EVAP SYS PRES	• Ignition switch: ON		Approx. 1.8 - 4.8 V
FUEL LEVEL SE	• Ignition switch: ON		Depending on fuel level of fuel tank
START SIGNAL	• Ignition switch: ON → START → ON		Off → On → Off

ECM

< ECU DIAGNOSIS INFORMATION >

[QR25DE]

Monitor Item	Condition		Values/Status
CLSD THL POS	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	On
		Accelerator pedal: Slightly depressed	Off
AIR COND SIG	Engine: After warming up, idle the engine	Air conditioner switch: OFF	Off
		Air conditioner switch: ON (Compressor operates.)	On
PW/ST SIGNAL	Engine: After warming up, idle the engine	Steering wheel: Not being turned	Off
		Steering wheel: Being turned	On
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	On
		Rear window defogger switch and lighting switch: OFF	Off
IGNITION SW	Ignition switch: ON → OFF → ON		On → Off → On
HEATER FAN SW	Engine: After warming up, idle the engine	Heater fan switch: ON	On
		Heater fan switch: OFF	Off
BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	Off
		Brake pedal: Slightly depressed	On
INJ PULSE-B1	- Engine: After warming up - Selector lever: P or N - 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: P or N - Air conditioner switch: OFF - No load	Idle	5° - 15° BTDC
		2,000 rpm	25° - 45° BTDC
CAL/LD VALUE	- Engine: After warming up - Selector lever: P or N - Air conditioner switch: OFF - No load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	- Engine: After warming up - Selector lever: P or N - Air conditioner switch: OFF - No load	Idle	1.0 - 4.0 g/s
		2,500 rpm	4.0 - 10.0 g/s
PURG VOL C/V	- Engine: After warming up - Selector lever: P or N - 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 - Air conditioner switch: OFF - No load	Idle	-5° - 5°C
		4,000 rpm	Approx. 0° - 30°C
EXH/V TIM B1	- Engine: After warming up - Selector lever: P or N - Air conditioner switch: OFF - No load	Idle	-5° - 5°C
		2,000 rpm	Approx. 0° - 40°C
INT/V SOL (B1)	- Engine: Idle speed - Selector lever: P or N - Air conditioner switch: OFF - No load	After warming up	0%
		Cold condition [Engine coolant temperature below 60°C (140°F)]	Approx. 50% - 100%
SWRL CONT S/V	- Ignition switch: ON - Engine coolant temperature: Between -7°C (19°F) and 60°C (140°F)	Accelerator pedal: Fully released	On
		Accelerator pedal: Fully depressed	Off

ECM

< ECU DIAGNOSIS INFORMATION >

[QR25DE]

Monitor Item	Condition		Values/Status
AIR COND RLY	Engine: After warming up, idle the engine	Air conditioner switch: OFF	Off
		Air conditioner switch: ON (Compressor operates)	On
FUEL PUMP RLY	- For 1 second after turning ignition switch: ON - Engine running or cranking		On
	Except above		Off
VENT CONT/V	Ignition switch: ON		Off
THRTL RELAY	Ignition switch: ON		On
COOLING FAN	- Engine: After warming up, idle the engine - Air conditioner switch: OFF	Engine coolant temperature is 97°C (207°F) or less	Off
		Engine coolant temperature between 98°C (208°F) and 99°C (210°F) or more	Low
		Engine coolant temperature between 100°C (212°F) or more	Hi
	- Engine: After warming up, idle the engine - Air conditioner switch: ON - Refrigerant pressure is less than 1,280 kPa (12.80 bar, 13.05 kg/cm², 185.6 psi)	Engine coolant temperature is 97°C (207°F) or less	Off
		Engine coolant temperature between 98°C (208°F) and 99°C (210°F) or more	Mid
		Engine coolant temperature between 100°C (212°F) or more	Hi
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
I/P PULLY SPD	Vehicle speed: More than 20 km/h (12 MPH)		Almost the same speed as the tachometer indication
VEHICLE SPEED	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as the speedometer indication
IDL A/V LEARN	Engine: running	Idle air volume learning has not been performed yet.	YET
		Idle air volume learning has already been performed successfully.	CMPLT
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has turned ON.	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%
VHCL SPEED SE	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as the speedometer indication
SET VHCL SPD	Engine: Running	ASCD: Operating	The preset vehicle speed is displayed
MAIN SW	Ignition switch: ON	MAIN switch: Pressed	On
		MAIN switch: Released	Off
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	On
		CANCEL switch: Released	Off
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	On
		RESUME/ACCELERATE switch: Released	Off

ECM

< ECU DIAGNOSIS INFORMATION >

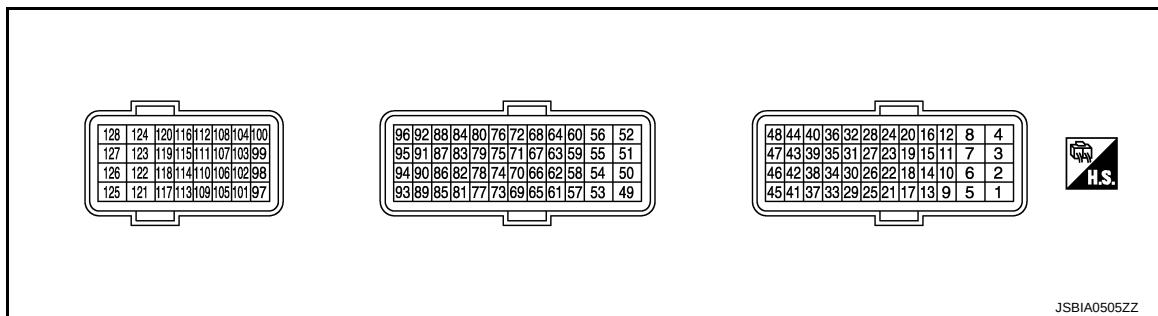
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Monitor Item	Condition		Values/Status
SET SW	• Ignition switch: ON	SET/COAST switch: Pressed	On
		SET/COAST switch: Released	Off
BRAKE SW1 (Brake pedal position switch)	• Ignition switch: ON	Brake pedal: Fully released	On
		Brake pedal: Slightly depressed	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
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: Between 40 km/h (25 MPH) and 171 km/h (106 MPH)	ASCD: Operating	On
		ASCD: Not operating	Off
A/F ADJ-B1	• Engine: running		-0.330 - 0.330
TUMBLE POS SEN	• Ignition switch: ON • Engine coolant temperature: Between -7°C (19°F) and 60°C (140°F)	Accelerator pedal: Fully released	Less than 1.4 V
		Accelerator pedal: Fully depressed	More than 2.8 V
P/N POSI SW	• Ignition switch: ON	Selector lever: P or N	On
		Selector lever: Except above	Off
INT/A TEMP SE	• Ignition switch: ON		Indicates intake air temperature
AC PRESS SEN	• Engine speed: Idle • Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0 V
VTC DTY EX B1	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle	0 - 2%
		2,000 rpm	Approx. 0- 90%
EOP SENSOR	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle	1,000 - 2,000 mV
		2,000 rpm	1,500 - 3,500 mV
EVAP LEAK DIAG	• Ignition switch: ON		Indicates the condition of EVAP leak diagnosis.
EVAP DIAG READY	• Ignition switch: ON		Indicates the ready condition of EVAP leak diagnosis.
THRTL STK CNT B1	NOTE: The item is indicated, but not used.		—
A/F SEN1 DIAG1 (B1)	DTC P015A and P015B self-diagnosis is incomplete.		INCMP
	DTC P015A and P015B self-diagnosis is complete.		CMPLT
A/F SEN1 DIAG2 (B1)	DTC P014C and P014D self-diagnosis is incomplete.		INCMP
	DTC P014C and P014D self-diagnosis is complete.		CMPLT
A/F SEN1 DIAG3 (B1)	The vehicle condition is not within the diagnosis range of DTC P014C, P014D, P015A or P015B.		ABSNT
	The vehicle condition is within the diagnosis range of DTC P014C, P014D, P015A or P015B.		PRSNT

Monitor Item	Condition	Values/Status
HO2 S2 DIAG1 (B1)	DTC P0139 self-diagnosis (delayed response) is incomplete.	INCMP
	DTC P0139 self-diagnosis (delayed response) is complete.	CMPLT
HO2 S2 DIAG2 (B1)	DTC P0139 self-diagnosis (slow response) is incomplete.	INCMP
	DTC P0139 self-diagnosis (slow response) is complete.	CMPLT
SYSTEM 1 DIAG-NOSIS A B1	DTC P117A self-diagnosis is incomplete.	INCMP
	DTC P117A self-diagnosis is complete.	CMPLT
SYSTEM 1 DIAG-NOSIS B B1	DTC P117A self-diagnosis is on standby.	ABSENT
	DTC P117A self-diagnosis is under diagnosis.	PRSENT
MASS AIR FLOW SENSOR (Hz)	See EC-566, "Diagnosis Procedure" .	
A/F-S ATMSPHRC CRCT B1	Engine: After warming up, idle the engine	Varies depending on vehicle environment.
A/F-S ATMSPHRC CRCT UP B1	Engine: Running	Varies depending on the number of updates.

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

TERMINAL LAYOUT



PHYSICAL VALUES

NOTE:

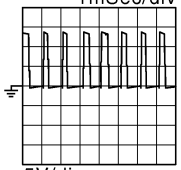
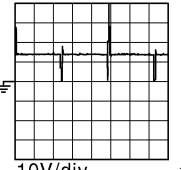
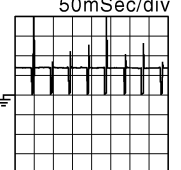
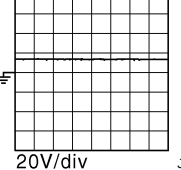
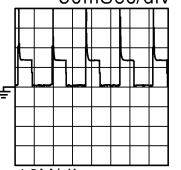
- ECM is located in the engine room left side near battery.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT.

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
1 (G)	128 (BR)	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	1.8 V★ 5mSec/div 5V/div JMBIA0326GB
2 (GR)	128 (BR)	Throttle control motor power supply	Input	[Ignition switch: ON]	Battery voltage (11 - 14 V)

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< ECU DIAGNOSIS INFORMATION >

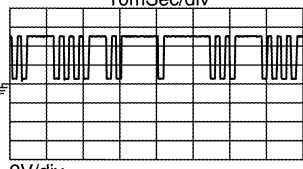
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Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
3 (L)	128 (BR)	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	3.2 V★ 1mSec/div  5V/div JMBIA0324GB
4 (W)	8 (—)	Knock sensor	Input	[Engine is running] • Idle speed	2.5 V
8 (—)	—	Sensor ground (Knock sensor shield circuit)	—	—	—
9 (Y) 10 (P) 13 (L) 14 (G)	128 (BR)	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 1 Fuel injector No. 2	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	Battery voltage (11 - 14 V)★ 50mSec/div  10V/div JMBIA0089GB
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Battery voltage (11 - 14 V)★ 50mSec/div  10V/div JMBIA0090GB
16 (BR)	—	ECM ground	—	—	—
17 (BG)	128 (BR)	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)★ 50mSec/div  20V/div JMBIA0087GB
				[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.)	Battery voltage (11 - 14 V)★ 50mSec/div  10V/div JMBIA0088GB

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< ECU DIAGNOSIS INFORMATION >

[QR25DE]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
18 (P)	128 (BR)	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)
21 (V)	128 (BR)	Throttle control motor relay	Output	[Ignition switch: OFF]	Battery voltage (11 - 14 V)
				[Ignition switch: ON]	0 - 1.0 V
22 (Y)	23 (B)	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
23 (B)	—	Sensor ground (Heated oxygen sensor 2)	—	—	—
25 (P)	26 (BR)	Engine oil temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine oil temperature.
26 (BR)	—	Sensor ground (Engine oil temperature sensor)	—	—	—
27 (L)	—	Sensor ground (Engine coolant temperature sensor)	—	—	—
28 (G)	27 (L)	Engine coolant temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.
30 (R)	—	Sensor ground [Camshaft position sensor (PHASE)]	—	—	—
31 (W)	30 (R)	Camshaft position sensor (PHASE)	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	1.0 - 2.0★ 10mSec/div 
				[Engine is running] • Engine speed is 2,000 rpm	1.0 - 2.0★ 10mSec/div 

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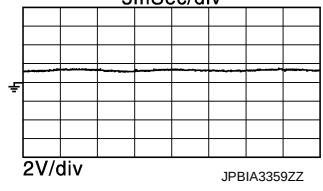
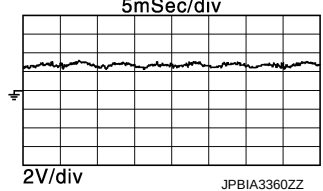
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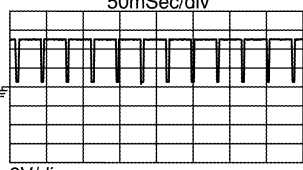
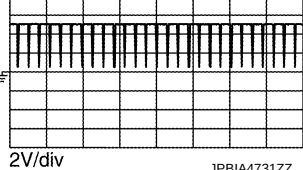
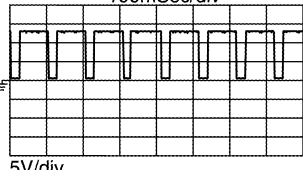
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Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
32 (B)	—	Sensor power supply [Camshaft position sensor (PHASE)]	—	[Ignition switch: ON]	5.0 V
33 (V)	34 (GR)	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.
34 (GR)	—	Sensor ground (Mass air flow sensor, intake air temperature sensor)	—	—	—
35 (BR)	34 (GR)	Mass air flow sensor	Input	[Ignition switch: ON] • Engine stopped	1.3 V
				[Engine is running] • Warm-up condition • Idle speed	1.3 - 1.6 V
				[Engine is running] • Warm-up condition • Engine is revving from idle to about 4,000 rpm	1.3 - 1.6 to 2.5 V (Check for linear voltage rise in response to engine being increased to about 4,000 rpm.)
36 (L)	—	Sensor power supply (Mass air flow sensor, intake air temperature sensor)	—	[Ignition switch: ON]	5.0 V
37 (—)	—	Shield	—	—	—
38 (SB)	—	Sensor ground (Engine oil pressure sensor)	—	—	—
39 (P)	38 (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★ 
40 (W)	38 (SB)	Sensor power supply (Engine oil pressure sensor)	—	[Ignition switch: ON]	5.0 V
41 (Y)	128 (BR)	A/F sensor 1	Input	[Ignition switch: ON]	2.2 V
42 (B)	—	Sensor ground [Exhaust valve timing control position sensor]	—	—	—

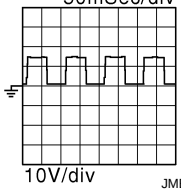
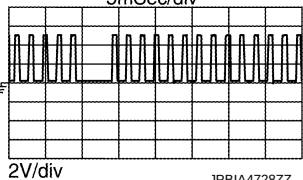
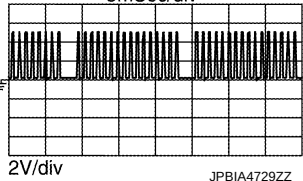
ECM

< ECU DIAGNOSIS INFORMATION >

[QR25DE]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
43 (LG)	42 (B)	Exhaust valve timing control position sensor	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	1.0 - 2.0★ 50mSec/div  2V/div JPBIA4730ZZ
				[Engine is running] • Engine speed is 2,000 rpm	1.0 - 2.0★ 50mSec/div  2V/div JPBIA4731ZZ
44 (Y)	—	Sensor power supply [Exhaust valve timing control position sensor]	—	[Ignition switch: ON]	5 V
45 (G)	128 (BR)	A/F sensor 1	Input	[Engine is running] • Engine speed is 2,000 rpm	1.8 V Output voltage varies with air fuel ratio.
49 (G)	128 (BR)	Intake manifold runner control valve motor (Close)	Output	[Ignition switch ON] • Engine coolant temperature: Between -7°C (19°F) and 60°C (140°F) • Accelerator pedal: Depressed → fully released	Battery voltage appears for about 1 second.
50 (V)	128 (BR)	Intake manifold runner control valve motor power supply	Input	[Ignition switch: ON]	Battery voltage (11 - 14 V)
51 (Y)	128 (BR)	Intake manifold runner control valve motor (Open)	Output	[Ignition switch ON] • Engine coolant temperature: Between -7°C (19°F) and 60°C (140°F) • Accelerator pedal: Fully released → depressed	Battery voltage appears for about 1 second.
52 (B)	—	ECM ground	—	—	—
53 (P)	128 (BR)	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★ 100mSec/div  5V/div JPBIA4732ZZ

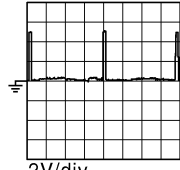
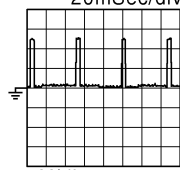
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Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
54 (V)	128 (BR)	Heated oxygen sensor 2 heater	Output	[Engine is running] - Engine speed: Below 3,600 rpm after the following conditions are met - Engine: 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★ 50mSec/div  10V/div JMBIA0325GB
				[Ignition switch: ON] - Engine stopped [Engine is running] - Engine speed: Above 3,600 rpm	Battery voltage (11 - 14 V)
56 (GR)	128 (BR)	Intake valve timing intermediate lock control solenoid valve	Output	[Engine is running] - Warm-up condition - Idle speed	0 V
				[Engine is running] - Cold condition [Engine coolant temperature: below 60°C (140°F)] - Idle speed	Battery voltage (11 - 14 V)
70 (BR)	—	Sensor ground [Crankshaft position sensor (POS)]	—	—	—
71 (GR)	70 (BR)	Crankshaft position sensor (POS)	Input	[Engine is running] - Warm-up condition - Idle speed NOTE: The pulse cycle changes depending on rpm at idle	4.0 V★ 5mSec/div  2V/div JP BIA4728ZZ
				[Engine is running] Engine speed: 2,000 rpm	4.0 V★ 5mSec/div  2V/div JP BIA4729ZZ
72 (L)	—	Sensor power supply [Crankshaft position sensor (POS)]	—	[Ignition switch: ON]	5.0 V
73 (—)	—	Shield	—	—	—
77 (W)	78 (B)	Throttle position sensor 2	Input	[Ignition switch: ON] - Engine stopped - Selector lever: D - Accelerator pedal: Fully released	Less than 4.75 V
				[Ignition switch: ON] - Engine stopped - Selector lever: D - Accelerator pedal: Fully depressed	More than 0.36 V
78 (B)	—	Sensor ground (Throttle position sensor 1, 2)	—	—	—

ECM

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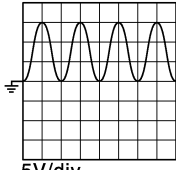
Terminal No. (Wire color)		Description		Condition	Value (Approx.)	
+	-	Signal name	Input/ Output			
79 (G)	78 (B)	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	More than 0.36 V	A
				[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	Less than 4.75 V	C
80 (R)	—	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5.0 V	D
83 (L)	92 (LG)	Intake manifold runner control valve position sen- sor	Input	[Ignition switch ON] • Engine coolant temperature: Be- tween -7°C (19°F) and 60°C (140°F) • Accelerator pedal: Fully released	Less than 1.4 V	E
				[Ignition switch ON] • Engine coolant temperature: Be- tween -7°C (19°F) and 60°C (140°F) • Accelerator pedal: Slightly de- pressed	More than 2.8 V	F
84 (V)	—	Sensor power supply (Intake manifold runner control valve position sen- sor)	—	[Ignition switch: ON]	5.0 V	G
85 (G)	—	Lin communication line	Input/ Output	—	—	H
86 (Y)	128 (BR)	Ignition signal No. 1	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	0 - 0.1 V★ 	I
87 (BR)		Ignition signal No. 2				J
90 (W)		Ignition signal No. 3				K
91 (SB)		Ignition signal No. 4		[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0 - 0.2 V★ 	L
89 (P)	128 (BR)	ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] • A few seconds after turning ignition switch OFF	0 - 1.0 V	M
				[Ignition switch: OFF] • More than a few seconds after turn- ing ignition switch OFF	Battery voltage (11 - 14 V)	N
92 (LG)	—	Sensor ground (Intake manifold runner control valve position sen- sor)	—	—	—	O
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[QR25DE]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
93 (L)	128 (BR)	Intake valve timing control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	0 V
				[Engine is running] • Warm-up condition • When revving engine up to 2,000rpm Quickly	Battery voltage (11 - 14 V) ★  5V/div JMBIA1638GB
94 (BR)	128 (BR)	Exhaust valve timing control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	0 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Battery voltage (11 - 14 V)
99 (P)	—	CAN communication line (CAN-L)	Input/ Output	—	—
100 (L)	—	CAN communication line (CAN-H)	Input/ Output	—	—
103 (Y)	124 (W)	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
104 (R)	—	Sensor power supply (Refrigerant pressure sensor)	—	[Ignition switch: ON]	5.0 V
109 (LG)	128 (BR)	Ignition switch	Input	[Ignition switch: OFF]	0 V
				[Ignition switch: ON]	Battery voltage (11 - 14 V)
110 (G)	111 (BR)	ASCD steering switch	Input	[Ignition switch: ON] • ASCD steering switch: OFF	4 V
				[Ignition switch: ON] • MAIN switch: Pressed	0 V
				[Ignition switch: ON] • CANCEL switch: Pressed	1 V
				[Ignition switch: ON] • ACCEL/RES switch: Pressed	3 V
				[Ignition switch: ON] • COAST/SET switch: Pressed	2 V
111 (BR)	—	Sensor ground (ASCD steering switch)	—	—	—
115 (V)	128 (BR)	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 (GR)	128 (BR)	Brake pedal position switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	Battery voltage (11 - 14 V)

ECM

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[QR25DE]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
117 (W)	128 (BR)	PNP signal	Input	[Ignition switch: ON] • Selector lever: P or N	Battery voltage (11 - 14 V)
				[Ignition switch: ON] • Selector lever: Except above	0 V
118 (SB)	—	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5.0 V
119 (Y)	120 (LG)	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.25 - 0.5 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	2.0 - 2.5 V
120 (LG)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
121 (BR)	128 (BR)	Power supply for ECM	Input	[Ignition switch: ON]	Battery voltage (11 - 14 V)
122 (V)	—	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5.0 V
123 (BR)	—	ECM ground	—	—	—
124 (W)	—	Sensor ground (Refrigerant pressure sensor)	—	—	—
126 (GR)	127 (R)	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.5 - 1.0 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	4.2 - 4.8 V
127 (R)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—
128 (BR)	—	ECM ground	—	—	—

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

Fail Safe

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NON DTC RELATED ITEM

Detected items	Engine operating condition in fail-safe mode	Remarks	Reference page
Malfunction indicator lamp circuit	Engine speed will not rise more than 2,500 rpm due to the fuel cut	When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system. Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail safe function. The fail safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.	EC-791, "Component Function Check"

DTC RELATED ITEM

Description

When a DTC is detected, ECM executes a mode (in the Fail-safe mode) applicable to the DTC. The fail-safe mode has the preset traveling control mode (accelerator angle variation and engine output limit) and device fix mode.

Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
	Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction.
Device fix mode		- This mode fixes the IVT control solenoid valve and the EVT control solenoid valve in the reference position. - The intake manifold runner control valve motor is turned OFF (intake manifold runner control valve opens).

Fail Safe Pattern

Pattern	Fail safe mode	
A	Traveling control mode	Accelerator angle variation control
B		Engine output control
C	Device fix mode	

Fail Safe List

×:Applicable —: Not applicable

DTC No.	Detected items	Vehicle behavior			
		Pattern			Others
		A	B	C	
P0011	Intake valve timing control	—	—	×	ECM activates the IVT intermediate lock control solenoid valve to bring the cam sprocket into an intermediate lock condition.
P0014 P0078	Exhaust valve timing control	—	—	×	—
P0102 P0103	Mass air flow sensor circuit	×	×	×	—
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.

DTC No.	Detected items	Vehicle behavior				
		Pattern			Others	
		A	B	C		
P0171 P0172	Fuel injection system	×	—	—	—	
P0197 P0198	Engine oil temperature sensor	—	—	—	Exhaust valve timing control does not function.	
P0300 P0301 P0302 P0303 P0304	Misfire	×	—	—	—	
P0500	Vehicle speed sensor	×	—	—	—	
P0524	Engine oil pressure	—	—	—	- ECM illuminates oil pressure warning lamp on the combination meter. - Engine speed will not rise more than 4,000rpm due to the fuel cut. - Fail-safe is canceled when ignition switch OFF → ON.	
P0603	ECM power supply circuit	—	×	—	—	
P0605	ECM	—	—	—	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.	
P1078	Exhaust valve timing control position sensor circuit	×	—	×	—	
P1568	Signal invalid	—	—	—	Active trace control does not function.	
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
P2004	Intake manifold runner control valve	—	×	×	—	
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	—	×	—	—	
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.	

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

Priority	DTC	Detected items
1	U0101, U1001	CAN communication line
	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
	P0197, P0198	Engine oil temperature sensor
	P0327, P0328	Knock sensor
	P0335	Crankshaft position sensor (POS)
	P0340	Camshaft position sensor (PHASE)
	P0500	Vehicle speed sensor
	P0520	Engine oil pressure sensor
	P0603, P0604, P0605, P0606, P0607, P060A, P060B	ECM
	P0643	Sensor power supply
	P0850	Transmission range switch
	P1078	Exhaust valve timing control position sensor
	P1610, P1611, P1612, P1615	NATS
	P2014, P2016, P2017, P2018	Intake manifold runner control valve position sensor
	P2122, P2123, P2127, P2128, P2138	Accelerator pedal position sensor
2	P0031, P0032	Air fuel ratio (A/F) sensor 1 heater
	P0037, P0038	Heated oxygen sensor 2 heater
	P0075	Intake valve timing control solenoid valve/Intake valve timing intermediate lock control solenoid valve
	P0078	Exhaust valve timing control solenoid valve
	P0130, P0131, P0132, P014C, P014D	Air fuel ratio (A/F) sensor 1
	P0137, P0138	Heated oxygen sensor 2
	P0444	EVAP canister purge volume control solenoid valve
	P1217	Engine over temperature (OVERHEAT)
	P1805	Brake switch
	P2004	Intake manifold runner control valve
	P2100, P2103	Throttle control motor relay
	P2101	Electric throttle control function
	P2118	Throttle control motor

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< ECU DIAGNOSIS INFORMATION >

[QR25DE]

Priority	DTC	Detected items
3	P0011	Intake valve timing control
	P0014	Exhaust valve timing control
	P0171, P0172	Fuel injection system function
	P0300, P0301, P0302, P0303, P0304	Misfire
	P0420	Three way catalyst function
	P0524	Engine oil pressure
	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:000000010986264

×:Applicable —: Not applicable

DTC* ¹		Items (CONSULT screen terms)	SRT code	Trip	MIL	Reference page
CONSULT GST* ²	ECM* ³					
U0101	0101* ⁴	LOST COMM (TCM)	—	1	×	EC-576
U1001	1001* ⁴	CAN COMM CIRCUIT	—	2 or 1	—	EC-577
U1040	1040* ⁴	ENG COMM CIRCUIT	—	2	—	EC-578
U1044	1044* ⁴	ENG COMM CIRCUIT	—	2	—	EC-580
U1050	1050* ⁴	LIN COMMUNICATION	—	2	—	EC-582
U1051	1051* ⁴	LIN COMMUNICATION	—	2	—	EC-582
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—	—	Flashing*⁵	—
P0011	0011	INT/V TIM CONT-B1	×	2	×	EC-584
P0014	0014	EXH/V TIM CONT-B1	—	2	×	EC-588
P0031	0031	A/F SEN1 HTR (B1)	—	2	×	EC-592
P0032	0032	A/F SEN1 HTR (B1)	—	2	×	EC-592
P0037	0037	HO2S2 HTR (B1)	—	2	×	EC-595
P0038	0038	HO2S2 HTR (B1)	—	2	×	EC-595
P0075	0075	INT/V TIM V/CIR-B1	—	2	×	EC-598
P0078	0078	EX V/T ACT/CIRC-B1	—	2	×	EC-602
P0102	0102	MAF SEN/CIRCUIT-B1	—	1	×	EC-605
P0103	0103	MAF SEN/CIRCUIT-B1	—	1	×	EC-605
P0112	0112	IAT SEN/CIRCUIT-B1	—	2	×	EC-609
P0113	0113	IAT SEN/CIRCUIT-B1	—	2	×	EC-609
P0117	0117	ECT SEN/CIRC	—	1	×	EC-612
P0118	0118	ECT SEN/CIRC	—	1	×	EC-612
P0122	0122	TP SEN 2/CIRC-B1	—	1	×	EC-615
P0123	0123	TP SEN 2/CIRC-B1	—	1	×	EC-615
P0130	0130	A/F SENSOR1 (B1)	—	2	×	EC-618

ECM

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DTC*1		Items (CONSULT screen terms)	SRT code	Trip	MIL	Reference page
CONSULT GST*2	ECM*3					
P0131	0131	A/F SENSOR1 (B1)	—	2	×	EC-622
P0132	0132	A/F SENSOR1 (B1)	—	2	×	EC-625
P0137	0137	HO2S2 (B1)	×	2	×	EC-628
P0138	0138	HO2S2 (B1)	×	2	×	EC-634
P014C	014C	A/F SENSOR1 (B1)	×	2	×	EC-647
P014D	014D	A/F SENSOR1 (B1)	×	2	×	EC-647
P0171	0171	FUEL SYS-LEAN-B1	—	2	×	EC-652
P0172	0172	FUEL SYS-RICH-B1	—	2	×	EC-657
P0197	0197	EOT SEN/CIRC	—	2	×	EC-662
P0198	0198	EOT SEN/CIRC	—	2	×	EC-662
P0222	0222	TP SEN 1/CIRC-B1	—	1	×	EC-665
P0223	0223	TP SEN 1/CIRC-B1	—	1	×	EC-665
P0300	0300	MULTI CYL MISFIRE	—	1 or 2	×	EC-668
P0301	0301	CYL 1 MISFIRE	—	1 or 2	×	EC-668
P0302	0302	CYL 2 MISFIRE	—	1 or 2	×	EC-668
P0303	0303	CYL 3 MISFIRE	—	1 or 2	×	EC-668
P0304	0304	CYL 4 MISFIRE	—	1 or 2	×	EC-668
P0327	0327	KNOCK SEN/CIRC-B1	—	2	—	EC-674
P0328	0328	KNOCK SEN/CIRC-B1	—	2	—	EC-674
P0335	0335	CKP SEN/CIRCUIT	—	2	×	EC-676
P0340	0340	CMP SEN/CIRC-B1	—	2	×	EC-679
P0420	0420	TW CATALYST SYS-B1	×	2	×	EC-682
P0444	0444	PURG VOLUME CONT/V	—	2	×	EC-687
P0500	0500	VEHICLE SPEED SENSOR A*6	—	2	×	EC-690
P0520	0520	EOP SENSOR/SWITCH	—	2	—	EC-692
P0524	0524	ENGINE OIL PRESSURE	—	1	—	EC-695
P0603	0603	ECM BACK UP/CIRCUIT*7	—	2	×	EC-698
P0604	0604	ECM	—	1	×	EC-700
P0605	0605	ECM	—	1	×	EC-701
P0606	0606	CONTROL MODULE	—	1	×	EC-702
P0607	0607	ECM	—	1 or 2	×	EC-704
P060A	060A	CONTROL MODULE	—	1 or 2	×	EC-705
P060B	060B	CONTROL MODULE	—	1	×	EC-706
P062F	062F	CONTROL MODULE	—	2	×	EC-698
P0643	0643	SENSOR POWER/CIRC	—	1	×	EC-707
P0850	0850	P-N POS SW/CIRCUIT	—	2	×	EC-710
P1078	1078	EXH TIM SEN/CIRC-B1	—	2	×	EC-713
P1212	1212	TCS/CIRC	—	2	—	EC-716
P1217	1217	ENG OVER TEMP	—	1	×	EC-718
P1225	1225	CTP LEARNING-B1	—	2	—	EC-721
P1226	1226	CTP LEARNING-B1	—	2	—	EC-722
P155D	155D	GENERATOR	—	2	—	EC-723

DTC*1		Items (CONSULT screen terms)	SRT code	Trip	MIL	Reference page	
CONSULT GST*2	ECM*3						
P1564	1564	ASCD SW	—	1	—	EC-724	EC
P1568	1568	ICC COMMAND VALUE	—	1	—	EC-727	
P1572	1572	ASCD BRAKE SW	—	1	—	EC-729	C
P1574	1574	ASCD VHL SPD SEN	—	1	—	EC-735	
P161D	161D	IMMOBILIZER	—	2	—	SEC-102, SEC-264	D
P161E	161E	IMMOBILIZER	—	2	—	SEC-103, SEC-265	
P161F	161F	IMMOBILIZER	—	2	—	SEC-104, SEC-266	E
P1715	1715	IN PULY SPEED	—	2	—	EC-737	
P1805	1805	BRAKE SW/CIRCUIT	—	2	—	EC-739	F
P2004	2004	TUMBLE CONT/V	—	2	×	EC-741	
P2014	2014	IN/MANIFOLD RUNNER POS SEN B1	—	2	×	EC-744	G
P2016	2016	IN/MANIFOLD RUNNER POS SEN B1	—	2	×	EC-744	
P2017	2017	IN/MANIFOLD RUNNER POS SEN B1	—	2	×	EC-744	H
P2018	2018	IN/MANIFOLD RUNNER POS SEN B1	—	2	×	EC-744	
P2100	2100	ETC MOT PWR-B1	—	1	×	EC-747	I
P2101	2101	ETC FNCTN/CIRC-B1	—	1	×	EC-750	
P2103	2103	ETC MOT PWR-B1	—	1	×	EC-747	J
P2118	2118	ETC MOT-B1	—	1	×	EC-753	
P2119	2119	ETC ACTR-B1	—	1	×	EC-755	K
P2122	2122	APP SEN 1/CIRC	—	1	×	EC-757	
P2123	2123	APP SEN 1/CIRC	—	1	×	EC-757	L
P2127	2127	APP SEN 2/CIRC	—	1	×	EC-760	
P2128	2128	APP SEN 2/CIRC	—	1	×	EC-760	M
P2135	2135	TP SENSOR-B1	—	1	×	EC-763	
P2138	2138	APP SENSOR	—	1	×	EC-766	

*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.

*5: When the ECM is in the mode that displays SRT status, MIL may blink. For details, Refer to [EC-488, "On Board Diagnosis Function"](#).

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

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

Test Value and Test Limit

INFOID:0000000110986266

The following is the information specified in Service \$06 of SAE J1979/ISO 15031-5.

The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

These data (test value and test limit) are specified by On Board Monitor ID (OBDMID), Test ID (TID), Unit and Scaling ID and can be displayed on the GST screen.

The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (e.g., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

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

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[QR25DE]

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

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P015D	94H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1
			P0153	95H	04H	Response rate: Response ratio (lean to rich)
			P0153	96H	84H	Response rate: Response ratio (rich to lean)
	06H	Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for test cycle
			P0157	08H	0CH	Maximum sensor output voltage for test cycle
			P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
			P0159	82H	11H	Rear O2 sensor delay response diagnosis
	07H	Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for test cycle
			P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage
			P0165	81H	0CH	Difference in sensor output voltage
CATA- LYST	21H	Three way catalyst function (Bank1)	P0420	80H	01H	O2 storage index
			P0420	82H	01H	Switching time lag engine exhaust index value
			P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2423	84H	84H	O2 storage index in HC trap catalyst
	22H	Three way catalyst function (Bank2)	P0430	80H	01H	O2 storage index
			P0430	82H	01H	Switching time lag engine exhaust index value
			P2424	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst
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

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

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
O2 SENSOR HEATER	41H	A/F sensor 1 heater (Bank 1)	Low Input: P0031 High Input: P0032	81H	0BH	Converted value of heater electric current to voltage
	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
			P117A	82H	03H	Cylinder A/F imbalance monitoring
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	80H	2FH	Long term fuel trim
			P0174 or P0175	81H	24H	The number of lambda control clamped
			P117B	82H	03H	Cylinder A/F imbalance monitoring

ECM

< ECU DIAGNOSIS INFORMATION >

[QR25DE]

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

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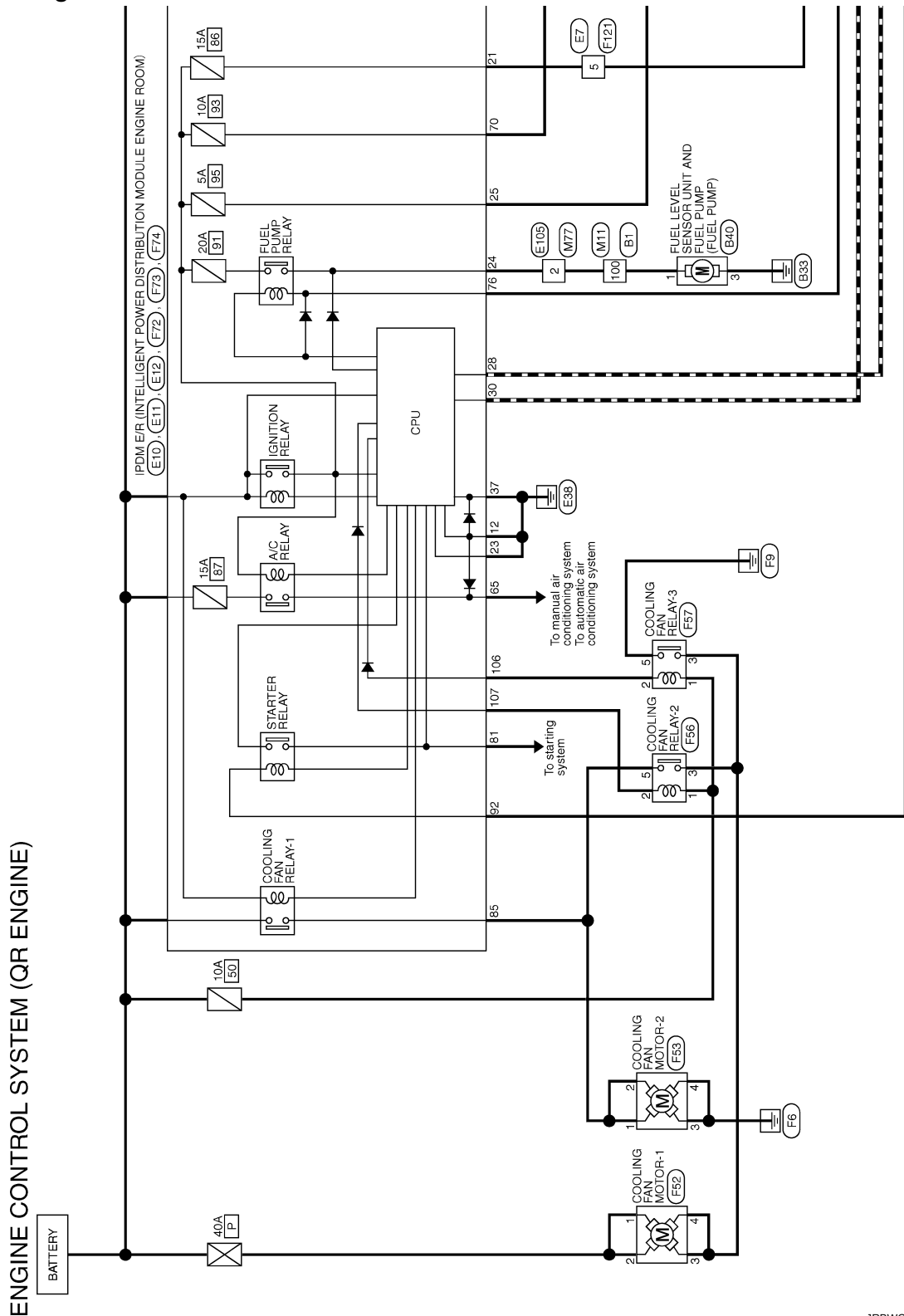
Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A2H	No. 1 cylinder misfire	P0301	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0301	0CH	24H	Misfire counts for last/current 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:0000000010986267



* This connector is not shown in "Harness Layout".

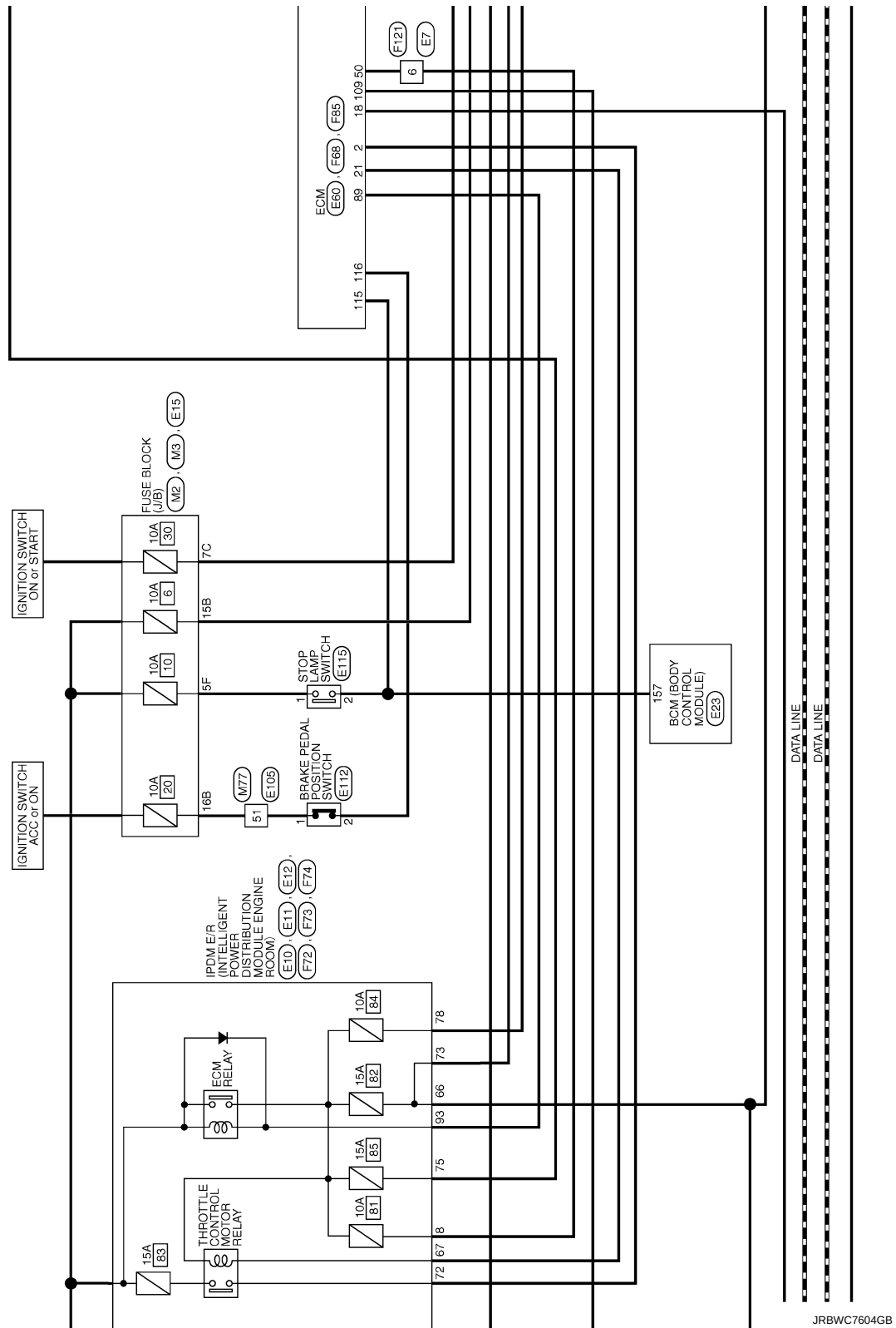
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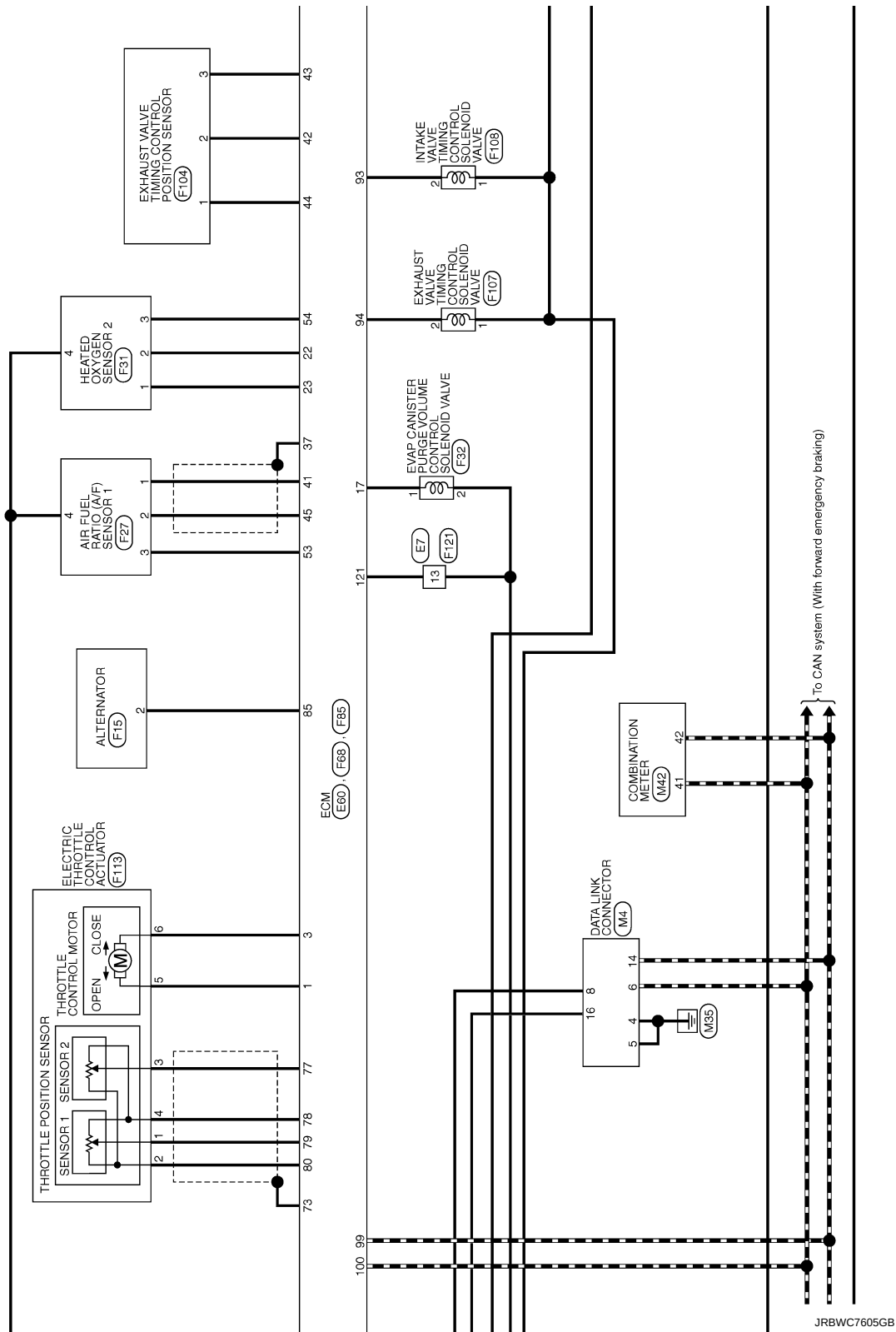
ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[QR25DE]



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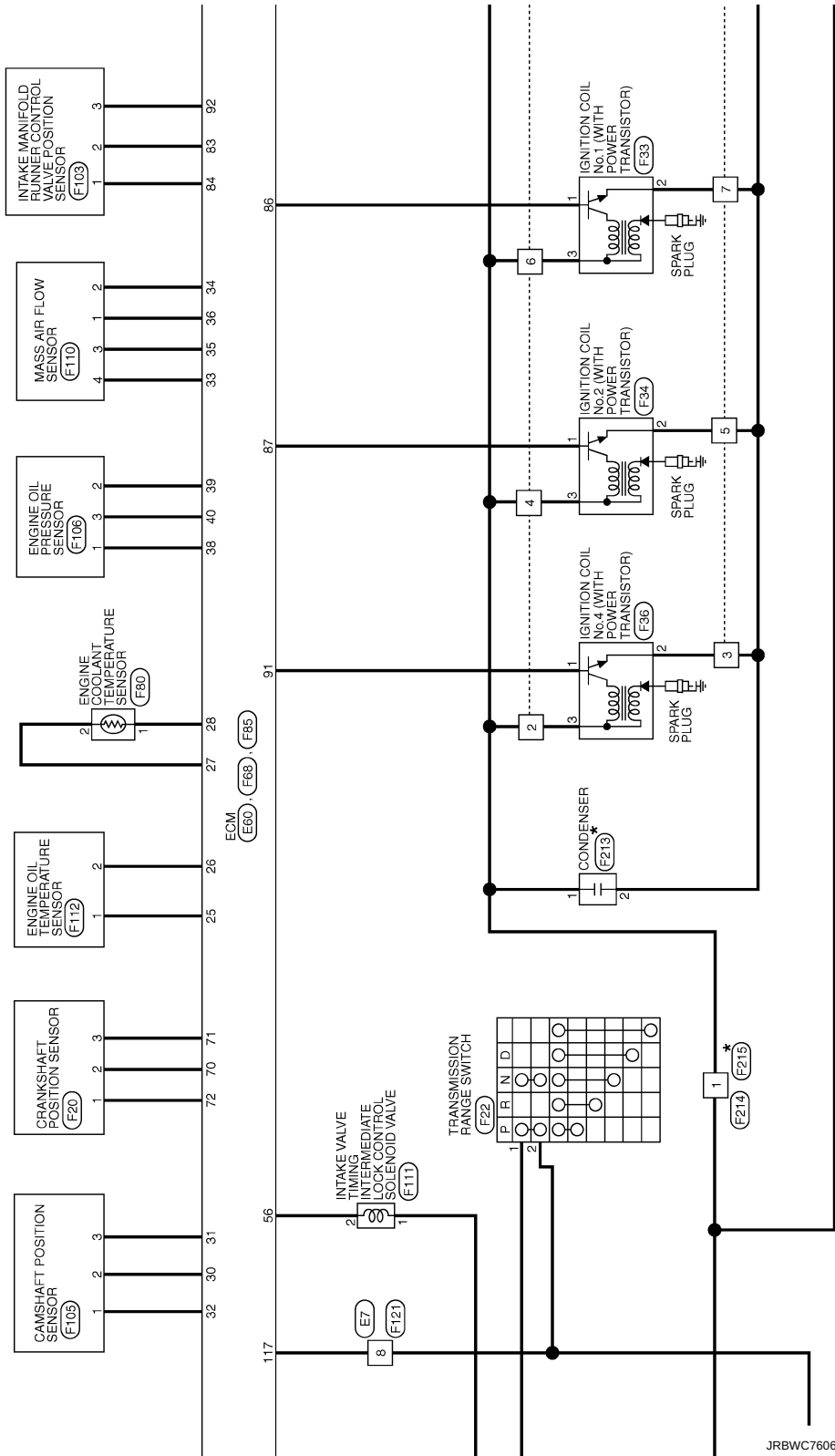


JRBWC7605GB

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[QR25DE]

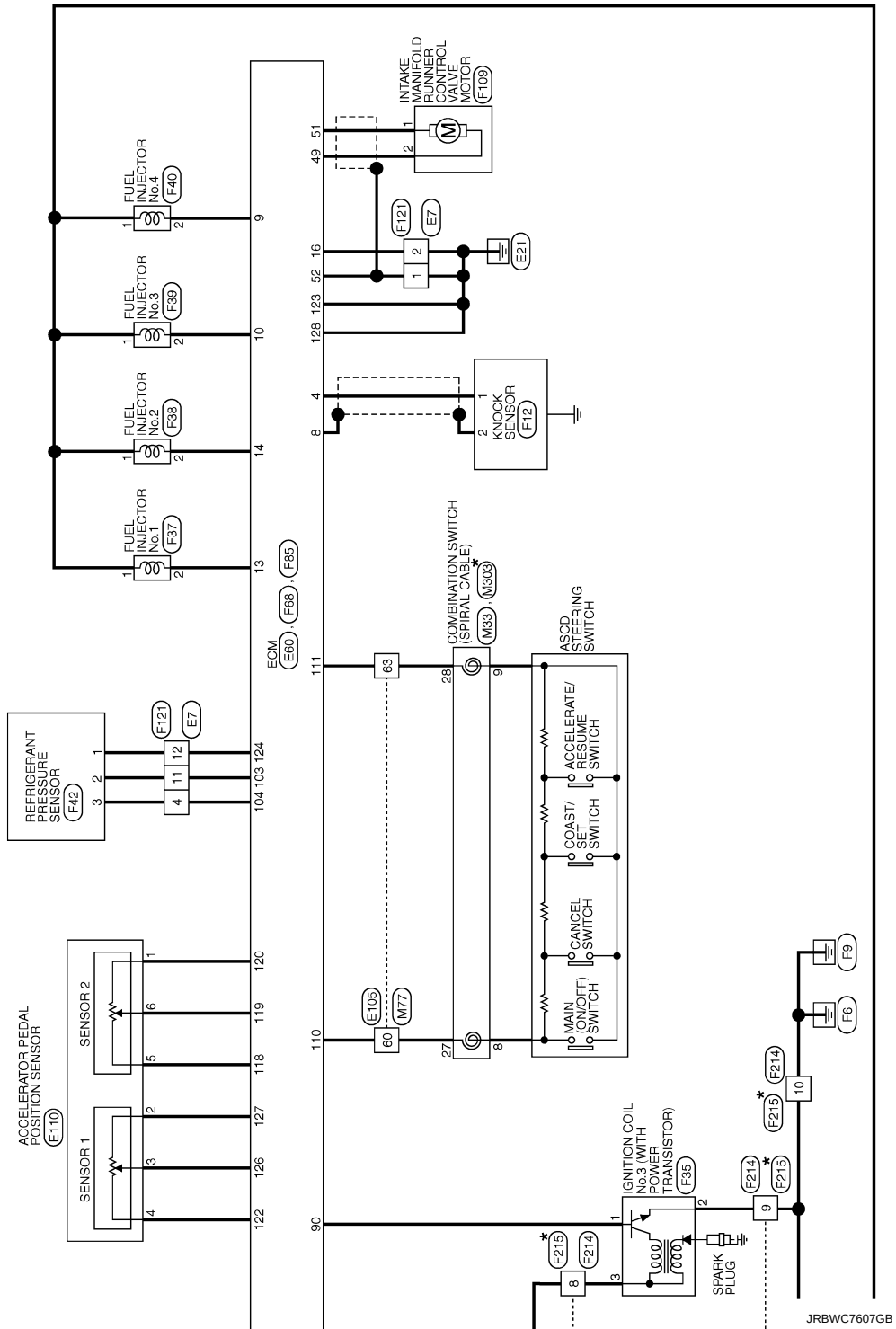


JRBWC7606GB

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

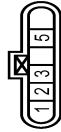
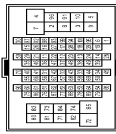
[QR25DE]



JRBWC7607GB

ENGINE CONTROL SYSTEM (QR ENGINE)

Connector No.	B1
Connector Name	WIRE TO WIRE
Connector Type	TH80MM-CS16-TM4



Connector No.	B40
Connector Name	FUEL LEVEL SENSOR UNIT AND FUEL PUMP
Connector Type	ED6FGY-RS

Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	-
2	LAY	-
6	V	-
7	LAV	-
20	L	- [With diesel engine]
21	B	- [With gasoline engine]
21	LAV	- [With diesel engine]
24	G	-
25	BR	-
73	LAV	-
74	R	-
75	R	-
84	L	-
85	L	-
92	LAV	-
93	LAL	-
95	LAVR	-
97	L	-
98	Y	-
99	LAP	-
100	GR	- [With diesel engine]
100	LAVR	- [With gasoline engine]

Connector No. E7

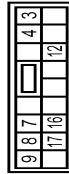
Connector Name WIRE TO WIRE

Connector Type NST6MR-CS



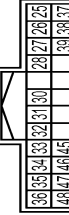
Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	- [With MR20 or QR25 engine]
1	SB	- [With R9M engine]
2	BR	- [With MR20 or QR25 engine]
3	GR	- [With R9M engine]
4	R	-
5	B	- [With MR20 engine]
5	L	- [With R9M engine]
5	LG	- [With QR25 engine]
6	BG	-
7	G	-
8	V	- [With MR20 engine or R9M engine]
8	W	- [With QR25 engine]
9	BG	- [With R9M engine]
9	BR	- [With MR20 engine]

Connector No.	E10
Connector Name	POWER INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	NST6FGY-CS



Terminal No.	Color Of Wire	Signal Name [Specification]
10	BR	-
11	Y	-
12	L	- [With R9M engine]
12	LG	- [With QR25 engine]
13	BR	- [With MR20 or QR25 engine]
13	R	- [With R9M engine]
15	L	-
16	SB	-

Connector No.	E12
Connector Name	POWER INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	TH24FGY-N4



Terminal No.	Color Of Wire	Signal Name [Specification]
19	V	-
20	R	-
21	LG	-
22	Y	-
23	B	-
24	W	-

Terminal No.	Color Of Wire	Signal Name [Specification]
3	P	-
4	Y	-
7	L	-
8	BG	-
9	L	-
12	B	-
16	G	-
17	W	-

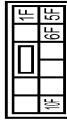
Terminal No.	Color Of Wire	Signal Name [Specification]
25	LG	-
26	W	-
27	SB	-
28	P	-
30	L	-
31	G	-
32	B	-
33	BG	-
34	LG	-
35	V	-
36	Y	-
37	B	-
38	GR	-
39	BR	-
45	L	-
46	P	-
47	W	-
48	R	-

Connector No.	E11
Connector Name	POWER INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	reversit-243405408R



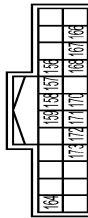
ENGINE CONTROL SYSTEM (QR ENGINE)

Connector No.	E15
Connector Name	FUSE BLOCK (UB)
Connector Type	NS10FW-CS



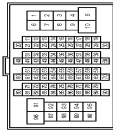
Terminal No.	Color	Wire	Signal Name [Specification]
10F	L	-	-
1F	W	-	-
5F	V	-	-
6F	Y	-	-

Connector No.	E23
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	TH24FB-NH



Terminal No.	Color	Wire	Signal Name [Specification]
156	V	-	CLUTCH INTERLOCK SW
157	LG	-	STOP LAMP SW 2
158	W	-	STOP LAMP SW 1
159	R	-	ASCD CLUTCH SWITCH
164	Y	-	INTELLIGENT KEY WARNING BUZZER
166	P	-	STEERING LOCK UNIT POWER SUPPLY
167	BR	-	TURN SIG LH (FRONT)
168	GR	-	TURN SIG RH (FRONT)
170	L	-	PTC RELAY 3 CONTROL
171	G	-	STARTER RELAY COIT
172	V	-	PTC RELAY 1 CONTROL
173	BG	-	PTC RELAY 2 CONTROL

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-CS16-TM4

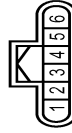


Terminal No.	Color	Wire	Signal Name [Specification]
2	W	-	-
5	V	-	- [Without ISS]
8	W	-	- [With ISS]
9	L	-	-
10	LG	-	-
20	W	-	-
21	B	-	-
22	SHIELD	-	-
31	Y	-	-
32	W	-	-
33	SB	-	-
34	LG	-	-
35	BG	-	-
36	LG	-	-
37	V	-	-
38	G	-	-
39	BR	-	-
40	L	-	-
41	P	-	-
47	GR	-	-
48	SB	-	-
51	P	-	-
52	L	-	-
53	W	-	-
54	Y	-	-
55	BR	-	-
56	P	-	-
57	B	-	-
58	L	-	-
59	W	-	-
60	G	-	-
61	BR	-	-
62	V	-	-
63	BR	-	-
64	GR	-	-

Terminal No.	Color	Wire	Signal Name [Specification]
99	P	-	CAN COMMUNICATION LINE (CANL)
100	L	-	CAN COMMUNICATION LINE (CANH)
103	Y	-	REFRIGERANT PRESSURE SENSOR
104	R	-	SENSOR POWER SUPPLY
109	LG	-	IGNITION SWITCH
110	G	-	ASCD STEERING SWITCH
111	BR	-	SENSOR GROUND
115	V	-	STOP LAMP SWITCH
116	GR	-	BRAKE PEDAL POSITION SWITCH
117	W	-	PNP SIGNAL
118	SB	-	SENSOR POWER SUPPLY
119	Y	-	ACCELERATOR PEDAL POSITION SENSOR 2
120	LG	-	SENSOR GROUND
121	BR	-	POWER SUPPLY FOR ECM
122	V	-	SENSOR POWER SUPPLY
123	BR	-	ECM GROUND
124	W	-	SENSOR GROUND
126	GR	-	ACCELERATOR PEDAL POSITION SENSOR 1
127	R	-	SENSOR GROUND
128	BR	-	ECM GROUND

65	LG	-	-
66	BG	-	-
67	L	-	-
68	R	-	-
71	V	-	-
72	L	-	-
73	R	-	-
76	L	-	-
77	V	-	-
78	LG	-	-
79	SHIELD	-	-
80	GR	-	-
82	Y	-	-
83	SB	-	-
84	L	-	-
85	G	-	-
86	V	-	-
87	B	-	-
88	B	-	-
91	R	-	-
92	BR	-	-
93	W	-	-
96	GR	-	-
97	R	-	-
98	V	-	-
99	Y	-	-

Connector No.	E110
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Type	RH46FB



Terminal No.	Color	Wire	Signal Name [Specification]
1	LG	-	- [With ME20 or QR25 Engine]
1	P	-	- [With E8M Engine]
2	R	-	- [With ME20 or QR25 Engine]
2	V	-	- [With E8M Engine]
3	GR	-	- [With ME20 or QR25 Engine]
3	W	-	- [With E8M Engine]
4	G	-	- [With ME20 or QR25 Engine]
4	V	-	- [With E8M Engine]

ENGINE CONTROL SYSTEM (QR ENGINE)

Terminal No.	Signal Name [Specification]
5 L	- [With R&M Engine]
5 SB	- [With MR20 or QR25 Engine]
6 V	- [With R&M Engine]
6 Y	- [With MR20 or QR25 Engine]



Connector No.	Signal Name [Specification]
E112	BRAKE PEDAL POSITION SWITCH
M02FBR-LC	



2	1

Terminal Color Of Wire	Signal Name [Specification]
1 W	-
2 SHIELD	-



Terminal Color Of Wire	Signal Name [Specification]
1 P	-
2 GR	- [With MR20 or QR25 Engine]
2 R	- [With R&M Engine]

Connector No.	Signal Name [Specification]
E115	STOP LAMP SWITCH
M04FW-LC	



3	4	1	2

Terminal Color Of Wire	Signal Name [Specification]
1 V	-
2 LG	-
3 L	-
4 W	-



Terminal Color Of Wire	Signal Name [Specification]
2 G	-

Connector No.	Signal Name [Specification]
F20	CRANKSHAFT POSITION SENSOR
RH33FB	



Terminal Color Of Wire	Signal Name [Specification]
1 L	-
2 BR	-
3 GR	-

Connector No.	Signal Name [Specification]
F22	TRANSMISSION RANGE SWITCH
YDX06FB-HS4	



8	4	3	7
2	6	5	1

Connector No.	Signal Name [Specification]
F31	HEATED OXYGEN SENSOR 2
RH44FB-P	



4	3	2	1

Terminal Color Of Wire	Signal Name [Specification]
1 B	-
2 Y	-
3 V	-
4 L	-

Connector No.	Signal Name [Specification]
F32	INTAKE MANIFOLD PULSE VOLUME CONTROL SOLENOID VALVE
E02FL-HS	



Connector No.	Signal Name [Specification]
F27	AIR FUEL RATIO (A/F) SENSOR 1
RH44FGY-P	



4	3	2	1

Terminal Color Of Wire	Signal Name [Specification]
1 Y	-
2 G	-
3 P	-
4 BR	-

ENGINE CONTROL SYSTEM (QR ENGINE)

Connector No.	F33
Connector Name	IGNITION COIL No. 1 (WITH POWER TRANSISTOR)
Connector Type	E03F-GY-RS



Connector No.	F35
Connector Name	IGNITION COIL No. 3 (WITH POWER TRANSISTOR)
Connector Type	E03F-GY-RS



Connector No.	F37
Connector Name	FUEL INJECTOR No. 1
Connector Type	HS02FGY



Connector No.	F39
Connector Name	FUEL INJECTOR No. 3
Connector Type	HS02FGY



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

Terminal No.	Wire	Signal Name [Specification]
1	W	-
2	B	-
3	BG	-

Terminal No.	Wire	Signal Name [Specification]
1	LG	- [With QR25 engine]
1	W	- [With MR20 engine]
2	B	- [With MR20 engine]
2	L	- [With QR25 engine]

Terminal No.	Wire	Signal Name [Specification]
1	W	-
2	B	- [With MR20 engine]
2	P	- [With QR25 engine]

Connector No.	F34
Connector Name	IGNITION COIL No. 2 (WITH POWER TRANSISTOR)
Connector Type	E03F-GY-RS



Connector No.	F36
Connector Name	IGNITION COIL No. 4 (WITH POWER TRANSISTOR)
Connector Type	E03F-GY-RS



Connector No.	F38
Connector Name	FUEL INJECTOR No. 2
Connector Type	HS02FGY



Connector No.	F40
Connector Name	FUEL INJECTOR No. 4
Connector Type	HS02FGY



Terminal No.	Wire	Signal Name [Specification]
1	BR	-
2	GR	-
3	P	-

Terminal No.	Wire	Signal Name [Specification]
1	SB	-
2	B	-
3	BR	-

Terminal No.	Wire	Signal Name [Specification]
1	BG	- [With QR25 engine]
1	W	- [With MR20 engine]
2	B	- [With MR20 engine]
2	G	- [With QR25 engine]

Terminal No.	Wire	Signal Name [Specification]
1	SB	- [With QR25 engine]
1	W	- [With MR20 engine]
2	B	- [With MR20 engine]
2	Y	- [With QR25 engine]

ENGINE CONTROL SYSTEM (QR ENGINE)

Connector No.	F42
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Type	RK03FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	- [With QR25 engine]
1	R	- [With MR20 engine]
1	V	- [With R9M Engine]
2	P	- [With MR20 or QR25 Engine]
2	SB	- [With R9M Engine]
3	BG	- [With QR25 engine]
3	L	- [With R9M engine]
3	Y	- [With MR20 engine]

Connector No.	F52
Connector Name	COOLING FAN MOTOR-1
Connector Type	RSM4FY-PR



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

Connector No.	F53
Connector Name	COOLING FAN MOTOR-2
Connector Type	RSM4FY-PR



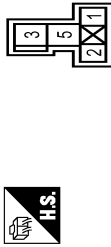
Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	-
2	P	-
3	B	-
4	B	-

Connector No.	F56
Connector Name	COOLING FAN RELAY-2
Connector Type	24381-4BA1A



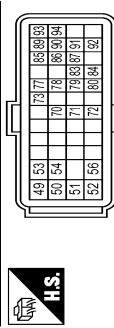
Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	-
2	V	-
3	G	-
5	P	-

Connector No.	F57
Connector Name	COOLING FAN RELAY-3
Connector Type	24381-4BA1A



Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	-
2	BR	-
3	G	-
5	GR	-

Connector No.	F68
Connector Name	ECM
Connector Type	R440FBR-R28-R-LH



Terminal No.	Color Of Wire	Signal Name [Specification]
49	G	INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR (CLOSE)
50	V	INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR (OPEN)
51	Y	INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR (OPEN)
52	B	ECM GROUND
53	P	AF SENSOR 1 HEATER
54	V	HEATED OXYGEN SENSOR 2 HEATER
56	GR	INTAKE VALVE TIMING ADJUSTMENT LOCK CONTROL SOLENOID VALVE
70	BR	SENSOR GROUND
71	GR	CRANKSHAFT POSITION SENSOR
72	L	SENSOR POWER SUPPLY
73	SHIELD	SHIELD
77	W	THROTTLE POSITION SENSOR 2
78	B	SENSOR GROUND
79	G	THROTTLE POSITION SENSOR 1
80	R	SENSOR POWER SUPPLY
83	L	INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR

84	V	SENSOR POWER SUPPLY
85	G	LIN COMMUNICATION LINE
86	Y	IGNITION SIGNAL NO. 1
87	BR	IGNITION SIGNAL NO. 2
89	P	ECM RELAY (SELF SHUT-OFF)
90	W	IGNITION SIGNAL NO. 3
91	SB	IGNITION SIGNAL NO. 4
92	L	SENSOR GROUND
93	L	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
94	BR	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE

Connector No.	F72
Connector Name	POWER INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	NS16FW-CS



71	70			67	66	65
	79	78		76	75	73
						72

Terminal No.	Color Of Wire	Signal Name [Specification]
65	P	-
66	L	- [With R9M Engine]
66	R	- [With MR20 or QR25 Engine]
67	V	-
70	BG	- [With CVT]
70	GR	- [With MT]
71	SB	-
72	GR	-
73	R	- [With R9M Engine]
73	Y	- [With MR20 or QR25 Engine]
75	BR	- [With MR20 or QR25 Engine]
75	L	- [With R9M Engine]
76	P	-
78	L	- [With QR25 engine]
78	R	- [With R9M Engine]
79	G	-

ENGINE CONTROL SYSTEM (QR ENGINE)

Connector No.	F73
Connector Name	POWER INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	YLAGEFY



Terminal No.	Color	Wire	Signal Name [Specification]
81	G	-	-
83	L	-	-
84	GR	-	-
85	P	-	-
86	LG	-	-

Connector No.	F74
Connector Name	POWER INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	TH24FB-NH



Terminal No.	Color	Wire	Signal Name [Specification]
87	L	-	-
88	P	-	-
89	W	-	-
90	R	-	-
92	GR	-	-
93	G	-	- [With R9M Engine]
93	P	-	- [With MR20 or QR25 Engine]
94	SB	-	-
95	LG	-	-
96	W	-	-
97	P	-	-
97	Y	-	-
98	Y	-	-
99	BG	-	-
100	LG	-	-
101	V	-	-

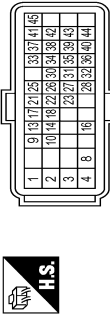
102	Y	-	-
105	W	-	-
106	BR	-	-
107	V	-	-
110	SB	-	-

Connector No.	F80
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Type	EDZFGY-RS



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

Connector No.	F85
Connector Name	EOM
Connector Type	RH40FB-R28-R-LH



Terminal No.	Color	Wire	Signal Name [Specification]
1	G	-	THROTTLE CONTROL MOTOR (CLOSE)
2	GR	-	THROTTLE CONTROL MOTOR POWER SUPPLY
3	L	-	THROTTLE CONTROL MOTOR (OPEN)
4	W	-	-
8	SHIELD	-	-
9	Y	-	FUEL INJECTOR NO. 4
10	P	-	FUEL INJECTOR NO. 3
13	L	-	FUEL INJECTOR NO. 1
14	G	-	FUEL INJECTOR NO. 2
16	BR	-	EOM GROUND
17	BG	-	EOM GROUND

18	P	-	FUEL PUMP RELAY
21	V	-	THROTTLE CONTROL MOTOR RELAY
22	Y	-	HEATED OXYGEN SENSOR 2
23	B	-	SENSOR GROUND
25	P	-	ENGINE OIL TEMPERATURE SENSOR
26	BR	-	SENSOR GROUND
27	L	-	SENSOR GROUND
28	G	-	ENGINE COOLANT TEMPERATURE SENSOR
30	R	-	SENSOR GROUND
31	W	-	CAMSHAFT POSITION SENSOR (PHASE)
32	B	-	SENSOR POWER SUPPLY
33	V	-	INTAKE AIR TEMPERATURE SENSOR
34	GR	-	SENSOR GROUND
35	BR	-	MASS AIR FLOW SENSOR
36	L	-	SENSOR POWER SUPPLY
37	SHIELD	-	-
38	SB	-	SENSOR GROUND
39	P	-	ENGINE OIL PRESSURE SENSOR
40	W	-	SENSOR POWER SUPPLY
41	Y	-	AIR SENSOR 1
42	B	-	SENSOR GROUND
43	LG	-	EXHAUST VALVE TIMING CONTROL POSITION SENSOR
44	Y	-	SENSOR POWER SUPPLY
45	G	-	AIR SENSOR 1

Connector No.	F103
Connector Name	INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR
Connector Type	RH40FB



Terminal No.	Color	Wire	Signal Name [Specification]
1	V	-	VCC
2	L	-	-
3	LG	-	-

Connector No.	F104
Connector Name	EXHAUST VALVE TIMING CONTROL POSITION SENSOR
Connector Type	RH40FB



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

Connector No.	F105
Connector Name	CAMSHAFT POSITION SENSOR
Connector Type	RH40FB



Terminal No.	Color	Wire	Signal Name [Specification]
1	B	-	- [With QR25 engine]
1	G	-	- [With MR20 engine]
2	R	-	-
3	W	-	-

ENGINE CONTROL SYSTEM (QR ENGINE)

Connector No.	F106
Connector Name	ENGINE OIL PRESSURE SENSOR
Connector Type	RHD3FB



Connector No.	F108
Connector Name	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
Connector Type	EO2FG-RS-LGY



Connector No.	F110
Connector Name	MASS AIR FLOW SENSOR
Connector Type	RHD4FB



Connector No.	F112
Connector Name	ENGINE OIL TEMPERATURE SENSOR
Connector Type	EO2FGY-RS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	- [With MR20 engine]
1	SB	- [With QR25 engine]
2	GR	- [With MR20 engine]
2	P	- [With QR25 engine]
3	W	- [With QR25 engine]
3	Y	- [With MR20 engine]

Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	BATT
2	L	C/U

Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	VCC
2	GR	GND
3	BR	AFM OUT
4	V	TA OUT

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

Connector No.	F107
Connector Name	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE
Connector Type	EO2FG-RS-LGY



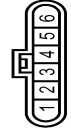
Connector No.	F109
Connector Name	INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR
Connector Type	RHD2FB



Connector No.	F111
Connector Name	INTERMEDIATE LOCK CONTROL SOLENOID VALVE
Connector Type	EO2FG-RS-LGY



Connector No.	F113
Connector Name	ELECTRIC THROTTLE CONTROL ACTUATOR
Connector Type	HS06FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	VALVE OPEN
2	G	VALVE CLOSE

Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	VALVE OPEN
2	G	VALVE CLOSE

Terminal No.	Color Of Wire	Signal Name [Specification]
1	V	BATT
2	GR	C/U

Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	TPS1 OUTPUT
2	R	POWER
3	W	TPS2 OUTPUT
4	B	GND A2
5	G	MOTOR 2
6	L	MOTOR 1

ENGINE CONTROL SYSTEM (QR ENGINE)

Connector No.	F121
Connector Name	WIRE TO WIRE
Connector Type	NS16FBRCS



7	6	5	4	3	2	1
16	15	14	13	12	11	10
9	8	7	6	5	4	3
2	1	0	9	8	7	6

Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	- [With MR20 or QR25 engine]
1	P	- [With R3M engine]
2	BR	- [With QR25 engine]
2	GR	- [With MR20 engine]
2	Y	- [With R3M engine]
3	G	-
4	BG	-
5	B	- [With MR20 engine]
5	L	- [With R3M engine]
5	LG	- [With QR25 engine]
6	V	-
7	G	-
8	V	- [With MR20 engine or R3M engine]
8	W	- [With QR25 engine]
9	B	- [With MR20 engine]
9	W	- [With R3M engine]
10	BR	-
11	P	- [Without ISS]
11	R	- [With ISS]
12	G	- [With QR25 engine]
12	L	- [With R3M engine]
13	R	- [With R3M engine]
13	Y	- [With MR20 or QR25 engine]
15	L	-
16	LG	-

Connector No.	F213
Connector Name	CONDENSER
Connector Type	IM02FW-LC



1	2

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

Connector No.	F214
Connector Name	WIRE TO WIRE
Connector Type	TH10MW-NH



1	2	3	4	5
6	7	8	9	10

Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	R	-
3	B	-
4	P	-
5	GR	-
6	BG	-
7	B	-
8	BR	-
9	B	-
10	B	-

Connector No.	F215
Connector Name	WIRE TO WIRE
Connector Type	TH10FW-NH



5	4	3	2	1
10	9	8	7	6

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

Connector No.	M2
Connector Name	FUSE BLOCK (JIB)
Connector Type	NS16FBRCS



7	6	5	4	3	2	1
10	9	8	7	6	5	4
3	2	1	0	9	8	7
6	5	4	3	2	1	0

Terminal No.	Color Of Wire	Signal Name [Specification]
10B	GR	- [With MR20 engine or R3M engine]
10B	LA/GR	- [With QR25 Engine]
12B	BR	-
14B	W	-
15B	W	-
16B	GR	-
1B	G	-
2B	R	-
3B	V	-
6B	LAL	-

7B	LAV

Connector No.	M3
Connector Name	FUSE BLOCK (JIB)
Connector Type	NS16FW-CS



7	6	5	4	3	2	1
10	9	8	7	6	5	4
3	2	1	0	9	8	7
6	5	4	3	2	1	0

Terminal No.	Color Of Wire	Signal Name [Specification]
10C	LG	-
13C	LAG	-
14C	R	-
15C	L	-
16C	LAV	-
1C	R	-
2C	G	-
3C	Y	-
4C	LG	-
5C	GR	-
6C	LA/R	-
7C	Y	-
8C	BR	- [With ISS]
8C	LABR	- [Without ISS]
9C	L	-

Connector No.	M4
Connector Name	DATA LINK CONNECTOR
Connector Type	BD16FW

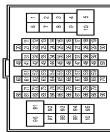


11	14	15	16
3	4	5	6
8	7	6	5
1	2	3	4

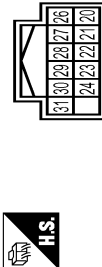
ENGINE CONTROL SYSTEM (QR ENGINE)

Terminal No.	Color Of Wire	Signal Name [Specification]
3	LG	-
4	B	-
5	B	-
6	L	-
8	Y	-
11	SB	-
14	P	-
15	BR	-
16	W	-

Connector No.	M11
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-CS16-TM4

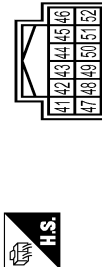


Connector No.	M33
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Type	TH12FW-AH



Terminal No.	Color Of Wire	Signal Name [Specification]
20	P	CRUISE CTRL
21	V	SPEED LIMIT
22	G	IGN
23	L	-
24	GR	-
26	BR	-
27	LAV	-
28	LAVBR	-
29	Y	-
30	B	-
31	R	-

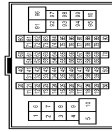
Connector No.	M42
Connector Name	COMBINATION METER
Connector Type	TH12FW-AH



Terminal No.	Color Of Wire	Signal Name [Specification]
41	L	CANH
42	P	-
43	W	ILLUMINATION CONTROL SIGNAL
44	LAV	FUEL LEVEL SENSOR GROUND
45	LAV	BATTERY POWER SUPPLY
46	LAVBR	IGNITION SIGNAL (Without ISS)
47	V	IGNITION SIGNAL (With ISS)
48	SB	AV COMMUNICATION SIGNAL (V)
48	LG	AV COMMUNICATION SIGNAL (L)

49	Y	OIL LEVEL SENSOR SIGNAL
50	BG	OIL LEVEL SENSOR GROUND
51	LAL	FUEL LEVEL SENSOR SIGNAL
52	B	GROUND

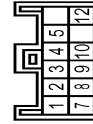
Connector No.	M77
Connector Name	WIRE TO WIRE
Connector Type	TH80MW-CS16-TM4



Terminal No.	Color Of Wire	Signal Name [Specification]
2	LAV	-
5	V	- [Without ISS]
5	W	- [With ISS]
8	G	-
9	Y	-
10	R	-
20	W	-
21	B	-
22	SHIELD	-
31	V	-
32	GR	-
33	G	-
34	LG	-
35	BG	-
36	LG	-
37	V	-
38	G	-
39	BR	-
40	L	-
41	P	-
47	Y	-
48	BG	-
51	GR	-
52	SB	-
53	R	-
54	LAL	-
55	BR	-
56	P	-
57	B	-
58	L	-

59	W	-
60	LAV	-
61	P	-
62	V	-
63	LAVBR	-
64	Y	-
65	GR	-
66	BG	-
67	L	-
68	R	-
71	V	-
72	L	-
73	Y	-
76	L	-
77	V	-
78	LG	-
79	SHIELD	-
80	L	- [With ISS]
80	LAL	- [Without ISS]
82	GR	-
83	G	-
84	SB	-
85	G	-
86	G	-
87	B	-
88	B	-
91	L	-
92	W	-
93	W	-
96	LG	-
97	BR	-
98	V	-
99	R	-

Connector No.	M303
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Type	TH12FW-AH



- A
- EC
- C
- D
- E
- F
- G
- H
- I
- J
- K
- L
- M
- N
- O
- P

ENGINE CONTROL SYSTEM (QR ENGINE)

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

JRBWC7617GB

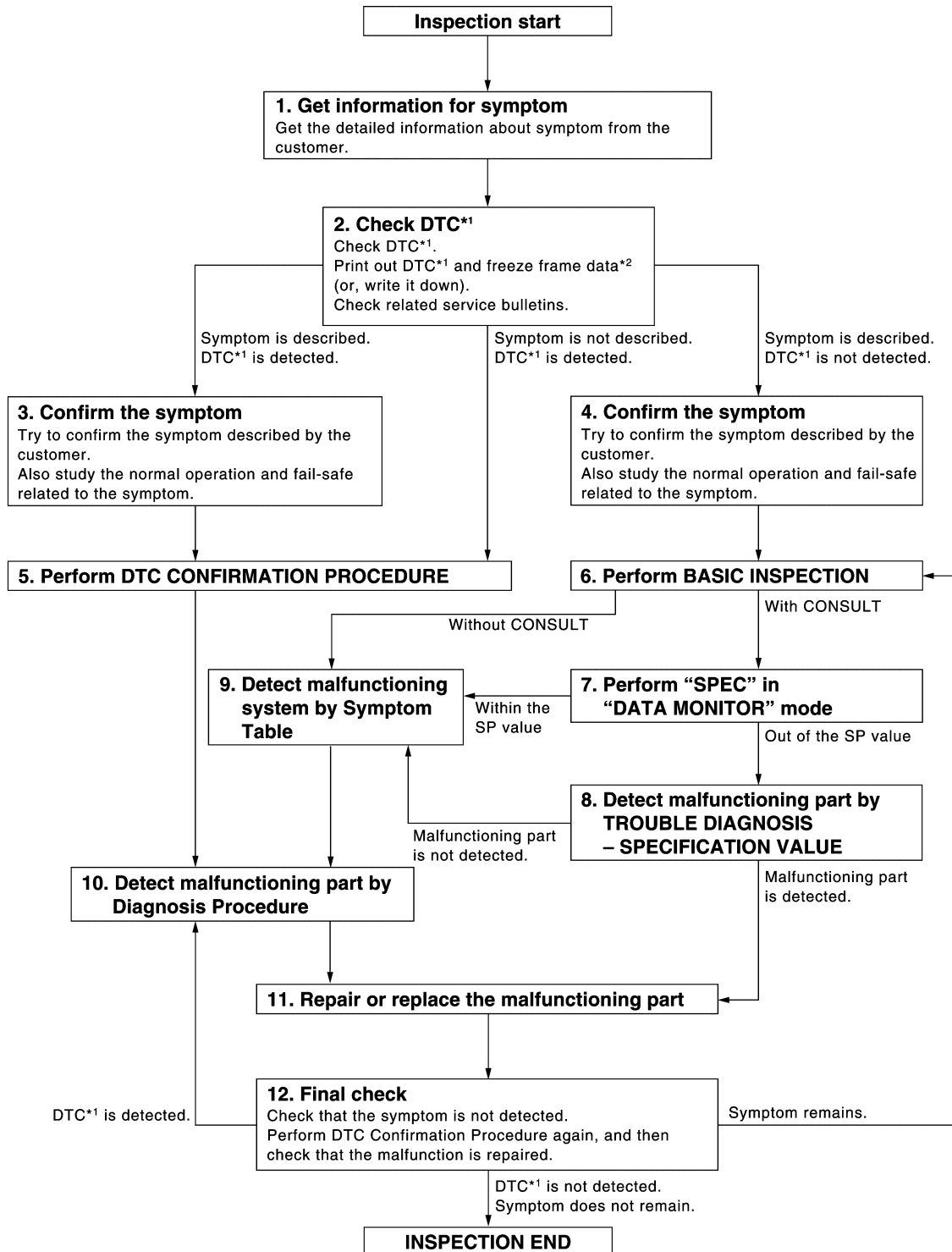
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:000000010986268

OVERALL SEQUENCE



*1: Include 1st trip DTC.

*2: Include 1st trip freeze frame data.

JSBIA1228GB

DETAILED FLOW

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

[QR25DE]

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-544, "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 or GST.)
 - Erase only DTC of "ENGINE".
 - Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Matrix Chart is useful. Refer to [EC-796, "Symptom Table"](#).)
3. Check related service bulletins for information.

Are any symptoms described and any DTCs detected?

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

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

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

3.CONFIRM THE SYMPTOM

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

Also study the normal operation and fail-safe related to the symptom. Refer to [EC-801, "Description"](#) and [EC-513, "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-801, "Description"](#) and [EC-513, "Fail Safe"](#).

Diagnosis Work Sheet is useful to verify the incident.

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

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then check that DTC is detected again.

If two or more DTCs are detected, refer to [EC-515, "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-44, "Intermittent Incident"](#).

6.PERFORM BASIC INSPECTION

Perform [EC-546, "Work Procedure"](#).

Do you have CONSULT?

< BASIC INSPECTION >

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

7. PERFORM SPEC IN DATA MONITOR MODE

 With CONSULT

Check that "MASS AIR FLOW SENSOR (Hz)", "B/FUEL SCHDL", and "A/F ALPHA-B1" are within the SP value using "SPEC" in "DATA MONITOR" mode with CONSULT. Refer to [EC-565, "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-566, "Diagnosis Procedure"](#).

Is a malfunctioning part detected?

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

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to [EC-796, "Symptom Table"](#) based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptoms.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

NOTE:

The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure. For details, refer to [GI-46, "Circuit Inspection"](#).

Is a malfunctioning part detected?

- YES >> GO TO 11.
NO >> Monitor input data from related sensors or check voltage of related ECM terminals using CONSULT. Refer to [EC-501, "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 check that the malfunction have been completely repaired.

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

Is DTC detected and does symptom remain?

- YES-1 >> DTC is detected: GO TO 10.
YES-2 >> Symptom remains: GO TO 6.
NO >> No request for I/M examination from the customer: Before returning the vehicle to the customer, always erase unnecessary DTC in ECM. If the completion of SRT is needed, drive vehicle under the specific driving pattern. Refer to [EC-561, "SRT Set Driving Pattern"](#).

Diagnostic Work Sheet

INFOID:0000000010986269

DESCRIPTION

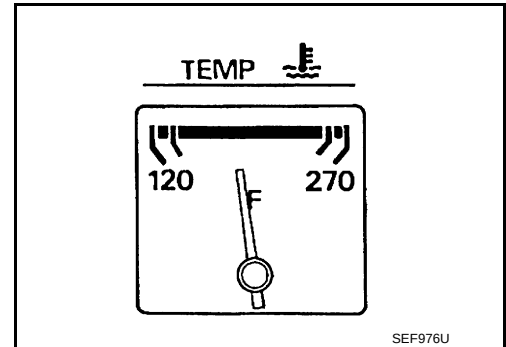
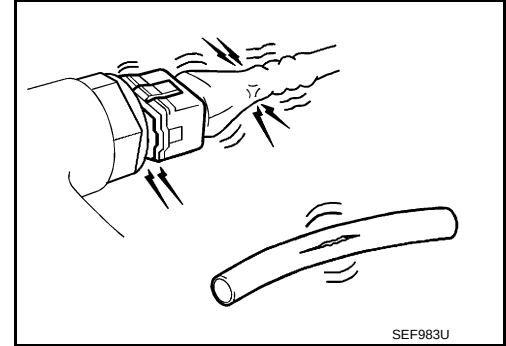
BASIC INSPECTION

Work Procedure

INFOID:000000010986270

1.INSPECTION START

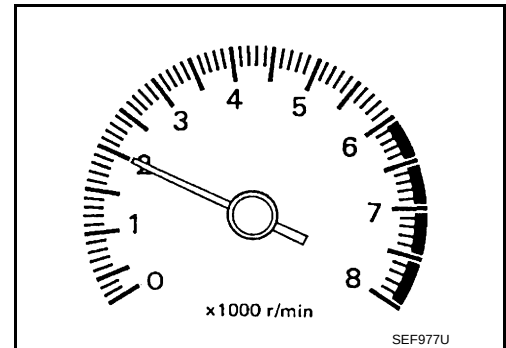
1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
 - Harness connectors for improper connections
 - Wiring harness for improper connections, pinches and cut
 - Vacuum hoses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



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

Is any DTC detected?

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



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.

BASIC INSPECTION

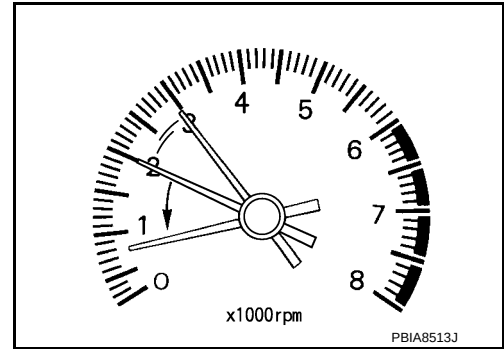
[QR25DE]

< BASIC INSPECTION >

- 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.
- Check idle speed.
For procedure, refer to [EC-802, "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

- Stop engine.
- Perform [EC-553, "Work Procedure"](#).

>> GO TO 5.

5.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC-554, "Work Procedure"](#).

>> GO TO 6.

6.PERFORM IDLE AIR VOLUME LEARNING

Perform [EC-555, "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

- Start engine and warm it up to normal operating temperature.
- Check idle speed.
For procedure, refer to [EC-802, "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-679, "DTC Description"](#).
- Check crankshaft position sensor (POS) and circuit. Refer to [EC-676, "DTC Description"](#).

Is the inspection result normal?

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

9.CHECK ECM FUNCTION

- Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
- Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to [SEC-100, "ECM : Work Procedure"](#) (With intelligent key system) or [SEC-262, "ECM : Work Procedure"](#) (Without intelligent key system).

>> GO TO 4.

10.CHECK IGNITION TIMING

- Run engine at idle.

BASIC INSPECTION

[QR25DE]

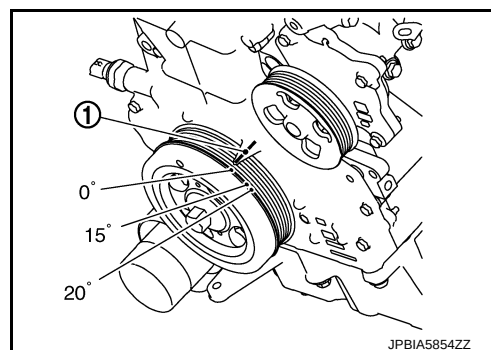
< BASIC INSPECTION >

2. Check ignition timing with a timing light.
For procedure, refer to [EC-803, "Inspection"](#).
For specification, refer to [EC-807, "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-553, "Work Procedure"](#).

>> GO TO 12.

12.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC-554, "Work Procedure"](#).

>> GO TO 13.

13.PERFORM IDLE AIR VOLUME LEARNING

Perform [EC-555, "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-802, "Inspection"](#).
For specification, refer to [EC-807, "Idle Speed"](#).

Is the inspection result normal?

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

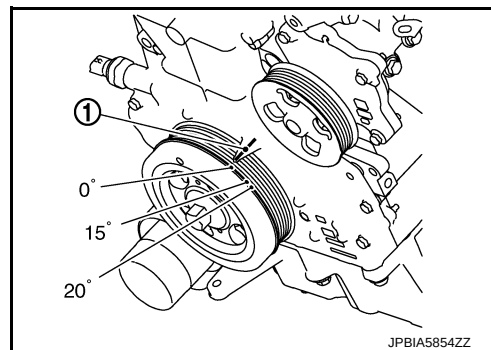
15.CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.
For procedure, refer to [EC-803, "Inspection"](#).
For specification, refer to [EC-807, "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-211, "Removal and Installation"](#).

Is the inspection result normal?

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

17.DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to [EC-679, "DTC Description"](#).
- Check crankshaft position sensor (POS) and circuit. Refer to [EC-676, "DTC Description"](#).

Is the inspection result normal?

YES >> GO TO 18.

NO >> Repair or replace. Then GO TO 4

18.CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to [SEC-262, "ECM : Work Procedure"](#) (With intelligent key system) or [SEC-100, "ECM : Work Procedure"](#) (Without intelligent key system).

>> GO TO 4.

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

ADDITIONAL SERVICE WHEN REPLACING ECM

Description

INFOID:0000000010986271

When replacing ECM, the following procedure must be performed. (For details, refer to [EC-550, "Work Procedure."](#))

PROGRAMMING OPERATION

NOTE:

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

Work Procedure

INFOID:0000000010986272

1. SAVE ECM DATA

Ⓟ With CONSULT

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

NOTE:

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

>> GO TO 2.

2. CHECK ECM PART NUMBER

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

NOTE:

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

Is the ECM a blank ECM?

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

3. SAVE ECM PART NUMBER

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

NOTE:

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

>> GO TO 4.

4. PERFORM ECM PROGRAMMING

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

NOTE:

- Refer to [EC-806, "Removal and Installation"](#) for replacement of ECM.
- During programming, maintain the following conditions:
 - Ignition switch: ON
 - Electric load: OFF
 - Brake pedal: Not depressed
 - Battery voltage: 12 – 13.5 V (Be sure to check the value of battery voltage by selecting "BATTERY VOLT" in "Data monitor" of CONSULT.)

>> GO TO 6.

5. REPLACE ECM

ADDITIONAL SERVICE WHEN REPLACING ECM

< BASIC INSPECTION >

[QR25DE]

Replace ECM. Refer to [EC-806, "Removal and Installation"](#).

>> GO TO 6.

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

Refer to [SEC-100, "ECM : Work Procedure"](#) (with intelligent key system) or [SEC-262, "ECM : Work Procedure"](#) (without intelligent key system).

>> GO TO 7.

7. CHECK ECM DATA STATUS

Check if the data is successfully copied from the ECM at Step 1 (before replacement) and saved in CONSULT.
Is the data saved successfully?

YES >> GO TO 8.

NO >> GO TO 9.

8. WRITE ECM DATA

 With CONSULT

1. Select "WRITING DATA FOR REPLC CPU" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.

2. Follow the instruction of CONSULT display.

NOTE:

The data saved by "SAVING DATA FOR REPLC CPU" is written to ECM.

>> GO TO 10.

9. PERFORM VIN REGISTRATION

Refer to [EC-552, "Work Procedure"](#).

>> GO TO 10.

10. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Perform Accelerator Pedal Released Position Learning. Refer to [EC-553, "Work Procedure"](#).

>> GO TO 11.

11. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform Throttle Valve Closed Position Learning. Refer to [EC-554, "Work Procedure"](#).

>> GO TO 12.

12. PERFORM IDLE AIR VOLUME LEARNING

Perform Idle Air Volume Learning. Refer to [EC-555, "Work Procedure"](#).

>> END

VIN REGISTRATION

Description

INFOID:0000000010986273

VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced.

Work Procedure

INFOID:0000000010986274

1. CHECK VIN

Check the VIN of the vehicle and note it. Refer to [GI-38, "Information About Identification or Model Code"](#).

>> GO TO 2.

2. PERFORM VIN REGISTRATION

ⓘ With CONSULT

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

>> END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

< BASIC INSPECTION >

[QR25DE]

ACCELERATOR PEDAL RELEASED POSITION LEARNING

Description

INFOID:0000000010986275

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:0000000010986276

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

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EC

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THROTTLE VALVE CLOSED POSITION LEARNING

Description

INFOID:000000010986277

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:000000010986278

1.START

Ⓐ With CONSULT

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

Ⓑ Without CONSULT

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

>> END

IDLE AIR VOLUME LEARNING

Description

INFOID:000000010986279

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:000000010986280

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
- 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

- ☐ With CONSULT

Drive vehicle until "ATF TENP SEN" in "DATA MONITOR" mode of "CVT" system indicates less than 0.9 V.

- ☒ Without CONSULT

Drive vehicle for 10 minutes.

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2. IDLE AIR VOLUME LEARNING

☐ With CONSULT

1. Perform Accelerator Pedal Released Position Learning. Refer to [EC-553, "Work Procedure"](#).
2. Perform Throttle Valve Closed Position Learning. Refer to [EC-554, "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 screen?

YES >> GO TO 4.

NO >> GO TO 5.

3. IDLE AIR VOLUME LEARNING

☒ Without CONSULT

NOTE:

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

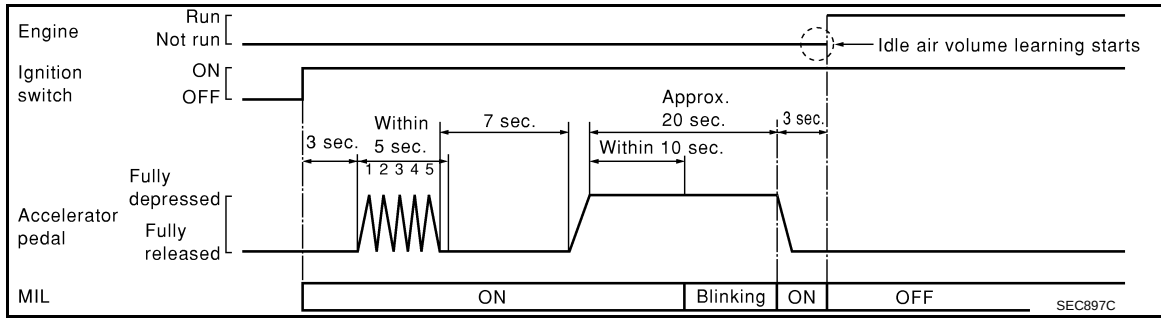
1. Perform Accelerator Pedal Released Position Learning. Refer to [EC-553, "Work Procedure"](#).
2. Perform Throttle Valve Closed Position Learning. Refer to [EC-554, "Work Procedure"](#).
3. Start engine and warm it up to normal operating temperature.
4. Turn ignition switch OFF and wait at least 10 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.

IDLE AIR VOLUME LEARNING

[QR25DE]

< BASIC INSPECTION >

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-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-565, "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

< BASIC INSPECTION >

[QR25DE]

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

Description

INFOID:000000010986281

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

Work Procedure

INFOID:000000010986282

1.START

With CONSULT

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

With GST

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

>> END

FUEL PRESSURE

Work Procedure

INFOID:000000010986283

FUEL PRESSURE RELEASE

1. FUEL PRESSURE RELEASE

① With CONSULT

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

② Without CONSULT

1. Remove fuel pump fuse located in IPDM E/R. For the fuse number, refer to [EC-527, "Wiring Diagram"](#). For the fuse arrangement, refer to [PG-89, "Fuse, Connector and Terminal Arrangement"](#).
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.

>> END

FUEL PRESSURE CHECK

CAUTION:

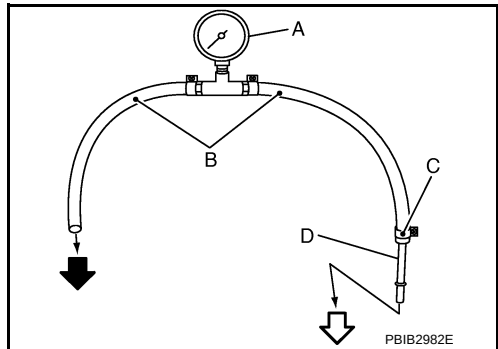
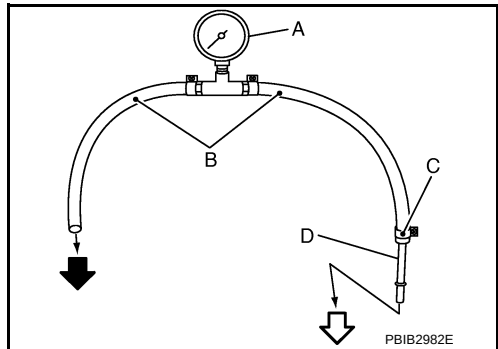
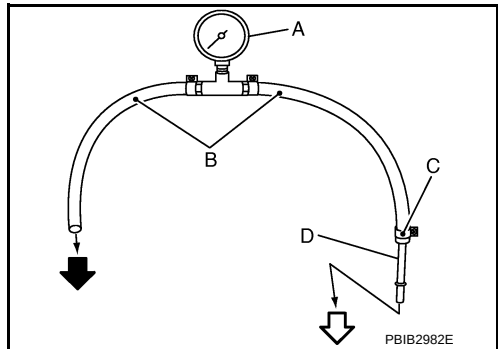
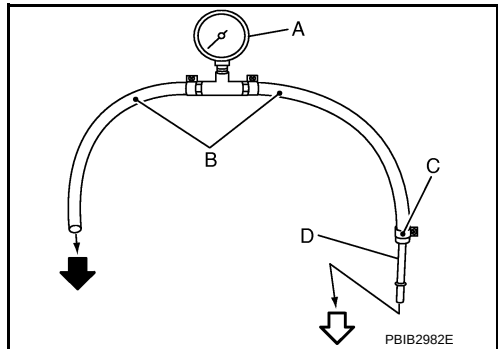
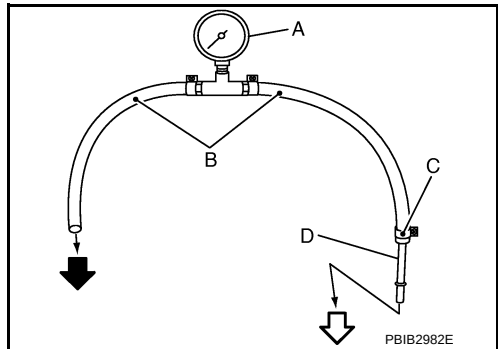
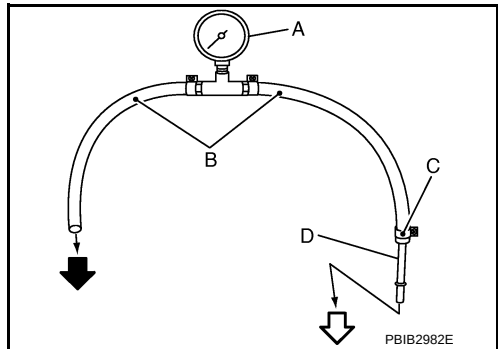
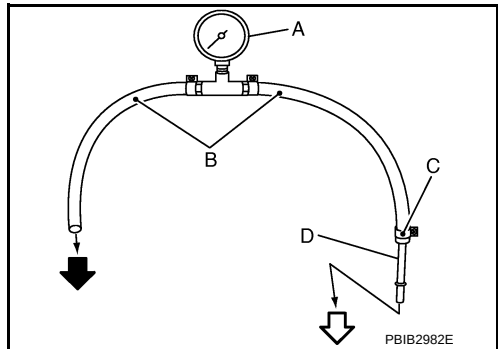
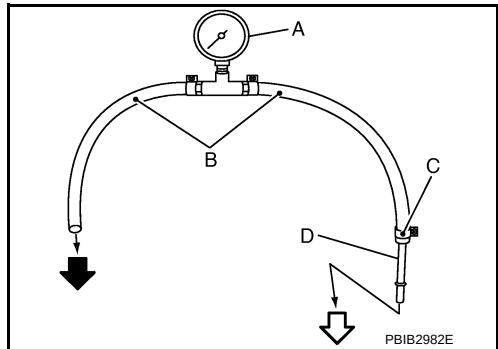
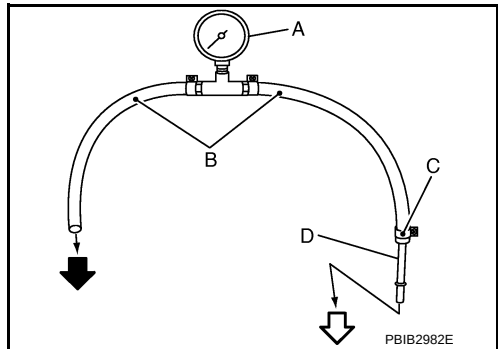
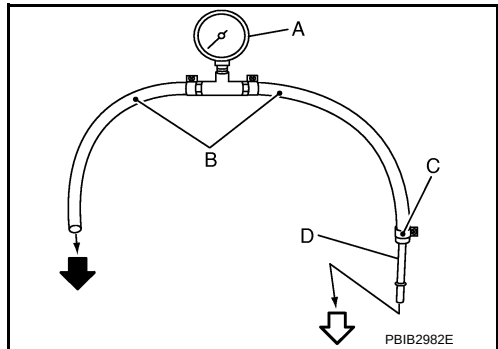
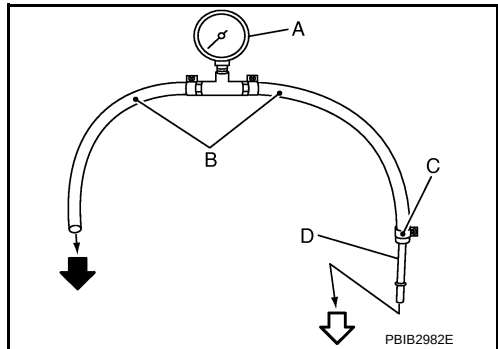
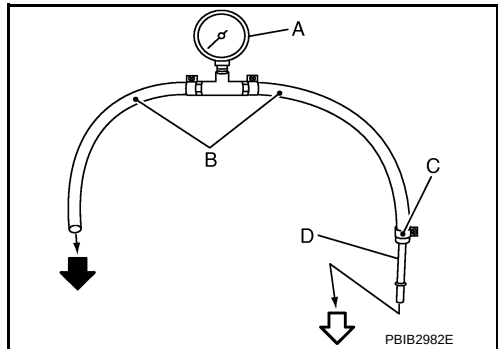
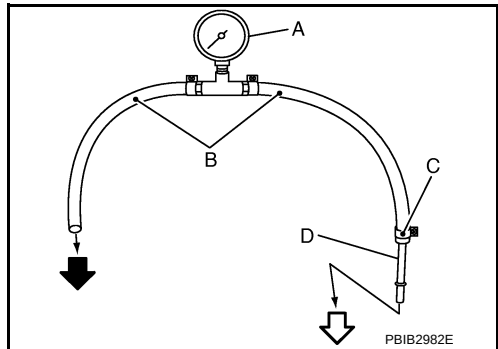
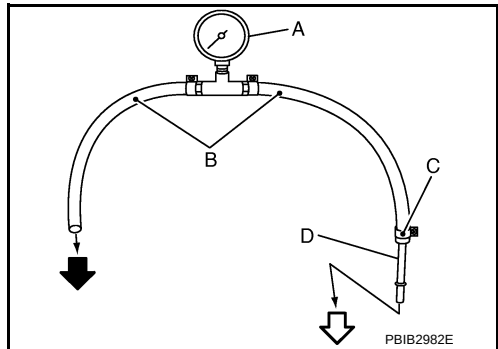
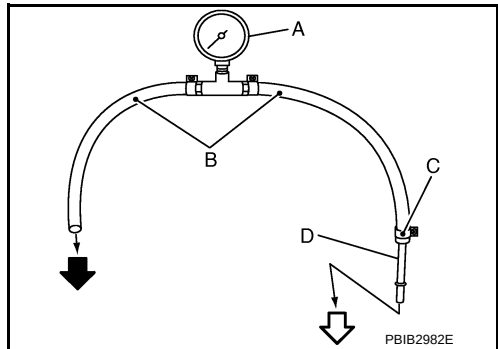
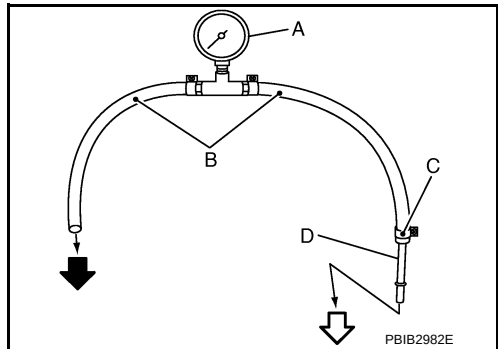
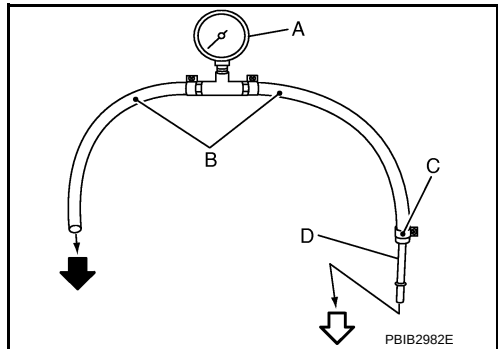
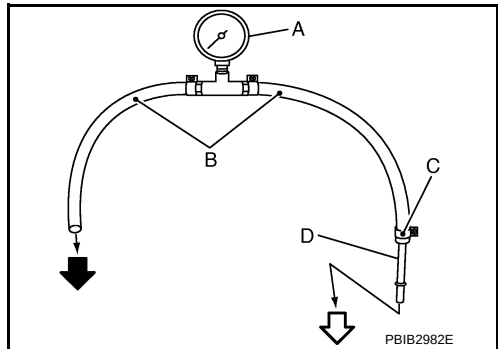
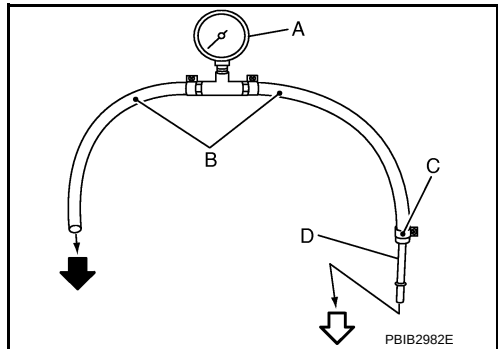
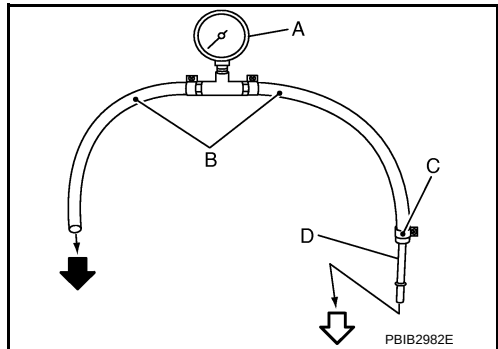
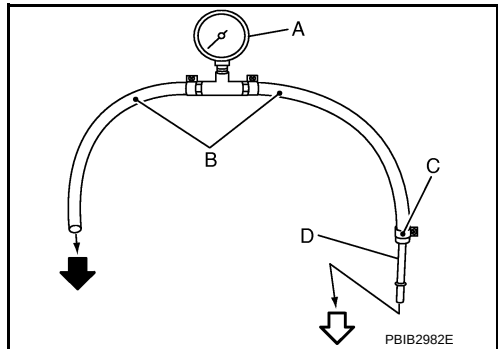
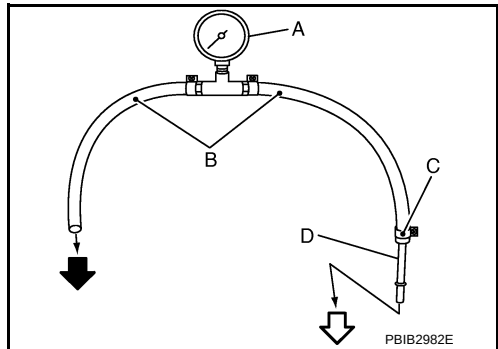
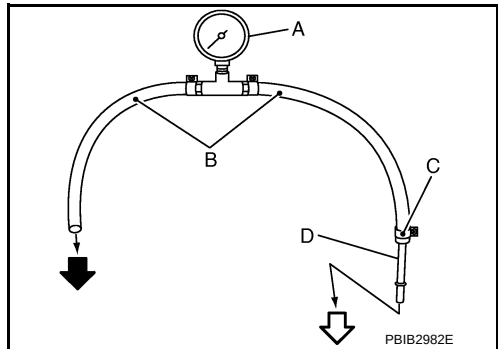
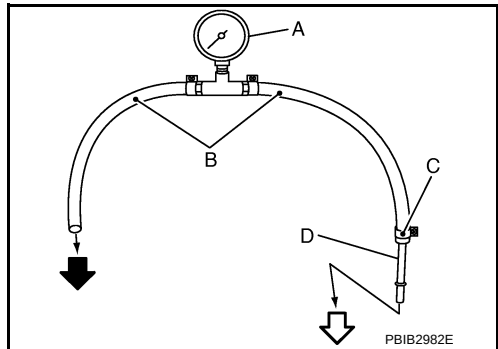
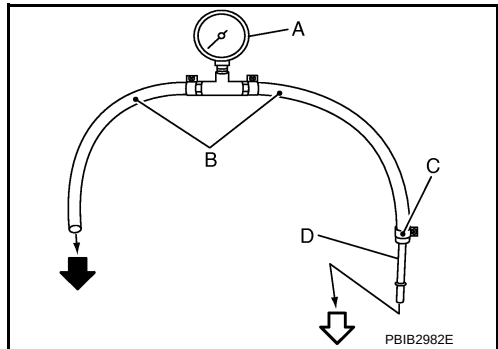
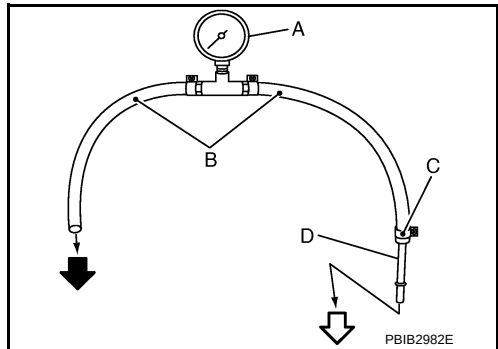
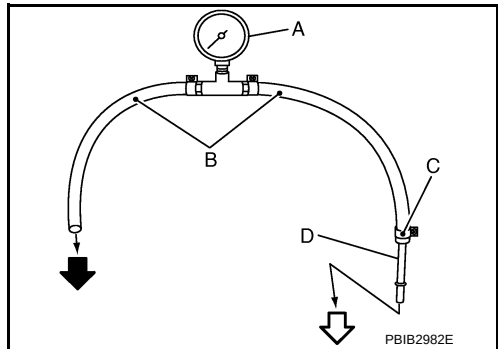
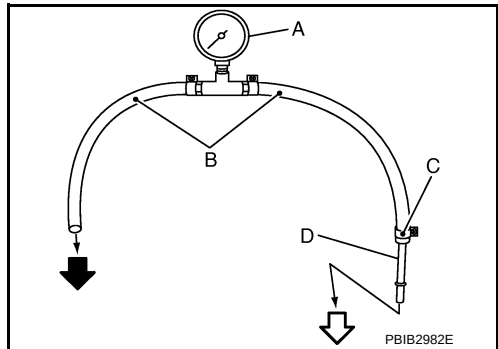
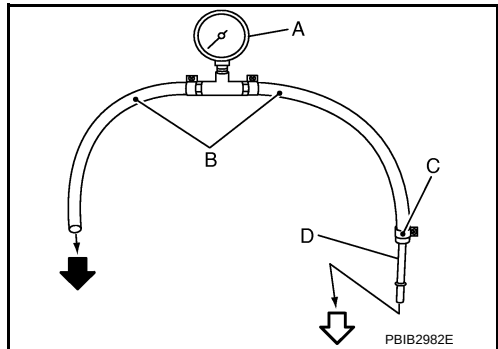
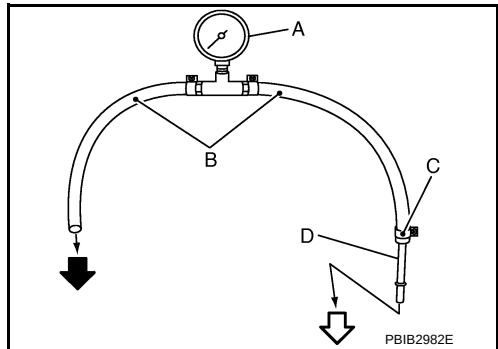
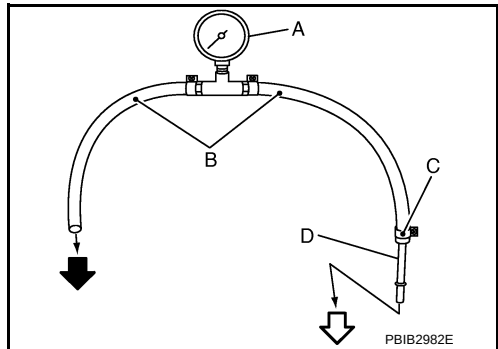
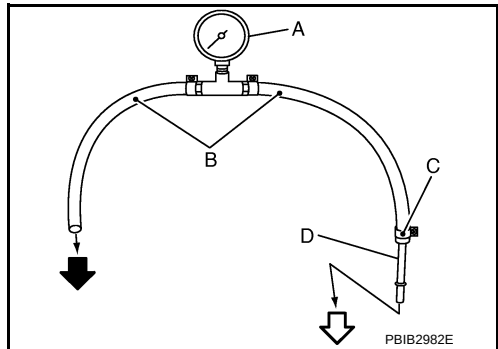
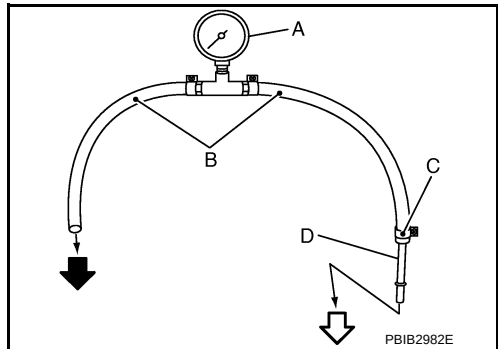
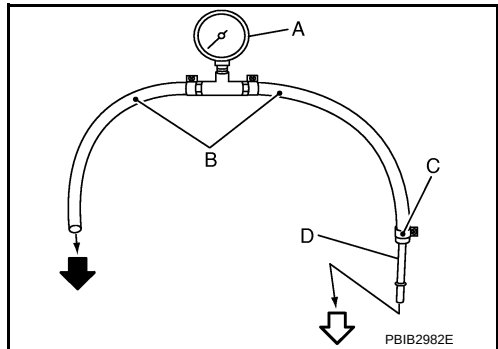
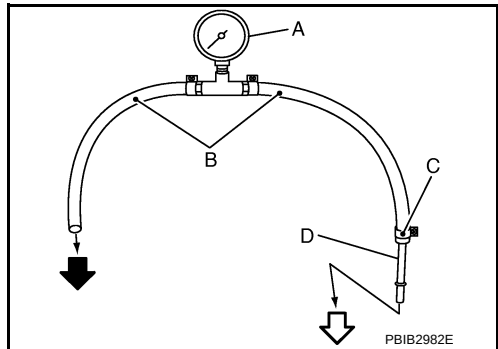
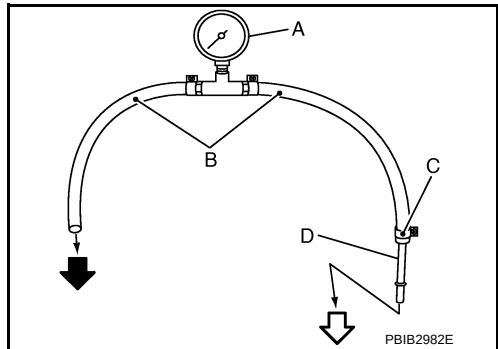
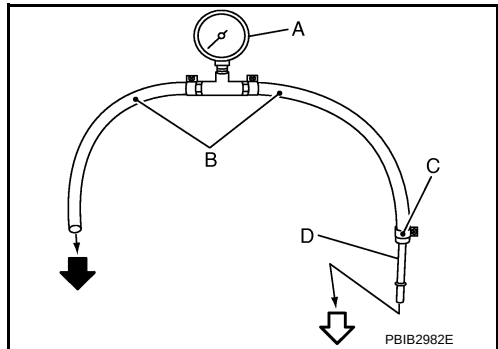
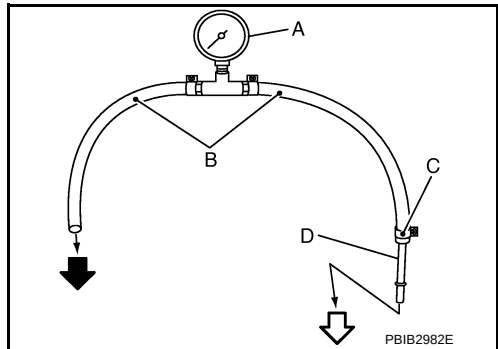
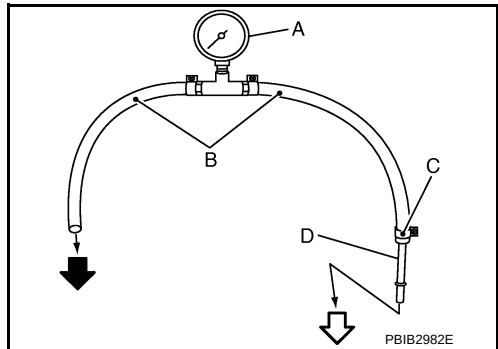
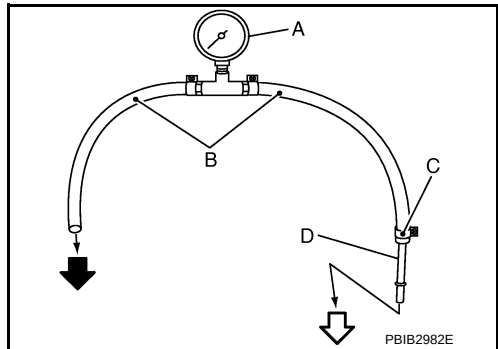
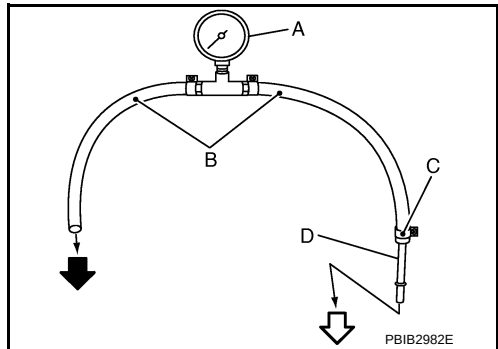
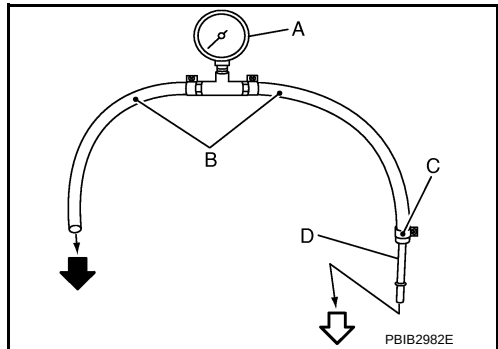
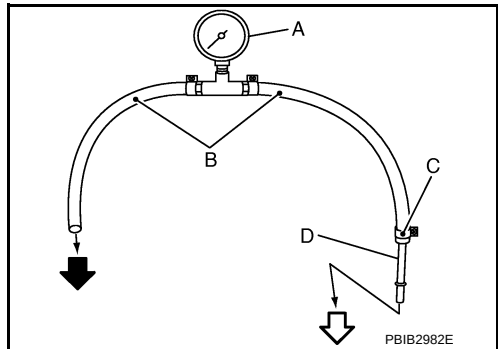
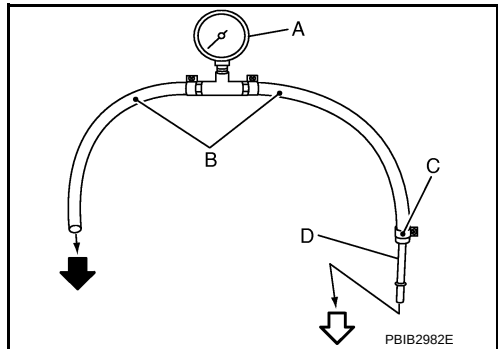
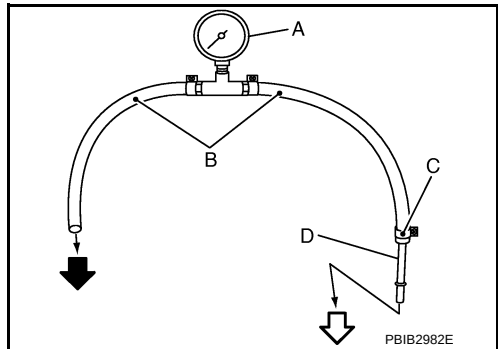
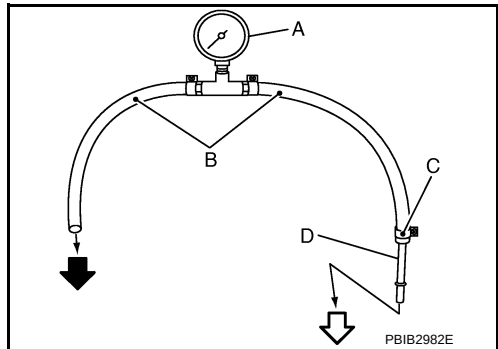
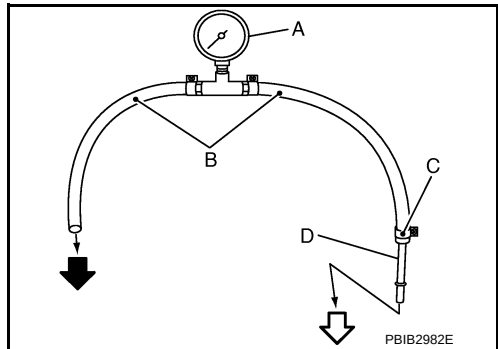
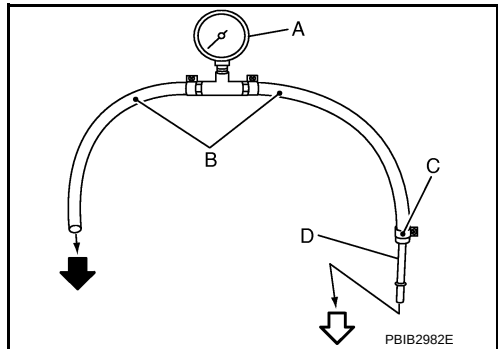
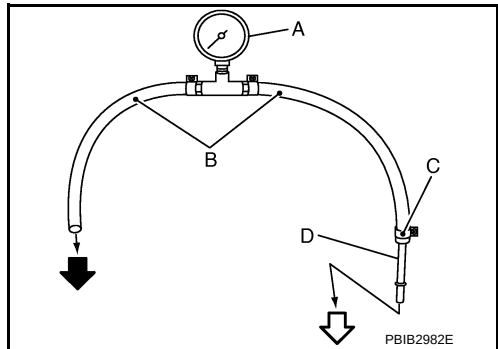
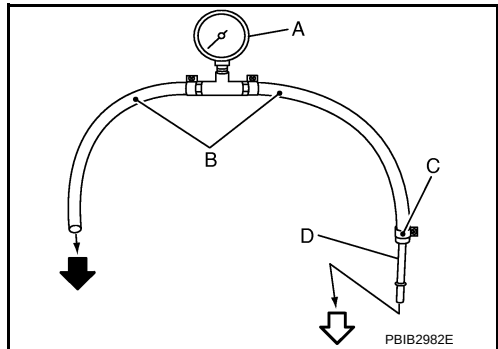
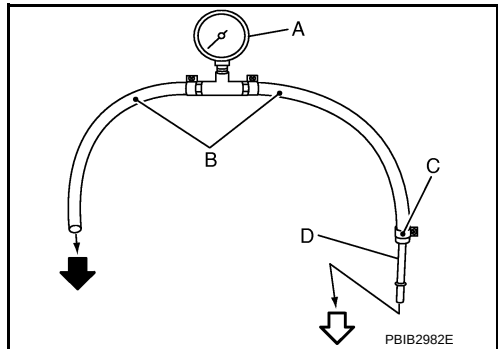
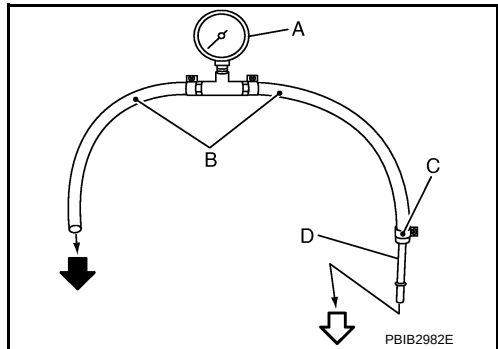
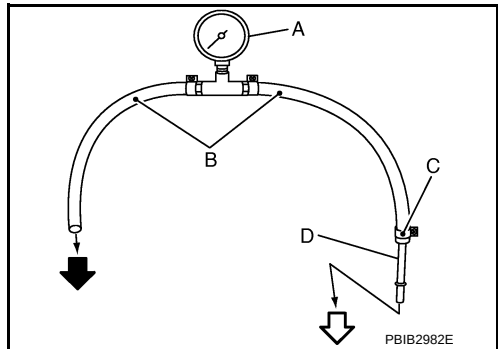
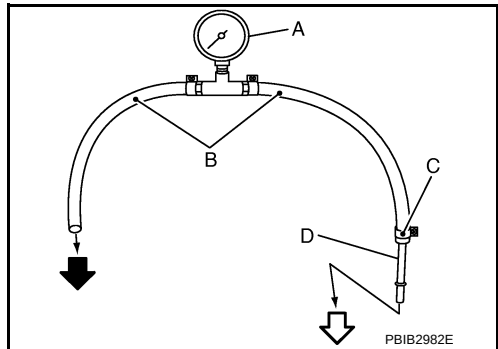
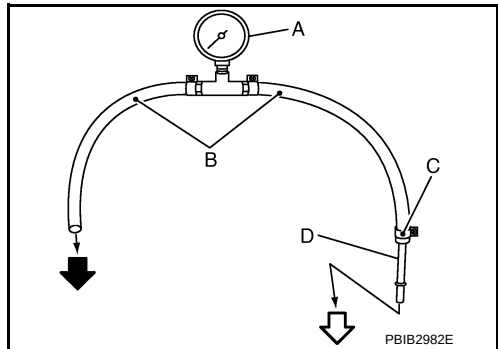
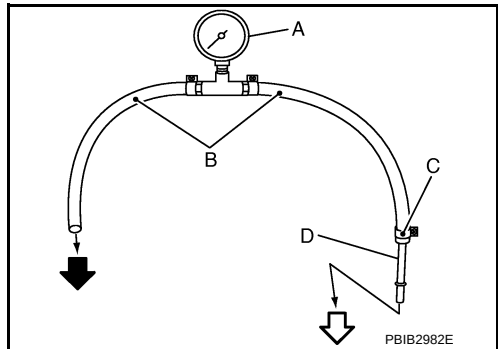
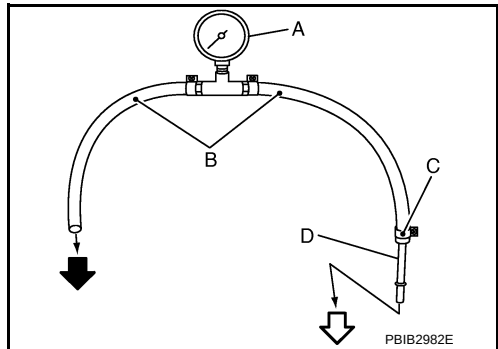
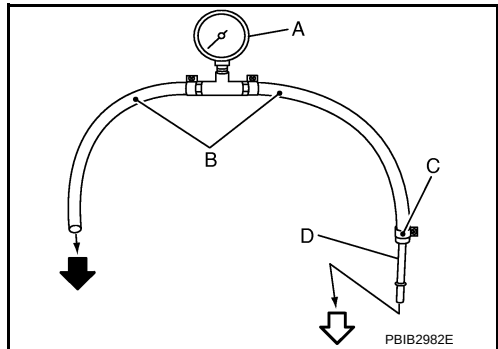
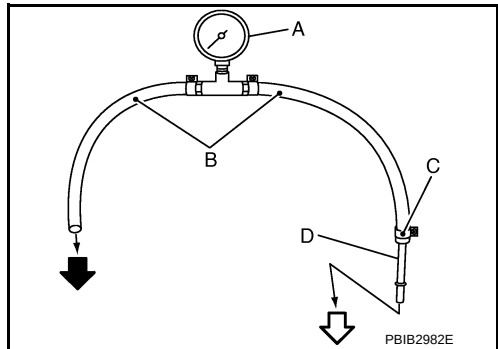
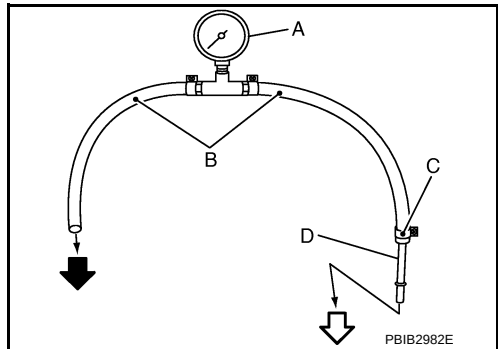
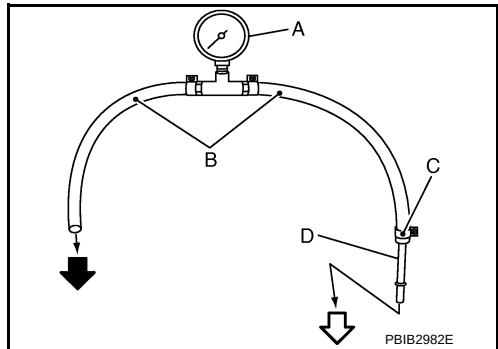
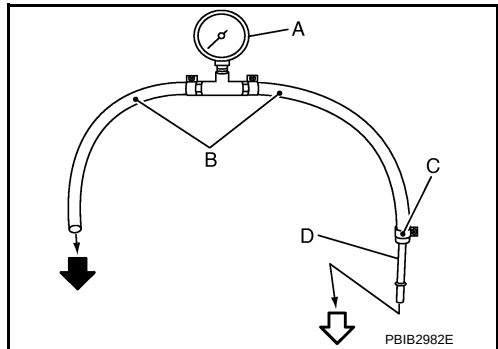
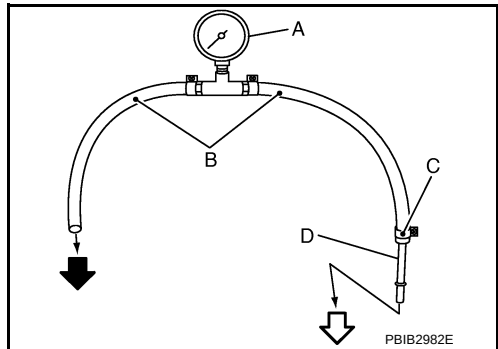
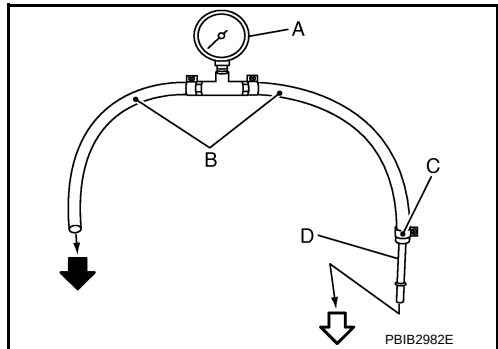
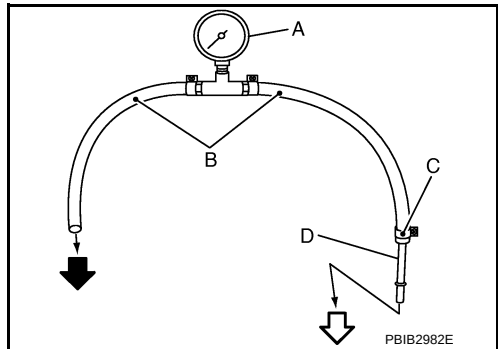
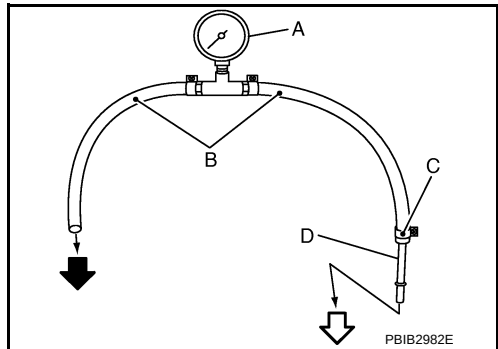
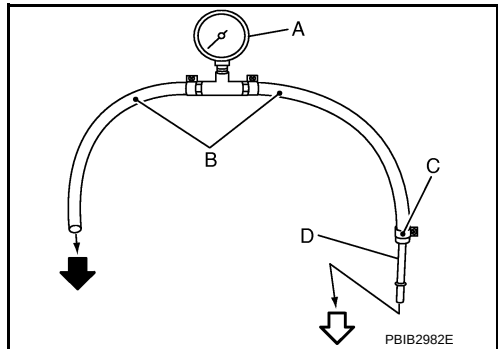
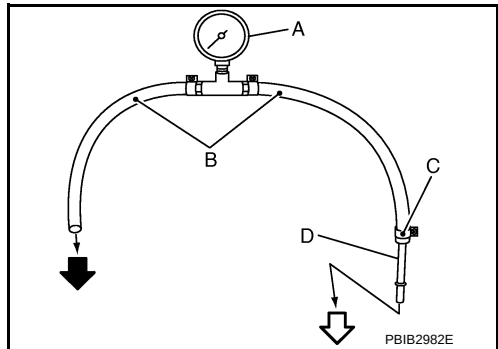
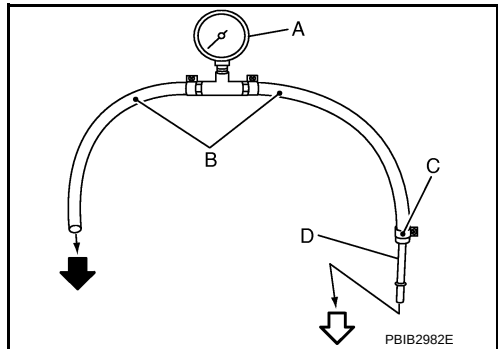
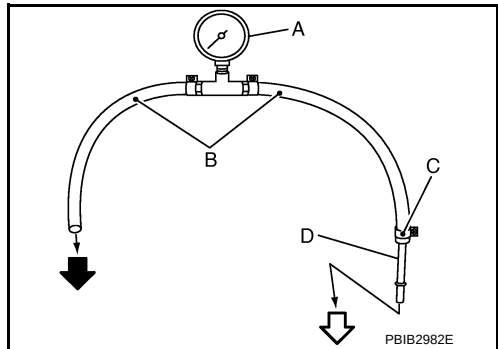
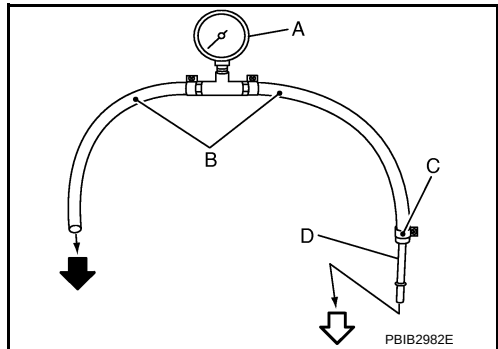
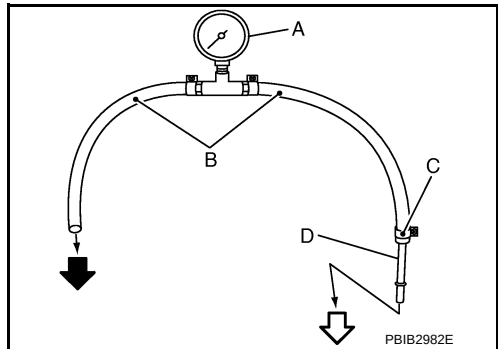
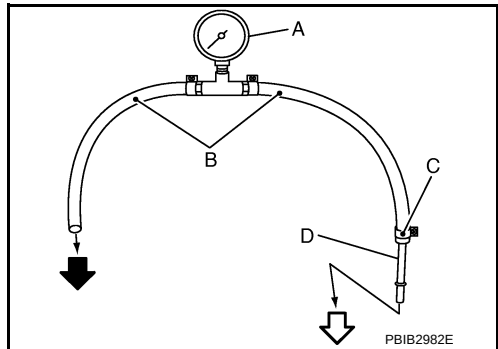
- Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.
- The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.
- Be careful not to scratch or put debris around connection area when servicing, so that the quick connector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

NOTE:

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

1. FUEL PRESSURE CHECK

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

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FUEL PRESSURE

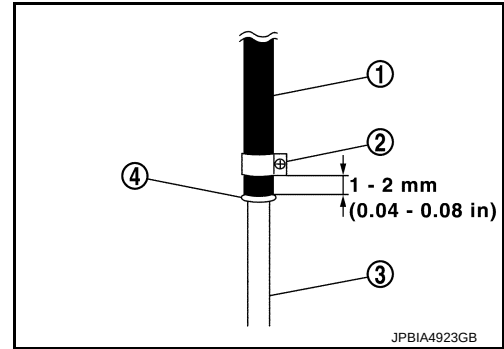
< BASIC INSPECTION >

[QR25DE]

4. Connect fuel hose① for fuel pressure check to fuel tube (engine side)③ with clamp② as shown in the figure.

CAUTION:

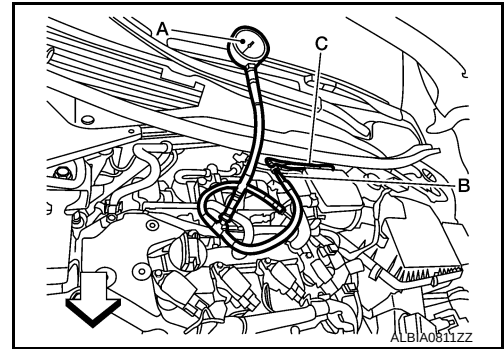
- Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
- Apply proper amount of gasoline between top of the fuel tube and spool④.
- Insert fuel hose for fuel pressure check until it touches the spool on fuel tube.
- Use NISSAN genuine hose clamp (part number: 16439 N4710 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 (SST: KV10120000) (C) to quick connector.

- A : Fuel pressure gauge
B : Fuel hose for fuel pressure check
⇨ : Vehicle front



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. Reinstall the part removed at Step 3.

NOTE:

Install the part to allow smooth engine starts.

8. Turn ignition switch ON and check for fuel leakage.
9. Start the engine and check for fuel leakage.
10. 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/cm², 51 psi)

Is the inspection result normal?

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

2. 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". Refer to [FL-12. "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

HOW TO SET SRT CODE

< BASIC INSPECTION >

[QR25DE]

HOW TO SET SRT CODE

Description

INFOID:000000010986284

OUTLINE

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

SRT ITEM

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

SRT item ^{*1} (CONSULT indication)	Performance Priority ^{*2}	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	1	Three way catalyst function	P0420
HO2S	1	Air fuel ratio (A/F) sensor 1	P014C, P014D
		Heated oxygen sensor 2	P0137
		Heated oxygen sensor 2	P0138
EGR/VVT SYSTEM	2	Intake valve timing control function	P0011

*1: Though displayed on the CONSULT screen, "HO2S HTR" is not SRT item.

*2: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT.

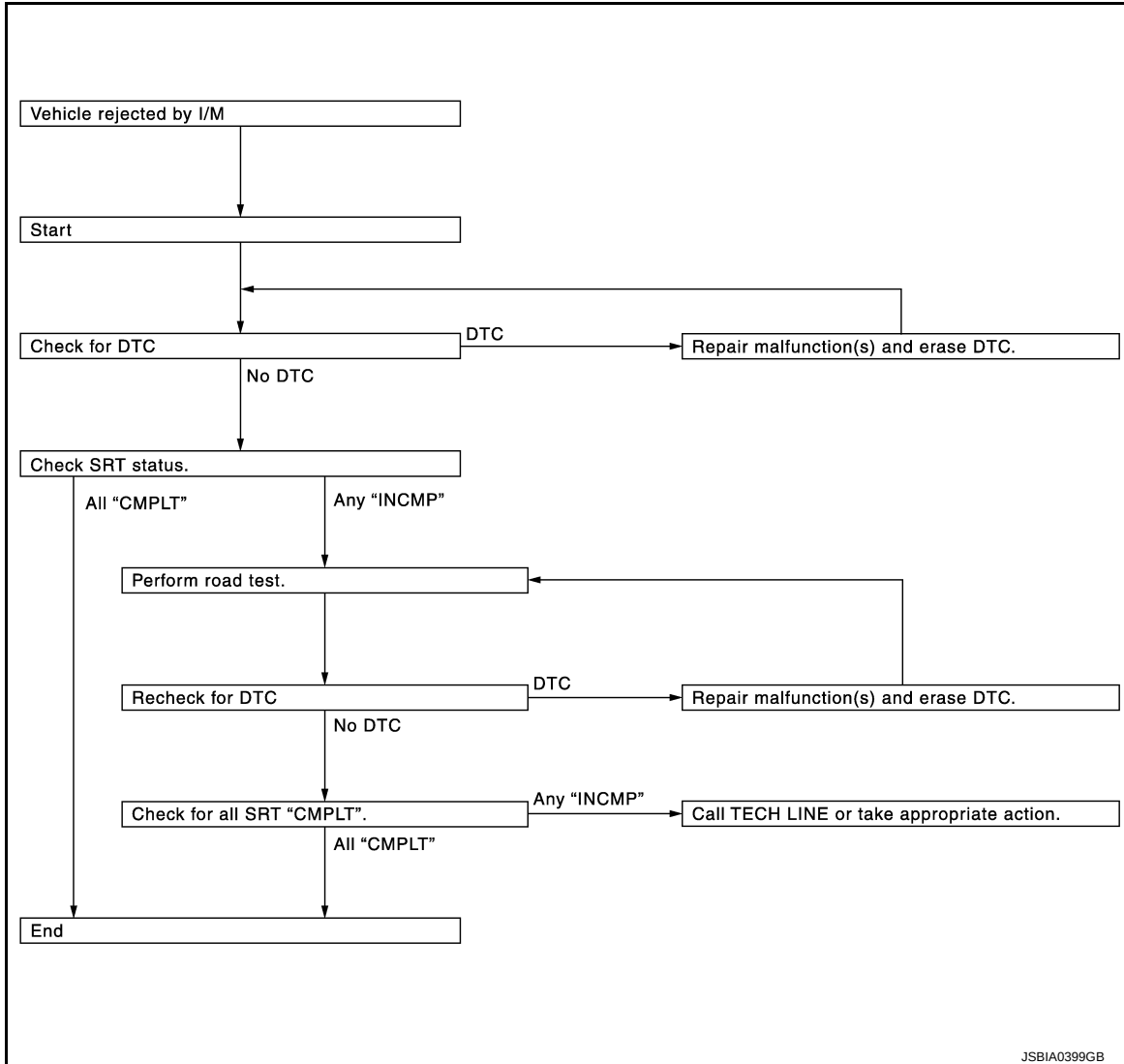
SRT SERVICE PROCEDURE

HOW TO SET SRT CODE

< BASIC INSPECTION >

[QR25DE]

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:0000000110986285

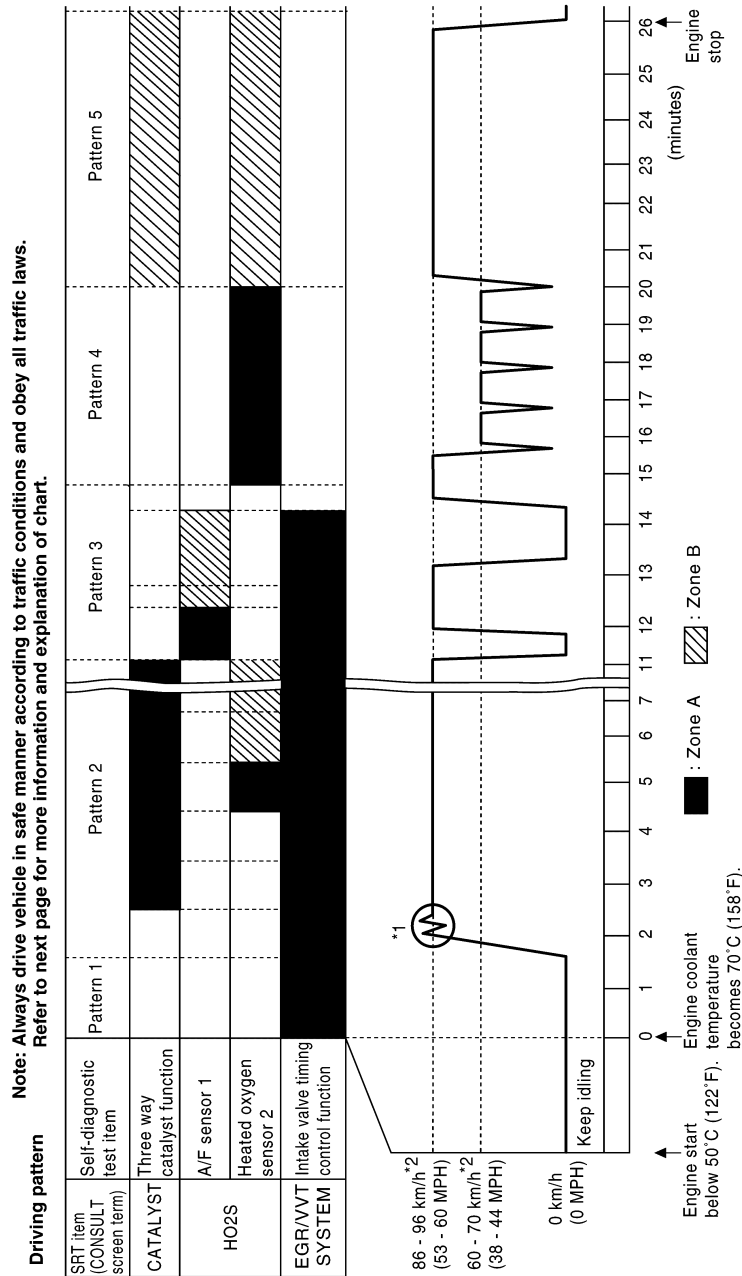
CAUTION:

HOW TO SET SRT CODE

< BASIC INSPECTION >

[QR25DE]

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



JSBIA4783GB

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

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

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

HOW TO SET SRT CODE

[QR25DE]

< BASIC INSPECTION >

*: Normal conditions

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

NOTE:

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

Work Procedure

INFOID:000000010986286

1.CHECK DTC

Check DTC.

Is any DTC detected?

- YES >> Repair malfunction(s) and erase DTC. Refer to [EC-517, "DTC Index"](#).
- NO >> GO TO 2.

2.CHECK SRT STATUS

 With CONSULT

Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT.

 Without CONSULT

Perform "SRT status" mode with [EC-488, "On Board Diagnosis Function"](#).

 With GST

Select Service \$01 with GST.

Is SRT code(s) set?

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

3.DTC CONFIRMATION PROCEDURE

1. Select "SRT WORK SUPPORT" in "DTC & SRT CONFIRMATION" mode with CONSULT.
2. For SRT(s) that is not set, perform the corresponding "DTC CONFIRMATION PROCEDURE" according to the "Performance Priority" in the "SRT ITEM" table. Refer to [EC-560, "Description"](#).
3. Check DTC.

Is any DTC detected?

- YES >> Repair malfunction(s) and erase DTC. Refer to [EC-517, "DTC Index"](#).
- NO >> GO TO 10.

4.PERFORM ROAD TEST

- Check the "Performance Priority" in the "SRT ITEM" table. Refer to [EC-560, "Description"](#).
- Perform the most efficient SRT set driving pattern to set the SRT properly. Refer to [EC-561, "SRT Set Driving Pattern"](#).

In order to set all SRTs, the SRT set driving pattern must be performed at least once.

>> GO TO 5.

5.PATTERN 1

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

NOTE:

ECM terminal voltage is follows;

- Engine coolant temperature
 - –10 to 35°C (14 to 95°F): 3.0 – 4.3 V
 - 70°(158°F): Less than 4.1 V
 - Fuel tank temperature: Less than 1.4 V
- Refer to [EC-501, "Reference Value"](#).

HOW TO SET SRT CODE

< BASIC INSPECTION >

[QR25DE]

>> GO TO 6.

6. PATTERN 2

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

NOTE:

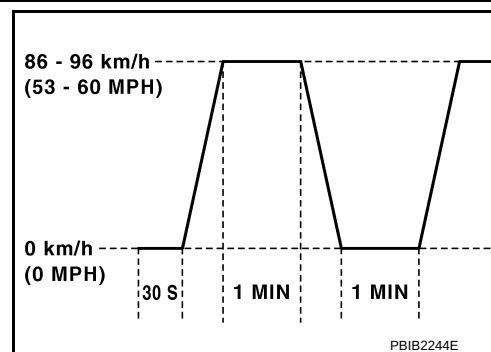
- Checking the vehicle speed with GST is advised.
- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

>> GO TO 7.

7. PATTERN 3

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

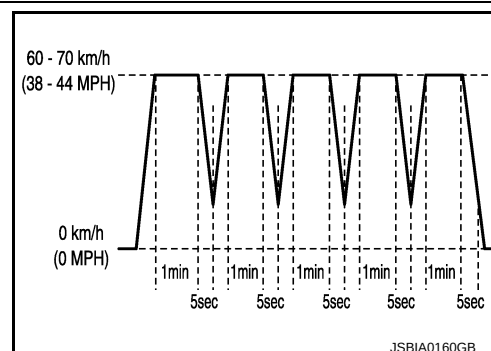
>> GO TO 8.



8. PATTERN 4

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

>> GO TO 9.



9. PATTERN 5

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

>> GO TO 10.

10. CHECK SRT STATUS

④ With CONSULT

Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT.

⊗ Without CONSULT

Perform "SRT status" mode with [EC-488. "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:0000000010986287

The specification (SP) value indicates the tolerance of the value that is displayed in "SPEC" of "DATA MONITOR" mode of CONSULT during normal operation of the Engine Control System. When the value in "SPEC" of "DATA MONITOR" mode is within the SP value, the Engine Control System is confirmed OK. When the value in "SPEC" of "DATA MONITOR" mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.

The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.

The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MASS AIR FLOW SENSOR (Hz) (The signal frequency of the mass air flow sensor)

Component Function Check

INFOID:0000000010986288

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/cm², 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
- After the engine is warmed up to normal operating temperature, drive vehicle until "ATF TEMP SEN" (CVT fluid temperature sensor signal) indicates more than 60°C (140°F).
- Electrical load: Not applied*
- Engine speed: Idle

*: Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

>> GO TO 2.

2.PERFORM "SPEC" OF "DATA MONITOR" MODE

With CONSULT

NOTE:

Perform "SPEC" in "DATA MONITOR" mode in maximum scale display.

1. Perform [EC-546, "Work Procedure"](#).
2. Select "B/FUEL SCHDL", "A/F ALPHA-B1" and "MASS AIR FLOW SENSOR (Hz)" in "SPEC" of "DATA MONITOR" mode with CONSULT.
3. Make sure that monitor items are within the SP value.

Is the inspection result normal?

YES >> END

NO >> Proceed to [EC-566, "Diagnosis Procedure"](#).

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

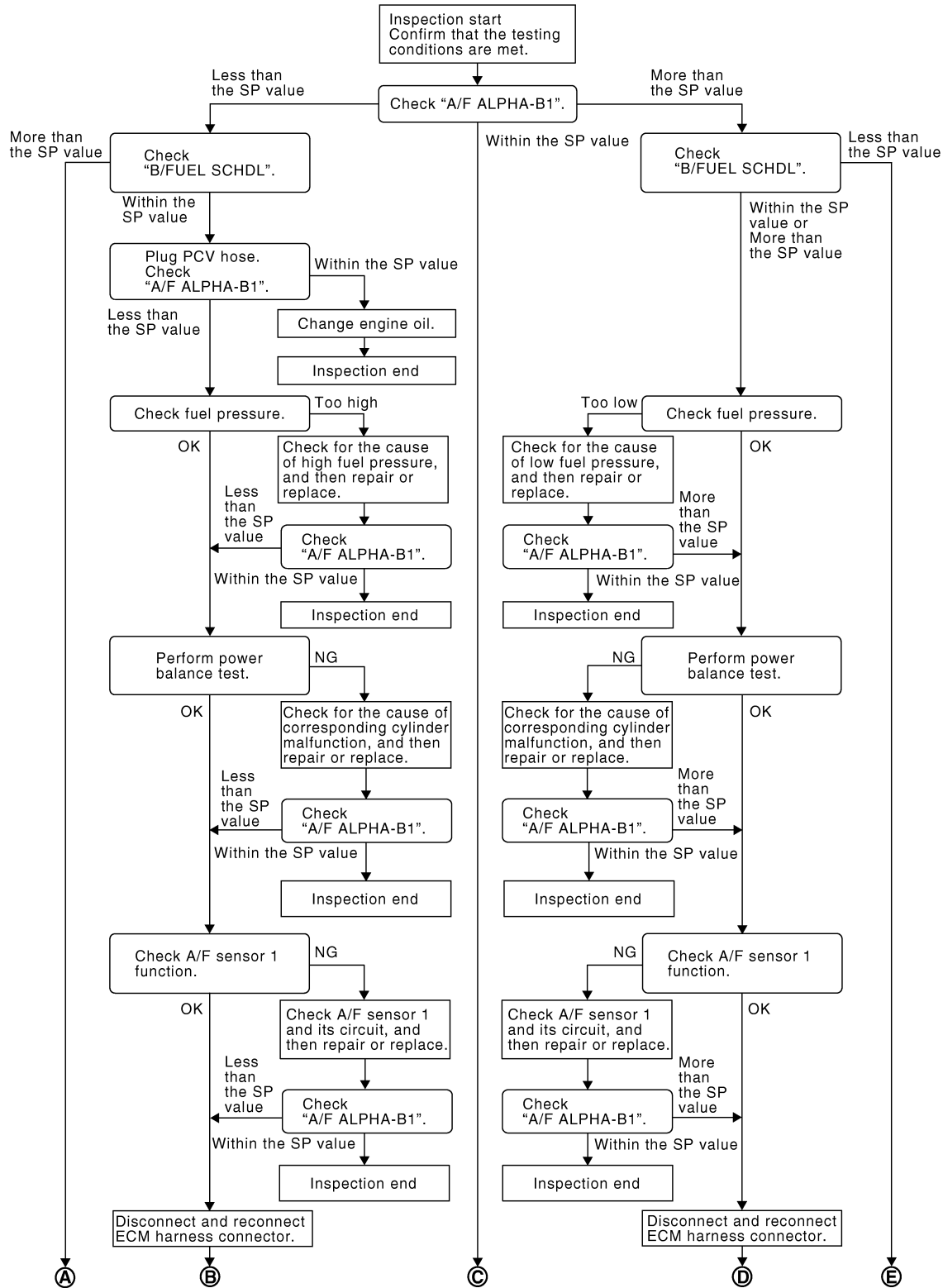
< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

Diagnosis Procedure

INFOID:000000010986289

OVERALL SEQUENCE



PBIB2318E

[QR25DE]

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1.CHECK "A/F ALPHA-B1"

1. Start engine.
2. Confirm that the testing conditions are met. Refer to [EC-565, "Component Function Check"](#).
3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the each indication is within the SP value.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

NOTE:

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

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-558, "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", refer to [FL-12, "Removal and Installation"](#), 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", refer to [FL-12, "Removal and Installation"](#), and then GO TO 8.

NO >> Repair or replace and then GO TO 8.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

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-785, "Component Function Check".](#))
2. Fuel injector and its circuit (Refer to [EC-779, "Component Function Check".](#))
3. Intake air leakage
4. Low compression pressure (Refer to [EM-162, "Inspection".](#))

Is the inspection result normal?

- YES >> Replace fuel injector, refer to [EM-184, "Removal and Installation",](#) 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-618, "DTC Description".](#)
- For DTC P0131, refer to [EC-622, "DTC Description".](#)
- For DTC P0132, refer to [EC-625, "DTC Description".](#)
- For DTC P014C, P014D, refer to [EC-647, "DTC Description".](#)

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 each 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

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

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

>> GO TO 16.

16.CHECK "A/F ALPHA-B1"

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

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to [EC-796, "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 the 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. Check pin terminal and connector for damage and then reconnect it again.

>> GO TO 22.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

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-605, "DTC Description"](#). Then GO TO 29.

NO >> GO TO 23.

23.CHECK "MASS AIR FLOW SENSOR (HZ)"

Select "MASS AIR FLOW SENSOR (Hz)" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 24.

NO >> More than the SP value: Replace mass air flow sensor, refer to [EM-174, "Exploded View"](#), and then GO TO 29.

24.REPLACE ECM

Replace ECM. Refer to [EC-806, "Removal and Installation"](#).

>> 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 "MASS AIR FLOW SENSOR (HZ)"

Select "MASS AIR FLOW SENSOR (Hz)" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 28.

NO >> Less than the SP value: Replace mass air flow sensor, refer to [EM-174, "Exploded View"](#), 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

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

- Malfunctioning seal of intake air system, etc.

>> GO TO 30.

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

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

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to [EC-796, "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-796, "Symptom Table"](#).

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:000000010986290

1.CHECK FUSE

Check that the following fuse is not fusing.

Location	Fuse No.	Capacity
IPDM E/R	#95	5 A
	#82	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 F6 or F9. Refer to [GI-46, "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		
F68	52	Ground	Existed
F85	16		
E60	123		
	128		

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK ECM POWER SUPPLY (MAIN)-1

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

ECM			Voltage
Connector	+	-	
	Terminal		
E60	121	128	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 6.

5.CHECK ECM POWER SUPPLY (MAIN)--2

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

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

ECM			Condition	Voltage (Approx.)
Connector	+	−		
	Terminal			
E60	121	128	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	
E60	121	F72	73	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	Connector	Terminal		
F68	89	E60	128	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-44, "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	
F68	89	F74	93	Existed

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

Is the inspection result normal?

POWER SUPPLY AND GROUND CIRCUIT

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Replace IPDM E/R. Refer to [PCS-60, "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			
E60	109	128	Ignition switch OFF	0 V
			Ignition switch ON	Battery voltage

Is the inspection result normal?

- YES >> Check Intermittent Incident. Refer to [GI-44, "Intermittent Incident"](#).
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	
E60	109	E12	25	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.

U0101 CAN COMM CIRCUIT

Description

INFOID:0000000010986291

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 Description

INFOID:0000000010986292

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
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.

POSSIBLE CAUSE

CAN communication line between TCM and ECM

FAIL-SAFE

Not applicable

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-576, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986293

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

U1001 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

U1001 CAN COMM CIRCUIT

Description

INFOID:0000000010986294

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 Description

INFOID:0000000010986295

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U1001	CAN COMM CIRCUIT (CAN COMM CIRCUIT)	When ECM is not transmitting or receiving CAN communication signal other than OBD (emission related diagnosis) for 2 seconds or more.

POSSIBLE CAUSE

Harness or connectors (CAN communication line is open or shorted)

FAIL-SAFE

Not applicable

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-577, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986296

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

U1040 ENG COMM CIRCUIT**DTC Description**

INFOID:0000000010986297

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U1040	ENG COMM CIRCUIT (Engine communication circuit)	ECM cannot transmit a communication signal to generator.

POSSIBLE CAUSE

- Harness or connectors
(LIN communication circuit is open or shorted.)
- ECM

FAIL-SAFE

Not applicable

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 ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-578, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986298

1.CHECK LIN COMMUNICATION CIRCUIT

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

+		-		Continuity
ECM		Generator		
Connector	Terminal	Connector	Terminal	
F68	85	F15	2	Existed

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

Is the inspection result normal?

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

2.REPLACE GENERATOR

1. Replace generator. Refer to [CHG-46, "QR25DE : Removal and Installation"](#).
2. Erase DTC.
3. Perform DTC confirmation procedure again. Refer to [EC-578, "DTC Description"](#).

Is DTC detected again?

YES >> Replace ECM. Refer to [EC-806, "Removal and Installation"](#).
 NO >> INSPECTION END

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U1044 ENG COMM CIRCUIT**DTC Description**

INFOID:0000000010986299

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U1044	ENG COMM CIRCUIT (Engine communication circuit)	A signal voltage of LIN communication between ECM and generator is excessively low or excessively high.

POSSIBLE CAUSE

- Harness or connectors
(LIN communication circuit is open or shorted.)
- Generator

FAIL-SAFE

Not applicable

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 ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-580, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986300

1.CHECK LIN COMMUNICATION CIRCUIT

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

+		-		Continuity
ECM		Generator		
Connector	Terminal	Connector	Terminal	
F68	85	F15	2	Existed

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

Is the inspection result normal?

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

2.REPLACE GENERATOR

1. Replace generator. Refer to [CHG-46, "QR25DE : Removal and Installation"](#).
2. Erase DTC.
3. Perform DTC confirmation procedure again. Refer to [EC-580, "DTC Description"](#).

Is DTC detected again?

YES >> Replace ECM. Refer to [EC-806, "Removal and Installation"](#).
 NO >> INSPECTION END

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U1050, U1051 LIN COMMUNICATION

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

U1050, U1051 LIN COMMUNICATION

DTC Description

INFOID:0000000010986301

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U1050	LIN COMMUNICATION [LIN (Local Interconnect Network) communication]]	ECM detects LIN communication error.
U1051		

POSSIBLE CAUSE

- Harness or connectors
(LIN communication circuit is open or shorted.)
- Generator
- ECM

FAIL-SAFE

Not applicable

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 ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-582, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986302

1.CHECK LIN COMMUNICATION CIRCUIT

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

+		-		Continuity
ECM		Generator		
Connector	Terminal	Connector	Terminal	
F68	85	F15	2	Existed

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

Is the inspection result normal?

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

2.REPLACE GENERATOR

1. Replace generator. Refer to [CHG-46, "QR25DE : Removal and Installation"](#).

U1050, U1051 LIN COMMUNICATION

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

2. Erase DTC.
3. Perform DTC confirmation procedure again. Refer to [EC-582, "DTC Description"](#).

Is DTC detected again?

YES >> Replace ECM. Refer to [EC-806, "Removal and Installation"](#).
NO >> INSPECTION END

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P0011 IVT CONTROL

DTC Description

INFOID:000000010986303

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0011	INT/V TIM CONT-B1 ("A" Camshaft position - timing over-advanced or system performance bank 1)	There is a gap between angle of target and phase-control angle degree.

POSSIBLE CAUSE

- 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

FAIL-SAFE

- Device fix mode
- ECM activates the IVT intermediate lock control solenoid valve to bring the cam sprocket into an intermediate lock condition.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0011 is displayed with DTC P0075, first perform the trouble diagnosis for DTC P0075.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-598. "DTC Description"](#).
 NO >> GO TO 2.

2.PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 11 V and 16 V at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
2. Start engine and warm it up to normal operating temperature.
3. Maintain the following conditions for at least 16 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

4. Stop vehicle with engine running and let engine idle for 16 seconds.
5. Check 1st trip DTC.

With GST

< DTC/CIRCUIT DIAGNOSIS >

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-585, "Diagnosis Procedure"](#).
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-2

 With CONSULT

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

ENG SPEED	1,200 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	D 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" above.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-585, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000110986304

1.CHECK DTC PRIORITY

If DTC P0011 is displayed with DTC P0075, first perform the trouble diagnosis for DTC P0075.

Is applicable DTC detected?

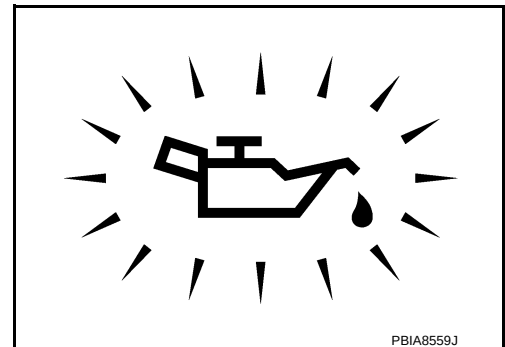
- YES >> Perform diagnosis of applicable. Refer to [EC-598, "DTC Description"](#).
NO >> GO TO 2.

2.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-25, "Inspection"](#).
NO >> GO TO 3.



3.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Check the intake valve timing control solenoid valve. Refer to [EC-586, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Replace intake valve timing control solenoid valve. Refer to [EM-210, "Exploded View"](#).

4.CHECK CRANKSHAFT POSITION SENSOR (POS)

Check the crankshaft position sensor (POS). Refer to [EC-678, "Component Inspection \(Crankshaft Position sensor\)"](#).

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 5.
NO >> Replace crankshaft position sensor (POS). Refer to [EM-247, "Exploded View"](#).

5.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Check the camshaft position sensor (PHASE). Refer to [EC-681, "Component Inspection \(Camshaft position sensor\)"](#).

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Replace camshaft position sensor (PHASE). Refer to [EM-221, "Exploded View"](#).

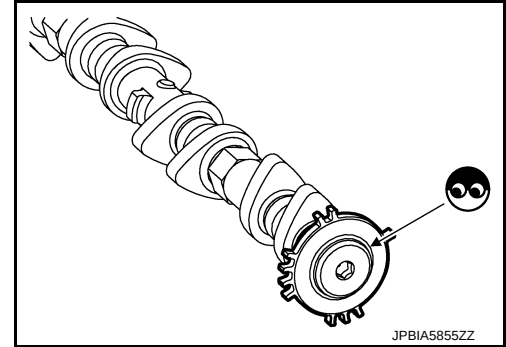
6.CHECK CAMSHAFT (INT)

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 7.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to [EM-222, "Removal and Installation"](#).



7.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-211, "Removal and Installation"](#).
NO >> GO TO 8.

8.CHECK LUBRICATION CIRCUIT

Refer to [LU-25, "Inspection"](#), "INSPECTION AFTER INSTALLATION".

Is the inspection result normal?

- YES >> GO TO 9.
NO >> Clean lubrication line.

9.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000010986305

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-1

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?

P0011 IVT CONTROL

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 2.

NO >> Replace intake valve timing control solenoid valve. Refer to [EM-210, "Exploded View"](#).

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-2

1. Remove intake valve timing control solenoid valve. Refer to [EM-210, "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.

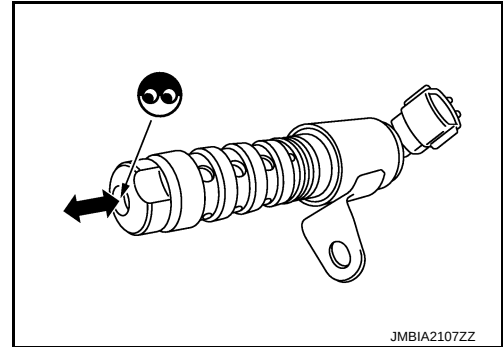
NOTE:

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-210, "Exploded View"](#).



P0014 EVT CONTROL

DTC Description

INFOID:000000010986306

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0014	EXH/V TIM CONT-B1 ("B" Camshaft position - timing over-advanced or system performance bank 1)	There is a gap between angle of target and phase-control angle degree.

POSSIBLE CAUSE

- 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

FAIL-SAFE

Device fix mode

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0014 is displayed with DTC P0078 or P1078, first perform the trouble diagnosis for DTC P0078 or P1078.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-517. "DTC Index"](#).
 NO >> GO TO 2.

2.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-1

 With CONSULT

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

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

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

 With GST

< DTC/CIRCUIT DIAGNOSIS >

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-589. "Diagnosis Procedure"](#)
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-2

 With CONSULT

1. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
2. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,700 - 2,950 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	D position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:

Always drive at a safe speed.

3. Check 1st trip DTC.

 With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-589. "Diagnosis Procedure"](#)
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986307

1.CHECK DTC PRIORITY

If DTC P0014 is displayed with DTC P0078 or P1078, first perform the trouble diagnosis for DTC P0078 or P1078.

Is applicable DTC detected?

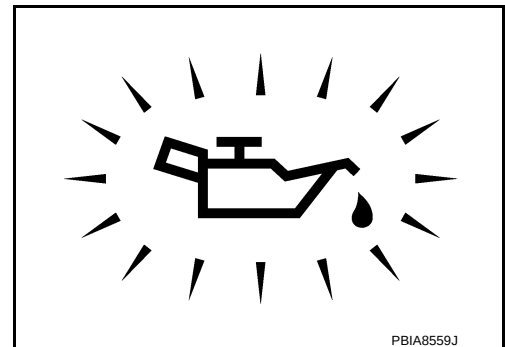
- YES >> Perform diagnosis of applicable. Refer to [EC-517. "DTC Index"](#).
NO >> GO TO 2.

2.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-25. "Inspection"](#).
NO >> GO TO 3.



3.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 >> GO TO 4.
NO >> Replace exhaust valve timing control solenoid valve. Refer to [EM-210. "Exploded View"](#).

4.CHECK CRANKSHAFT POSITION SENSOR (POS)

P0014 EVT CONTROL

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

Check the crankshaft position sensor (POS). Refer to [EC-678, "Component Inspection \(Crankshaft Position sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace crankshaft position sensor (POS). Refer to [EM-247, "Exploded View"](#).

5.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR

Check the exhaust valve timing control position sensor. Refer to [EC-715, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace exhaust valve timing control position sensor. Refer to [EM-221, "Exploded View"](#).

6.CHECK CAMSHAFT (EXH)

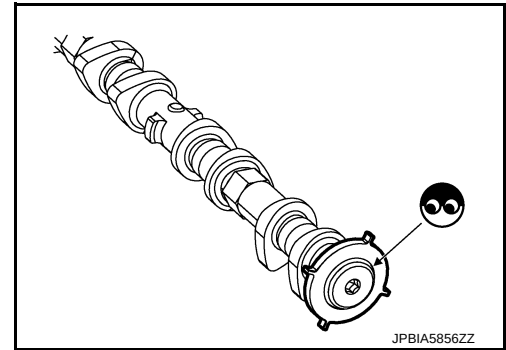
Check the following.

- 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 7.

NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to [EM-222, "Removal and Installation"](#).



7.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-211, "Removal and Installation"](#).

NO >> GO TO 8.

8.CHECK LUBRICATION CIRCUIT

Refer to [LU-25, "Inspection"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Clean lubrication line.

9.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000010986308

1.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-1

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)]

P0014 EVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

Exhaust valve timing control solenoid valve		Resistance
+	—	
Terminal		
1	Ground	$\infty \Omega$ (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-210, "Exploded View"](#).

2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-2

1. Remove exhaust valve timing control solenoid valve. Refer to [EM-210, "Exploded View"](#).

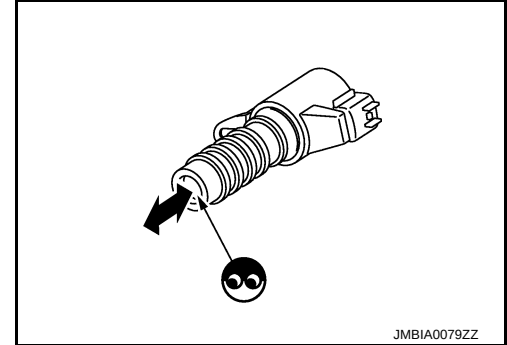
2. Provide 12 V DC between exhaust valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check that the plunger moves as shown in the figure.

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-210, "Exploded View"](#).

P0031, P0032 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P0031, P0032 A/F SENSOR 1 HEATER

DTC Description

INFOID:0000000010986309

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0031	A/F SEN1 HTR (B1) [Air fuel ratio (A/F) sensor 1 heater (bank 1)control circuit low]	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)
P0032	A/F SEN1 HTR (B1) [Air fuel ratio (A/F) sensor 1 heater (bank 1)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.)

POSSIBLE CAUSE

DTC P0031

- Harness or connectors (A/F sensor 1 heater circuit is open or shorted.)
- A/F sensor 1 heater

DTC P0032

- Harness or connectors (A/F sensor 1 heater circuit is shorted.)
- A/F sensor 1 heater

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. 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-592, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986310

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.

P0031, P0032 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

+		-	Voltage
A/F sensor 1			
Connector	Terminal		
F27	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	
F27	3	F68	53	Existed

4. Also check harness for short to ground and 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-593, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 5.

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-180, "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

5.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000010986311

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.

P0031, P0032 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

A/F sensor 1		Resistance
+	−	
Terminal		
3	4	1.8 - 2.44 Ω [at 20°C (68°F)]
	1	∞ Ω (Continuity should not exist)
	2	
4	1	
	2	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

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

Replace air fuel ratio (A/F) sensor 1. Refer to [EM-180. "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/CIRCUIT DIAGNOSIS >

[QR25DE]

P0037, P0038 HO2S2 HEATER

DTC Description

INFOID:0000000010986312

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0037	HO2S2 HTR (B1) (HO2S heater control circuit low bank 1 sensor 2)	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.)
P0038	HO2S2 HTR (B1) (HO2S heater control circuit high bank 1 sensor 2)	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.)

POSSIBLE CAUSE

DTC P0037

- Harness or connectors (Heated oxygen sensor 2 heater circuit is open or shorted.)
- Heated oxygen sensor 2 heater

DTC P0038

- Harness or connectors (Heated oxygen sensor 2 heater circuit is shorted.)
- Heated oxygen sensor 2 heater

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

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

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-595, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986313

1. CHECK HO2S2 POWER SUPPLY CIRCUIT

P0037, P0038 HO2S2 HEATER

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

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		
F31	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK HO2S2 OUTPUT SIGNAL CIRCUIT

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

+		-		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F31	3	F68	54	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 HEATED OXYGEN SENSOR 2 HEATER

Check the heated oxygen sensor 2 heater. Refer to [EC-596, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to [EX-12, "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

5.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000010986314

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.

P0037, P0038 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

Heated oxygen sensor 2		Resistance
+	–	
Terminal		
4	3	3.3 - 4.4 Ω [at 25°C (77°F)]
1	2	∞ Ω (Continuity should not exist)
	3	
	4	
2	3	
	4	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to [EX-12. "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 INTAKE VALVE TIMING CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P0075 INTAKE VALVE TIMING CONTROL

DTC Description

INFOID:0000000010986315

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0075	INT/V TIM V/CIR-B1 (Intake valve control solenoid circuit bank 1)	- ECM detects an abnormal voltage in the intake valve timing control solenoid valve control circuit. - ECM detects an abnormal voltage in the intake valve timing intermediate lock control solenoid valve control circuit.

POSSIBLE CAUSE

- Harness or connectors
 - Intake valve timing control solenoid valve circuit is open or shorted.
 - Intake valve timing intermediate lock control solenoid valve circuit is open or shorted.
- Intake valve timing control solenoid valve
- Intake valve timing intermediate lock control solenoid valve

FAIL-SAFE

Not applicable

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-598, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986316

1.CHECK INTAKE VALVE TIMING (IVT) CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect 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		
F108	1	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK IVT CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

P0075 INTAKE VALVE TIMING CONTROL

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

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

+		-		Continuity
IVT control solenoid valve		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F108	1	F72	78	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 IVT CONTROL SOLENOID VALVE GROUND CIRCUIT

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

+		-		Continuity
IVT control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F108	2	F68	93	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK IVT CONTROL SOLENOID VALVE

Check the IVT control solenoid valve. Refer to [EC-600, "Component Inspection \(IVT Control Solenoid Valve\)"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace IVT control solenoid valve. Refer to [EM-210, "Exploded View"](#).

5.CHECK IVT INTERMEDIATE LOCK CONTROL SOLENOID VALVE POWER SUPPLY

1. Disconnect IVT intermediate lock control solenoid valve harness connector.
2. Turn ignition switch ON.
3. Check the voltage between IVT intermediate lock control solenoid valve harness connector and ground.

+		-	Voltage
IVT intermediate lock control solenoid valve			
Connector	Terminal		
F111	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.CHECK IVT INTERMEDIATE LOCK CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IVT intermediate lock control solenoid valve harness connector and IPDM E/R harness connector.

P0075 INTAKE VALVE TIMING CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

+		-		Continuity
IVT intermediate lock control solenoid valve		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F111	1	F72	78	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 IVT INTERMEDIATE LOCK CONTROL SOLENOID VALVE GROUND CIRCUIT

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

+		-		Continuity
IVT intermediate lock control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F111	2	F68	56	Existed

4. 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 IVT INTERMEDIATE LOCK CONTROL SOLENOID VALVE

Check the IVT intermediate lock control solenoid valve. Refer to [EC-601, "Component Inspection \(IVT Intermediate Lock Control Solenoid Valve\)"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace IVT intermediate lock control solenoid valve. Refer to [EM-210, "Exploded View"](#).

9. CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection (IVT Control Solenoid Valve)

INFOID:0000000010986317

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
1 and 2	7.0 - 7.5 Ω [at 20°C (68°F)]
1 or 2 and ground	$\infty \Omega$ (Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace intake valve timing control solenoid valve. Refer to [EM-210, "Exploded View"](#).

P0075 INTAKE VALVE TIMING CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

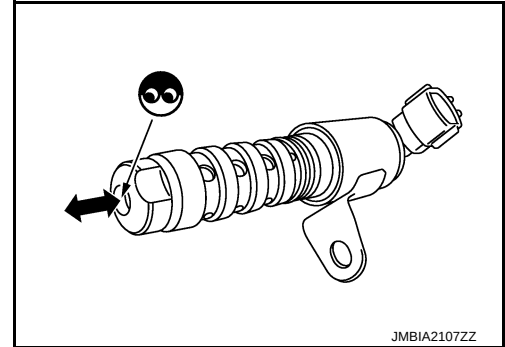
1. Remove intake valve timing control solenoid valve. Refer to [EM-210, "Exploded View"](#).
2. Provide 12 V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

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-210, "Exploded View"](#).

Component Inspection (IVT Intermediate Lock Control Solenoid Valve)

INFOID:0000000010986318

1.CHECK INTAKE VALVE TIMING INTERMEDIATE LOCK CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.
2. Disconnect intake valve timing intermediate lock control solenoid valve harness connector.
3. Check resistance between intake valve timing intermediate lock control solenoid valve terminals as follows.

Terminals	Resistance
1 and 2	7.0 - 7.5 Ω [at 20°C (68°F)]
1 or 2 and ground	$\infty \Omega$ (Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace intake valve timing intermediate lock control solenoid valve. Refer to [EM-210, "Exploded View"](#).

2.CHECK INTAKE VALVE TIMING INTERMEDIATE LOCK CONTROL SOLENOID VALVE-II

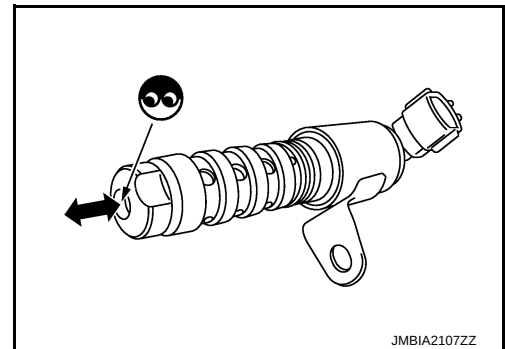
1. Remove intake valve timing intermediate lock control solenoid valve. Refer to [EM-210, "Exploded View"](#).
2. Provide 12 V DC between intake valve timing intermediate lock control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

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 intermediate lock control solenoid valve.

NOTE:

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



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake valve timing intermediate lock control solenoid valve. Refer to [EM-210, "Exploded View"](#).

P0078 EVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P0078 EVT CONTROL SOLENOID VALVE

DTC Description

INFOID:0000000010986319

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0078	EX V/T ACT/CIRC-B1 (Exhaust valve control solenoid circuit bank 1)	An improper voltage is sent to the ECM through exhaust valve timing control solenoid valve.

POSSIBLE CAUSE

- Harness or connectors (Exhaust valve timing control solenoid valve circuit is open or shorted.)
- Exhaust valve timing control solenoid valve

FAIL-SAFE

Device fix mode

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-602, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986320

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		
F107	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.

P0078 EVT CONTROL SOLENOID VALVE

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

3. Check the continuity between EVT control solenoid valve harness connector and IPDM E/R harness connector.

+		+		Continuity
EVT control solenoid valve		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F107	1	F72	78	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.

+		+		Continuity
EVT control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F107	2	F68	94	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-590, "Component Inspection"](#).

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000010986321

1.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-1

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?

P0078 EVT CONTROL SOLENOID VALVE

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 2.

NO >> Replace exhaust valve timing control solenoid valve. Refer to [EM-210, "Exploded View"](#).

2. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-2

1. Remove exhaust valve timing control solenoid valve. Refer to [EM-210, "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.

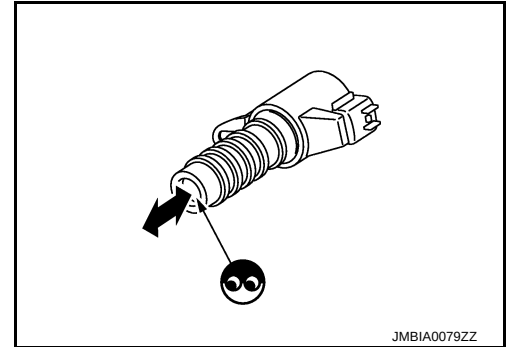
NOTE:

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-210, "Exploded View"](#).



P0102, P0103 MAF SENSOR

DTC Description

INFOID:000000010986322

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0102	MAF SEN/CIRCUIT-B1 (Mass or volume air flow "A" circuit low)	An excessively low voltage from the mass air flow sensor is sent to ECM.
P0103	MAF SEN/CIRCUIT-B1 (Mass or volume air flow "A" circuit high)	An excessively high voltage from the mass air flow sensor is sent to ECM.

POSSIBLE CAUSE

DTC P0102

- Harness or connectors (Mass air flow sensor circuit is open or shorted.)
- Intake air leaks
- Mass air flow sensor
- Sensor power supply 2 circuit

DTC P0103

- Harness or connectors (Mass air flow sensor circuit is open or shorted.)
- Mass air flow sensor
- Sensor power supply 2 circuit

FAIL-SAFE

- Traveling control mode (Accelerator angle variation control)
- Traveling control mode (Engine output control)
- Device fix mode

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-606. "Diagnosis Procedure"](#).

NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-1

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

Is DTC detected?

YES >> Proceed to [EC-606. "Diagnosis Procedure"](#).

NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-2

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

< DTC/CIRCUIT DIAGNOSIS >

Is DTC detected?

- YES >> Proceed to [EC-606, "Diagnosis Procedure"](#).
 NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986323

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-174, "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		
F110	1	Ground	5 V

Is the inspection result normal?

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

4.CHECK SENSOR POWER SUPPLY 2 CIRCUITPerform [EC-794, "Diagnosis Procedure"](#).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	
F110	2	F85	34	Existed

Is the inspection result normal?

- YES >> GO TO 6.
 NO >> Repair or replace error-detected parts.

6.CHECK MAF SENSOR INPUT SIGNAL CIRCUIT

P0102, P0103 MAF SENSOR

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

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

+		-		Continuity
MAF sensor		ECM		
Connector	Terminal	Connector	Terminal	
F110	3	F85	35	Existed

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

Is the inspection result normal?

YES >> GO TO 7.

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

7.CHECK MAF SENSOR

Check the MAF sensor. Refer to [EC-607, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace mass air flow sensor. Refer to [EM-174, "Exploded View"](#).

8.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000010986324

1.CHECK MASS AIR FLOW SENSOR-1

 With CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select "DATA MONITOR" mode of "ENGINE".
5. Select "MASS AIR FLOW SENSOR (Hz)" and check indication.

Monitor item	Condition	Value
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3500 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	3500- 4100 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	5000 - 5600 Hz
	Idle to about 4,000 rpm	3500 - 4100 Hz to Approx. 6300 Hz*

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

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

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

Is the inspection result normal?

YES >> GO TO 4.

P0102, P0103 MAF SENSOR

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 3.

3. CHECK MASS AIR FLOW SENSOR-2

 With CONSULT

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT and select "DATA MONITOR" mode of "ENGINE".
4. Select "MASS AIR FLOW SENSOR (Hz)" and check indication.

Monitor item	Condition	Value
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3500 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	3500- 4100 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	5000 - 5600 Hz
	Idle to about 4,000 rpm	3500 - 4100 Hz to Approx. 6300 Hz*

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4. CHECK MASS AIR FLOW SENSOR-3

 With CONSULT

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select "DATA MONITOR" mode of "ENGINE".
5. Select "MASS AIR FLOW SENSOR (Hz)" and check indication.

Monitor item	Condition	Value
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3500 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	3500- 4100 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	5000 - 5600 Hz
	Idle to about 4,000 rpm	3500 - 4100 Hz to Approx. 6300 Hz*

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Clean or replace mass air flow sensor. Refer to [EM-174, "Exploded View"](#).

P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P0112, P0113 IAT SENSOR

DTC Description

INFOID:0000000010986325

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0112	IAT SEN/CIRCUIT- B1 (Intake air temperature sensor 1 circuit low bank 1)	An excessively low voltage from the intake air temperature sensor is sent to ECM.
P0113	IAT SEN/CIRCUIT- B1 (Intake air temperature sensor 1 circuit high bank 1)	An excessively high voltage from the intake air temperature sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (Intake air temperature sensor circuit is open or shorted.)
- Intake air temperature sensor
- Sensor power supply 2 circuit

FAIL-SAFE

Not applicable

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-609, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986326

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		
F110	4	Ground	5 V

Is the inspection result normal?

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

P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

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	
F110	4	F85	33	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	
F110	2	F85	34	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-610, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to [EM-174, "Exploded View"](#).

5. CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000010986327

1. CHECK INTAKE AIR TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Turn ignition switch ON.
4. Select "DATA MONITOR" mode with CONSULT.
5. Check that "INT/A TEMP SEN" indicates as per following condition.

Monitor item	Condition		Value (Approx.)
INT/A TEMP SEN	Temperature [°C (°F)]	25 (77)	1.9 - 2.1 (V)

Is the inspection result normal?

P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

YES >> INSPECTION END
NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to [EM-174, "Exploded View"](#).

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P

P0117, P0118 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P0117, P0118 ECT SENSOR

DTC Description

INFOID:0000000010986328

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0117	ECT SEN/CIRC (Engine coolant temperature sensor 1 circuit low)	An excessively low voltage from the engine coolant temperature sensor is sent to ECM.
P0118	ECT SEN/CIRC (Engine coolant temperature sensor 1 circuit high)	An excessively high voltage from the engine coolant temperature sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (Engine coolant temperature sensor circuit is open or shorted.)
- Engine coolant temperature sensor

FAIL-SAFE

Not applicable

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-612, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986329

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		
F80	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

P0117, P0118 ECT SENSOR

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

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	
F80	1	F85	28	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	
F80	2	F85	27	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-613, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace engine coolant temperature sensor. Refer to [CO-52, "Exploded View"](#).

5.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000010986330

1.CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

1. Turn ignition switch OFF.
2. Disconnect ECT sensor harness connector.
3. Remove ECT sensor.

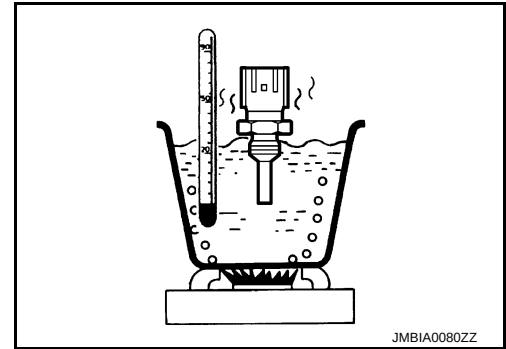
P0117, P0118 ECT SENSOR

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

4. Check resistance between ECT sensor terminals by heating with hot water as shown in the figure.

ECT sensor		Condition		Resistance (k Ω)
+	-			
Terminal				
1	2	Temperature [$^{\circ}$ C ($^{\circ}$ F)]	20 (68)	2.37 - 2.63
			50 (122)	0.68 - 1.00
			90 (194)	0.236 - 0.260



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor. Refer to [CO-52, "Exploded View"](#).

P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P0122, P0123 TP SENSOR

DTC Description

INFOID:000000010986331

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0122	TP SEN 2/CIRC-B1 (Throttle/pedal position sensor/switch "A" circuit low)	An excessively low voltage from the TP sensor 2 is sent to ECM.
P0123	TP SEN 2/CIRC-B1 (Throttle/pedal position sensor/switch "A" circuit high)	An excessively high voltage from the TP sensor 2 is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (TP sensor 2 circuit is open or shorted.)
- Electric throttle control actuator (TP sensor 2)

FAIL-SAFE

- The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.
- The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0122 or P0123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-707, "DTC Description"](#).
NO >> GO TO 2.

2.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-615, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000010986332

1.CHECK DTC PRIORITY

If DTC P0122 or P0123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-707, "DTC Description"](#).
NO >> GO TO 2.

P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

2. 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		
F113	2	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

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

+		-		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F113	2	F68	80	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.

4. 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	
F113	4	F68	78	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT

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

P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

+		-		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F113	3	F68	77	Existed

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK THROTTLE POSITION SENSOR

Check the throttle position sensor. Refer to [EC-617, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace electric throttle control actuator. Refer to [EM-176, "Removal and Installation"](#).

7.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000010986333

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-554, "Work Procedure"](#).
4. Turn ignition switch ON.
5. Set selector lever to D position.
6. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM				Condition		Voltage
Connector		+	−			
		Terminal				
Sensor 1	F68	79	78	Accelerator pedal	Fully released	More than 0.36V
					Fully depressed	Less than 4.75V
Sensor 2		77			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-176, "Removal and Installation"](#).

P0130 A/F SENSOR 1

DTC Description

INFOID:000000010986334

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P0130	A/F SENSOR1 (B1) (O2 sensor circuit bank 1 sensor 1)	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.
		B	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.

POSSIBLE CAUSE

- Harness or connectors (A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

With CONSULT

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

Is 1st trip DTC detected?

YES >> Proceed to [EC-619, "Diagnosis Procedure"](#).

NO-1 >> With CONSULT: GO TO 3.

NO-2 >> Without CONSULT: GO TO 7.

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

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

Does the indication fluctuates around 2.2 V?

YES >> GO TO 4.

NO >> Proceed to [EC-619, "Diagnosis Procedure"](#).

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-1

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

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

If "TESTING" is not displayed after 20 seconds, retry from step 2.

CAUTION:

Always drive vehicle at a safe speed.

Is "TESTING" displayed on CONSULT screen?

YES >> GO TO 5.

NO >> Check A/F sensor 1 function again. GO TO 2.

5.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-2

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 3.

6.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-3

Touch "SELF-DIAG RESULT"

Which is displayed on CONSULT screen?

YES >> INSPECTION END

NO >> Proceed to [EC-619, "Diagnosis Procedure"](#).

7.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

 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, 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-619, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986335

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.

P0130 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

+		-	Voltage
A/F sensor 1			
Connector	Terminal		
F27	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	
F27	4	F72	75	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	
F27	1	F85	41	Existed
	2		45	

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		
F27	1	Ground	Not existed
	2		

+		-	Continuity
ECM			
Connector	Terminal		
F85	41	Ground	Not existed
	45		

5. Also check harness for short to power.

Is the inspection result normal?

P0130 A/F SENSOR 1

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

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

4.CHECK INTERMITTENT INCIDENT

Perform [GI-44. "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-180. "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

A

EC

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P0131 A/F SENSOR 1

DTC Description

INFOID:000000010986336

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0131	A/F SENSOR1 (B1) (O2 sensor circuit low voltage bank 1 sensor 1)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0 V.

POSSIBLE CAUSE

- Harness or connectors (A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

FAIL-SAFE

Not applicable

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

⑧ With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Select "A/F SEN1 (B1)" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Check "A/F SEN1 (B1)" indication.

⑧ With GST

Follow the procedure "With CONSULT" above.

Is the indication constantly approx. 0 V?

YES >> Proceed to [EC-623, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

⑧ With CONSULT

1. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.

CAUTION:

Always drive vehicle at a safe speed.

3. Maintain the following conditions for about 20 consecutive seconds.

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

NOTE:

P0131 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

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

4. Check 1st trip DTC.

 With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-623. "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986337

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		
F27	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	
F27	4	F72	75	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	
F27	1	F85	41	Existed
	2		45	

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

P0131 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

+		-	Continuity
A/F sensor 1			
Connector	Terminal		
F27	1	Ground	Not existed
	2		

+		-	Continuity
ECM			
Connector	Terminal		
F85	41	Ground	Not existed
	45		

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-44. "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-180. "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 Description

INFOID:000000010986338

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0132	A/F SENSOR1 (B1) (O2 sensor circuit high voltage bank 1 sensor 1)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5 V.

POSSIBLE CAUSE

- Harness or connectors (A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

2.CHECK A/F SENSOR FUNCTION

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Select "A/F SEN1 (B1)" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Check "A/F SEN1 (B1)" indication.

With GST

Follow the procedure "With CONSULT" above.

Is the indication constantly approx. 5 V?

YES >> Proceed to [EC-626, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.

CAUTION:

Always drive vehicle at a safe speed.

3. Maintain the following conditions for about 20 consecutive seconds.

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

NOTE:

P0132 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

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

4. Check 1st trip DTC.

 With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC is detected?

YES >> Proceed to [EC-626, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986339

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		
F27	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	
F27	4	F72	75	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	
F27	1	F85	41	Existed
	2		45	

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

P0132 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

+		-	Continuity
A/F sensor 1			
Connector	Terminal		
F27	1	Ground	Not existed
	2		

+		-	Continuity
ECM			
Connector	Terminal		
F85	41	Ground	Not existed
	45		

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-44. "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-180. "Exploded View"](#).

CAUTION:

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

>> INSPECTION END

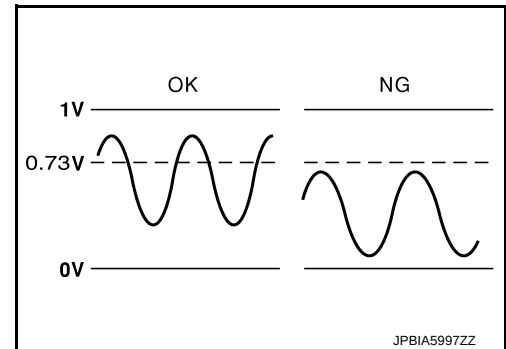
P0137 HO2S2

DTC Description

INFOID:0000000010986340

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0137	HO2S2 (B1) (O2 sensor circuit low voltage bank 1 sensor 2)	The maximum voltage from the heated oxygen sensor 2 is not reached to the specified voltage.

POSSIBLE CAUSE

- Harness or connectors (Heated oxygen sensor 2 circuit is open or shorted.)
- Heated oxygen sensor 2
- Fuel pressure
- Fuel injector
- Intake air leaks

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 5.

2. PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

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

< DTC/CIRCUIT DIAGNOSIS >

5. Let engine idle for 1 minute.
6. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).
7. Open engine hood.
8. Select "HO2S2 (B1) P1147" of "HO2S2" in "DTC WORK SUPPORT" mode of "ENGINE" using CONSULT.
9. Follow the instruction of CONSULT.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

10. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT screen?

- OK >> INSPECTION END
 NG >> Proceed to [EC-630, "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-1

☒ Without CONSULT

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

ECM			Condition	Voltage
Connector	+	-		
	Terminal			
F85	22	23	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.73 V at least once during this procedure.

Is the inspection result normal?

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

6.PERFORM COMPONENT FUNCTION CHECK-2

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

ECM			Condition	Voltage
Connector	+	-		
	Terminal			
F85	22	23	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.73 V at least once during this procedure.

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> GO TO 7.

7.PERFORM COMPONENT FUNCTION CHECK-3

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F85	22	23	Coasting from 80 km/h (50 MPH) in D position	The voltage should be above 0.73 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-630, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000010986341

1. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to [EC-557, "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-652, "DTC Description"](#).

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	
F31	1	F85	23	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	
F31	2	F85	22	Existed

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

+		-	Continuity
HO2S2			
Connector	Terminal		
F31	2	Ground	Not existed

+		-	Continuity
ECM			
Connector	Terminal		
F85	22	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-631, "Component Inspection"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-44, "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:0000000010986342

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

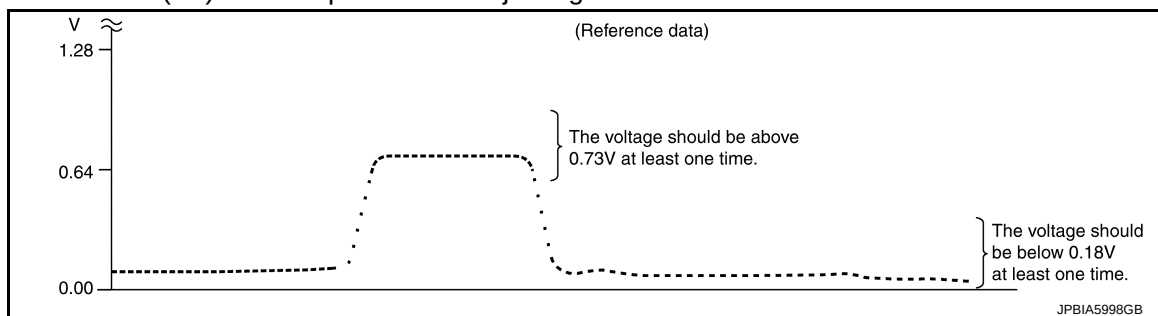
YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2

Ⓔ With CONSULT

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



"HO2S2 (B1)" should be above 0.73 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%.

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

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

3.CHECK HEATED OXYGEN SENSOR 2-1

⊗ Without CONSULT

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F85	22	23	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.73 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 2-2

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

ECM			Condition	Voltage
Connector	+	−		
	Terminal			
F85	22	23	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.73 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 2-3

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F85	22	23	Coasting from 80 km/h (50 MPH) in D position	The voltage should be above 0.73 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-12. "Exploded View"](#).

CAUTION:

P0137 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

- 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).

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>> INSPECTION END

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P0138 HO2S2

DTC Description

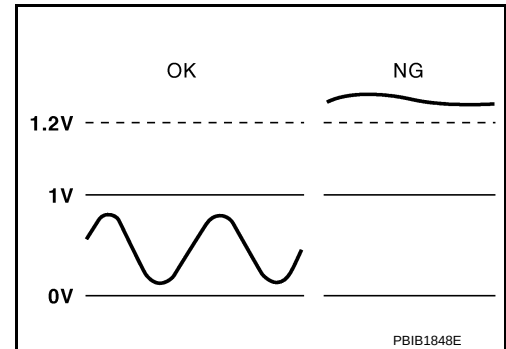
INFOID:000000010986343

DTC DETECTION LOGIC

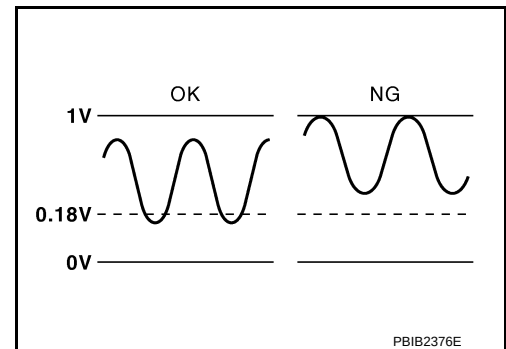
The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time.

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P0138	HO2S2 (B1) (O2 sensor circuit high voltage bank 1 sensor 2)	A	An excessively high voltage from the sensor is sent to ECM.
		B	The minimum voltage from the sensor is not reached to the specified voltage.

POSSIBLE CAUSE

DTC P0138 - A

- Harness or connectors (The sensor circuit is open or shorted.)
- Heated oxygen sensor 2

DTC P0138 - B

- Harness or connectors (The sensor circuit is open or shorted.)
- Heated oxygen sensor 2
- Fuel pressure
- Fuel injector

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

< DTC/CIRCUIT DIAGNOSIS >

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

1. Turn ignition 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-636, "Diagnosis Procedure"](#).

NO-1 >> With CONSULT: GO TO 3.

NO-2 >> Without CONSULT: GO TO 5.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

NOTE:

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

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

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

10. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT

OK >> INSPECTION END

NG >> Proceed to [EC-636, "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-1

⊗Without CONSULT

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F85	22	23	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.73 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

6.PERFORM COMPONENT FUNCTION CHECK-2

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

ECM			Condition	Voltage
Connector	+	−		
	Terminal			
F85	22	23	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.73 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 7.

7.PERFORM COMPONENT FUNCTION CHECK-3

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F85	22	23	Coasting from 80 km/h (50 MPH) in D position	The voltage should be above 0.73 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-636, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010986344

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to [EC-634, "DTC Description"](#).

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

< DTC/CIRCUIT DIAGNOSIS >

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

+		-		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F31	1	F85	23	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	
F31	2	F85	22	Existed

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

+		-	Continuity
HO2S2			
Connector	Terminal		
F31	2	Ground	Not existed

+		-	Continuity
ECM			
Connector	Terminal		
F85	22	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-639, "Component Inspection"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to [EX-12, "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

< DTC/CIRCUIT DIAGNOSIS >

7. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to [EC-557, "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-657, "DTC Description"](#).
 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	
F31	1	F85	23	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	
F31	2	F85	22	Existed

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

+		-	Continuity
HO2S2			
Connector	Terminal		
F31	2	Ground	Not existed

+		-	Continuity
ECM			
Connector	Terminal		
F85	22	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-639, "Component Inspection"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).
 NO >> GO TO 11.

11. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to [EX-12. "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:0000000010986345

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

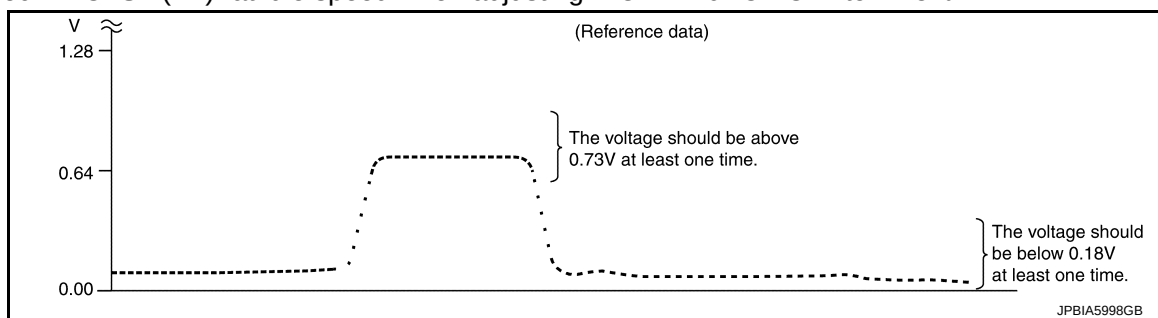
YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2

 With CONSULT

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



"HO2S2 (B1)" should be above 0.73 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 2-1

 Without CONSULT

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

ECM			Condition	Voltage
Connector	+	−		
	Terminal			
F85	22	23	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.73 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 2-2

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

ECM			Condition	Voltage
Connector	+	−		
	Terminal			
F85	22	23	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.73 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 2-3

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F85	22	23	Coasting from 80 km/h (50 MPH) in D position	The voltage should be above 0.73 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-12, "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

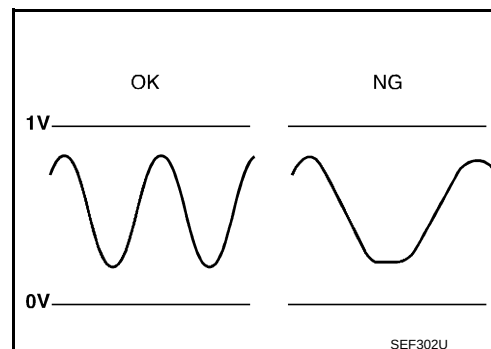
P0139 HO2S2

DTC Description

INFOID:000000010986346

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0139	HO2S2 (B1) (O2 sensor circuit slow response bank 1 sensor 2)	The switching time between rich and lean of a heated oxygen sensor 2 signal delays more than the specified time computed by ECM.

POSSIBLE CAUSE

- Harness or connectors (The sensor circuit is open or shorted.)
- Heated oxygen sensor 2
- Fuel system
- EVAP system
- Intake air system

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 7.

2. PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

④ With CONSULT

1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.

< DTC/CIRCUIT DIAGNOSIS >

5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
7. Let engine idle for 1 minute.
8. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
9. Drive the vehicle in a proper at 60 km/h (38MPH) and maintain the speed.

CAUTION:

Always drive vehicle at a safe speed.

10. Release the accelerator pedal fully at least 5 seconds.

CAUTION:

- **Enable engine brake.**
- **Always drive carefully.**
- **Never apply brake when releasing the accelerator pedal.**

11. Repeat step 9 and 10 at least 8 times.
12. Check the following item of "DATA MONITOR".

Data monitor item	Status
HO2 S2 DIAG1 (B1)	CMPLT
HO2 S2 DIAG2 (B1)	

Is "CMPLT" displayed on CONSULT screen?

YES >> GO TO 6.

NO-1: "CMPLT" is not displayed on DIAG 1>>Perform DTC confirmation procedure again.

NO-2: "CMPLT" is not displayed on DIAG 2>>GO TO 4.

4.PERFORM DTC WORK SUPPORT

1. Open engine hood.
2. Select "HO2S2 (B1) P0139" in "DTC WORK SUPPORT" mode of "ENGINE" using CONSULT.
3. Start engine and follow the instruction of CONSULT display.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

Is "COMPLETED" displayed on CONSULT screen?

YES >> GO TO 6.

NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

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

>> GO TO 3.

6.PERFORM SELF-DIAGNOSIS

ⓅWith CONSULT

Perform ECM self-diagnosis.

Is DTC "P0139" detected?

YES >> Proceed to [EC-643, "Diagnosis Procedure"](#).

NO >> INSPECTION END

7.PERFORM COMPONENT FUNCTION CHECK-1

ⓧWithout CONSULT

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F85	22	23	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.24 V at least once during this procedure

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 8.

8.PERFORM COMPONENT FUNCTION CHECK-2

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F85	22	23	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.24 V at least once during this procedure

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 9.

9.PERFORM COMPONENT FUNCTION CHECK-3

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F85	22	23	Coasting from 80 km/h (50 MPH) in D position	The voltage should be above 0.24 V at least once during this procedure

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-630, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010986347

1.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to [EC-557, "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-652, "DTC Description"](#) or [EC-657, "DTC Description"](#).

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	
F31	1	F85	23	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	
F31	2	F85	22	Existed

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

+		-	Continuity
HO2S2			
Connector	Terminal		
F31	2	Ground	Not existed

+		-	Continuity
ECM			
Connector	Terminal		
F85	22	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-645, "Component Inspection"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

NO >> GO TO 5.

5.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to [EX-12, "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:000000010986348

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

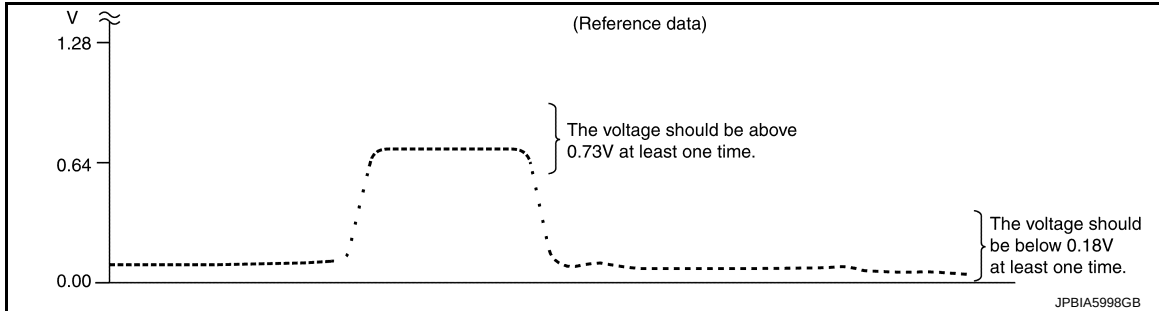
YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

Ⓜ With CONSULT

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



"HO2S2 (B1)" should be above 0.73 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 2-1

ⓧ Without CONSULT

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

ECM			Condition	Voltage
Connector	+	-		
	Terminal			
F85	22	23	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.73 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 2-2

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

ECM			Condition	Voltage
Connector	+	−		
	Terminal			
F85	22	23	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.73 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 2-3

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

ECM			Condition	Voltage
Connector	+	−		
	Terminal			
F85	22	23	Coasting from 80 km/h (50 MPH) in D position	The voltage should be above 0.73 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-12, "Exploded View"](#).

CAUTION:

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

>> INSPECTION END

P014C, P014D A/F SENSOR 1

DTC Description

INFOID:000000010986349

DTC DETECTION LOGIC

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

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P014C	A/F SENSOR1 (B1) (O2 sensor slow response - rich to lean bank 1 sensor 1)	The response time of a A/F sensor 1 signal delays more than the specified time computed by ECM.
P014D	A/F SENSOR1 (B1) (O2 sensor slow response - lean to rich bank 1 sensor 1)	

POSSIBLE CAUSE

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

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

TESTING CONDITION:

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

Do you have CONSULT?

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

2. PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
6. Let engine idle for 1 minute.
7. Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds.
8. Fully release accelerator pedal and then let engine idle for about 1 minute.
9. Check the items status of "DATA MONITOR" as follows.

NOTE:

If "PRSNT" changed to "ABSNT", refer to [EC-565, "Component Function Check"](#).

Data monitor item	Status
A/F SEN1 DIAG3 (B1)	PRSNT

Is "PRSNT" displayed on CONSULT screen?

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

< DTC/CIRCUIT DIAGNOSIS >

3.PERFORM DTC CONFIRMATION PROCEDURE-2 **With CONSULT**

Perform DTC confirmation procedure-1 again.

Is "PRSENT" displayed on CONSULT screen?

YES >> GO TO 4.

NO >> Refer to [EC-565, "Component Function Check"](#).**4.PERFORM DTC CONFIRMATION PROCEDURE-2** **With CONSULT**

1. Wait for about 20 seconds at idle.

2. Check the items status of "DATA MONITOR" as follows.

NOTE:If "CMPLT" changed to "INCMP", refer to [EC-565, "Component Function Check"](#).

Data monitor item	Status
A/F SEN1 DIAG1 (B1)	CMPLT
A/F SEN1 DIAG2 (B1)	

Is "CMPLT" displayed on CONSULT screen?

YES >> GO TO 5.

NO >> Refer to [EC-565, "Component Function Check"](#).**5.PERFORM SELF-DIAGNOSIS** **With CONSULT**

Check the "SELF-DIAG RESULT".

Is any DTC detected?YES >> Proceed to [EC-649, "Diagnosis Procedure"](#).

NO >> INSPECTION END

6.CHECK AIR-FUEL RATIO SELF-LEARNING VALUE **With GST**

1. Start engine and warm it up to normal operating temperature.

2. Select Service \$01 with GST.

3. Calculate the total value of "Short term fuel trim" and "Long term fuel trim" indications.

Is the total percentage within $\pm 15\%$?

YES >> GO TO 8.

NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.

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

>> Repair or replace malfunctioning part.

8.PERFORM DTC CONFIRMATION PROCEDURE

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

2. Turn ignition switch ON.

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

4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.

5. Let engine idle for 1 minute.

P014C, P014D A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

6. Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds.
7. Fully release accelerator pedal and then let engine idle for about 1 minute.
8. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-649, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986350

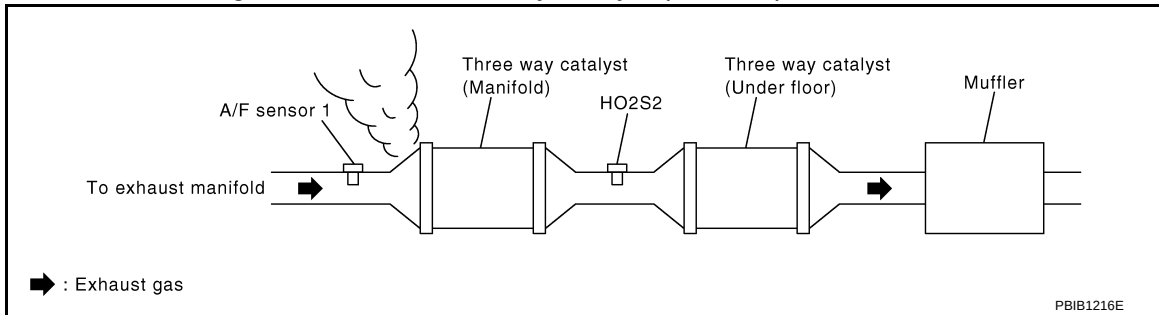
1.RETIGHTEN A/F SENSOR 1

Loosen and retighten the A/F sensor 1. Refer to [EM-180, "Exploded View"](#).

>> GO TO 2.

2.CHECK EXHAUST GAS LEAK

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



Is exhaust gas leak detected?

- YES >> Repair or replace.
NO >> GO TO 3.

3.CHECK FOR INTAKE AIR LEAK

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

Is intake air leak detected?

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

4.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to [EC-557, "Work Procedure"](#).
2. Run engine for at least 10 minutes at idle speed.

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

- YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to [EC-652, "DTC Description"](#) or [EC-657, "DTC Description"](#).
NO >> GO TO 5.

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

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

+		-	Voltage
A/F sensor 1			
Connector	Terminal		
F27	4	Ground	Battery voltage

Is the inspection result normal?

P014C, P014D A/F SENSOR 1

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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

+		-		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F27	1	F85	41	Existed
	2		45	

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		
F27	1	Ground	Not existed
	2		

+		-	Continuity
ECM			
Connector	Terminal		
F85	41	Ground	Not existed
	45		

5. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

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

Refer to [EC-593, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 8.
NO >> GO TO 11.

8.CHECK MASS AIR FLOW SENSOR

Refer to [EC-607, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 9.
NO >> Replace mass air flow sensor. Refer to [EM-174, "Exploded View"](#).

9.CHECK PCV VALVE

Refer to [EC-805, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 10.
NO >> Repair or replace PCV valve. Refer to [EC-440, "Component Parts Location"](#).

10.CHECK INTERMITTENT INCIDENT

Perform [GI-44, "Intermittent Incident"](#).

P014C, P014D A/F SENSOR 1

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair or replace.

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

Replace air fuel ratio (A/F) sensor 1. Refer to [EM-180, "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

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P

P0171 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Description

INFOID:000000010986351

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0171	FUEL SYS-LEAN-B1 (System too lean bank 1)	- Fuel injection system does not operate properly. - The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)

POSSIBLE CAUSE

- 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

FAIL-SAFE

Traveling control mode (Accelerator angle variation 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.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Clear the mixture ratio self-learning value. Refer to [EC-557, "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?

P0171 FUEL INJECTION SYSTEM FUNCTION

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Proceed to [EC-653, "Diagnosis Procedure"](#).
NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-2

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-653, "Diagnosis Procedure"](#).
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-3

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?

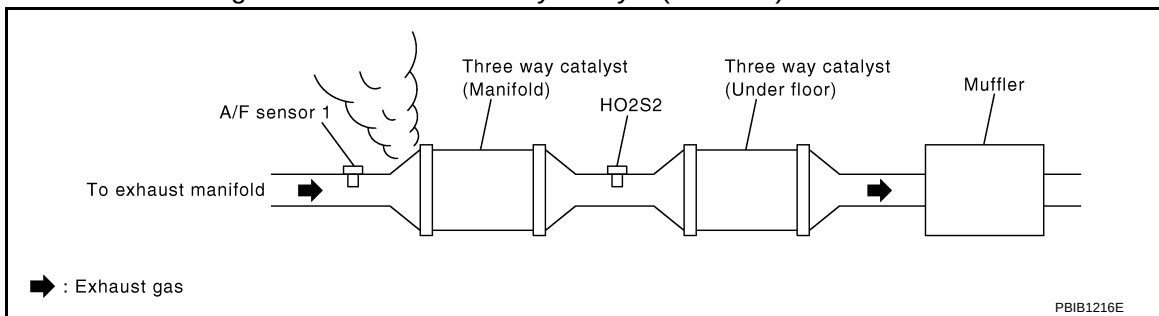
- YES >> Proceed to [EC-653, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986352

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.

P0171 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

+		-		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F27	1	F85	41	Existed
	2		45	

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		
F27	1	Ground	Not existed
	2		

+		-	Continuity
ECM			
Connector	Terminal		
F85	41	Ground	Not existed
	45		

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-558, "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-184, "Exploded View"](#).

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly". Refer to [FL-12, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

6.CHECK MASS AIR FLOW SENSOR

④ With CONSULT

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check "MASS AIR FLOW SENSOR (Hz)" in "DATA MONITOR" mode of "ENGINE" using CONSULT.

Monitor item	Condition	Value
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3500 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	3500- 4100 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	5000 - 5600 Hz
	Idle to about 4,000 rpm	3500 - 4100 Hz to Approx. 6300 Hz*

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

P0171 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

⊗ Without CONSULT

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check mass air flow sensor signal in Service \$01 with GST.

ECM			Condition	Value
Connector	+	-		
	Terminal			
F85	35	34	Ignition switch ON (Engine stopped.)	Approx. 3500 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	3500- 4100 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	5000 - 5600 Hz
			Idle to about 4,000 rpm	3500 - 4100 Hz to Approx. 6300 Hz*
			Ignition switch ON (Engine stopped.)	Approx. 3500 Hz

*: Check for linear frequency rise in response to engine being increased to about 4,000 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-605, "DTC Description"](#).

7.CHECK FUNCTION OF FUEL INJECTOR

Ⓜ With CONSULT

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

⊗ Without CONSULT

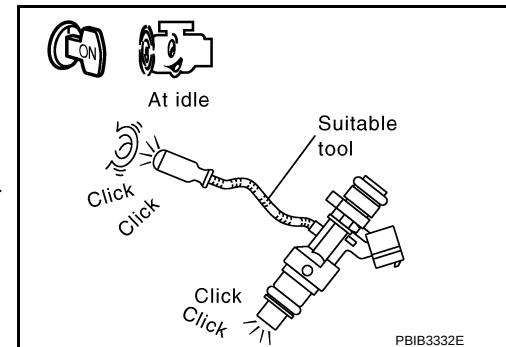
1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Perform trouble diagnosis for "FUEL INJECTOR", refer to [EC-779, "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-184, "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.

P0171 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

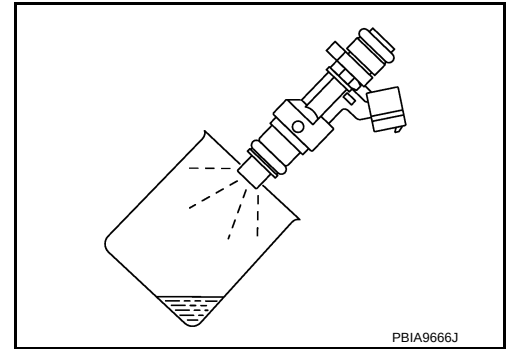
7. Crank engine for about 3 seconds.

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. Refer to [EM-184, "Removal and Installation"](#).



9. CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

P0172 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Description

INFOID:000000010986353

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0172	FUEL SYS-RICH-B1 (System too rich bank 1)	- Fuel injection system does not operate properly. - The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)

POSSIBLE CAUSE

- A/F sensor 1
- Fuel injector
- Exhaust gas leaks
- Incorrect fuel pressure
- Mass air flow sensor

FAIL-SAFE

Traveling control mode (Accelerator angle variation 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.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Clear the mixture ratio self-learning value. Refer to [EC-557, "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-658, "Diagnosis Procedure"](#).
NO >> Check exhaust and intake air leak visually.

P0172 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

4.PERFORM DTC CONFIRMATION PROCEDURE-2

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-658. "Diagnosis Procedure"](#).
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-3

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?

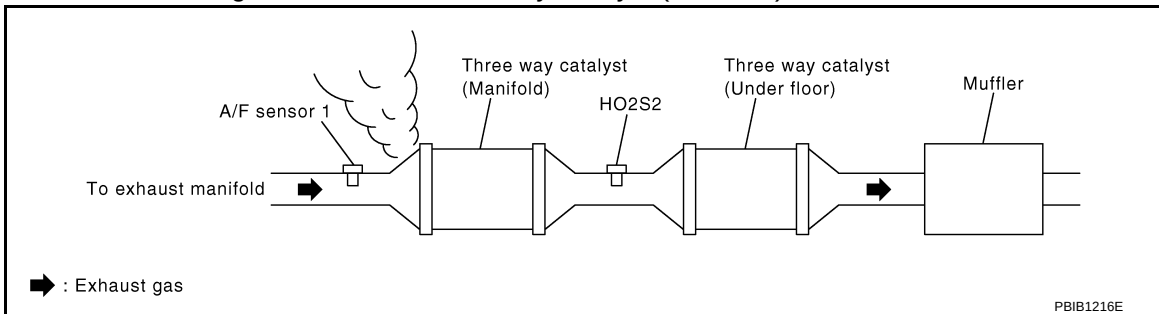
YES >> Proceed to [EC-658. "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986354

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.

P0172 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

+		-		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F27	1	F85	41	Existed
	2		45	

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		
F27	1	Ground	Not existed
	2		

+		-	Continuity
ECM			
Connector	Terminal		
F85	41	Ground	Not existed
	45		

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-558, "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-184, "Exploded View"](#).

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly". Refer to [FL-12, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

6.CHECK MASS AIR FLOW SENSOR

 With CONSULT

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check "MASS AIR FLOW SENSOR (Hz)" in "DATA MONITOR" mode of "ENGINE" using CONSULT.

Monitor item	Condition	Value
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3500 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	3500- 4100 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	5000k - 5600 Hz
	Idle to about 4,000 rpm	3500 - 4100 Hz to Approx. 6300 Hz*

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

P0172 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

⊗ Without CONSULT

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check mass air flow sensor signal in Service \$01 with GST.

ECM			Condition	Value
Connector	+	-		
	Terminal			
F85	35	34	Ignition switch ON (Engine stopped.)	Approx. 3500 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	3500- 4100 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	5000k - 5600 Hz
			Idle to about 4,000 rpm	3500 - 4100 Hz to Approx. 6300 Hz*
			Ignition switch ON (Engine stopped.)	Approx. 3500 Hz

*: Check for linear frequency rise in response to engine being increased to about 4,000 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-606, "Diagnosis Procedure"](#).

7.CHECK FUNCTION OF FUEL INJECTOR

📖 With CONSULT

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

⊗ Without CONSULT

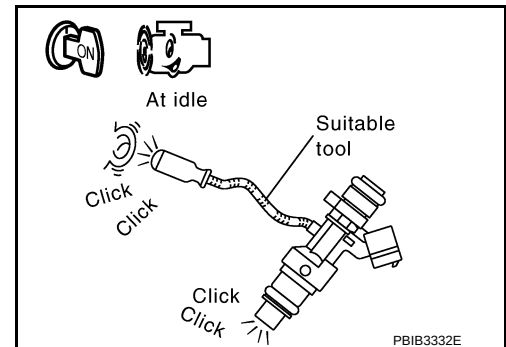
1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Perform trouble diagnosis for "FUEL INJECTOR", refer to [EC-779, "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-184, "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.

P0172 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

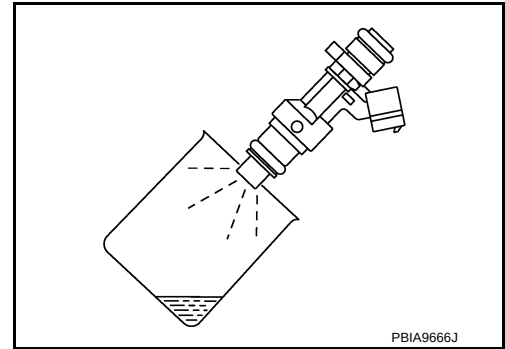
7. Crank engine for about 3 seconds.

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. Refer to [EM-184, "Removal and Installation"](#).



9. CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

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P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P0197, P0198 EOT SENSOR

DTC Description

INFOID:000000010986355

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0197	EOT SEN/CIRC (Engine oil temperature sensor low)	An excessively low voltage from the engine oil temperature sensor is sent to ECM.
P0198	EOT SEN/CIRC (Engine oil temperature sensor high)	An excessively high voltage from the engine oil temperature sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (EOT sensor circuit is open or shorted.)
- Engine oil temperature sensor

FAIL-SAFE

Exhaust valve timing control does not function.

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-662, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000010986356

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		
F112	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.

P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

3. Check the continuity between EOT sensor harness connector and ECM harness connector.

+		-		Continuity
EOT sensor		ECM		
Connector	Terminal	Connector	Terminal	
F112	1	F85	25	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	
F112	2	F85	26	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-663, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Replace engine oil temperature sensor. Refer to [EC-440, "Component Parts Location"](#).

5.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

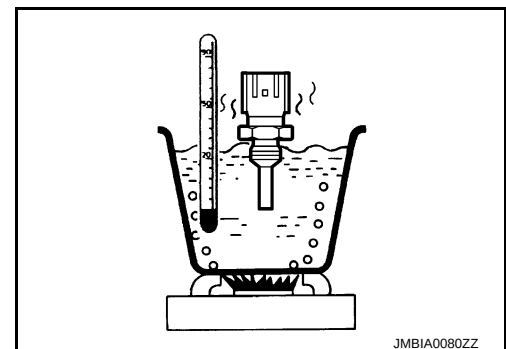
Component Inspection

INFOID:0000000010986357

1.CHECK ENGINE OIL TEMPERATURE SENSOR

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

Engine oil temperature sensor		Condition		Resistance (kΩ)
+	−			
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63
			50 (122)	0.68 - 1.00
			90 (194)	0.236 - 0.260



P0197, P0198 EOT SENSOR

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil temperature sensor. Refer to [EC-440. "Component Parts Location"](#).

P0222, P0223 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P0222, P0223 TP SENSOR

DTC Description

INFOID:000000010986358

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0222	TP SEN 1/CIRC-B1 (Throttle/pedal position sensor/switch "B" circuit low)	An excessively low voltage from the TP sensor 1 is sent to ECM.
P0223	TP SEN 1/CIRC-B1 (Throttle/pedal position sensor/switch "B" circuit high)	An excessively high voltage from the TP sensor 1 is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (TP sensor 1 circuit is open or shorted.)
- Electric throttle control actuator (TP sensor 1)

FAIL-SAFE

- The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.
- The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0222 or P0223 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-707, "DTC Description"](#).
NO >> GO TO 2.

2.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-665, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000010986359

1.CHECK DTC PRIORITY

If DTC P0222 or P0223 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-707, "DTC Description"](#).
NO >> GO TO 2.

< DTC/CIRCUIT DIAGNOSIS >

2. 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		
F113	2	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. 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	
F113	2	F68	80	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 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	
F113	4	F68	78	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 THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT

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

P0222, P0223 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

+		-		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F113	1	F68	79	Existed

2. Also check harness for short to ground and 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 THROTTLE POSITION SENSOR

Check the throttle position sensor. Refer to [EC-667, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace electric throttle control actuator. Refer to [EM-176, "Removal and Installation"](#).

7.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000010986360

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-554, "Work Procedure"](#).
4. Turn ignition switch ON.
5. Set selector lever to D position.
6. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM				Condition		Voltage	
Connector		+	—				
		Terminal					
Sensor 1	F68	79	78	Accelerator pedal	Fully released	More than 0.36V	
					Fully depressed	Less than 4.75V	
Sensor 2		77				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-176, "Removal and Installation"](#).

P0300, P0301, P0302, P0303, P0304 MISFIRE

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Description

INFOID:000000010986361

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0300	MULTI CYL MISFIRE (Random/multiple cylinder misfire detected)	Multiple cylinder misfire.
P0301	CYL 1 MISFIRE (Cylinder 1 Misfire Detected)	No. 1 cylinder misfires.
P0302	CYL 2 MISFIRE (Cylinder 2 Misfire Detected)	No. 2 cylinder misfires.
P0303	CYL 3 MISFIRE (Cylinder 3 Misfire Detected)	No. 3 cylinder misfires.
P0304	CYL 4 MISFIRE (Cylinder 4 Misfire Detected)	No. 4 cylinder misfires.

POSSIBLE CAUSE

- 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

FAIL-SAFE

Traveling control mode (Accelerator angle variation control)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

P0300, P0301, P0302, P0303, P0304 MISFIRE

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

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

1. Turn ignition 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

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-669, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start 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 $\pm$ 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data $\pm$ 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-669, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986362

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

3. PERFORM POWER BALANCE TEST

Ⓟ With CONSULT

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

Is the inspection result normal?

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

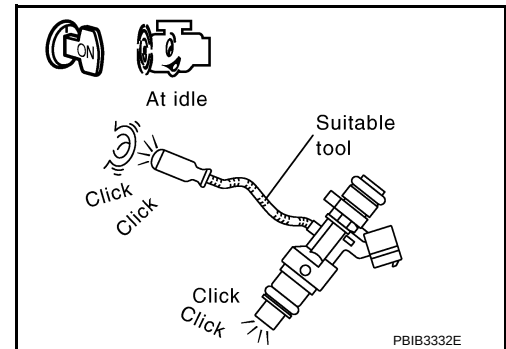
4. CHECK FUNCTION OF FUEL INJECTOR

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-779, "Diagnosis Procedure"](#).



5. CHECK FUNCTION OF IGNITION COIL-1

CAUTION:

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

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

NOTE:

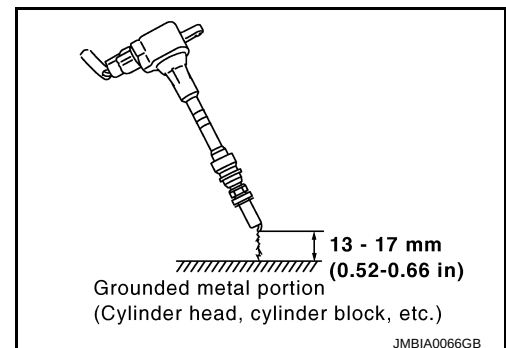
Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

- Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.



P0300, P0301, P0302, P0303, P0304 MISFIRE

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

- 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-2

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-785, "Diagnosis Procedure"](#).

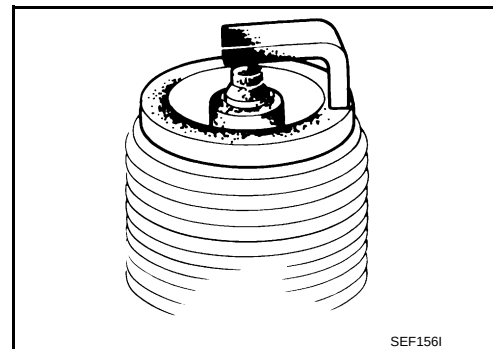
7.CHECK SPARK PLUG

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-275, "Spark Plug"](#).

NO >> Repair or clean spark plug. Then GO TO 8.



8.CHECK FUNCTION OF IGNITION COIL-3

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-275, "Spark Plug"](#).

9.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to [EM-162, "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.
3. Install fuel pressure gauge and check fuel pressure. Refer to [EC-558, "Work Procedure"](#).

At idling: Approximately 350 kPa (3.57 kg/cm², 51 psi)

Is the inspection result normal?

YES >> GO TO 12.

< DTC/CIRCUIT DIAGNOSIS >

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-12. "Removal and Installation"](#).

NO >> Repair or replace.

12.CHECK IGNITION TIMING

Check the following items.

For procedure, refer to [EC-546. "Work Procedure"](#).

For specification, refer to [EC-807. "Ignition Timing"](#).

Is the inspection result normal?

YES >> GO TO 13.

NO >> Follow the [EC-546. "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	
F27	1	F85	41	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		
F27	1	Ground	Not existed

+		-	Continuity
ECM			
Connector	Terminal		
F85	41	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-593. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace A/F sensor 1. Refer to [EM-180. "Exploded View"](#).

15.CHECK MASS AIR FLOW SENSOR

 With CONSULT

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check "MASS AIR FLOW SENSOR (Hz)" in "DATA MONITOR" mode of "ENGINE" using CONSULT.

P0300, P0301, P0302, P0303, P0304 MISFIRE

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

Monitor item	Condition	Value
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3500 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	3500- 4100 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	5100 - 5600 Hz
	Idle to about 4,000 rpm	3500 - 4100 Hz to Approx. 6300 Hz*

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

⊗ Without CONSULT

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check mass air flow sensor signal in Service \$01 with GST.

ECM			Condition	Value
Connector	+	–		
	Terminal			
F85	35	34	Ignition switch ON (Engine stopped.)	Approx. 3500 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	3500- 4100 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	5100 - 5600 Hz
			Idle to about 4,000 rpm	3500 - 4100 Hz to Approx. 6300 Hz*
			Ignition switch ON (Engine stopped.)	Approx. 3500 Hz

*: Check for linear frequency rise in response to engine being increased to about 4,000 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-605, "DTC Description"](#).

16.CHECK SYMPTOM TABLE

Check items on the rough idle symptom in [EC-796, "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-480, "Diagnosis Description"](#).

>> GO TO 18.

18.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

P0327, P0328 KS

DTC Description

INFOID:000000010986363

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0327	KNOCK SEN/CIRC-B1 (Knock sensor 1 circuit low bank 1 or single sensor)	An excessively low voltage from the knock sensor is sent to ECM.
P0328	KNOCK SEN/CIRC-B1 (Knock sensor 1 circuit high bank 1 or single sensor)	An excessively high voltage from the knock sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (Knock sensor circuit is open or shorted.)
- Knock sensor

FAIL-SAFE

Not applicable

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-674. "Diagnosis Procedure"](#).
 NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000010986364

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	F85	8	Existed

5. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 2.

< DTC/CIRCUIT DIAGNOSIS >

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	F85	4	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-675, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace knock sensor. Refer to [EM-247, "Exploded View"](#).

4.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000010986365

1.CHECK KNOCK SENSOR

- Turn ignition switch OFF.
- Disconnect knock sensor harness connector.
- 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-247, "Exploded View"](#).

P0335 CKP SENSOR (POS)

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P0335 CKP SENSOR (POS)

DTC Description

INFOID:0000000010986366

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0335	CKP SEN/CIRCUIT (Crankshaft position sensor "A" 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.

POSSIBLE CAUSE

- Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.]
- Crankshaft position sensor (POS)
- Signal plate
- Sensor power supply 2 circuit

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0335 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-707, "DTC Description"](#).
NO >> GO TO 2.

2.PRECONDITIONING

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

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

3.PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and let it idle for at least 5 seconds.
If engine does not start, crank engine for at least 2 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-676, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986367

1.CHECK DTC PRIORITY

If DTC P0335 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-707, "DTC Description"](#).
NO >> GO TO 2.

P0335 CKP SENSOR (POS)

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

2. 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		
F20	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

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	
F20	2	F68	70	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	
F20	3	F68	71	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-678, "Component Inspection \(Crankshaft Position sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace crankshaft position sensor (POS). Refer to [EM-247, "Exploded View"](#).

6. CHECK GEAR TOOTH

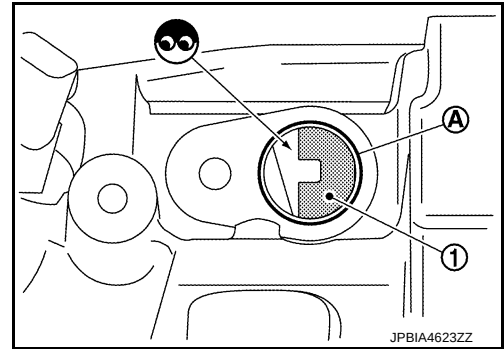
1. Remove crankshaft position sensor (POS). Refer to [EM-247, "Exploded View"](#).

P0335 CKP SENSOR (POS)

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

- Look into the mounting hole[Ⓐ] 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 >> GO TO 7.

NO >> Replace the signal plate. Refer to [EM-247, "Exploded View"](#).

7.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection (Crankshaft Position sensor)

INFOID:0000000010986368

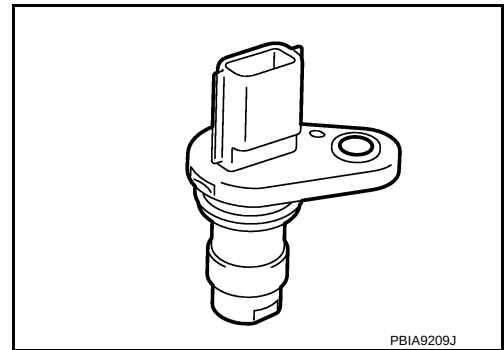
1.CHECK CRANKSHAFT POSITION SENSOR (POS)-1

- Turn ignition switch OFF.
- Loosen the fixing bolt of the sensor.
- Disconnect crankshaft position sensor (POS) harness connector.
- Remove the sensor.
- Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace crankshaft position sensor (POS). Refer to [EM-247, "Exploded View"](#).



2.CHECK CRANKSHAFT POSITION SENSOR (POS)-2

Check the resistance between crankshaft position sensor (POS) terminals as per the following.

Crankshaft position sensor (POS)		Resistance [at 25°C (77°F)]
+	–	
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace crankshaft position sensor (POS). Refer to [EM-247, "Exploded View"](#).

P0340 CMP SENSOR (PHASE)

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P0340 CMP SENSOR (PHASE)

DTC Description

INFOID:0000000110986369

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0340	CMP SEN/CIRC-B1 (Camshaft position sensor "A" circuit bank 1 or single sensor)	- 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.

POSSIBLE CAUSE

- Harness or connectors (Camshaft position sensor circuit is open or shorted.)
- Camshaft position sensor
- Camshaft (Intake)
- Starter motor
- Starting system circuit
- Dead (Weak) battery
- Sensor power supply 2 circuit

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 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.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-679, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

- Maintaining engine speed at more than 800 rpm for at least 5 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-679, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000110986370

1.CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

P0340 CMP SENSOR (PHASE)

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 2.
NO >> Check starting system. Refer to [STR-19, "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		
F105	1	Ground	5 V

Is the inspection result normal?

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

3. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform [EC-794, "Diagnosis Procedure"](#).

Is inspection result normal?

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

4. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT

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

+		-		Continuity
CMP sensor (PHASE)		ECM		
Connector	Terminal	Connector	Terminal	
F105	2	F85	30	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	
F105	3	F85	31	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-681, "Component Inspection \(Camshaft position sensor\)"](#).

P0340 CMP SENSOR (PHASE)

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace camshaft position sensor (PHASE). Refer to [EM-221, "Exploded View"](#).

7.CHECK CAMSHAFT (INT)

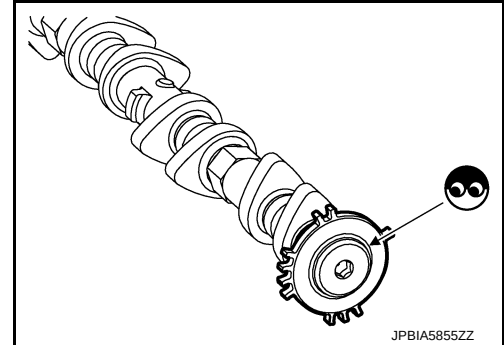
Check the following.

- 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. Refer to [EM-221, "Exploded View"](#).



8.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection (Camshaft position sensor)

INFOID:0000000010986371

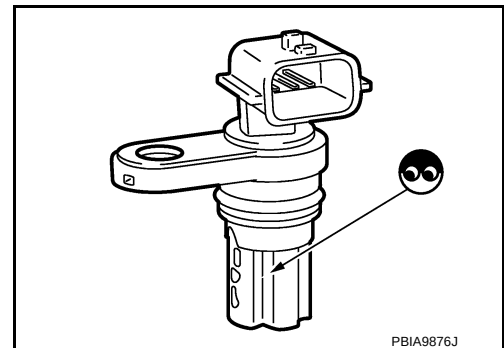
1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-1

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

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace camshaft position sensor (PHASE).



2.CHECK CAMSHAFT POSITION SENSOR (PHASE)-2

Check the resistance camshaft position sensor (PHASE) terminals as per the following.

Camshaft position sensor (PHASE)		Resistance [Ω at 25°C (77°F)]
+	-	
Terminals (Polarity)		Except 0 or ∞
1	2	
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace camshaft position sensor (PHASE). Refer to [EM-221, "Exploded View"](#).

P0420 THREE WAY CATALYST FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P0420 THREE WAY CATALYST FUNCTION

DTC Description

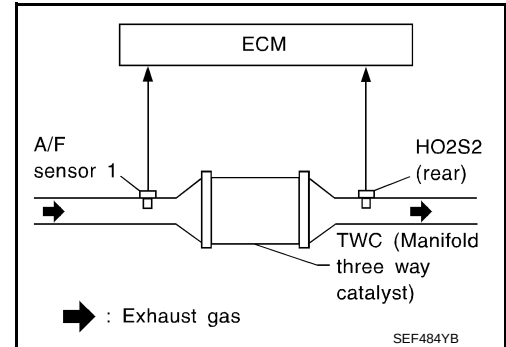
INFOID:000000010986372

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0420	TW CATALYST SYS-B1 (Catalyst system efficiency below threshold bank 1)	- Three way catalyst (manifold) does not operate properly. - Three way catalyst (manifold) does not have enough oxygen storage capacity.

POSSIBLE CAUSE

- Three way catalyst (manifold)
- Exhaust tube
- Intake air leaks
- Fuel injector
- Fuel injector leaks
- Spark plug
- Improper ignition timing

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

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

Will CONSULT be used?

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

2. PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

TESTING CONDITION:

Do not hold engine speed for more than the specified minutes below.

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
6. Let engine idle for 1 minute.
7. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
8. Check that "COOLAN TEMP/S" indicates more than 70°C (158°F).

P0420 THREE WAY CATALYST FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

- If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F).
- Open engine hood.
 - Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode of "ENGINE" using CONSULT.
 - Rev engine up to 2,500 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
 - Check the indication of "CATALYST".

Which is displayed on CONSULT screen?

CMPLT >> GO TO 5.

INCMP >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

- Wait 5 seconds at idle.
- Rev engine up to 2,500 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

- Stop engine and cool it down to less than 70°C (158°F).
- Perform DTC confirmation procedure again.

>> GO TO 2.

5.PERFORM DTC CONFIRMATION PROCEDURE-3

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-683, "Diagnosis Procedure"](#).

NO >> INSPECTION END

6.PERFORM COMPONENT FUNCTION CHECK

⊗ Without CONSULT

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

ECM			Condition	Voltage (V)
Connector	+	−		
	Terminal			
F85	22	23	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-683, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010986373

1.CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dent.

Is the inspection result normal?

P0420 THREE WAY CATALYST FUNCTION

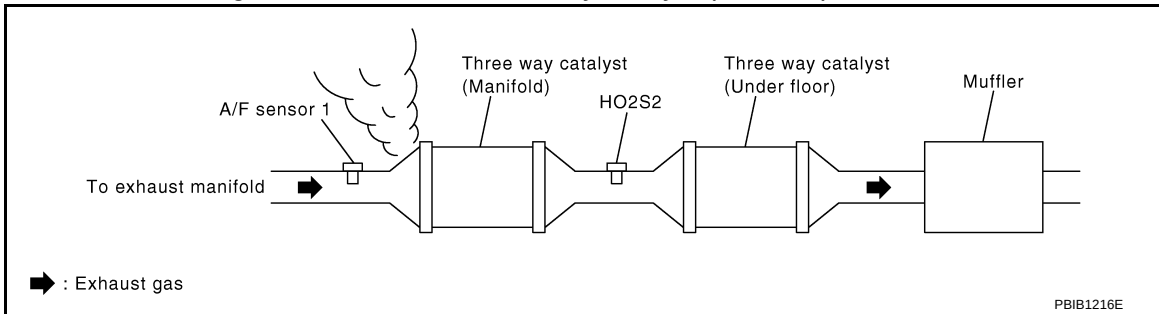
[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

- 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-546, "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-546, "Work Procedure"](#).

5.CHECK FUEL INJECTOR

Check the fuel injector. Refer to [EC-779, "Component Function Check"](#).

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Perform [EC-779, "Diagnosis Procedure"](#).

6.CHECK FUNCTION OF IGNITION COIL-1

CAUTION:

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

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

NOTE:

Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.

P0420 THREE WAY CATALYST FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

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-2

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?

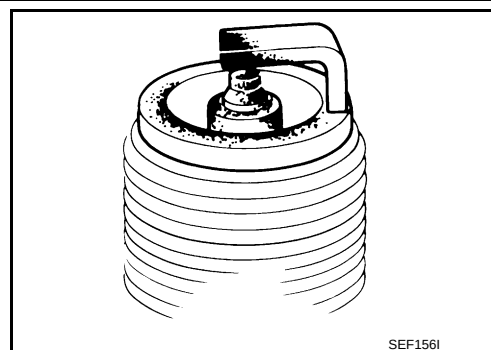
- YES >> GO TO 8.
NO >> Check ignition coil, power transistor and their circuits. Refer to [EC-785, "Diagnosis Procedure"](#).

8.CHECK SPARK PLUG

Check the initial spark plug for fouling, etc. Refer to [EM-171, "Removal and Installation"](#).

Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [EM-274, "General Specification"](#).
- NO >> Repair or clean spark plug. Refer to [EM-171, "Removal and Installation"](#). Then GO TO 9



9.CHECK FUNCTION OF IGNITION COIL-3

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-274, "General Specification"](#).

10.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.

P0420 THREE WAY CATALYST FUNCTION

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

2. Remove fuel injector assembly.
Refer to [EM-184, "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-184, "Exploded View"](#).

11.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

Is the trouble fixed?

- YES >> INSPECTION END
NO >> Replace three way catalyst assembly. Refer to [EM-180, "Exploded View"](#).

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Description

INFOID:000000010986374

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0444	PURG VOLUME CONT/V (Evaporative emission system purge control valve circuit open)	An excessively low voltage signal is sent to ECM through the EVAP canister purge volume control solenoid valve.

POSSIBLE CAUSE

- Harness or connectors (EVAP canister purge volume control solenoid valve circuit is open or shorted.)
- EVAP canister purge volume control solenoid valve

FAIL-SAFE

Not applicable

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-687. "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000010986375

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		
F32	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

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

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	
F32	2	F72	73	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE GROUND CIRCUIT

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

+		-		Continuity
EVAP canister purge volume control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F32	1	F85	17	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 4.

YES-2 >> Without CONSULT: GO TO 5.

NO >> Repair or replace error-detected parts.

4.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
4. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 6.

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-689, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to [EC-440, "Component Parts Location"](#).

6.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

Component Inspection

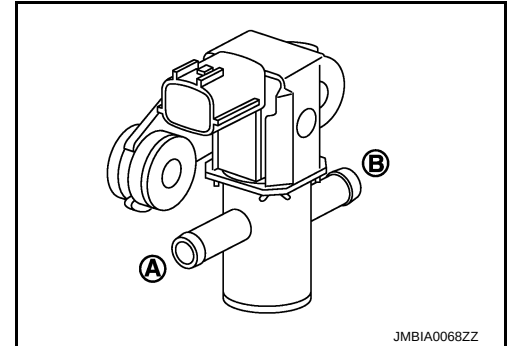
INFOID:000000010986376

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

④With CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Start engine.
5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
6. Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve as per the following conditions.

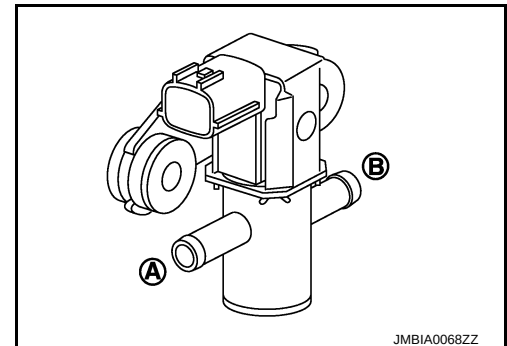
Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



⊗Without CONSULT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Check air passage continuity of EVAP canister purge volume control solenoid valve as per the following conditions.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Existed
No supply	Not existed



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to [EC-440](#),
["Component Parts Location"](#).

P0500 VSS

Description

INFOID:000000010986377

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 Description

INFOID:000000010986378

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0500	VEHICLE SPEED SENSOR A (Vehicle speed sensor "A")	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).

POSSIBLE CAUSE

- Harness or connectors (CAN communication line is open or shorted.)
- Combination meter
- ABS actuator and electric unit (control unit)
- Wheel sensor
- TCM
- Output speed sensor

FAIL-SAFE

Traveling control mode (Accelerator angle variation control)

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0500 is displayed with DTC UXXXX or P0607, first perform the trouble diagnosis for DTC UXXXX or P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-517, "DTC Index"](#).
 NO >> GO TO 2.

2.PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 10 V or more at idle.

>> GO TO 3.

3.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.

< DTC/CIRCUIT DIAGNOSIS >

Is 1st trip DTC detected?

- YES >> Proceed to [EC-691, "Diagnosis Procedure"](#)
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986379

EC

1.CHECK DTC PRIORITY

If DTC P0500 is displayed with DTC UXXXX or P0607, first perform the trouble diagnosis for DTC UXXXX or P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-517, "DTC Index"](#).
- NO >> GO TO 2.

2.CHECK DTC WITH TCM

Check DTC with TCM. Refer to [TM-288, "DTC Index"](#).

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Perform trouble shooting relevant to DTC indicated.

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

Check DTC with ABS actuator and electric unit (control unit). Refer to [BRC-84, "DTC Index"](#).

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Perform trouble shooting relevant to DTC indicated.

4.CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to [MWI-105, "DTC Index"](#).

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Perform trouble shooting relevant to DTC indicated.

5.CHECK INPUT SPEED SENSOR

Check input speed sensor. Refer to [TM-335, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Replace or replace error-detected parts.

6.CHECK WHEEL SENSOR

Check wheel sensor. Refer to [BRC-127, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Replace or replace error-detected parts.

7.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

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P0520 EOP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P0520 EOP SENSOR

DTC Description

INFOID:0000000010986386

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0520	EOP SENSOR/SWITCH (Engine oil pressure sensor/switch circuit)	Signal voltage from the EOP sensor remains at more than 5.02 V / less than 0.3 V for 5 seconds or more.

POSSIBLE CAUSE

- Harness or connectors (EOP sensor circuit is open or shorted.)
- Engine oil level abnormality
- EOP sensor
- Sensor power supply 2 circuit

FAIL-SAFE

Not applicable

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-692, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986387

1.CHECK ENGINE OIL

1. Turn ignition switch OFF.
2. Check engine oil level and pressure. Refer to [LU-25, "Inspection"](#).

Is inspection result normal?

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

2.CHECK EOP SENSOR POWER SUPPLY-1

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		
F106	3	1	5 V

Inspection result normal?

P0520 EOP SENSOR

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 7.
NO >> GO TO 3.

3.CHECK EOP SENSOR POWER SUPPLY-2

Check the voltage between EOP sensor harness connector and the ground.

+		-	Voltage (Approx.)
EOP sensor			
Connector	Terminal		
F106	3	Ground	5 V

Is inspection result normal?

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

4.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform [EC-794, "Diagnosis Procedure"](#).

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	
F106	1	F85	38	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		
F85	16	Ground	Existed
F68	52		
E60	123		
	128		

Is inspection result normal?

YES >> GO TO 9.
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.

P0520 EOP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

+		-		Continuity
EOP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F106	2	F85	39	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-694, "Component Inspection"](#).

Is inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000010986388

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 [EC-440, "Component Parts Location"](#).

P0524 ENGINE OIL PRESSURE

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P0524 ENGINE OIL PRESSURE

DTC Description

INFOID:000000010986389

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0524	ENGINE OIL PRESSURE (Engine oil pressure too low)	An EOP sensor signal voltage applied to ECM remains lower than the specified value continuously for 10 seconds or more when the engine speed is 1,000 rpm or more.

POSSIBLE CAUSE

- Decrease in engine oil pressure
- Decrease in engine oil level
- Engine oil condition
- EOP sensor
- Engine body

FAIL-SAFE

- ECM illuminates oil pressure warning lamp on the combination meter.
- Engine speed will not rise more than 4,000rpm due to the fuel cut.
- Fail-safe is canceled when ignition switch OFF → ON.

DTC CONFIRMATION PROCEDURE

CAUTION:

If "[EC-696, "Diagnosis Procedure"](#)" is unfinished, be sure to perform Step 3 and 4.

1. PRECONDITIONING-1

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

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

TEST CONDITION:

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

>> GO TO 2.

2. PRECONDITIONING-2

Is "Diagnosis Procedure" of DTC P0524 finished?

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

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Maintain the following conditions for about 10 consecutive seconds.

Selector lever	P or N position
Engine coolant temperature	70°C (158°F) or more
Engine speed	1,000 rpm or more

NOTE:

With engine speed set around 4,000 rpm, the phenomenon can be reproduced more easily.

3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-696, "Diagnosis Procedure"](#).
NO >> INSPECTION END

P0524 ENGINE OIL PRESSURE

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

4.CHECK ENGINE OIL LEVEL

Check engine oil pressure. Refer to [LU-25, "Inspection"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Proceed to [EC-696, "Diagnosis Procedure"](#).

5.CHECK ENGINE OIL PRESSURE

 With CONSULT

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Start the engine and check that "EOP SENSOR" changes, according to engine speeds.

Monitor item	Condition		Value (Approx.)
EOP SENSOR	• Engine oil temperature: 80°C (176°F) • Selector lever: P or N position • Air conditioner switch: OFF • No load	Engine speed: Idle	1,450 mV or more
		Engine speed: 2,000 rpm	2,850 mV or more

 Without CONSULT

Check engine oil level. Refer to [LU-25, "Inspection"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Proceed to [EC-696, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010986390

1.CHECK ENGINE OIL LEVEL

1. Turn ignition switch OFF.
2. Check engine oil pressure level. Refer to [LU-25, "Inspection"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 4.

2.CHECK ENGINE OIL PRESSURE

 With CONSULT

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Start the engine and check that "EOP SENSOR" changes, according to engine speeds.

Monitor item	Condition		Value (Approx.)
EOP SENSOR	• Engine oil temperature: 80°C (176°F) • Selector lever: P or N position • Air conditioner switch: OFF • No load	Engine speed: Idle	1,450 mV or more
		Engine speed: 2,000 rpm	2,850 mV or more

 Without CONSULT

Check engine oil pressure. Refer to [LU-25, "Inspection"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Check oil pump. Refer to [LU-31, "Exploded View"](#).

3.CHECK EOP SENSOR

Check EOP sensor. Refer to [EC-694, "Component Inspection"](#).

Is the inspection result normal?

P0524 ENGINE OIL PRESSURE

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

4.CHECK ENGINE OIL LEAKAGE

Check engine oil leakage. Refer to [LU-24, "Engine Lubrication System Schematic"](#).

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK CAUSE OF ENGINE OIL CONSUMPTION

Check the following item.

Step	Inspection item	Equipment	Standard	Reference
1	PCV valve	EC-805, "Inspection"		
2	Exhaust front tube	Visual	• No blocking • No abnormal sounds	—
3	Oil pump	Visual	• No blocking • No abnormal sounds	—
		LU-31, "Exploded View"		
4	• Piston • Piston pin • Piston ring	• Piston to piston pin oil clearance • Piston ring side clearance • Piston ring end gap		EM-265, "Description"
5	Cylinder block	• Cylinder block top surface distortion • Piston to cylinder bore clearance		EM-256, "Inspection"

>> Repair or replace error-detected parts.

6.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000010986391

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 [EC-440, "Component Parts Location"](#).

P0603, P062F ECM

DTC Description

INFOID:0000000010986398

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0603	ECM BACK UP/CIRCUIT [Internal Control Module Keep Alive Memory (KAM) Error]	ECM buck up system does not function properly.
P062F	CONTROL MODULE (Internal control module EEPROM error)	EEPROM (built-in microcomputer) system internal ECM does not function properly.

POSSIBLE CAUSE

DTC P0603

- Harness or connectors (ECM power supply circuit is open or shorted.)
- ECM

DTC P062F

ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Perform the following procedure before performing DTC Confirmation Procedure.

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P062F

1. Start engine and wait at least 10 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Repeat steps 1 and 2 for 4 times.
4. Turn ignition switch ON.
5. Erase DTC.
6. Turn ignition switch OFF and wait at least 10 seconds.
7. Start engine and wait at least 10 seconds.
8. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-699, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0603

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON and wait at least 10 seconds.
3. Turn ignition switch OFF and wait at least 5 minutes.
4. Turn ignition switch ON and wait at least 10 seconds.
5. Repeat steps 3 and 4 for 5 times.
6. Turn ignition switch ON.
7. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-699, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000010986399

1.INSPECTION START

Check that the battery negative terminal is not disconnected during ignition switch ON.

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.ERASE DTC

1. Start the engine and let it idle at least 10 seconds.
2. Turn ignition switch OFF.
3. Repeat steps 1 and 2 for 4 times.
4. Erase DTC.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start the engine and let it idle for 10 seconds.
7. Check 1st trip DTC.

Is DTC P062F detected again?

YES >> Replace ECM. Refer to [EC-806, "Removal and Installation"](#).

NO >> INSPECTION END

3.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to [EC-573, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to [EC-698, "DTC Description"](#).

Is the DTC P0603 or P062F detected again?

YES >> Replace ECM. Refer to [EC-806, "Removal and Installation"](#).

NO >> INSPECTION END

P0604 ECM

DTC Description

INFOID:0000000010986400

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0604	ECM [Internal control module random access memory (RAM) error]	Malfunction in the internal RAM of ECM.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON (engine stopped) and wait least 20 minutes.

CAUTION:**Never start engine during this procedure.**

2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-700, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986401

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to [EC-700, "DTC Description"](#).

Is the 1st trip DTC P0604 displayed again?

- YES >> Replace ECM. Refer to [EC-806, "Removal and Installation"](#).
- NO >> INSPECTION END

P0605 ECM

DTC Description

INFOID:0000000010986402

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0605	ECM [Internal control module read only memory (ROM) error]	Malfunction in the internal ROM of ECM.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Traveling control mode (Engine output control)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON (engine stopped) and wait least 20 minutes.

CAUTION:**Never start engine during this procedure.**

2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-701, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986403

1. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to [EC-701, "DTC Description"](#).

Is the 1st trip DTC P0605 displayed again?

- YES >> Replace ECM. Refer to [EC-806, "Removal and Installation"](#).
- NO >> INSPECTION END

P0606 ECM

DTC Description

INFOID:0000000010986404

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0606	CONTROL MODULE (Control module processor)	Malfunction in ECM processor.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Turn ignition switch ON (engine stopped) and wait at least 10 seconds.

CAUTION:

Never start engine during this procedure.

2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-702, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Start engine.
2. Rev up the engine quickly to approximately 3,000 rpm under unloaded condition and completely release the accelerator pedal.
3. Let the engine idle and wait at least 10 seconds.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-702, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986405

1. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure for 3 times. Refer to [EC-702, "DTC Description"](#).

Is the 1st trip DTC P0606 displayed again?

P0606 ECM

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

YES >> Replace ECM. Refer to [EC-806. "Removal and Installation"](#).
NO >> INSPECTION END

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P0607 ECM

DTC Description

INFOID:0000000010986406

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0607	ECM (Control module performance)	ECM internal communication system is malfunctioning.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON (engine stopped) and wait least 10 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-704, "Diagnosis Procedure"](#).
 NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986407

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to [EC-704, "DTC Description"](#).

Is the 1st trip DTC P0607 displayed again?

- YES >> Replace ECM. Refer to [EC-806, "Removal and Installation"](#).
 NO >> INSPECTION END

P060A ECM

DTC Description

INFOID:0000000010986408

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P060A	CONTROL MODULE (Internal control module monitoring processor performance)	ECM internal monitoring processor is malfunctioning.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 10 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Repeat step 1 and 2 for 5 times.
4. Turn ignition switch ON.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-705, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986409

1. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to [EC-705, "DTC Description"](#).

Is the 1st trip DTC P060A displayed again?

- YES >> Replace ECM. Refer to [EC-806, "Removal and Installation"](#).
NO >> INSPECTION END

P060B ECM

DTC Description

INFOID:0000000010986410

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P060B	CONTROL MODULE (Internal control module A/D processing performance)	ECM internal analog/digital conversion processing system is malfunctioning.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON (engine stopped) and wait least 10 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-706, "Diagnosis Procedure"](#).
 NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986411

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to [EC-706, "DTC Description"](#).

Is the 1st trip DTC P060B displayed again?

- YES >> Replace ECM. Refer to [EC-806, "Removal and Installation"](#).
 NO >> INSPECTION END

P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P0643 SENSOR POWER SUPPLY

Description

INFOID:000000010986412

ECM supplies a voltage of 5 V to some of the sensors systematically divided into 2 groups, respectively. Accordingly, when a short circuit develops in a sensor power source, a malfunction may occur simultaneously in the sensors belonging to the same group as the short-circuited sensor.

Sensor power supply 1

- APP sensor 1
- CKP sensor (POS)
- Intake manifold runner control valve position sensor
- Refrigerant pressure sensor
- TP sensor

NOTE:

If sensor power supply 1 circuit is malfunctioning, DTC P0643 is displayed.

Sensor power supply 2

- APP sensor 2
- CMP sensor (PHASE)
- EVT control position sensor
- EOP sensor
- MAF sensor

DTC Description

INFOID:000000010986413

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0643	SENSOR POWER/CIRC (Sensor reference voltage "A" circuit high)	ECM detects that the voltage of sensor power supply 1 is excessively low or high.

POSSIBLE CAUSE

- Harness or connectors
- APP sensor 1 circuit is shorted.
- CKP sensor (POS) circuit is shorted.
- Intake manifold runner control valve position sensor circuit is shorted.
- TP sensor circuit is shorted.
- Refrigerant pressure sensor circuit is shorted.
- Accelerator pedal position sensor
- CKP sensor (POS)
- Intake manifold runner control valve position sensor
- Throttle position sensor
- Refrigerant pressure sensor

FAIL-SAFE

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

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.

P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

>> 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 >> Refer to [EC-708, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986414

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection F6 and F9. Refer to Ground Inspection in [GI-46, "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.

+		-	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E110	4	Ground	5 V

Is the inspection result normal?

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

3.CHECK SENSOR POWER SUPPLY CIRCUITS

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F68	72	CKP sensor (POS)	F20	1
	80	Electric throttle control actuator	F113	2
	84	Intake manifold runner control valve position sensor	F103	1
E60	104	Refrigerant pressure sensor	F42	3
	122	APP sensor	E110	4

Is the inspection result normal?

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

4.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to [EC-678, "Component Inspection \(Crankshaft Position sensor\)"](#).)
- Intake manifold runner control valve position sensor (Refer to [EC-745, "Diagnosis Procedure"](#).)
- Refrigerant pressure sensor (Refer to [EC-792, "Diagnosis Procedure"](#).)
- TP sensor (Refer to [EC-617, "Component Inspection"](#).)

Is the inspection result normal?

- YES >> GO TO 5.

P0643 SENSOR POWER SUPPLY

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace malfunctioning component.

5.CHECK APP SENSOR

Refer to [EC-759, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace accelerator pedal assembly. Refer to [ACC-4, "Removal and Installation"](#).

6.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

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P0850 PNP SWITCH

Description

INFOID:0000000010986415

Transmission range switch is turn ON when the selector lever is P or N.
ECM detects the position because the continuity of the line (the ON) exists.

DTC Description

INFOID:0000000010986416

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0850	P-N POS SW/CIRCUIT (Park/neutral switch input circuit)	The signal of transmission range switch is not changed in the process of engine starting and driving.

POSSIBLE CAUSE

- Harness or connectors (The transmission range switch circuit is open or shorted.)
- Transmission range switch

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

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

2.PRECONDITIONING

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

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

>> GO TO 3.

3.CHECK PNP SIGNAL FUNCTION

 With CONSULT

1. Turn ignition switch ON.
2. Select "P/N POSI SW" in "DATA MONITOR" mode of "ENGINE" using CONSULT. Then check the "P/N POSI SW" signal as per the following conditions.

Selector lever position	Known-good signal
N or P position	ON
Except above position	OFF

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Proceed to [EC-711, "Diagnosis Procedure"](#).

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
2. Start engine and warm it up to normal operating temperature.
3. Maintain the following conditions for at least 60 consecutive seconds.

CAUTION:

P0850 PNP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

Always drive vehicle at a safe speed.

ENG SPEED	1,000 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.25 - 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-711, "Diagnosis Procedure"](#).

NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

- Turn ignition switch ON.
- Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition		Voltage (Approx.)
Connector	+	-			
	Terminal				
E60	117	128	Selector lever	P or N	Battery voltage
				Except above	0 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-711, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010986417

1.CHECK TRANSMISSION RANGE SWITCH POWER SUPPLY

- Turn ignition switch OFF.
- Disconnect transmission range switch harness connector.
- Turn ignition switch ON.
- Check the voltage between transmission range switch harness connector and ground.

+		-	Voltage
Transmission range switch			
Connector	Terminal		
F22	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK TRANSMISSION RANGE SWITCH POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect IPDM E/R harness connector.
- 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	
F22	1	F72	70	Existed

< DTC/CIRCUIT DIAGNOSIS >

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 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	
F22	2	E60	117	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 TRANSMISSION RANGE SWITCH

Check the transmission range switch. Refer to [TM-325, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace transmission range switch. Refer to [TM-450, "Removal and Installation"](#).

5.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

P1078 EVT CONTROL POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P1078 EVT CONTROL POSITION SENSOR

DTC Description

INFOID:0000000010986418

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1078	EXH TIM SEN/CIRC-B1 (EXH TIM SEN/CIRC-B1)	An excessively high or low voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (Exhaust valve timing control position sensor circuit is open or shorted.)
- Accumulation of debris to the signal pick-up portion of the camshaft
- Exhaust valve timing control position sensor
- Sensor power supply 2 circuit

FAIL-SAFE

- Traveling control mode (Accelerator angle variation control)
- Device fix mode

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-713, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986419

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 control position sensor			
Connector	Terminal		
F104	1	Ground	5 V

Is the inspection result normal?

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

2.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform [EC-794, "Diagnosis Procedure"](#).

P1078 EVT CONTROL POSITION SENSOR

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

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	
F104	2	F85	42	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

4.CHECK EVT CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between EVT control position sensor harness connector and ECM harness connector.

+		-		Continuity
EVT control position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F104	3	F85	43	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-715, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Replace EVT control position sensor. Refer to [EM-221, "Exploded View"](#).

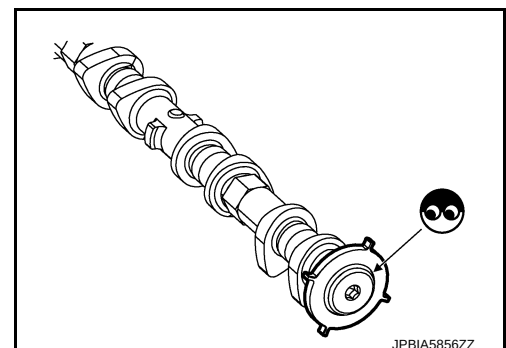
6.CHECK CAMSHAFT (EXT)

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 >> GO TO 7.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to [EM-222, "Removal and Installation"](#).



7.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

P1078 EVT CONTROL POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

>> INSPECTION END

Component Inspection

INFOID:0000000010986420

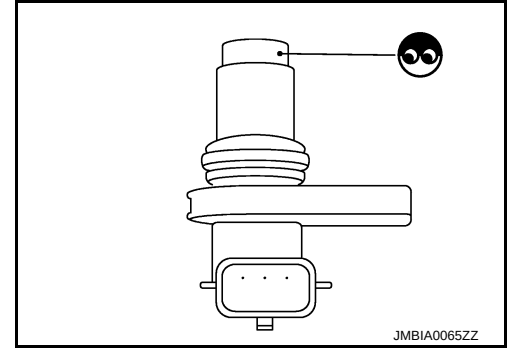
1.EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR-1

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-221](#).
"Exploded View".



2.EVT CONTROL POSITION SENSOR-2

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-221](#). "Exploded View".

P1212 TCS COMMUNICATION LINE

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P1212 TCS COMMUNICATION LINE

Description

INFOID:0000000010986421

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 Description

INFOID:0000000010986422

DTC DETECTION LOGIC

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1212	TCS/CIRC (TCS/CIRC)	ECM can not receive the information from "ABS actuator and electric unit (control unit)" continuously.

POSSIBLE CAUSE

- Harness or connectors (CAN communication line is open or shorted.)
- ABS actuator and electric unit (control unit)
- Dead (Weak) battery

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1217 is displayed with DTC UXXXX or P0607, first perform the trouble diagnosis for DTC UXXXX or P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-517, "DTC Index"](#).
NO >> GO TO 2.

2.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 3.

3.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-716, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986423

Perform the trouble diagnosis for TCS. Refer to [BRC-95, "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-517, "DTC Index"](#).

- Trouble diagnosis for DTC P0607 Refer to [EC-704, "DTC Description"](#).

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P1217 ENGINE OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P1217 ENGINE OVER TEMPERATURE

DTC Description

INFOID:000000010986424

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1217	ENG OVER TEMP (ENG OVER TEMP)	- 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.

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to [CO-39, "Draining"](#) and [CO-40, "Refilling"](#). Also, replace the engine oil. Refer to [LU-26, "Draining"](#) and [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-24, "Engine Coolant Mixture Ratio"](#).
2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

POSSIBLE CAUSE

- Harness or connectors (Cooling fan circuit is open or shorted.)
- IPDM E/R
- Cooling fan motor
- Radiator hose
- Radiator
- Radiator cap
- Reservoir tank
- Water pump
- Thermostat

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P1217 is displayed with DTC UXXXX or P0607, first perform the trouble diagnosis for DTC UXXXX or P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-517, "DTC Index"](#).
NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK-1

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.

P1217 ENGINE OVER TEMPERATURE

[QR25DE]

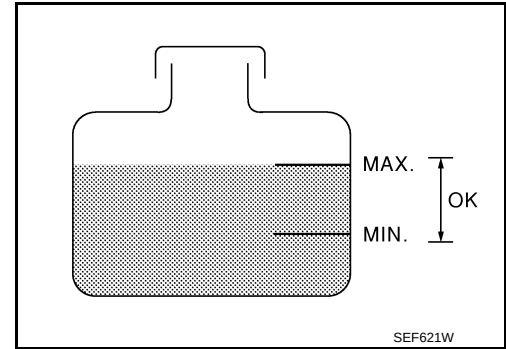
< DTC/CIRCUIT DIAGNOSIS >

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-719, "Diagnosis Procedure"](#).
NO >> GO TO 3.



3.PERFORM COMPONENT FUNCTION CHECK-2

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

- YES >> Proceed to [EC-719, "Diagnosis Procedure"](#).
NO >> GO TO 4.

4.PERFORM COMPONENT FUNCTION CHECK-3

ⓂWith CONSULT

1. Turn ignition switch ON.
2. Perform "COOLING FAN (DUAL)" in "ACTIVE TEST" mode of "IPDM E/R" using CONSULT.
3. Touch "LOW", "HI" on the CONSULT screen.
4. Check that cooling fan operates.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Proceed to [EC-719, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010986425

1.CHECK DTC PRIORITY

If DTC P1217 is displayed with DTC UXXXX or P0607, first perform the trouble diagnosis for DTC UXXXX or P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-517, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK COOLING FAN OPERATION

ⓂWith CONSULT

1. Turn ignition switch ON.
2. Perform "COOLING FAN (DUAL)" in "ACTIVE TEST" mode of "IPDM E/R" using CONSULT.
3. Touch "LOW", "HI" on the CONSULT screen.
4. Check that cooling fan operates.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Proceed to [EC-773, "Diagnosis Procedure"](#).

3.CHECK COOLING SYSTEM FOR LEAK-1

Check cooling system for leak. Refer to [CO-39, "Inspection"](#).

Is leakage detected?

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

4.CHECK COOLING SYSTEM FOR LEAK-2

Check the following for leak.

- Hose (Refer to [CO-39, "Inspection"](#).)
- Radiator (Refer to [CO-46, "Inspection"](#).)
- Water pump (Refer to [CO-50, "Removal and Installation"](#).)

P1217 ENGINE OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

>> Repair or replace malfunctioning part.

5. CHECK RADIATOR CAP

Check radiator cap. Refer to [CO-42, "RADIATOR CAP : Inspection"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace radiator cap. Refer to [CO-43, "Exploded View"](#).

6. CHECK THERMOSTAT

Check thermostat. Refer to [CO-52, "Removal and Installation"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace thermostat. Refer to [CO-52, "Removal and Installation"](#).

7. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-613, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace engine coolant temperature sensor. Refer to [CO-52, "Exploded View"](#).

8. OVERHEATING CAUSE ANALYSIS

If the cause cannot be isolated, check the [CO-37, "Troubleshooting Chart"](#).

>> INSPECTION END

P1225 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P1225 TP SENSOR

DTC Description

INFOID:0000000110986426

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1225	CTP LEARNING-B1 (CTP LEARNING-B1)	Closed throttle position learning value is excessively low.

POSSIBLE CAUSE

Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE

Not applicable

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-721, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

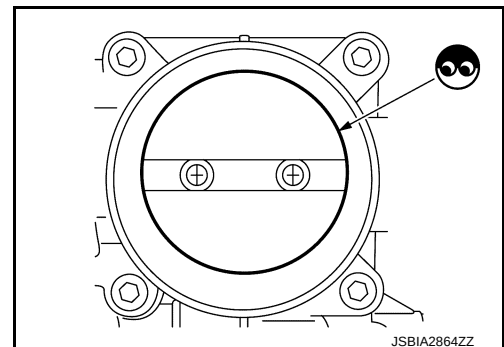
INFOID:0000000110986427

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct. Refer to [EM-174, "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-176, "Removal and Installation"](#).
NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to [EC-554, "Work Procedure"](#).



P1226 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P1226 TP SENSOR

DTC Description

INFOID:0000000010986428

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1226	CTP LEARNING-B1 (CTP LEARNING-B1)	Closed throttle position learning is not performed successfully, repeatedly.

POSSIBLE CAUSE

Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE

Not applicable

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-722. "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

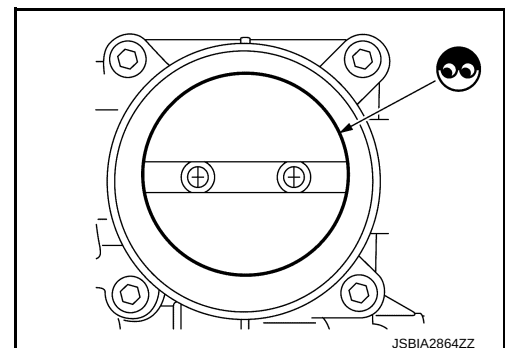
INFOID:0000000010986429

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct. Refer to [EM-174. "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-176. "Removal and Installation"](#).
NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to [EC-554. "Work Procedure"](#).



P155D GENERATOR

DTC Description

INFOID:0000000010986430

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P155D	GENERATOR (Generator)	- ECM receives mechanical malfunction signal sent from generator. - ECM receives electrical malfunction signal sent from generator.

POSSIBLE CAUSE

Generator

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle at least 10 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-723, "Diagnosis Procedure"](#).
 NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986431

1.CHECK CHARGING SYSTEM

Perform trouble diagnosis for charging system. Refer to [CHG-40, "Work Flow"](#).

Is the inspection result normal?

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

2.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace generator. Refer to [CHG-46, "QR25DE : Removal and Installation"](#).
 NO >> Repair or replace error-detected parts.

P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P1564 ASCD STEERING SWITCH

DTC Description

INFOID:0000000010986432

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1564	ASCD SW (ASCD 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.

POSSIBLE CAUSE

- Harness or connectors (ASCD steering switch circuit is open or shorted.)
- ASCD steering switch
- ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1564 is displayed with DTC P0603, P0604, P0605, P0606, P0607, P060A, or P060B, first perform the trouble diagnosis for DTC P0603, P0604, P0605, P0606, P0607, P060A, or P060B.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-517, "DTC Index"](#).
NO >> GO TO 2.

2.PRECONDITIONING

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

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON.
- Wait at least 10 seconds.
- Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press ACCEL/RES switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press COAST/SET switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-724, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986433

1.CHECK DTC PRIORITY

If DTC P1564 is displayed with DTC P0603, P0604, P0605, P0606, P0607, P060A, or P060B, first perform the trouble diagnosis for DTC P0603, P0604, P0605, P0606, P0607, P060A, or P060B.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-517, "DTC Index"](#).

P1564 ASCD STEERING SWITCH

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT

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

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
		Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
		Released	OFF
RESUME/ACC SW	ACCEL/RES switch	Pressed	ON
		Released	OFF
SET SW	COAST/SET switch	Pressed	ON
		Released	OFF

Without CONSULT

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

ECM			Condition	Voltage (Approx.)
Connector	+	-		
	Terminal			
E60	110	111	MAIN switch: Pressed	0 V
			CANCEL switch: Pressed	1 V
			COAST/SET switch: Pressed	2 V
			ACCEL/RES switch: Pressed	3 V
			All ASCD steering switches: Released	4 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 3.

3.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	28	E60	111	Existed

5. 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 INPUT SIGNAL CIRCUIT

P1564 ASCD STEERING SWITCH

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

1. Check the continuity between ECM harness connector and combination switch.

+		-		Continuity
Combination switch (Spiral cable)		ECM		
Connector	Terminal	Connector	Terminal	
M33	27	E60	110	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 ASCD STEERING SWITCH

Refer to [EC-726, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace ASCD steering switch. Refer to [CHG-46, "QR25DE : Removal and Installation"](#).

6.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000010986434

1.CHECK ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector.
2. Check the resistance between combination switch harness connector terminals as per the following conditions.

Combination switch (Spiral cable)			Condition	Resistance (Approx.)
Connector	+	−		
	Terminals			
M303	9	8	MAIN switch: Pressed	0 Ω
			CANCEL switch: Pressed	250 Ω
			COAST/SET switch: Pressed	660 Ω
			ACCEL/RES switch: Pressed	1,480 Ω
			All ASCD steering switches: Released	4,000 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD steering switch. Refer to [ST-12, "Removal and Installation"](#).

P1568 SIGNAL INVALID

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P1568 SIGNAL INVALID

DTC Description

INFOID:0000000010986435

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1568	ICC COMMAND VALUE (Intelligent cruise control command value)	ECM detects that a throttle valve opening angle request signal sent from chassis control module is difference from the specified value calculated by ECM.

POSSIBLE CAUSE

- Chassis control module
- ECM

FAIL-SAFE

Active trace control does not function.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1568 is displayed with DTC UXXXX, first perform the confirmation procedure for DTC UXXXX.

Is applicable DTC detected?

- YES >> Perform diagnosis for detected DTC. Refer to [EC-517, "DTC Index"](#).
NO >> GO TO 2.

2.PRECONDITIONING

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

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

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

- YES >> Proceed to [EC-727, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986436

1.CHECK DTC PRIORITY

If DTC P1568 is displayed with DTC UXXXX, first perform the confirmation procedure for DTC UXXXX.

Is applicable DTC detected?

- YES >> Perform diagnosis for detected DTC. Refer to [EC-517, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK SELF-DIAGNOSTIC RESULT OF CHASSIS CONTROL MODULE

Check that the chassis control module does not detect any DTC.

Is any DTC detected?

- YES >> GO TO 3.
NO >> Replace chassis control module. Refer to [DAS-278, "Removal and Installation"](#).

3.REPLACE CHASSIS CONTROL MODULE

P1568 SIGNAL INVALID

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

1. Replace chassis control module. Refer to [DAS-278. "Removal and Installation"](#).
2. Perform DTC Confirmation Procedure again.

Is DTC P1568 detected again?

- YES >> Replace ECM. Refer to [EC-806. "Removal and Installation"](#).
NO >> INSPECTION END

P1572 BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P1572 BRAKE PEDAL POSITION SWITCH

DTC Description

INFOID:000000010986437

DTC DETECTION LOGIC

NOTE:

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P1572	ASCD BRAKE SW (ASCD BRAKE SW)	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.
		B	Brake pedal position switch signal is not sent to ECM for extremely long time while the vehicle is driving.

POSSIBLE CAUSE

- 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

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1572 is displayed with DTC P0603, P0604, P0605, P0606, P0607, P060A, or P060B, first perform the trouble diagnosis for DTC P0603, P0604, P0605, P0606, P0607, P060A, or P060B.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-517, "DTC Index"](#).
NO >> GO TO 2.

2.PRECONDITIONING

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

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

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 3.

3.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:

P1572 BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

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-736, "Diagnosis Procedure"](#).

NO >> GO TO 4.

4.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-736, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986438

1.CHECK DTC PRIORITY

If DTC P1572 is displayed with DTC P0603, P0604, P0605, P0606, P0607, P060A, or P060B, first perform the trouble diagnosis for DTC P0603, P0604, P0605, P0606, P0607, P060A, or P060B.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC-517, "DTC Index"](#).

NO >> GO TO 2.

2.CHECK OVERALL FUNCTION-1

Ⓐ With CONSULT

1. Turn ignition switch ON.
2. Select "BRAKE SW1" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Check "BRAKE SW1" indication as per the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Ⓑ Without CONSULT

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

P1572 BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

ECM			Condition		Voltage (Approx.)
Connector	+	−			
	Terminal				
E60	116	128	Brake pedal	Slightly depressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 4.

3.CHECK OVERALL FUNCTION-2

 With CONSULT

Select "BRAKE SW2" and check indication as per the following conditions.

Monitor item	Condition		Indication
BRAKE SW2	Brake pedal	Slightly depressed	ON
		Fully released	OFF

 Without CONSULT

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

ECM			Condition		Voltage (Approx.)
Connector	+	−			
	Terminal				
E60	115	128	Brake pedal	Slightly depressed	Battery voltage
				Fully released	0 V

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

NO >> GO TO 7.

4.CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY

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

+		–	Voltage
Brake pedal position switch			
Connector	Terminal		
E112	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> Perform the trouble diagnosis for power supply circuit.

5.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.

P1572 BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

+		-		Continuity
Brake pedal position switch		ECM		
Connector	Terminal	Connector	Terminal	
E112	2	E60	116	Existed

4. 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 BRAKE PEDAL POSITION SWITCH

Check the brake pedal position switch. Refer to [EC-732, "Component Inspection \(Brake Pedal Position Switch\)"](#)

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

NO >> Replace brake pedal position switch. Refer to [BR-21, "Exploded View"](#).

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.

+		-	Voltage
Stop lamp switch			
Connector	Terminal		
E115	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.

NO >> Perform the trouble diagnosis for power supply circuit.

8.CHECK STOP LAMP SWITCH GROUND CIRCUIT

1. Check the continuity between stop lamp switch harness connector and ECM harness connector.

+		-		Continuity
Stop lamp switch		ECM		
Connector	Terminal	Connector	Terminal	
E115	2	E60	115	Existed

2. 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 STOP LAMP SWITCH

Check the stop lamp switch. Refer to [EC-733, "Component Inspection \(Stop Lamp Switch\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

NO >> Replace stop lamp switch. Refer to [BR-21, "Exploded View"](#).

Component Inspection (Brake Pedal Position Switch)

INFOID:0000000010986439

1.CHECK BRAKE PEDAL POSITION SWITCH-1

1. Turn ignition switch OFF.
2. Disconnect brake pedal position harness connector.

P1572 BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

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-2

1. Adjust brake pedal position switch installation. Refer to [BR-22. "Inspection and Adjustment"](#).
2. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition		Continuity
+	–			
Terminals				
1	2	Brake pedal	Fully released	Existed
			Slightly de-pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace brake pedal position switch. Refer to [BR-21. "Exploded View"](#).

Component Inspection (Stop Lamp Switch)

INFOID:0000000010986440

1.CHECK STOP LAMP SWITCH-1

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-2

1. Adjust stop lamp switch installation. Refer to [BR-22. "Inspection and Adjustment"](#).
2. Check the continuity between stop lamp switch terminals as per the following conditions.

P1572 BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

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-21, "Exploded View"](#).

P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P1574 ASCD VEHICLE SPEED SENSOR

Description

INFOID:0000000010986441

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-473, "AUTOMATIC SPEED CONTROL DEVICE \(ASCD\) : System Description"](#) for ASCD functions.

DTC Description

INFOID:0000000010986442

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1574	ASCD VHL SPD SEN (ASCD VHL SPD SEN)	ECM detects a difference between two vehicle speed signals is out of the specified range.

POSSIBLE CAUSE

- Harness or connectors (CAN communication line is open or shorted.)
- ABS actuator and electric unit (control unit)
- TCM
- ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1574 is displayed with DTC U1001, P0500, P0603, P0604, P0605, P0606, P0607, P060A or P060B, first perform the trouble diagnosis for DTC U1001, P0500, P0603, P0604, P0605, P0606, P0607, P060A or P060B.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-517, "DTC Index"](#).
NO >> GO TO 2.

2.PRECONDITIONING

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

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

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

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-736, "Diagnosis Procedure"](#).
NO >> INSPECTION END

P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

Diagnosis Procedure

INFOID:0000000010986443

1.CHECK DTC PRIORITY

If DTC P1574 is displayed with DTC U1001, P0500, P0603, P0604, P0605, P0606, P0607, P060A or P060B, first perform the trouble diagnosis for DTC U1001, P0500, P0603, P0604, P0605, P0606, P0607, P060A or P060B.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC-517, "DTC Index"](#).

NO >> GO TO 2.

2.CHECK DTC WITH TCM

Check DTC with TCM. Refer to [TM-272, "CONSULT Function"](#).

Is DTC detected?

NO >> GO TO 3.

YES >> Perform trouble shooting relevant to DTC indicated.

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

Check DTC with ABS actuator and electric unit (control unit). Refer to [BRC-70, "CONSULT Function"](#).

Is DTC detected?

NO >> INSPECTION END

YES >> Perform trouble shooting relevant to DTC indicated.

P1715 INPUT SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P1715 INPUT SPEED SENSOR

Description

INFOID:000000010986444

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

DTC Description

INFOID:000000010986445

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1715	IN PULY SPEED (IN PULY SPEED)	Input speed sensor signal is different from the theoretical value calculated by ECM from output speed sensor signal and engine rpm signal.

POSSIBLE CAUSE

- Harness or connectors (The CAN communication line is open or shorted.)
- Harness or connectors (Input speed sensor circuit is open or shorted.)
- TCM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1715 is displayed with DTC UXXXX, P0335, P0340, P0603, P0604, P0605, P0606, P0607, P060A, or P060B, first perform the trouble diagnosis for DTC UXXXX, P0335, P0340, P0603, P0604, P0605, P0606, P0607, P060A, or P060B.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-517, "DTC Index"](#).
NO >> GO TO 2.

2.PRECONDITIONING

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

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

>> GO TO 3.

3.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 >> Proceed to [EC-737, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000010986446

1.CHECK DTC PRIORITY

If DTC P1715 is displayed with DTC UXXXX, P0335, P0340, P0603, P0604, P0605, P0606, P0607, P060A, or P060B, first perform the trouble diagnosis for DTC UXXXX, P0335, P0340, P0603, P0604, P0605, P0606, P0607, P060A, or P060B.

Is applicable DTC detected?

P1715 INPUT SPEED SENSOR

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Perform diagnosis of applicable. Refer to [EC-517. "DTC Index"](#).
NO >> GO TO 2.

2.CHECK DTC WITH TCM

Check DTC with TCM. Refer to [TM-288. "DTC Index"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Perform trouble shooting relevant to DTC indicated.

3.REPLACE TCM

Replace TCM. Refer to [TM-415. "Removal and Installation"](#).

>> INSPECTION END

P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P1805 BRAKE SWITCH

DTC Description

INFOID:0000000010986447

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1805	BRAKE SW/CIRCUIT (BRAKE SW/CIRCUIT)	A stop lamp switch signal is not sent to ECM for extremely long time while the vehicle is driving.

POSSIBLE CAUSE

- Harness or connectors (Stop lamp switch circuit is open or shorted.)
- Stop lamp switch

FAIL-SAFE

ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.

Vehicle condition	Driving condition
When engine is idling	Normal
When accelerating	Poor acceleration

DTC CONFIRMATION PROCEDURE

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-739, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986448

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		
E115	1	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK STOP LAMP SWITCH GROUND CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between stop lamp switch harness connector and ECM harness connector.

P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

+		-		Continuity
Stop lamp switch		ECM		
Connector	Terminal	Connector	Terminal	
E115	2	E60	115	Existed

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-733, "Component Inspection \(Stop Lamp Switch\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

NO >> Replace stop lamp switch. Refer to [BR-21, "Exploded View"](#).

Component Inspection (Stop Lamp Switch)

INFOID:0000000010986449

1.CHECK STOP LAMP SWITCH-1

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-2

1. Adjust stop lamp switch installation. Refer to [BR-22, "Inspection and Adjustment"](#).
2. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch		Condition		Continuity
+	–			
Terminals				
1	2	Brake pedal	Fully released	Not existed
			Slightly de-pressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to [BR-21, "Exploded View"](#).

P2004 INTAKE MANIFOLD RUNNER CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P2004 INTAKE MANIFOLD RUNNER CONTROL VALVE

DTC Description

INFOID:0000000110986450

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2004	TUMBLE CONT/V (Intake manifold runner control stuck open bank 1)	The target angle of intake manifold runner control valve controlled by ECM and the input signal from intake manifold runner control valve position sensor is not in the normal range.

POSSIBLE CAUSE

- Harness or connectors (Intake manifold runner control valve motor circuit is open or shorted.)
- Intake manifold runner control valve motor
- Intake manifold runner control valve is stuck

FAIL-SAFE

- Traveling control mode (Engine output control)
- Device fix mode

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.
- Always perform the test at a temperature above -7°C (19°F)

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT.
3. Make sure that "COOLAN TEMP/S" indicates between -7°C (19°F) to 60°C (140°F).
If not, cool engine down or warm engine up until "COOLAN TEMP/S" indicates between -7°C (19°F) to 60°C (140°F). Then go to the following steps.
4. Fully release accelerator pedal and wait at least 10 seconds.
5. Depress accelerator pedal and wait at least 10 seconds.
6. Check 1st trip DTC.

With GST

Following the procedure "With CONSULT" above.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-741, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000110986451

1.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR POWER SUPPLY

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

ECM				Voltage
+		-		
Connector	Terminal	Connector	Terminal	
F68	50	E60	128	Battery voltage

P2004 INTAKE MANIFOLD RUNNER CONTROL VALVE

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

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

2.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR POWER SUPPLY CIRCUIT

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

+		-		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F68	50	E10	8	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

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

3.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR OUTPUT SIGNAL CIRCUIT

1. Disconnect intake manifold runner control valve motor harness connector.
2. Check the continuity between intake manifold runner control valve motor harness connector and ECM harness connector.

+		-		Continuity
Intake manifold runner control valve motor		ECM		
Connector	Terminal	Connector	Terminal	
F109	1	F68	49	Not existed
			51	Existed
	2		49	Existed
			51	Not existed

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

Is the inspection result normal?

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

4.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR

Check the intake manifold runner control valve motor. Refer to [EC-742, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Replace intake manifold assembly. Refer to [EM-176, "Removal and Installation"](#).

5.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000010986452

1.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE

With CONSULT

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT.

P2004 INTAKE MANIFOLD RUNNER CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

3. Make sure that "COOLAN TEMP/S" indicates between -7°C (19°F) to 60°C (140°F).
If not, cool engine down or warm engine up until "COOLAN TEMP/S" indicates between -7°C (19°F) to 60°C (140°F). Then go to the following steps.
4. Fully release accelerator pedal and make sure that "TUMBLE POS SEN" indicates between 2.8 V to 4.1 V.
5. Depress accelerator pedal and make sure that "TUMBLE POS SEN" indicates between 0.2 V to 1.4 V.
6. Check 1st trip DTC.

With GST

Following the procedure "With CONSULT" above.

Is 1st trip DTC detected?

- YES >> Replace intake manifold assembly. Refer to [EM-176. "Removal and Installation"](#).
NO >> GO TO 2.

2. CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR

1. Turn ignition switch OFF.
2. Disconnect intake manifold runner control valve motor harness connector.
3. Check the resistance between intake manifold runner control valve motor terminals as per the following.

Intake manifold runner control valve motor		Resistance (Approx.)
+	−	
Terminals		
1	2	4.64 - 6.30 Ω [at 25°C (77°F)]

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace intake manifold assembly. Refer to [EM-176. "Removal and Installation"](#).

P2014, P2016, P2017, P2018 INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P2014, P2016, P2017, P2018 INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR

DTC Description

INFOID:000000010986453

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2014	IN/MANIFOLD RUNNER POS SEN B1 (Intake manifold runner position sensor/ switch circuit bank 1)	An excessively low voltage from the sensor is sent to ECM.
P2016	IN/MANIFOLD RUNNER POS SEN B1 (Intake manifold runner position sensor/ switch circuit low bank 1)	
P2017	IN/MANIFOLD RUNNER POS SEN B1 (Intake manifold runner position sensor/ switch circuit high bank 1)	An excessively high voltage from the sensor is sent to ECM.
P2018	IN/MANIFOLD RUNNER POS SEN B1 (Intake manifold runner position sensor/ switch circuit intermittent bank 1)	

POSSIBLE CAUSE

- Harness or connectors (Intake manifold runner control position sensor circuit is shorted.)
- Intake manifold runner control position sensor

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2014, P2016, P2017 or P2018 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-707, "DTC Description"](#).
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 3.

3.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-745, "Diagnosis Procedure"](#).
NO >> INSPECTION END

P2014, P2016, P2017, P2018 INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

Diagnosis Procedure

INFOID:000000010986454

1.CHECK DTC PRIORITY

If DTC P2014, P2016, P2017 or P2018 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC-707, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake valve manifold runner control valve position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake valve manifold runner control valve position sensor harness connector.

Intake manifold runner control valve position sensor			Voltage (Approx.)
Connector	+	-	
	Terminal		
F103	1	3	5 V

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 3.

3.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

Check the voltage between intake valve manifold runner control valve position sensor harness connector and ground.

+		-	Voltage (Approx.)
Intake manifold runner control valve position sensor			
Connector	Terminal		
F103	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> Perform the trouble diagnosis for power supply circuit.

4.CHECK ECM GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F85	16	Ground	Existed
F65	52		
E60	123		
	128		

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.

P2014, P2016, P2017, P2018 INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

5. CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake manifold runner control valve position sensor harness connector and ECM harness connector.

+		-		Continuity
Intake manifold runner control valve position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F103	3	F68	92	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between intake manifold runner control valve position sensor harness connector and ECM harness connector.

+		-		Continuity
Intake manifold runner control valve position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F103	2	F68	83	Existed

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 INTERMITTENT INCIDENT

Perform [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace intake manifold assembly. Refer to [EM-176, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

8. CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

DTC Description

INFOID:000000010986455

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2100	ETC MOT PWR-B1 (Throttle actuator "A" control motor circuit/ open)	ECM detects a voltage of power source for throttle control motor is excessively low.
P2103	ETC MOT PWR-B1 (Throttle actuator "A" control motor circuit high)	ECM detect the throttle control motor relay is stuck ON.

POSSIBLE CAUSE

DTC P2100

- Harness or connectors (Throttle control motor relay circuit is open.)
- Throttle control motor relay

DTC P2103

- Harness or connectors (Throttle control motor relay circuit is shorted.)
- Throttle control motor relay

FAIL-SAFE

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

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.

With 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-748, "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-748, "Diagnosis Procedure"](#).

NO >> INSPECTION END

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

Diagnosis Procedure

INFOID:000000010986456

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	
F85	2	E60	128	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	
F85	2	F72	72	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL

Check the voltage between ECM harness connector and ground as per the following conditions.

ECM				Condition	Voltage (Approx.)
+		-			
Connector	Terminal	Connector	Terminal		
F85	21	E60	128	Ignition switch: OFF	0 V
				Ignition switch: ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

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	
F85	21	F72	67	Existed

5. Also check harness for short to ground and to power.

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK INTERMITTENT INCIDENT

Refer to [GI-44. "Intermittent Incident"](#).

>> INSPECTION END

A

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P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

DTC Description

INFOID:0000000010986457

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2101	ETC FNCTN/CIRC-B1 (Throttle actuator "A" control motor circuit range/performance)	Electric throttle control function does not operate properly.

POSSIBLE CAUSE

- Harness or connectors (Throttle control motor circuit is open or shorted.)
- Electric throttle control actuator

FAIL-SAFE

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2101 is displayed with DTC P2100 or P2119, first perform the trouble diagnosis for DTC P2100 or P2119.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-517, "DTC Index"](#).
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when engine is running.

>> GO TO 3.

3.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-750, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986458

1.CHECK DTC PRIORITY

If DTC P2101 is displayed with DTC P2100 or P2119, first perform the trouble diagnosis for DTC P2100 or P2119.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-517, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

Check the voltage between ECM harness connector terminals as per the following conditions.

ECM				Condition	Voltage (Approx.)
+		-			
Connector	Terminal	Connector	Terminal		
F85	21	E60	128	Ignition switch: OFF	0 V
				Ignition switch: ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 3.

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	
F85	2	F72	72	Existed

2. 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 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	
F85	21	F72	67	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.

5.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.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

+		-		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F113	5	F85	1	Existed
			3	Not existed
	6		1	Not existed
			3	Existed

5. 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 ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct. Refer to [EM-176, "Exploded View"](#).
2. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to [EC-554, "Work Procedure"](#).

7. CHECK THROTTLE CONTROL MOTOR

Check the throttle control motor. Refer to [EC-752, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace electric throttle control actuator. Refer to [EM-176, "Removal and Installation"](#).

8. CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000010986459

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-176, "Removal and Installation"](#).

P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P2118 THROTTLE CONTROL MOTOR

DTC Description

INFOID:000000010986460

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2118	ETC MOT-B1 (Throttle actuator control motor current range/performance)	ECM detects short in both circuits between ECM and throttle control motor.

POSSIBLE CAUSE

- Harness or connectors (Throttle control motor circuit is shorted.)
- Electric throttle control actuator (Throttle control motor)

FAIL-SAFE

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

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-753. "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000010986461

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	
F113	5	F85	1	Existed
			3	Not existed
	6		1	Not existed
			3	Existed

5. Also check harness for short to ground and to power.

P2118 THROTTLE CONTROL MOTOR

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

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-754, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace electric throttle control actuator. Refer to [EM-176, "Removal and Installation"](#).

3.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000010986462

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-176, "Removal and Installation"](#).

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Description

INFOID:000000010986463

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P2119	ETC ACTR-B1 (Throttle actuator control throttle body range/performance)	A	Electric throttle control actuator does not function properly due to the return spring malfunction.
		B	Throttle valve opening angle in fail-safe mode is not in specified range.
		C	ECM detect the throttle valve is stuck open.

POSSIBLE CAUSE

Electric throttle control actuator

FAIL-SAFE

Traveling control mode (Engine output 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.

>> 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 position and wait at least 3 seconds.
3. Set selector lever to P 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 position and wait at least 3 seconds.
7. Set selector lever to P 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-755. "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 position and wait at least 3 seconds.
3. Set selector lever to P position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-755. "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000010986464

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct. Refer to [EM-174. "Exploded View"](#).

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

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-176, "Removal and Installation"](#).

NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to [EC-554, "Work Procedure"](#).

P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P2122, P2123 APP SENSOR

DTC Description

INFOID:000000010986465

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2122	APP SEN 1/CIRC (Throttle/pedal position sensor/switch "D" circuit low)	An excessively low voltage from the APP sensor 1 is sent to ECM.
P2123	APP SEN 1/CIRC (Throttle/pedal position sensor/switch "D" circuit high)	An excessively high voltage from the APP sensor 1 is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (APP sensor 1 circuit is open or shorted.)
- Accelerator pedal position sensor (APP sensor 1)

FAIL-SAFE

- The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.
- The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-707, "DTC Description"](#).
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-757, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000010986466

1.CHECK DTC PRIORITY

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-707, "DTC Description"](#).
NO >> GO TO 2.

P2122, P2123 APP SENSOR

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

2. 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		
E110	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. 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	
E110	4	E60	122	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 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	
E110	2	E60	127	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 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	
E110	3	E60	126	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

- YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK APP SENSOR

Check the APP sensor. Refer to [EC-759, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 7.
NO >> Replace accelerator pedal assembly. Refer to [ACC-4, "Removal and Installation"](#).

7.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000010986467

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				
Sensor 1	E60	126	127	Accelerator pedal	Fully released	0.5 - 1.0 V
					Fully depressed	4.2 - 4.8 V
Sensor 2		119	120		Fully released	0.25 - 0.5 V
					Fully depressed	2.0 - 2.5 V

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace accelerator pedal assembly. Refer to [ACC-4, "Removal and Installation"](#).

P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P2127, P2128 APP SENSOR

DTC Description

INFOID:0000000010986468

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2127	APP SEN 2/CIRC (Throttle/pedal position sensor/switch "E" circuit low)	An excessively low voltage from the APP sensor 2 is sent to ECM.
P2128	APP SEN 2/CIRC (Throttle/pedal position sensor/switch "E" circuit high)	An excessively high voltage from the APP sensor 2 is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (APP sensor 2 circuit is open or shorted.)
- Accelerator pedal position sensor (APP sensor 2)
- Sensor power supply 2 circuit

FAIL-SAFE

- The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.
- The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC CONFIRMATION PROCEDURE

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-760, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986469

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		
E110	5	Ground	5 V

P2127, P2128 APP SENSOR

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform [EC-794, "Diagnosis Procedure"](#).

Is inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK APP SENSOR 2 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		-		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
E110	1	E60	120	Existed

4. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

+		-		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
E110	6	E60	119	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts

5.CHECK APP SENSOR

Check the APP sensor. Refer to [EC-761, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Replace accelerator pedal assembly. Refer to [ACC-4, "Removal and Installation"](#).

6.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection

INFOID:000000010986470

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.

P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

ECM				Condition		Voltage
Connector		+	−			
		Terminal				
Sensor 1	E60	126	127	Accelerator pedal	Fully released	0.5 - 1.0 V
					Fully depressed	4.2 - 4.8 V
Sensor 2		119	120		Fully released	0.25 - 0.5 V
					Fully depressed	2.0 - 2.5 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal assembly. Refer to [ACC-4, "Removal and Installation"](#).

P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

P2135 TP SENSOR

DTC Description

INFOID:0000000010986471

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2135	TP SENSOR-B1 (Throttle/pedal position sensor/switch "A" / "B" voltage correlation)	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.

POSSIBLE CAUSE

- Harness or connectors (TP sensor 1 or 2 circuit is open or shorted.)
- Electric throttle control actuator (TP sensor 1 or 2)

FAIL-SAFE

- The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.
- The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC-707, "DTC Description"](#).

NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to [EC-763, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986472

1.CHECK DTC PRIORITY

If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC-707, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.

P2135 TP SENSOR

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

- Turn ignition switch ON.
- Check the voltage between electric throttle control actuator harness connector and ground.

+		−	Voltage (Approx.)
Electric throttle control actuator			
Connector	Terminal		
F113	2	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ground.

+		-		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F113	2	F68	80	Existed

- 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 POSITION SENSOR GROUND CIRCUIT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

+		-		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F113	4	F68	78	Existed

- 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 THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT

- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

+		-		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F113	1	F68	79	Existed
	3		77	

P2135 TP SENSOR

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

2. Also check harness for short to ground and 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 THROTTLE POSITION SENSOR

Check the throttle position sensor. Refer to [EC-765, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace electric throttle control actuator. Refer to [EM-176, "Removal and Installation"](#).

7.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000010986473

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-554, "Work Procedure"](#).
4. Turn ignition switch ON.
5. Set selector lever to D position.
6. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM				Condition		Voltage	
Connector		+	—				
		Terminal					
Sensor 1	F68	79	78	Accelerator pedal	Fully released	More than 0.36V	
					Fully depressed	Less than 4.75V	
Sensor 2					77	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-176, "Removal and Installation"](#).

P2138 APP SENSOR

DTC Description

INFOID:0000000010986474

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2138	APP SENSOR (Throttle/pedal position sensor/switch "D" / "E" voltage correlation)	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.

POSSIBLE CAUSE

- Harness or connectors (APP sensor 1 or 2 circuit is open or shorted.)
- Accelerator pedal position sensor (APP sensor 1 or 2)
- Sensor power supply 2 circuit

FAIL-SAFE

- The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.
- The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-707, "DTC Description"](#).
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-766, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010986475

1.CHECK DTC PRIORITY

If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-707, "DTC Description"](#).
NO >> GO TO 2.

2.CHECK APP SENSOR 1 POWER SUPPLY

1. Turn ignition switch OFF.

P2138 APP SENSOR

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

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		
E110	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.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	
E110	4	E60	122	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 APP SENSOR 2 POWER SUPPLY

Check the voltage between APP sensor harness connector and ground.

+		-	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E110	5	Ground	5 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform [EC-794, "Diagnosis Procedure"](#).

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

6.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.

P2138 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

+		-		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
E110	1	E60	120	Existed
	2		127	

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 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	
E110	3	E60	126	Existed
	6		119	

2. 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 APP SENSOR

Check the APP sensor. Refer to [EC-768, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace accelerator pedal assembly. Refer to [ACC-4, "Removal and Installation"](#).

9.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000010986476

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				
Sensor 1	E60	126	127	Accelerator pedal	Fully released	0.5 - 1.0 V
					Fully depressed	4.2 - 4.8 V
Sensor 2		119	120		Fully released	0.25 - 0.5 V
					Fully depressed	2.0 - 2.5 V

Is the inspection result normal?

P2138 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

YES >> INSPECTION END
NO >> Replace accelerator pedal assembly. Refer to [ACC-4, "Removal and Installation"](#).

A

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P

BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

BRAKE PEDAL POSITION SWITCH

Component Function Check

INFOID:0000000010986477

1.CHECK BRAKE PEDAL POSITION SWITCH FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
3. Check "BRAKE SW1" indication as per the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals.

ECM			Condition	Voltage
Connector	+	-		
	Terminal			
E60	116	128	Brake pedal	Slightly depressed
				Fully released
				Approx. 0 V
				Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-770, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010986478

1.CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect brake pedal position switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between brake pedal position switch harness connector and ground.

+		-	Voltage
Brake pedal position switch			
Connector	Terminal		
E112	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuse block (J/B) harness connector.
3. Check the continuity between brake pedal position switch harness connector and fuse block (J/B) harness connector.

+		+		Continuity
Brake pedal position switch		Fuse block (J/B)		
Connector	Terminal	Connector	Terminal	
E112	1	M2	16B	Existed

BRAKE PEDAL POSITION SWITCH

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK BRAKE PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between brake pedal position switch harness connector and ECM harness connector.

+		+		Continuity
Brake pedal position switch		ECM		
Connector	Terminal	Connector	Terminal	
E112	2	E60	116	Existed

4. Also check harness for short to ground and 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 BRAKE PEDAL POSITION SWITCH

Check brake pedal position switch. Refer to [EC-771, "Component Inspection \(Brake Pedal Position Switch\)"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).
NO >> Replace brake pedal position switch. Refer to [BR-21, "Exploded View"](#).

Component Inspection (Brake Pedal Position Switch)

INFOID:0000000010986479

1.CHECK BRAKE PEDAL POSITION SWITCH-1

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-2

1. Adjust brake pedal position switch installation. Refer to [BR-22, "Inspection and Adjustment"](#).
2. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition		Continuity
+	–			
Terminals				
1	2	Brake pedal	Fully released	Existed
			Slightly de-pressed	Not existed

Is the inspection result normal?

BRAKE PEDAL POSITION SWITCH

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

YES >> INSPECTION END

NO >> Replace brake pedal position switch. Refer to [BR-21, "Exploded View"](#).

COOLING FAN

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

COOLING FAN

Component Function Check

INFOID:0000000010986480

1.CHECK COOLING FAN FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Perform "COOLING FAN (DUAL)" in "ACTIVE TEST" mode of "IPDM E/R" using CONSULT.
3. Touch "LOW", "HI" on the CONSULT screen.
4. Check that cooling fan operates.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-773, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010986481

1.CHECK COOLING FAN RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relays-2, -3.
3. Turn ignition switch ON.
4. Check the voltage between cooling fan relays-2, -3 harness connectors and ground.

+		-	Voltage
Cooling fan relay			
Connector	Terminal		
F56 (cooling fan relay-2)	1	Ground	Battery voltage
F57 (cooling fan relay-3)			

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble diagnosis for power supply circuit.

2.CHECK COOLING FAN MOTOR CIRCUIT-1

Check the voltage between cooling fan relays-2, -3 harness connectors and ground.

+		-	Voltage
Cooling fan relay			
Connector	Terminal		
F56 (cooling fan relay-2)	3	Ground	Battery voltage
F57 (cooling fan relay-3)			

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 4.

3.CHECK COOLING FAN RELAY OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connectors.
3. Check the continuity between cooling fan relay-2, -3 harness connectors and IPDM E/R harness connector.

COOLING FAN

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

+		-		Continuity
Cooling fan relay		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F56 (cooling fan relay-2)	2	F74	107	Existed
F57 (cooling fan relay-3)			106	

4. 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.

4.CHECK COOLING FAN MOTOR POWER SUPPLY CIRCUIT

1. Disconnect cooling fan motor-1 harness connector.
2. Check the voltage between cooling fan motor-1 harness connector and ground.

+		-	Voltage
Cooling fan motor-1			
Connector	Terminal		
F52	1	Ground	Battery voltage
	2		

Is the inspection result normal?

YES >> GO TO 5.

NO >> Perform trouble diagnosis for power supply circuit.

5.CHECK COOLING FAN MOTOR CIRCUIT-2

1. Check the continuity between cooling fan relay-2, -3 harness connectors and cooling fan motor-1, -2 harness connectors.

+		-		Continuity
Cooling fan relay		Cooling fan motor-1		
Connector	Terminal	Connector	Terminal	
F56 (cooling fan relay-2)	3	F3	3	Existed
			4	
F57 (cooling fan relay-3)			3	
			4	

2. 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.

6.CHECK COOLING FAN MOTOR CIRCUIT-3

1. Check the continuity between IPDM E/R harness connector and cooling fan motor-2 harness connector.

+		-		Continuity
IPDM E/R		Cooling fan motor-2		
Connector	Terminal	Connector	Terminal	
F73	85	F53	1	Existed
			2	

COOLING FAN

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

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 COOLING FAN MOTOR CIRCUIT-4

1. Check the continuity between cooling fan relay-3 harness connectors and ground.

+		-	Continuity
Cooling fan relay-3			
Connector	Terminal		
F57	5	Ground	Existed

2. 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 COOLING FAN MOTOR CIRCUIT-5

1. Check the continuity between cooling fan relay-2 harness connectors and cooling fan motor-2 harness connector.

+		-		Continuity
Cooling fan relay-2		Cooling fan motor-2		
Connector	Terminal	Connector	Terminal	
F56	5	F53	1	Existed
			2	

2. 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 COOLING FAN MOTOR CIRCUIT-4

1. Check the continuity between cooling fan motor-2 harness connector and ground.

+		-	Continuity
Cooling fan motor-2			
Connector	Terminal		
F53	3	Ground	Existed
	4		

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace error-detected parts.

10.CHECK COOLING FAN RELAY-2 AND -3

Refer to [EC-776. "Component Inspection \(Cooling Fan Relay\)".](#)

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace malfunctioning cooling fan relay.

11.CHECK COOLING FAN MOTORS-1 AND -2

Refer to [EC-776. "Component Inspection \(Cooling Fan Motor\)".](#)

COOLING FAN

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace malfunctioning cooling fan motor. Refer to [CO-47, "Removal and Installation"](#).

12.CHECK INTERMITTENT INCIDENT

Perform [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to [PCS-60, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

Component Inspection (Cooling Fan Motor)

INFOID:0000000010986482

1.CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector.
3. Supply cooling fan motor terminals with battery voltage and check operation.

Cooling fan motor		Condition
Terminal		
+	—	
1	3 and 4	A
2	3 and 4	
1 and 2	3	
1 and 2	4	
1, 2	3, 4	B

Check that cooling fan speed of condition B is higher than that of A.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace cooling fan motor. Refer to [CO-47, "Removal and Installation"](#).

Component Inspection (Cooling Fan Relay)

INFOID:0000000010986483

1.CHECK COOLING FAN RELAYS

1. Turn ignition switch OFF.
2. Remove cooling fan relay-2, -3.
3. Check the continuity between cooling fan relay-2, -3 terminals as per the following conditions.

Cooling fan relay-2, -3		Conditions	Continuity
+	—		
Terminal			
3	5	12V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace cooling fan relay.

ELECTRICAL LOAD SIGNAL

Description

INFOID:0000000010986484

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred via the CAN communication.

Component Function Check

INFOID:0000000010986485

1.CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

1. Turn ignition switch ON.
2. Connect CONSULT and select "DATA MONITOR" mode.
3. Select "LOAD SIGNAL" and check indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Rear window defogger switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to [EC-777, "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 >> Proceed to [EC-777, "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 >> Proceed to [EC-777, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010986486

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to [EC-777, "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 rear window defogger system. Refer to [DEF-25, "Work Flow"](#).

>> INSPECTION END

3. CHECK HEADLAMP SYSTEM

Check headlamp system. Refer to [EXL-297, "Work Flow"](#) (with halogen headlamp) or [EXL-95, "Work Flow"](#) (with LED headlamp).

>> INSPECTION END

4. CHECK HEATER FAN CONTROL SYSTEM

Check heater fan control system. Refer to [HAC-69, "Work Flow"](#) (with automatic air conditioner) or [HAC-183, "Work Flow"](#) (with manual air conditioner).

>> INSPECTION END

FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

FUEL INJECTOR

Component Function Check

INFOID:000000010986487

1.INSPECTION START

Turn ignition switch to START.

Are any cylinders ignited?

YES >> GO TO 2.

NO >> Proceed to [EC-779, "Diagnosis Procedure"](#).

2.CHECK FUEL INJECTOR FUNCTION

With CONSULT

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
3. Check that each circuit produces a momentary engine speed drop.

Without CONSULT

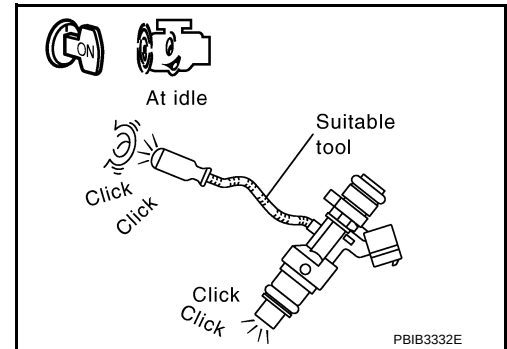
1. Start engine.
2. Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-779, "Diagnosis Procedure"](#).



Diagnosis Procedure

INFOID:000000010986488

1.CHECK FUEL INJECTOR POWER SUPPLY

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	F37	1	Ground	Battery voltage
2	F38	1		
3	F39	1		
4	F40	1		

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between fuel injector harness connector and IPDM E/R harness connector.

FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

+			-		Continuity
Fuel injector			IPDM E/R		
Cylinder	Connector	Terminal	Connector	Terminal	
1	F37	1	E11	21	Existed
2	F38				
3	F39				
4	F40				
1	F37		E72	66	
2	F38				
3	F39				
4	F40				

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3.CHECK FUEL INJECTOR OUTPUT SIGNAL 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	F37	2	F85	13	Existed
2	F38	2		14	
3	F39	2		10	
4	F40	2		9	

4. Also check harness for short to ground and 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 FUEL INJECTOR

Check fuel injector. Refer to [EC-780. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning fuel injector. Refer to [EM-184. "Removal and Installation"](#).

5.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-44. "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to [PCS-60. "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

Component Inspection

INFOID:0000000010986489

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.

FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

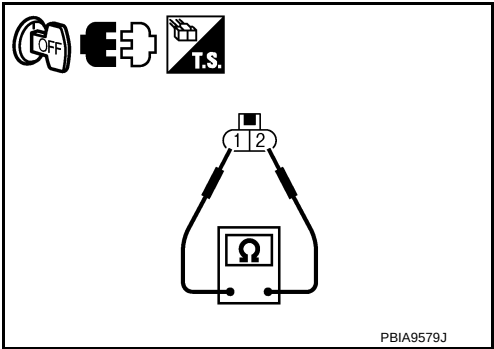
[QR25DE]

3. Check resistance between fuel injector terminals as per the following.

Fuel injector		Resistance
+	-	
Terminal		
1	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. Refer to [EM-184](#).
"Removal and Installation".



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FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

FUEL PUMP

Description

INFOID:0000000010986490

Sensor	Input signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay ↓
Battery	Battery voltage*		Fuel pump

*: ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine start ability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.

Component Function Check

INFOID:0000000010986491

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 >> Proceed to [EC-782, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010986492

1.CHECK FUEL PUMP RELAY CONTROL SIGNAL

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector.

ECM				Voltage
+		-		
Connector	Terminal	Connector	Terminal	
F85	18	E60	128	Battery voltage should exist 1 second after ignition switch is turn ON.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK FUEL PUMP RELAY CONTROL SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector.

FUEL PUMP

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		-		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F85	18	F72	76	Existed

5. 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.

3.CHECK FUEL PUMP POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.
3. Turn ignition switch ON.
4. Check the voltage between “fuel level sensor unit and fuel pump” harness connector and ground.

+		-	Voltage
Fuel level sensor unit and fuel pump			
Connector	Terminal		
B40	1	Ground	Battery voltage should exist 1 second after ignition switch is turn ON.

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.CHECK FUEL PUMP 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 “fuel level sensor unit and fuel pump” harness connector.

+		-		Continuity
IPDM E/R		Fuel level sensor unit and fuel pump		
Connector	Terminal	Connector	Terminal	
E11	24	B40	1	Existed

4. 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.

5.CHECK FUEL PUMP GROUND CIRCUIT

1. Check the continuity between “fuel level sensor unit and fuel pump” and ground.

+		-	Continuity
Fuel level sensor unit and fuel pump			
Connector	Terminal		
B40	3	Ground	Existed

2. Also heck harness for short to power.

Is the inspection result normal?

FUEL PUMP

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK FUEL PUMP

Refer to [EC-784, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 7.
NO >> Replace "fuel level sensor unit and fuel pump". Refer to [FL-12, "Removal and Installation"](#).

7.CHECK INTERMITTENT INCIDENT

Perform [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace IPDM E/R. Refer to [PCS-60, "Removal and Installation"](#).
NO >> Repair or replace harness or connectors.

Component Inspection

INFOID:0000000010986493

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.

Fuel level sensor unit and fuel pump		Resistance
+	-	
Terminal		
1	3	0.2 - 5.0Ω [at 25°C (77°F)]

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace "fuel level sensor unit and fuel pump". Refer to [FL-12, "Removal and Installation"](#).

IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

IGNITION SIGNAL

Component Function Check

INFOID:0000000110986494

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES-1 >> With CONSULT: GO TO 2.

YES-2 >> Without CONSULT: GO TO 3.

NO >> Proceed to [EC-785, "Diagnosis Procedure"](#).

2.CHECK IGNITION SIGNAL FUNCTION

 With CONSULT

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.

2. Check that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

YES >> INSPECTION END

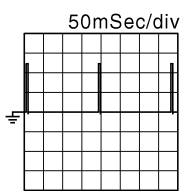
NO >> Proceed to [EC-785, "Diagnosis Procedure"](#).

3.CHECK IGNITION SIGNAL FUNCTION

 Without CONSULT

1. Let engine idle.

2. Read the voltage signal between ECM harness connector terminals with an oscilloscope.

ECM				Voltage signal
+		-		
Connector	Terminal	Connector	Terminal	
F68	86	E16	128	50mSec/div  2V/div JMBIA0035GB
	87			
	90			
	91			

NOTE:

The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-785, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000110986495

1.CHECK ECM POWER SUPPLY

1. Turn ignition switch OFF, wait at least 10 seconds and then turn it ON.

2. Check the voltage between ECM harness connector terminals.

ECM			Voltage
Connector	+	−	
	Terminal		
E60	121	128	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Refer to [EC-573, "Diagnosis Procedure"](#).

IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

2. 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		
F213	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. 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	
F72	66	F213	1	Existed
E11	21			

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Refer to [EC-573, "Diagnosis Procedure"](#).

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4. CHECK CONDENSER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between condenser harness connector and ground.

+		-	Voltage
Condenser			
Connector	Terminal		
F213	2	Ground	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 power in harness or connectors.

5. CHECK CONDENSER

Check condenser. Refer to [EC-789, "Component Inspection \(Condenser\)"](#)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace condenser.

6. CHECK IGNITION COIL POWER SUPPLY

1. Reconnect all harness connectors disconnected.
2. Disconnect ignition coil harness connector.
3. Turn ignition switch ON.

IGNITION SIGNAL

[QR25DE]

< DTC/CIRCUIT DIAGNOSIS >

4. Check the voltage between ignition coil harness connector and ground.

+			-	Voltage
Ignition coil				
Cylinder	Connector	Terminal	Ground	Battery voltage
1	F33	3		
2	F34	3		
3	F35	3		
4	F36	3		

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace harness or connectors.

7.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	Ground	Existed
1	F33	2		
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 8.

NO >> Repair open circuit or short to power in harness or connectors.

8.CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ignition coil harness connector and ECM harness connector.

+			-		Continuity
Ignition coil			ECM		
Cylinder	Connector	Terminal	Connector	Terminal	Existed
1	F33	1	F68	86	
2	F34	1		87	
3	F35	1		90	
4	F36	1		91	

3. Also check harness for short to ground and 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 IGNITION COIL WITH POWER TRANSISTOR

Check ignition coil with power transistor. Refer to [EC-788, "Component Inspection \(Ignition Coil with Power Transistor\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

NO >> Replace malfunctioning ignition coil with power transistor. Refer to [EM-190. "Removal and Installation"](#).

Component Inspection (Ignition Coil with Power Transistor)

INFOID:000000010986496

1.CHECK IGNITION COIL WITH POWER TRANSISTOR-1

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as per the following.

Ignition coil		Resistance Ω [at 25°C (77°F)]
+	-	
Terminal No. (Polarity)		
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-190. "Removal and Installation"](#).

2.CHECK IGNITION COIL WITH POWER TRANSISTOR-2

CAUTION:

Perform the following procedure in a place with no combustible objects and good ventilation.

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

NOTE:

Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

4. Start engine.
5. After engine stalls, crank it 2 or 3 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 approximately 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

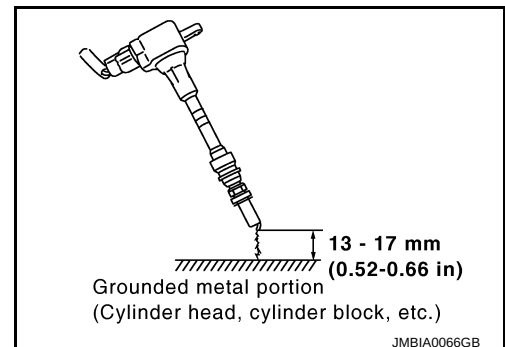
- During the operation, always stay 0.5 m (19.7 in) or more away from the spark plug and the ignition coil. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 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



IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

NO >> Replace malfunctioning ignition coil with power transistor. Refer to [EM-190. "Removal and Installation"](#).

A

Component Inspection (Condenser)

INFOID:0000000010986497

1.CHECK CONDENSER

EC

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check resistance between condenser terminals as per the following.

C

Condenser		Resistance
+	-	
Terminal		
1	2	Above 1 MΩ [at 25C° (77C°)]

D

Is the inspection result normal?

E

YES >> INSPECTION END
NO >> Replace condenser.

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INFORMATION DISPLAY (ASCD)

Component Function Check

INFOID:0000000010986498

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-790, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010986499

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-690, "DTC Description"](#).
 NO-3 >> Perform trouble diagnosis for DTC P1574. Refer to [EC-735, "DTC Description"](#).

2.CHECK DTC WITH COMBINATION METER

Refer to [MWI-86, "CONSULT Function"](#).

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Perform trouble diagnosis for DTC indicated.

3.CHECK INTERMITTENT INCIDENT

Perform [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace combination meter. Refer to [MWI-151, "Removal and Installation"](#).
 NO >> Repair or replace error-detected parts.

MALFUNCTION INDICATOR LAMP

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

MALFUNCTION INDICATOR LAMP

Component Function Check

INFOID:000000010986500

1.CHECK MIL FUNCTION

1. Turn ignition switch ON.
2. Check that MIL illuminates.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Proceed to [EC-791, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000010986501

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 COMBINATION METER FUNCTION

Check combination meter function. Refer to [MWI-86, "CONSULT Function"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace combination meter. Refer to [MWI-151, "Removal and Installation"](#).
NO >> Repair or replace error-detected parts.

REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

REFRIGERANT PRESSURE SENSOR

Component Function Check

INFOID:0000000010986502

1.CHECK REFRIGERANT PRESSURE SENSOR 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 terminals under the following conditions.

ECM			Voltage (V)
Connector	+	–	
	Terminal		
E60	103	124	1.0 - 4.0

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-792, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010986503

1.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between refrigerant pressure sensor harness connector and ground.

+		-	Voltage (Approx.)
Refrigerant pressure sensor			
Connector	Terminal		
F42	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	
F42	3	E60	104	Existed

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 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.

REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

+		-		Continuity
Refrigerant pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
F42	1	E60	124	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 refrigerant pressure sensor harness connector and ECM harness connector.

+		-		Continuity
Refrigerant pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
F42	2	E60	103	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

Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor. Refer to [HAC-131, "Removal and Installation"](#) (with automatic air conditioning) or [HAC-225, "Removal and Installation"](#) (with manual air conditioning).

NO >> Repair or replace error-detected parts.

SENSOR POWER SUPPLY2 CIRCUIT

Description

INFOID:000000010986504

ECM supplies a voltage of 5 V to some of the sensors systematically divided into 2 groups, respectively. Accordingly, when a short circuit develops in a sensor power source, a malfunction may occur simultaneously in the sensors belonging to the same group as the short-circuited sensor.

Sensor power supply 1

- APP sensor 1
- CKP sensor (POS)
- Intake manifold runner control valve position sensor
- Refrigerant pressure sensor
- TP sensor

NOTE:

If sensor power supply 1 circuit is malfunctioning, DTC P0643 is displayed.

Sensor power supply 2

- APP sensor 2
- CMP sensor (PHASE)
- EVT control position sensor
- EOP sensor
- MAF sensor

Diagnosis Procedure

INFOID:000000010986505

1.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position (APP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between APP sensor harness connector and ground.

+		-	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E110	5	Ground	5V

Is the inspection result normal?

- YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-2

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		+		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
E110	5	E60	118	Existed

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair open circuit.

3.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

1. Disconnect following sensors harness connector.
2. Check harness for short to power and short to ground, between the following terminals.

SENSOR POWER SUPPLY2 CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[QR25DE]

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F85	32	CMP sensor (PHASE)	F105	1
	36	MAF sensor	F110	1
	40	EOP sensor	F106	3
	44	EVT control position sensor	F104	1
E60	118	APP sensor 2	E110	5

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair short to ground or short to power in harness or connectors.

4.CHECK COMPONENTS

Check the following.

- APP sensor 2 (Refer to [EC-761, "Component Inspection".](#))
- Camshaft position sensor (PHASE) (Refer to [EC-681, "Component Inspection \(Camshaft position sensor\)".](#))
- EVT control position sensor (Refer to [EC-715, "Component Inspection".](#))
- EOP sensor (Refer to [EC-694, "Component Inspection".](#))
- MAF sensor (Refer to [EC-607, "Component Inspection".](#))

Is the inspection result normal?

YES >> Refer to [GI-44, "Intermittent Incident".](#)

NO >> Replace malfunctioning component.

ENGINE CONTROL SYSTEM

< SYMPTOM DIAGNOSIS >

[QR25DE]

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM

Symptom Table

INFOID:000000010986506

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-782						
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-558						
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-779						
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-804						
Air	Positive crankcase ventilation sys-tem	3	3	4	4	4	4	4	4	4		4	1		EC-805						
	Incorrect idle speed adjustment						1	1	1	1		1			EC-555						
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-750 , EC-755						
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-803						
	Ignition circuit	1	1	2	2	2		2	2			2			EC-785						
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-573						
Mass air flow sensor circuit		1			2										EC-605						
Intake air temperature sensor circuit														EC-609							
Engine coolant temperature sensor circuit											3			3					EC-612		
Air fuel ratio (A/F) sensor 1 circuit			1	2	3	2		2	2			2			EC-618 , EC-622 , EC-625 , EC-647						
Throttle position sensor circuit																	2		2		
Accelerator pedal position sensor circuit															3	2	1				

ENGINE CONTROL SYSTEM

< SYMPTOM DIAGNOSIS >

[QR25DE]

	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	OVERHEATSWATER 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-628 , EC-634 , EC-641
Knock sensor circuit			2								3			EC-674
Engine oil temperature sensor circuit			4		2						3			EC-662
Engine oil pressure sensor circuit			4		4	3	3	3			3			EC-692 , EC-695
Crankshaft position sensor (POS) circuit	2	2												EC-676
Camshaft position sensor (PHASE) circuit	3	2												EC-679
Vehicle speed signal circuit		2	3		3						3			EC-690
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-698 , EC-700 , EC-701 , EC-704 , EC-705 , EC-706
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-584 , EC-598
Intake valve timing intermediate lock control solenoid valve circuit														—
Exhaust valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-602
PNP signal circuit			3		3		3	3			3			EC-710
Refrigerant pressure sensor circuit		2				3			3		4			EC-792
Electrical load signal circuit							3							EC-777
Intake manifold runner control valve motor circuit					4	4								EC-741
Intake manifold runner control valve position sensor circuit					4	4								EC-744
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-69 , HAC-183
ASCD steering switch circuit														EC-724
ABS actuator and electric unit (control unit)			4											BRC-95

1 - 6: The numbers refer to the order of inspection.

(continued on next table)

SYSTEM — ENGINE MECHANICAL & OTHER

ENGINE CONTROL SYSTEM

< SYMPTOM DIAGNOSIS >

[QR25DE]

		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	5												FL-22	
	Fuel piping			5	5	5		5	5			5			FL-9	
	Vapor lock															—
	Valve deposit															—
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5			5				—
Air	Air duct		5												EM-175	
	Air cleaner															
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)			5	5		5		5	5		5				EM-176
	Electric throttle control actuator	5			5		5		5							
	Air leakage from intake manifold/Collector/Gasket															
Cranking	Battery	1	1	1		1		1	1					1	PG-124	
	Generator circuit														CHG-40	
	Starter circuit	3										1			STR-19	
	Signal plate	6													EM-248	
	PNP signal	4													TM-450	
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-239	
	Cylinder head gasket										4		3			
	Cylinder block	6	6	6	6		6	6			6	4	EM-248			
	Piston															
	Piston ring															
	Connecting rod															
	Bearing															
	Crankshaft															

ENGINE CONTROL SYSTEM

< SYMPTOM DIAGNOSIS >

[QR25DE]

		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	OVERHEATSWATER 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			
Valve mecha- nism	Timing chain	5	5	5	5	5		5	5			5		3		EM-211	
	Camshaft															EM-222	
	Intake valve timing control															EM-211	
	Intake valve															EM-239	
	Exhaust valve																
Exhaust	Exhaust manifold/Tube/Muf- fler/Gasket	5	5	5	5	5		5	5			5				EM-180, EX-12	
	Three way catalyst																
Lubrica- tion	Oil pan/Oil strainer/Oil pump/ Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5				EM-194, LU-25, LU-31, LU-23, LU-30	
	Oil level (Low)/Filthy oil															LU-25	
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5				CO-43	
	Thermostat															5	CO-52
	Water pump																CO-50
	Water gallery																CO-36
	Cooling fan																CO-47
	Coolant level (Low)/Contami- nated coolant															5	CO-39
NVIS (NISSAN Vehicle Immobilizer Sys- tem — NATS)		1	1													SEC-100, SEC-262	

1 - 6: The numbers refer to the order of inspection.

INFORMATION DISPLAY IS MALFUNCTIONING

< SYMPTOM DIAGNOSIS >

[QR25DE]

INFORMATION DISPLAY IS MALFUNCTIONING

Diagnosis Procedure

INFOID:0000000010986507

1.CHECK DTC WITH ECM

Check that DTC is not displayed.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble diagnosis relevant to DTC indicated.

2.CHECK INFORMATION DISPLAY (ASCD)

Refer to [EC-790, "Component Function Check"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part.

3.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

>> INSPECTION END

NORMAL OPERATING CONDITION

Description

INFOID:0000000110986508

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 Multiport Fuel Injection (MFI) System, [EC-461](#), "[MULTIPOINT FUEL INJECTION SYSTEM : System Description \(with automatic air conditioner\)](#)" or [EC-463](#), "[MULTIPOINT FUEL INJECTION SYSTEM : System Description \(with manual air conditioner\)](#)".

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

PERIODIC MAINTENANCE

IDLE SPEED

Inspection

INFOID:0000000010986509

1. CHECK IDLE SPEED

 With CONSULT

Check idle speed in "DATA MONITOR" mode of "ENGINE" using CONSULT.

 With GST

Check idle speed with Service \$01 of GST.

>> INSPECTION END

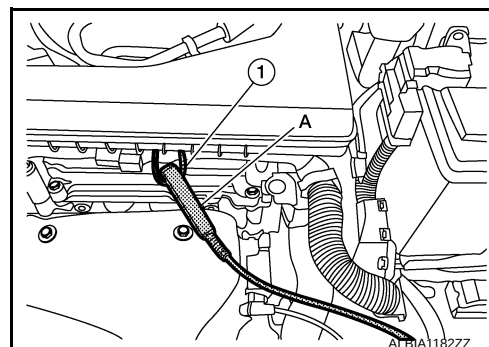
IGNITION TIMING

Inspection

INFOID:000000010986510

1.CHECK IGNITION TIMING

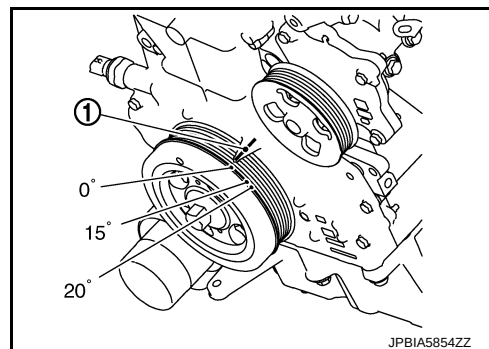
1. Attach timing light (A) to the ignition coil No.1 harness①.



2. Check ignition timing.

① : Timing indicator

>> INSPECTION END

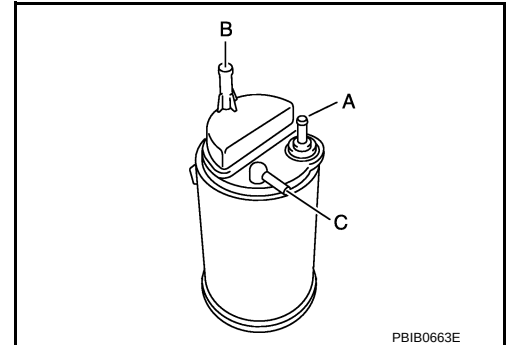


EVAPORATIVE EMISSION SYSTEM

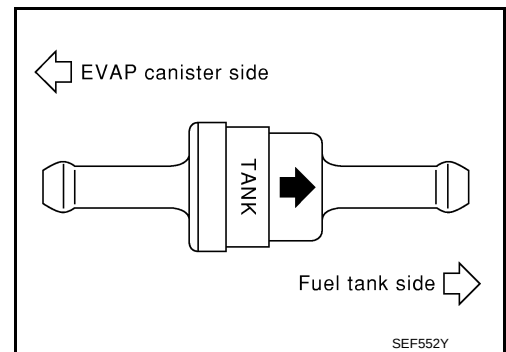
Inspection

INFOID:000000010986511

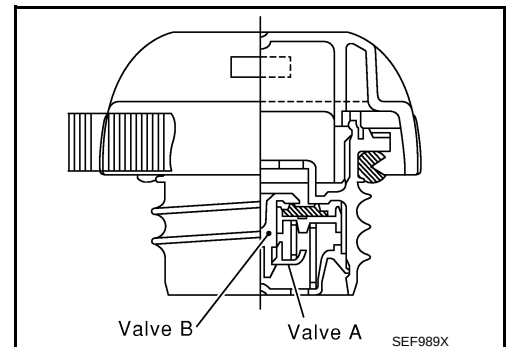
1. Visually inspect EVAP vapor lines for improper attachment and for cracks, damage, loose connections, chafing and deterioration.
2. Check EVAP canister as follows:
 - a. Block port (B). Orally blow air through port (A). Check that air flows freely through port (C).
 - b. Block port. Orally blow air through port. Check that air flows freely through port.
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.

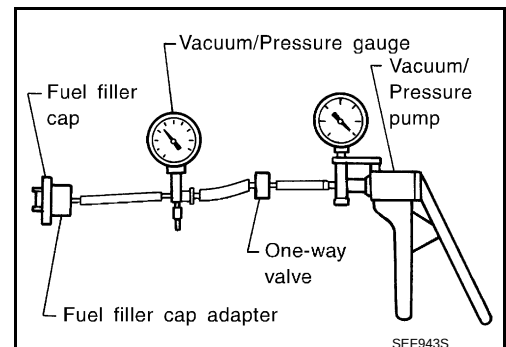


- b. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.153 - 0.200 bar, 0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)

Vacuum: -6.0 to -3.4 kPa (-0.06 bar to -0.034bar, -0.061 to -0.035 kg/cm², -0.87 to -0.49 psi)

- c. If out of specification, replace fuel filler cap as an assembly.



POSITIVE CRANKCASE VENTILATION

< PERIODIC MAINTENANCE >

[QR25DE]

POSITIVE CRANKCASE VENTILATION

Inspection

INFOID:0000000010986512

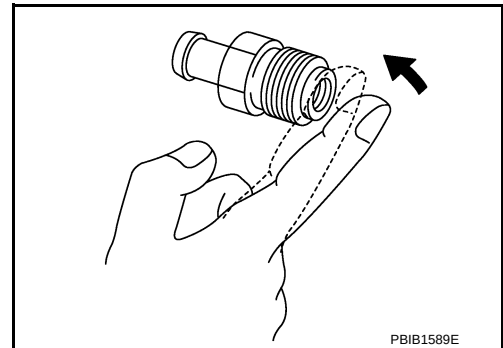
1.CHECK PCV VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace PCV valve. Refer to [EC-440](#),
["Component Parts Location"](#).



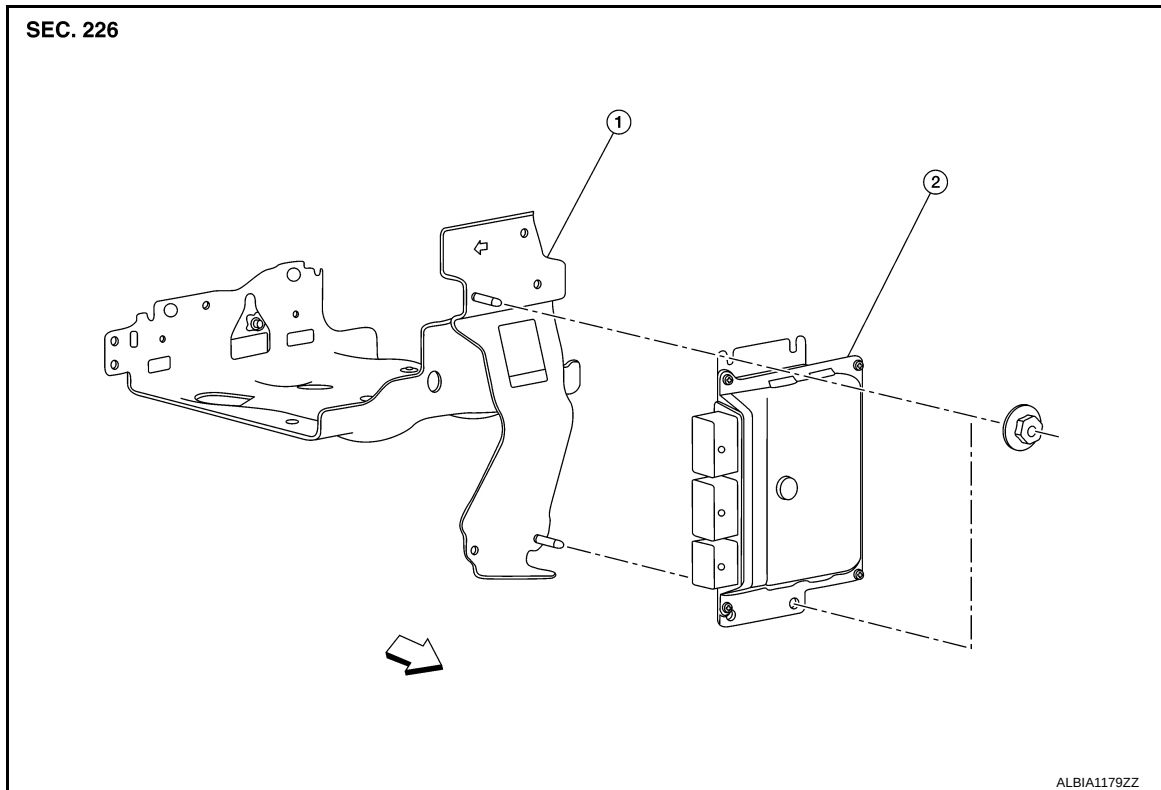
REMOVAL AND INSTALLATION

ECM

Removal and Installation

INFOID:000000010986513

EXPLODED VIEW

**CAUTION:**

Perform **ADDITIONAL SERVICE WHEN REPLACING ECM**. Refer to [EC-550, "Work Procedure"](#).

REMOVAL

1. Disconnect the battery negative terminal.
2. Remove the resonator. Refer to [EM-174, "Exploded View"](#).
3. Disconnect ECM harness connectors.
4. Remove ECM mounting nuts, and then remove ECM.

INSTALLATION

Install in the reverse order of removal.

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[QR25DE]

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:0000000010986514

Condition	Specification
No load* (in P or N 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:0000000010986515

Condition	Specification
No load* (in P or N position)	10 ± 2° BTDC

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

INFOID:0000000010986516

Condition	Specification (Using CONSULT or GST)
At idle	10 – 35 %
At 2,500 rpm	10 – 35 %

Mass Air Flow Sensor

INFOID:0000000010986517

Supply voltage	Battery voltage (11 – 14 V)
Output voltage at idle	1.3 – 1.6 V*
Mass air flow (Using CONSULT or GST)	1.0 – 4.0 g/s at idle* 4.0 – 10.0 g/s at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.

HOW TO USE THIS MANUAL

HOW TO USE THIS SECTION

Information

INFOID:0000000011058853

Both “VDC” and “ESP” are used in this manual. These indicate the same system.

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:000000010935499

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.

WARNING:

Always observe the following items for preventing accidental activation.

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, 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:

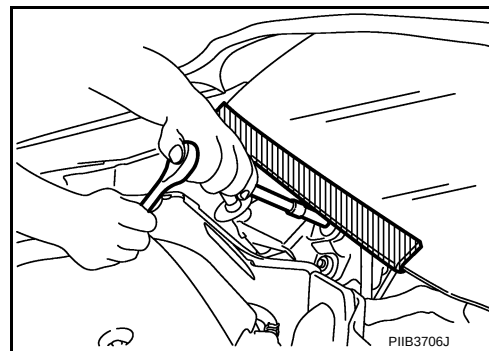
Always observe the following items for preventing accidental activation.

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Precaution for Procedure without Cowl Top Cover

INFOID:000000010935500

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



Precautions for Removing Battery Terminal

INFOID:000000010935501

- With the adoption of Auto ACC function, ACC power is automatically supplied by operating the intelligent key or remote keyless entry or by opening/closing the driver side door. In addition, ACC power is supplied even after the ignition switch is turned to the OFF position, i.e. ACC power is supplied for a certain fixed time.

PRECAUTIONS

[R9M]

< PRECAUTION >

- When disconnecting the 12V battery terminal, turn off the ACC power before disconnecting the 12V battery terminal, observing "How to disconnect 12V battery terminal" described below.

NOTE:

Some ECUs operate for a certain fixed time even after ignition switch is turned OFF and ignition power supply is stopped. If the battery terminal is disconnected before ECU stops, accidental DTC detection or ECU data damage may occur.

- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.

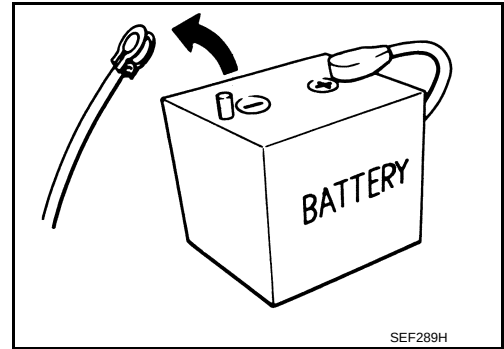
NOTE:

If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.

- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.

NOTE:

The removal of 12V battery may cause a DTC detection error.



HOW TO DISCONNECT 12V BATTERY TERMINAL

Disconnect 12V battery terminal according to Instruction 1 or Instruction 2 described below.

For vehicles parked by ignition switch OFF, refer to Instruction 2.

INSTRUCTION 1

- Open the hood.
- Turn key switch to the OFF position with the driver side door opened.
- Get out of the vehicle and close the driver side door.
- Wait at least 3 minutes. For vehicle with the engine listed below, remove the battery terminal after a lapse of the specified time.

D4D engine	: 20 minutes
HRA2DDT	: 12 minutes
K9K engine	: 4 minutes
M9R engine	: 4 minutes
R9M engine	: 4 minutes
V9X engine	: 4 minutes

CAUTION:

While waiting, never operate the vehicle such as locking, opening, and closing doors. Violation of this caution results in the activation of ACC power supply according to the Auto ACC function.

- Remove 12V battery terminal.

CAUTION:

After installing 12V battery, always check self-diagnosis results of all ECUs and erase DTC.

INSTRUCTION 2 (FOR VEHICLES PARKED BY IGNITION SWITCH OFF)

- Unlock the door with intelligent key or remote keyless entry.

NOTE:

At this moment, ACC power is supplied.

- Open the driver side door.
- Open the hood.
- Close the driver side door.
- Wait at least 3 minutes.

CAUTION:

While waiting, never operate the vehicle such as locking, opening, and closing doors. Violation of this caution results in the activation of ACC power supply according to the Auto ACC function.

- Remove 12V battery terminal.

CAUTION:

After installing 12V battery, always check self-diagnosis results of all ECUs and erase DTC.

Precaution for Stop/Start System Service

INFOID:0000000010935502

CAUTION:

PRECAUTIONS

< PRECAUTION >

[R9M]

When performing an inspection and its related work with the engine at idle, always turn the stop/start OFF switch ON or open the hood to release the stop/start system.

On Board Diagnostic (OBD) System of Engine

INFOID:0000000010935503

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 [PG-7, "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 injection system, etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.

< SYSTEM DESCRIPTION >

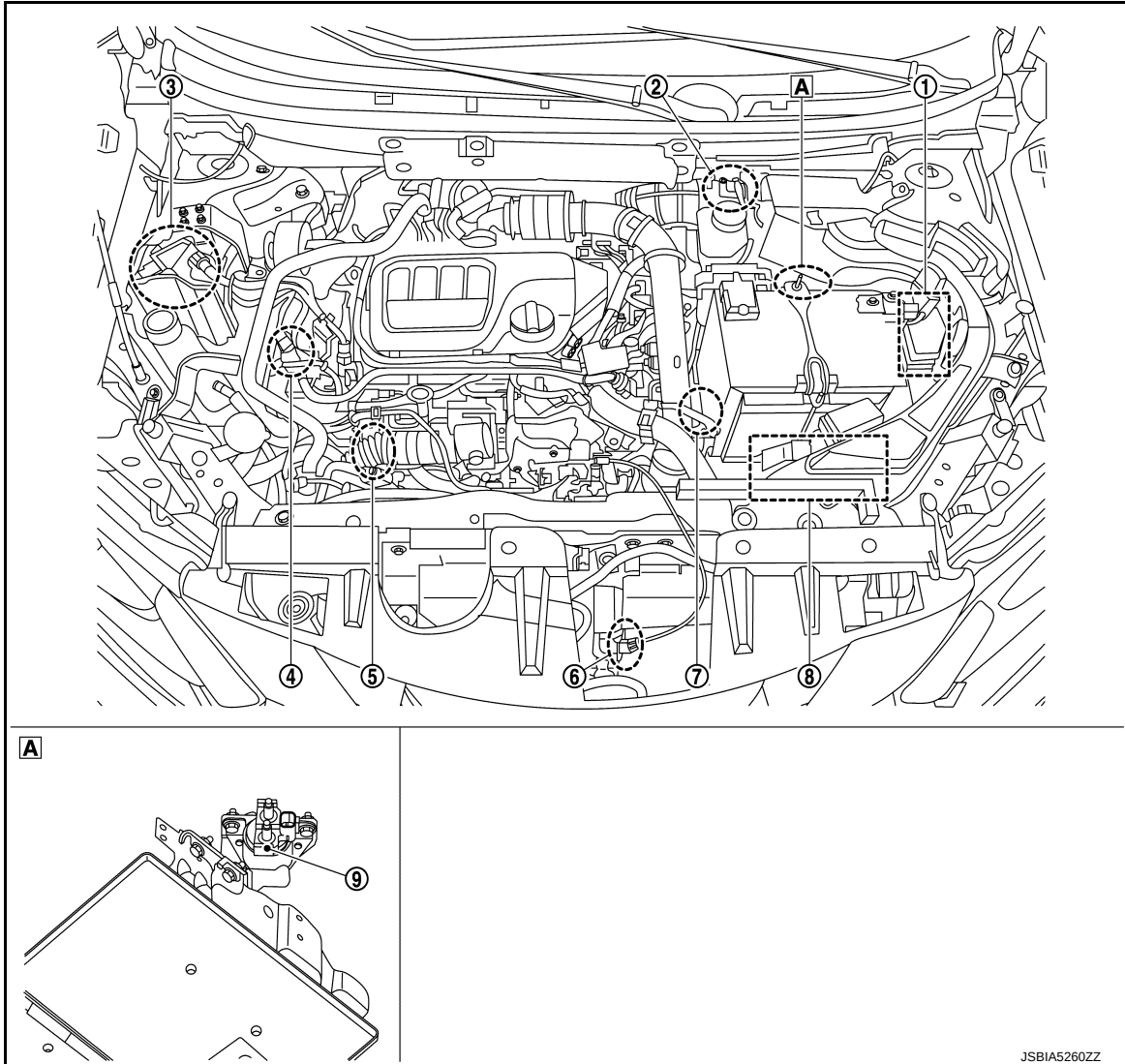
SYSTEM DESCRIPTION

COMPONENT PARTS

Component Parts Location

INFOID:000000010935504

ENGINE ROOM COMPARTMENT



A Battery mounting bracket assembly

No.	Component parts	Function
①	IPDM E/R	IPDM E/R activates the internal control circuit to perform the relay ON-OFF control according to the input signals from various sensors and the request signals received from control units via CAN communication. Refer to PCS-5, "Component Parts Location" for detailed installation location.
②	Mass air flow (MAF) sensor (with intake air temperature sensor 1)	• EC-816, "Mass Air Flow Sensor" • EC-816, "Intake Air Temperature Sensor 1"
③	Fuel heater and water in fuel level sensor	EC-818, "Fuel Heater With Water In Fuel Level Sensor"
④	Fuel pressure sensor	EC-818, "Fuel Pressure Sensor"

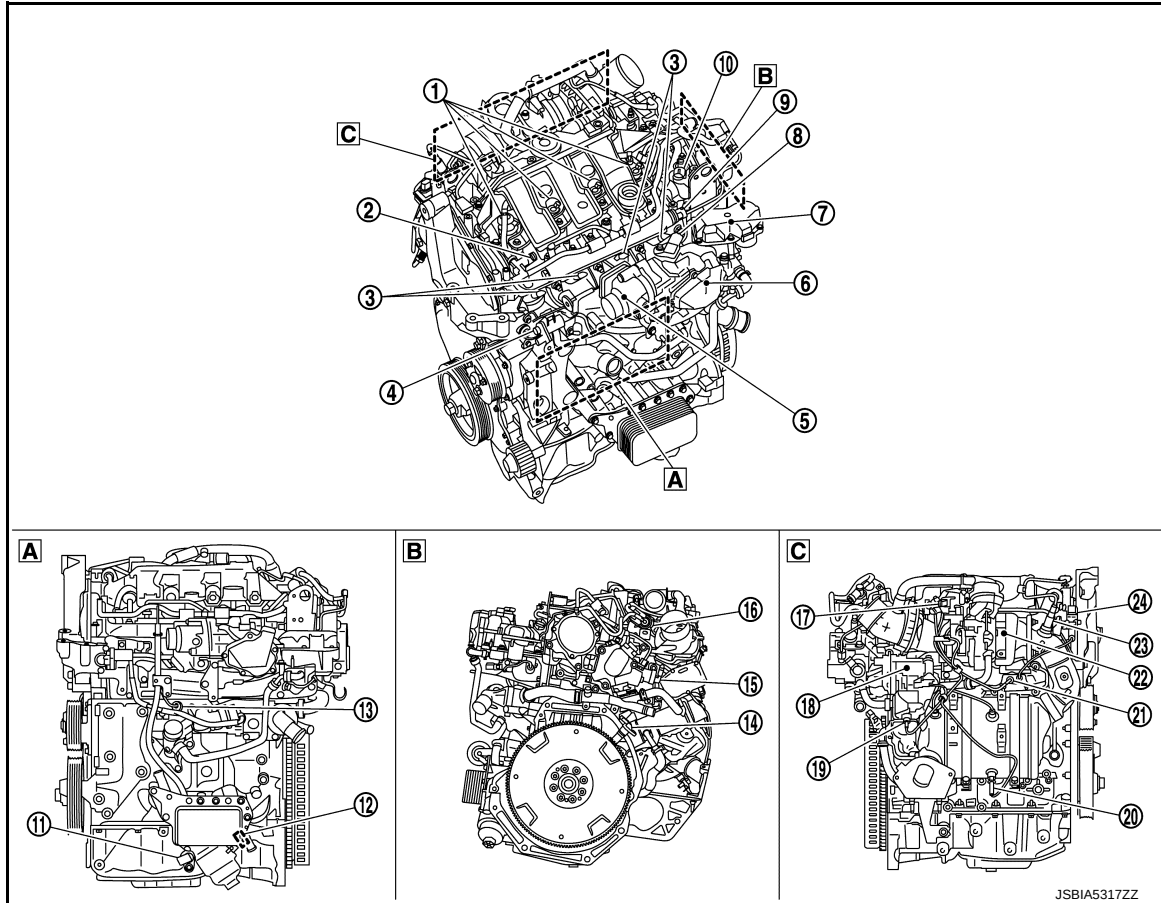
COMPONENT PARTS

< SYSTEM DESCRIPTION >

[R9M]

No.	Component parts	Function
⑤	Alternator	CHG-6, "Alternator"
⑥	Hood switch	EC-823, "Hood Switch"
⑦	Reverse / neutral position switch (M/T models)	It detects that the transmission is in reverse and neutral.
⑧	ECM	EC-816, "ECM"
⑨	Engine restart bypass relay	EC-823, "Engine Restart Bypass Relay"

ENGINE COMPARTMENT



No.	Component parts	Function
①	Fuel injector	EC-818, "Fuel Injector"
②	Fuel temperature sensor	EC-818, "Fuel Temperature Sensor"
③	Glow plug	EC-821, "Glow Plug"
④	Engine coolant bypass control solenoid valve	EC-822, "Engine Coolant Bypass Valve Control Solenoid Valve"
⑤	Electric throttle control actuator	EC-819, "Electric Throttle Control Actuator"
⑥	Intake valve runner control valve	EC-819, "Intake Manifold Runner Control Valve"
⑦	High pressure EGR volume control valve	EC-819, "High Pressure EGR Volume Control Valve"
⑧	Turbocharger boost sensor (with intake air temperature sensor 2)	• EC-817, "Turbocharger Boost Sensor" • EC-817, "Intake Air Temperature Sensor 2"
⑨	Fuel rail pressure sensor	EC-818, "Fuel Rail Pressure Sensor"
⑩	Camshaft position sensor	EC-816, "Camshaft Position Sensor"
⑪	Engine oil level sensor	—

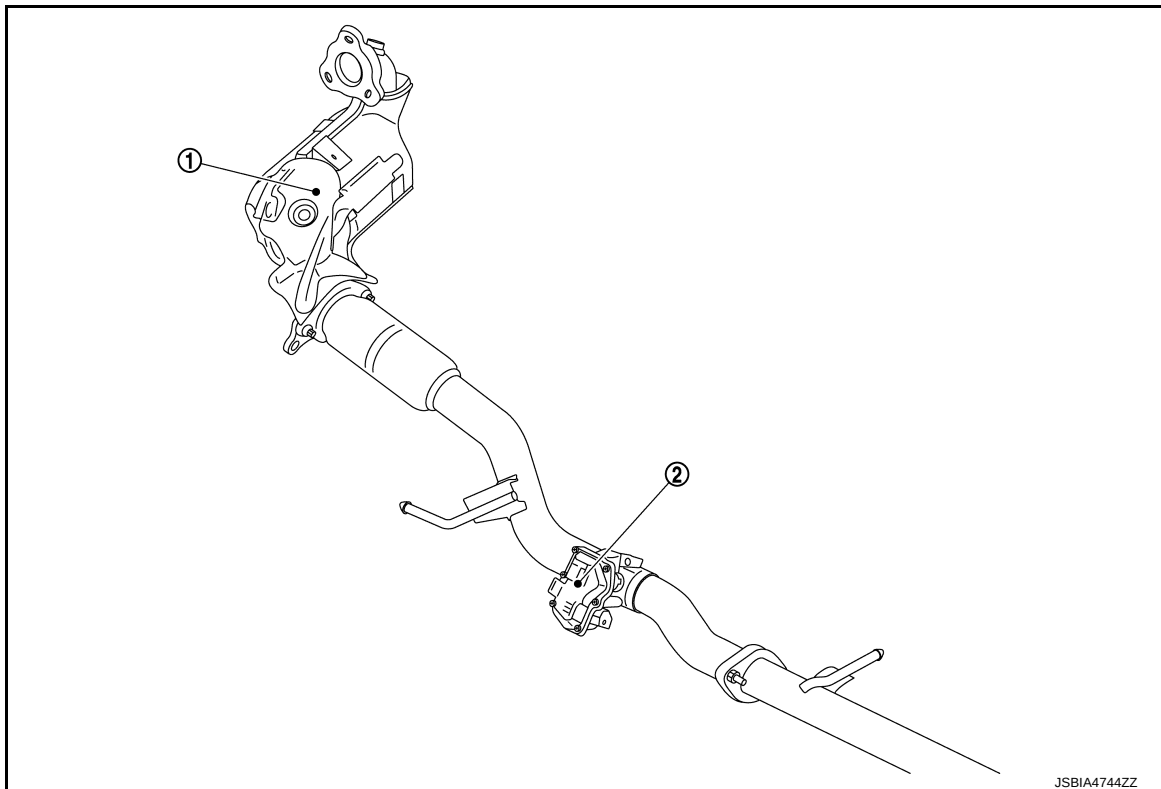
COMPONENT PARTS

< SYSTEM DESCRIPTION >

[R9M]

No.	Component parts	Function
⑫	Engine oil pressure sensor	—
⑬	Engine coolant temperature sensor	EC-817, "Engine Coolant Temperature Sensor"
⑭	Crankshaft position sensor	EC-816, "Crankshaft Position Sensor"
⑮	Fuel flow actuator	EC-817, "High Pressure Fuel Pump"
⑯	Turbocharger boost control solenoid valve	EC-818, "Turbocharger Boost Control Solenoid Valve"
⑰	DPF (diesel particulate filter) differential pressure sensor	EC-820, "DPF Differential Pressure Sensor"
⑱	Low pressure EGR volume control valve	EC-819, "Low Pressure EGR Volume Control Valve"
⑲	Low pressure EGR temperature sensor	EC-819, "Low Pressure EGR Temperature Sensor"
⑳	Exhaust gas temperature sensor 2	EC-821, "Exhaust Gas Temperature Sensor 2"
㉑	Exhaust gas temperature sensor 1	EC-820, "Exhaust Gas Temperature Sensor 1"
㉒	Turbocharger	EC-836, "TURBOCHARGER BOOST CONTROL : System Description"
㉓	A/F sensor 1	EC-817, "Air Fuel Ratio (A/F) Sensor"
㉔	Exhaust gas pressure sensor	EC-820, "Exhaust Gas Pressure Sensor"

EXHAUST COMPARTMENT



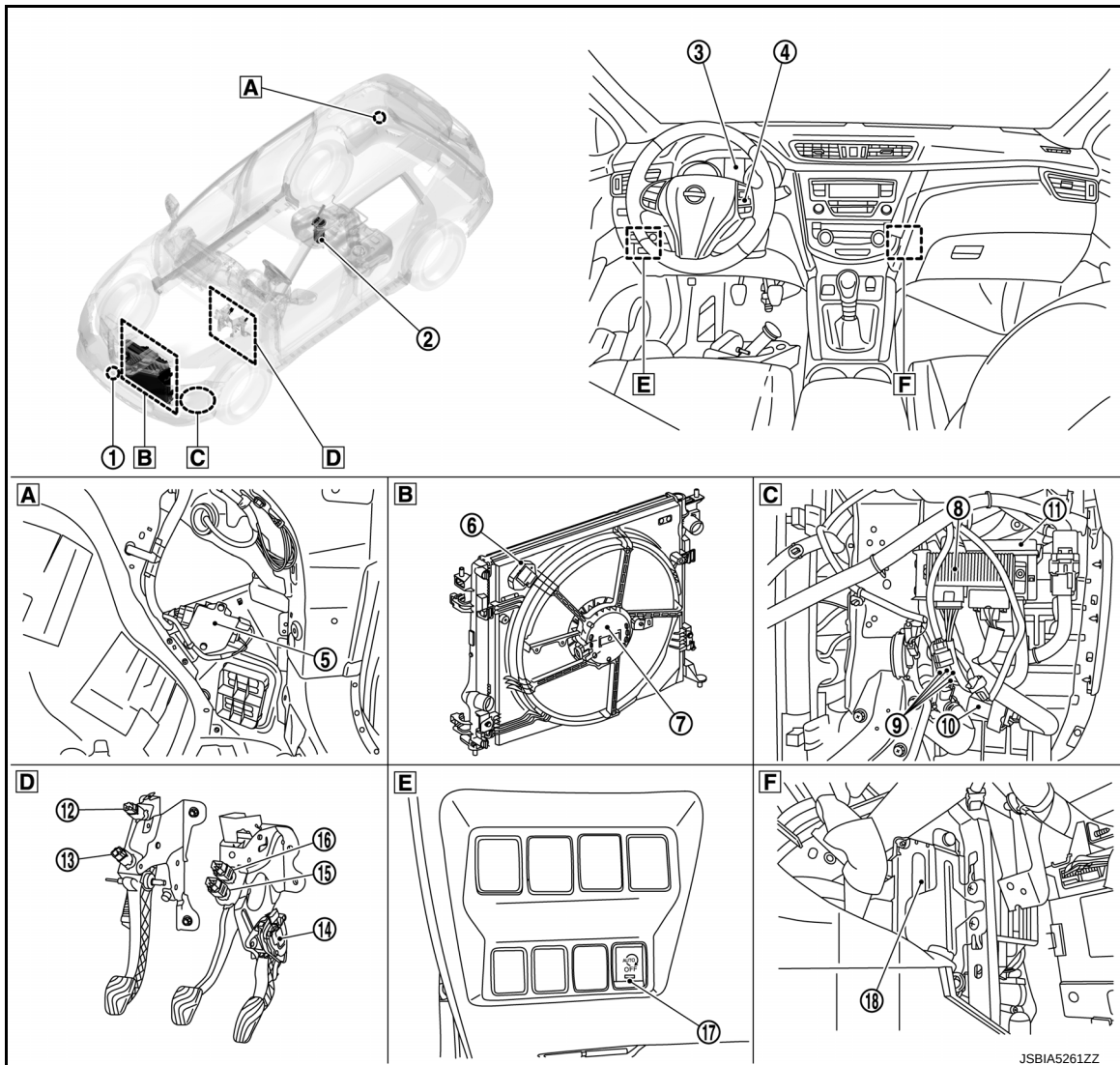
No.	Component parts	Function
①	DPF (diesel particulate filter)	EC-820, "DPF (Diesel Particulate Filter)"
②	Exhaust electric throttle control actuator	EC-819, "Exhaust Electric Throttle Control Actuator"

BODY COMPARTMENT

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[R9M]



- A** Behind luggage side finisher RH **B** Radiator assembly **C** Behind front fender protector LH
D Periphery of pedals **E** Instrument lower panel **F** Behind of glove upper box assembly

No.	Component parts	Function
①	Refrigerant pressure sensor	EC-822, "Refrigerant Pressure Sensor"
②	Fuel pump	EC-817, "Fuel Pump"
③	Combination meter	MWI-13, "METER SYSTEM : Combination Meter"
④	ASCD steering switch	EC-822, "ASCD Steering Switch"
⑤	Fuel pump control module (FPCM)	EC-818, "FPCM (Fuel Pump Control Module)"
⑥	Cooling fan resistor	EC-821, "Cooling Fan Resistor"
⑦	Cooling fan motor	EC-821, "Cooling Fan"
⑧	Thermoplunger control unit	EC-821, "Thermoplunger Control Unit"
⑨	Thermoplunger unit	EC-821, "Thermoplunger"
⑩	Glow control unit	EC-821, "Glow Control Unit"
⑪	Relay box	—

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[R9M]

No.	Component parts	Function
⑫	Clutch interlock switch (M/T models)	EC-822. "Clutch Interlock Switch & Clutch Pedal Position Switch"
⑬	Clutch pedal position switch (M/T models)	
⑭	Accelerator pedal position sensor	EC-822. "Accelerator Pedal Position Sensor"
⑮	Stop lamp switch	EC-822. "Stop Lamp Switch"
⑯	Brake pedal position switch (CVT models)	EC-822. "Stop Lamp Switch"
⑰	Stop/start OFF switch	EC-824. "Stop/Start OFF Switch"
⑱	DC/DC converter	EC-823. "DC/DC Converter"

ECM

INFOID:0000000010935505

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.

Camshaft Position Sensor

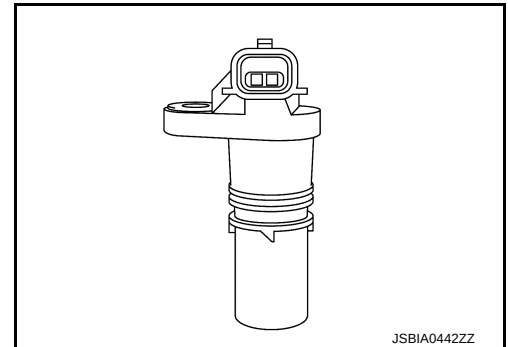
INFOID:0000000010935506

The camshaft position (CMP) sensor senses the retraction with camshaft 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.

Crankshaft Position Sensor

INFOID:0000000010935507

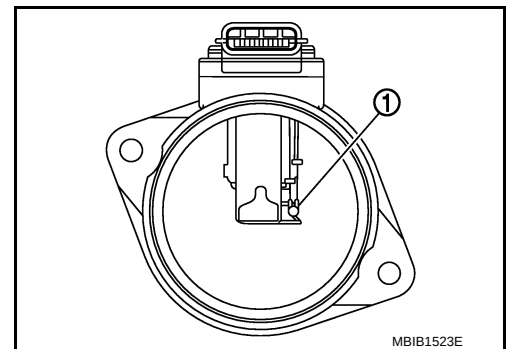
Crankshaft position (CKP) sensor detects engine speed and crankshaft position. The size difference of gear tooth placed on signal plate changes the gap between signal plate and sensor, and magnetic field change around the sensor induces sensor output voltage change. ECM detects engine speed and crankshaft position based on this voltage change.



Mass Air Flow Sensor

INFOID:0000000010935508

The mass air flow sensor ① is installed in the passage of intake air and measures the intake flow rate. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The greater air flow, the greater the heat loss. Therefore, the electric current 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

INFOID:0000000010935509

The intake air temperature (IAT) sensor 1 is built-into the mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM. The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the rise in temperature.

< SYSTEM DESCRIPTION >

<Reference data>

Intake air temperature °C (°F)	Resistance (Approx.) kΩ
-10 (14)	8.628 – 9.577
10 (50)	3.524 – 3.841
20 (68)	2.342 – 2.531
30 (86)	1.585 – 1.715
50 (122)	0.769 – 0.844

Turbocharger Boost Sensor

INFOID:0000000010935510

The turbocharger boost sensor detects pressure in the charge air cooler outlet area. The sensor send to volt- age signal to the ECM. As the pressure increases, the voltage rises.

Intake Air Temperature Sensor 2

INFOID:0000000010935511

The Intake Air Temperature (IAT) Sensor 2 is built-into the Turbocharger Boost Pressure Sensor. The sensor detects intake air temperature and transmits a signal to the ECM.

<Reference data>

Intake air temperature °C (°F)	Resistance (Approx.) kΩ
-10 (14)	9.395 – 9.775
10 (50)	3.791 – 3.927
20 (68)	2.499 – 2.583
30 (86)	1.706 – 1.760
50 (122)	0.833 – 0.857

Air Fuel Ratio (A/F) Sensor

INFOID:0000000010935512

Air fuel ratio (A/F) sensor is installed on the upstream of the oxidation catalyst. A/F sensor measures the oxy- gen level in the exhaust gas and converts it into a voltage signal. A/F sensor sends the signal to ECM. Based on the signal from A/F sensor, ECM calculates the air fuel mixture ratio. ECM uses the calculated ratio for the DPF (Diesel Particulate Filter) regeneration control.

A heater is integrated in A/F sensor to ensure the required operating temperature.

Engine Coolant Temperature Sensor

INFOID:0000000010935513

The engine coolant temperature (ECT) sensor is used to detect the engine coolant temperature.

<Reference data>

Engine coolant temperature °C (°F)	Resistance (Approx.) kΩ
-10 (14)	11.33 – 13.59
25 (77)	2.140 – 2.364
80 (176)	0.274 – 0.290
110 (230)	0.112 – 0.117

High Pressure Fuel Pump

INFOID:0000000010935514

High Pressure Fuel Pump is operated by high pressure fuel pump drive pinion, installed at camshaft. The high pressure fuel pump inlets fuel transported through fuel filter and performs pressure feed to fuel rail. The pump includes fuel flow actuator which enables adjustment of fuel rail pressure.

Fuel Pump

INFOID:0000000010935515

The fuel pump is installed in the fuel tank to start the engine faster. Fuel pump is controlled by FPCM (Fuel Pump Control Module).

CAUTION:

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[R9M]

Fuel pump is lubricated by the fuel in the tank. Never operate the pump for a long time without fuel in the tank to prevent serious damages.

Fuel Injector

INFOID:0000000010935516

This injector is a magnetic type injector. It has a code exhibiting unique characteristics, and fuel injection quantity can be controlled with more precision by writing the code into ECM.

Fuel Rail Pressure Sensor

INFOID:0000000010935517

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. ECM operates fuel flow actuator according to feedback signal from fuel rail pressure sensor, and controls fuel pressure inside fuel rail.

Fuel Pressure Sensor

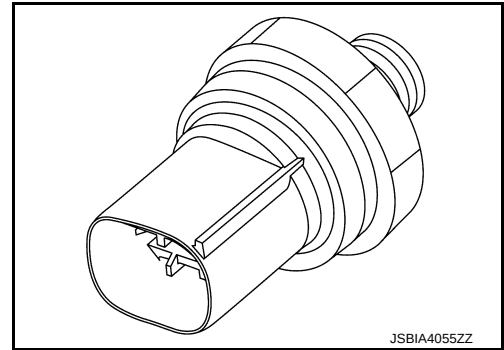
INFOID:0000000010935518

The fuel pressure sensor detects the fuel pressure (actual pressure) of the fuel pump.

The fuel pressure measured by a measuring capacitor coupled with the fuel pressure sensor.

When fuel pressure increase, the gap between the capacitor electrodes decreases. The capacitance, and therefore the signal voltage, thus increase in proportion to the fuel pressure.

The signal voltage serves the FPCM as information about the fuel pressure.



Fuel Temperature Sensor

INFOID:0000000010935519

Fuel temperature sensor measures fuel temperature inside fuel tube of engine room. 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>

Fuel temperature °C (°F)	Resistance (Approx.) kΩ
-10 (14)	8.623 – 10.454
25 (77)	1.928 – 2.174
80 (176)	0.292 – 0.326
110 (230)	0.127 – 0.143

Fuel Heater With Water In Fuel Level Sensor

INFOID:0000000010935520

Fuel heater is installed on fuel filter and operated when fuel temperature is low in order to inhibit fuel solidification caused by wax content separation in fuel.

FPCM (Fuel Pump Control Module)

INFOID:0000000010935521

FPCM (Fuel Pump Control Module) controls fuel pump discharge rate according to the actual fuel requirements of the engine and, as a result, the electric consumption of fuel pump is significantly reduced.

This is a power electronic unit controlled by ECM pulse width modulation (PWM).

Turbocharger Boost Control Solenoid Valve

INFOID:0000000010935522

Turbocharger boost control solenoid valve controls the turbocharger boost control actuator. By changing the variable nozzle vane opening through the rods, the intake air volume is adjusted. The turbocharger boost control solenoid valve is moved by ON/OFF pulse from the ECM. The longer the ON pulse, the charge air pressure rises.

High Pressure EGR Volume Control Valve

INFOID:000000010935523

High pressure EGR Volume Control Valve controls the volume of EGR gas returning from the exhaust manifold to the intake manifold.

The High Pressure EGR Volume Control Valve consists of High Pressure EGR Volume Control Valve Position Sensor, High Pressure EGR Valve, and DC motor. The High Pressure EGR Volume Control Valve Position Sensor consists of a permanent magnet and Hall IC, and senses the valve position and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the valve from this signals, and controls the DC motor to make the valve opening angle in response to driving conditions.

The valve is controlled by means of double regulation loop.

The first loop, the quicker of the two, is a position loop. It allows the valve to be adjusted to the desired position by feedback based on the information derived from the sensor position.

The second loop (slower) is a mass air flow loop. The mass air flow set-point is set by reference maps depending on engine working point, ambient condition corrections (air and coolant liquid temperatures, atmospheric pressure), gear engaged and state of EGR cooler bypass. For a given operating point, the air flow is obtained by modulating the quantity of exhaust gases passing through the EGR valve and the fresh air flow passing through the intake flap. When EGR flow is increase, fresh air flow is decrease. The air flow measurement is provided by the mass air flow sensor. The fresh air and EGR flow controller provides the EGR and inlet throttle position set-points.

Low Pressure EGR Volume Control Valve

INFOID:000000010935524

Low Pressure EGR Volume Control Valve controls the volume of EGR gas returning from the exhaust tube (downstream of DPF) to the passage of intake air (upstream of turbocharger).

The Low pressure EGR Volume Control Valve consists of Low pressure EGR Volume Control Valve Position Sensor, EGR Valve, and DC motor. The EGR Volume Control Valve Position Sensor consists of a permanent magnet and Hall IC, and senses the valve position and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the valve from this signals, and controls the DC motor to make the valve opening angle in response to driving conditions.

Low Pressure EGR Temperature Sensor

INFOID:000000010935525

Low Pressure EGR Temperature Sensor is installed on the downstream of EGR cooler. The sensor detects the low pressure EGR gas temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the exhaust gas temperature input.

<Reference data>

Exhaust gas temperature °C (°F)	Resistance (Approx.) kΩ
0 (32)	148.9 – 175.5
20 (68)	57.1 – 65.9
100 (212)	3.167 – 3.433
130 (572)	0.062 – 0.068

Electric Throttle Control Actuator

INFOID:000000010935526

The Electric Throttle Control Actuator consists of position sensor, throttle valve, and DC motor. The position sensor consists of a permanent magnet and Hall IC, and senses the valve position and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the valve from this signals, and controls the DC motor to make the valve opening angle in response to driving conditions.

Throttle valve is fully open when in non-operating status. When EGR is Performed or the engine is stopped, this valve operates in direction that closes itself.

Intake Manifold Runner Control Valve

INFOID:000000010935527

Intake Manifold Runner Control Valve is located on the intake manifold. This valve has position sensor. It senses the valve position and feeds the voltage signals to the ECM.

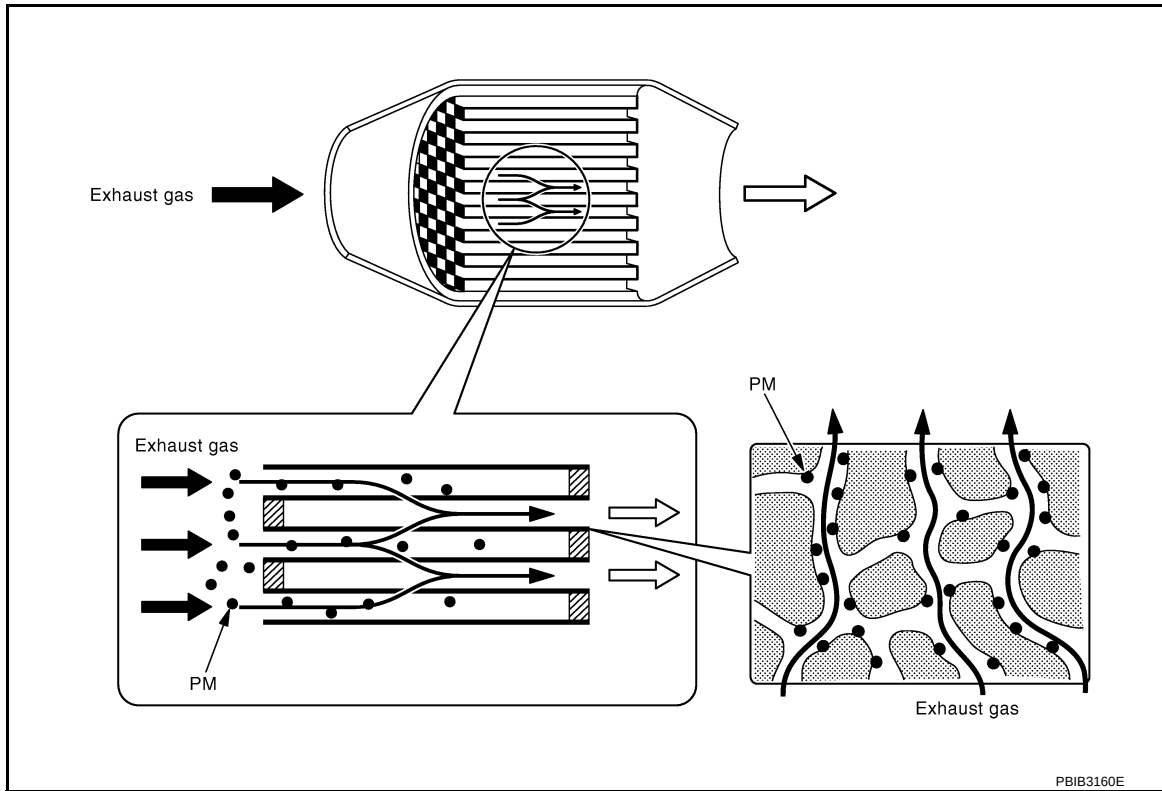
Exhaust Electric Throttle Control Actuator

INFOID:000000010935528

Exhaust Electric Throttle Control Actuator is installed to the exhaust tube and activated only during low pressure EGR.

DPF (Diesel Particulate Filter)

INFOID:0000000010935529



DPF (Diesel Particulate Filter) traps PM (Particulate Matter) in exhaust gas. DPF is formed in a honeycomb form made of ceramic. This structure facilitates to trap particulate matter. When the amount of particulate matter in the DPF reaches the specified level, the particulate matter needs to be reduced through burning to maintain the DPF function. This reducing of particulate matter is called Regeneration and should be performed periodically. DPF can be effective for a long time through the cycle of trapping particulate matter and regeneration.

Exhaust Gas Pressure Sensor

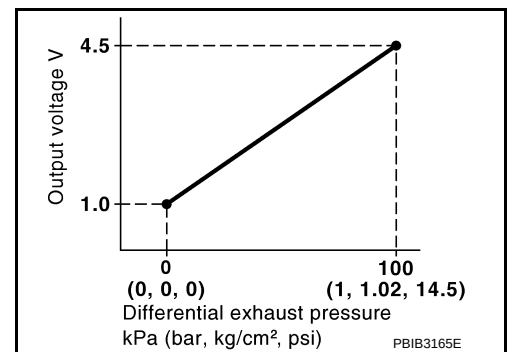
INFOID:0000000010935530

Exhaust gas pressure sensor measures exhaust gas pressure around turbocharger outlet, converts it to voltage signal and transmits it to ECM. ECM controls turbocharger boost pressure according to this signal.

DPF Differential Pressure Sensor

INFOID:0000000010935531

DPF (Diesel Particulate Filter) pressure sensor is connected to DPF with tubes (upstream and downstream). DPF pressure sensor measures the difference between the exhaust pressure before and after the DPF. DPF pressure sensor converts the difference pressure into a voltage signal. ECM receives the signal and estimates the amount of particulate matter in DPF.



Exhaust Gas Temperature Sensor 1

INFOID:0000000010935532

The exhaust gas temperature (EGT) sensor is built-into the Exhaust Pressure Sensor. The sensor detects 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.

< SYSTEM DESCRIPTION >

<Reference data>

Exhaust gas temperature °C (°F)	Resistance (Approx.) kΩ
0 (32)	5.671 – 6.118
25 (77)	1.99 – 2.123
100 (212)	0.097 – 0.103
130 (266)	0.087 – 0.091

Exhaust Gas Temperature Sensor 2

INFOID:0000000010935533

Upstream DPF Temperature Sensor is installed DPF (Diesel Particulate Filter). The sensor uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rises.

<Reference data>

Exhaust gas temperature °C (°F)	Resistance (Approx.) kΩ
0 (32)	159.8 – 309.4
20 (68)	89.3 – 159.8
100 (212)	15.2 – 22.1
300 (572)	1.307 – 1.562
400 (752)	0.606 – 0.697

Glow Control Unit

INFOID:0000000010935534

Glow Control Unit performs PWM (Pulse Width Modulation) communication with ECM. It improves engine starting function by performing glow control.

Glow Plug

INFOID:0000000010935535

The glow plug is located in the cylinder head, in order to stabilize combustion and keep good cold start performance.

The glow plug glows in response to a signal sent from the ECM, allowing current to flow through the glow plug via the glow control unit.

Glow Indicator Lamp

INFOID:0000000010935536

Glow indicator lamp illuminates when glow system is activated in order to inform it to the driver.

Cooling Fan

INFOID:0000000010935537

Cooling fan operates at each speed when the current flows in the cooling fan motor as follows. Refer to [EC-843. "COOLING FAN CONTROL : System Description"](#) for cooling fan operation.

Cooling Fan Resistor

INFOID:0000000010935538

Cooling Fan Resistor is installed to the power circuit of Cooling Fan Motor and switches cooling fan speed between LOW and HIGH.

When Cooling Fan Motor is rotated at LOW speeds, power is supplied to the cooling fan via Cooling Fan Resistor.

Thermoplunger

INFOID:0000000010935539

Thermoplunger Unit is installed to the passage of engine coolant and has four thermoplungers. These thermoplungers increase engine coolant temperature by the passage of electric current through the Thermoplunger Control Unit.

Thermoplunger Control Unit

INFOID:0000000010935540

Thermoplunger Control Unit passes a current to Thermoplungers according to a signal transmitted from ECM.

Engine Coolant Bypass Valve

INFOID:0000000010935541

Engine Coolant Bypass Valve switches the flow passage of engine coolant. This valve is controlled by Engine Coolant Bypass Valve Control Solenoid Valve.

Engine Coolant Bypass Valve Control Solenoid Valve

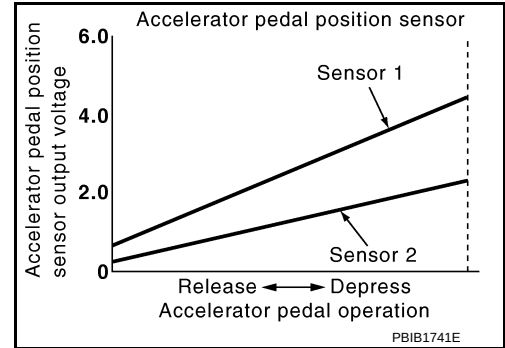
INFOID:0000000010935542

Engine coolant bypass valve control solenoid valve is controlled by ECM. The solenoid valve controls negative pressure given to diaphragm of engine coolant bypass valve. When engine coolant bypass valve control solenoid valve is activated, it opens solenoid valve and gives negative pressure from vacuum pump to diaphragm of engine coolant bypass valve.

Accelerator Pedal Position Sensor

INFOID:0000000010935543

The accelerator pedal position (APP) 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.



Refrigerant Pressure Sensor

INFOID:0000000010935544

The refrigerant pressure sensor is installed at the liquid tank of the air conditioner system. The sensor is used to sense a refrigerant pressure.

Stop Lamp Switch

INFOID:0000000010935545

Stop lamp switch signal is sent to ECM via CAN communication line from BCM. This signal is used mainly to decrease the engine speed when the vehicle is driving.

Brake Pedal Position Switch

INFOID:0000000010935546

Brake pedal position switch is installed to brake pedal bracket. ECM detects the state of the brake pedal according to the input signal sent from brake pedal position switch.

Clutch Interlock Switch & Clutch Pedal Position Switch

INFOID:0000000010935547

Clutch interlock switch and clutch pedal position switch are installed to clutch pedal bracket. ECM detects the state of the clutch pedal by those two types of input signal (ON/OFF).

Clutch pedal	Clutch interlock switch	Clutch pedal position switch
Released	OFF	ON
Depressed	ON	OFF

ASCD Steering Switch

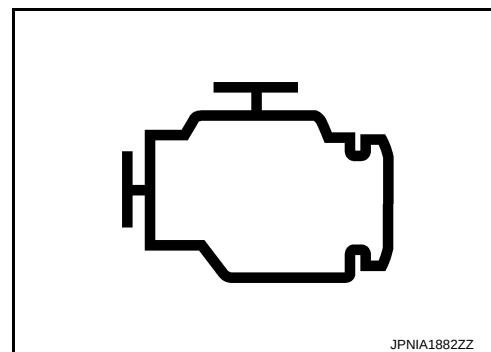
INFOID:0000000010935548

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.

Malfunction Indicator Lamp

INFOID:0000000010935549

The malfunction indicator Lamp (MIL) is located on the combination meter. The MIL will illuminate when the ignition switch is turned ON without the engine running (bulb check). When the engine is started, the MIL should turn OFF. If the MIL remains illuminated, the on board diagnostic system has detected an engine system malfunction.



Information Display

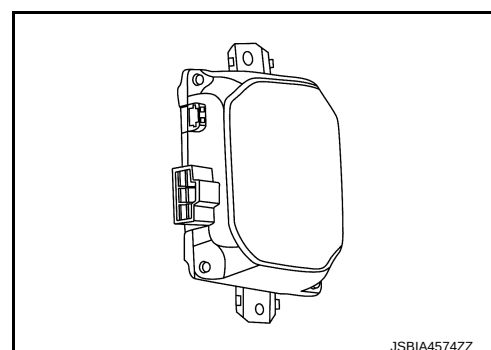
INFOID:0000000010935550

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.

DC/DC Converter

INFOID:0000000010935551

The DC/DC converter is installed at the back of the glove box assembly and supplies power to the electrical equipment. This converter is connected to ECM via the engine communication line and includes an internal voltage converter. When restarting the vehicle from the stop/start system operating condition, the voltage converter boosts the voltage conveyed from the battery and provides stable power to the electrical equipment to prevent reset from occurring. For further details, refer to [EC-848, "STOP/START SYSTEM : System Description \(M/T models\)"](#) or [EC-856, "STOP/START SYSTEM : System Description \(CVT models\)"](#).



Engine Restart Relay

INFOID:0000000010935552

The engine restart relay is installed in the relay box and controlled by ECM when restarting the engine during the stop/start system operation.

Engine Restart Bypass Control Relay

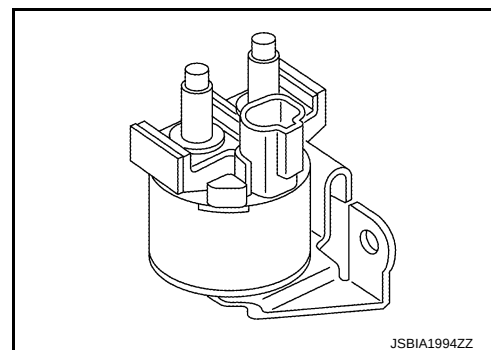
INFOID:0000000010935553

The engine restart bypass control relay is controlled by ECM and controls the engine restart bypass relay.

Engine Restart Bypass Relay

INFOID:0000000010935554

The engine restart bypass relay reduces battery voltage drop right after the starter motor activation at an engine restart by switching the electric circuit of the starter motor. For details, refer to [EC-848, "STOP/START SYSTEM : System Description \(M/T models\)"](#) or [EC-856, "STOP/START SYSTEM : System Description \(CVT models\)"](#).



Hood Switch

INFOID:0000000010935555

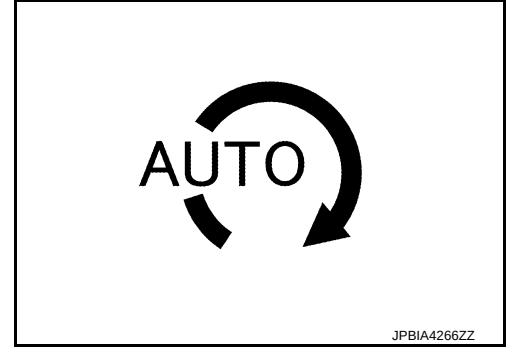
Hood switch is located around radiator core support. Hood switch detects open/close condition of hood and input the hood switch signal to IPDM E/R.

Stop/Start Indicator Lamp

INFOID:000000010935556

The stop/start indicator lamp is located on the combination meter. The stop/start indicator lamp turns ON when the stop/start system is operating.

When a malfunction is detected in the stop/start system, the stop/start indicator lamp blinks at a slow speed to alert the driver to the malfunction. When a driver's operation is judged as dangerous one during stop/start system operation, the stop/start indicator lamp blinks at a high speed.



Stop/Start indicator lamp status

System condition	Condition	Stop/start indicator lamp	Warning chime
Operate	Normal	Illuminate	—
	Door (driver side) open and seat belt released*1	High speed blinking	Sound
	Hood open	High speed blinking*2	Sound*2
Fail-Safe	Starter motor operation counter: too much	Slow speed blinking	—
	Malfunction of stop/start system	Slow speed blinking	—

*1: Only in models with M/T

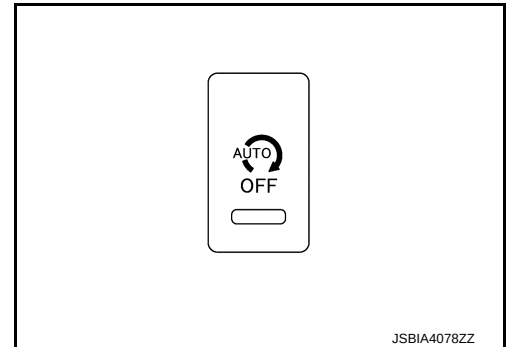
*2: Engine is stalled after alert for 1.5 seconds.

Stop/Start OFF Switch

INFOID:000000010935557

The stop/start OFF switch is mounted on the switch panel of the driver side lower instrument panel. When the stop/start OFF switch is pressed, the indicator lamp turns ON and the stop/start system can be deactivated.

For further details, refer to [EC-871, "STOP/START SYSTEM : Switch Name and Function"](#).



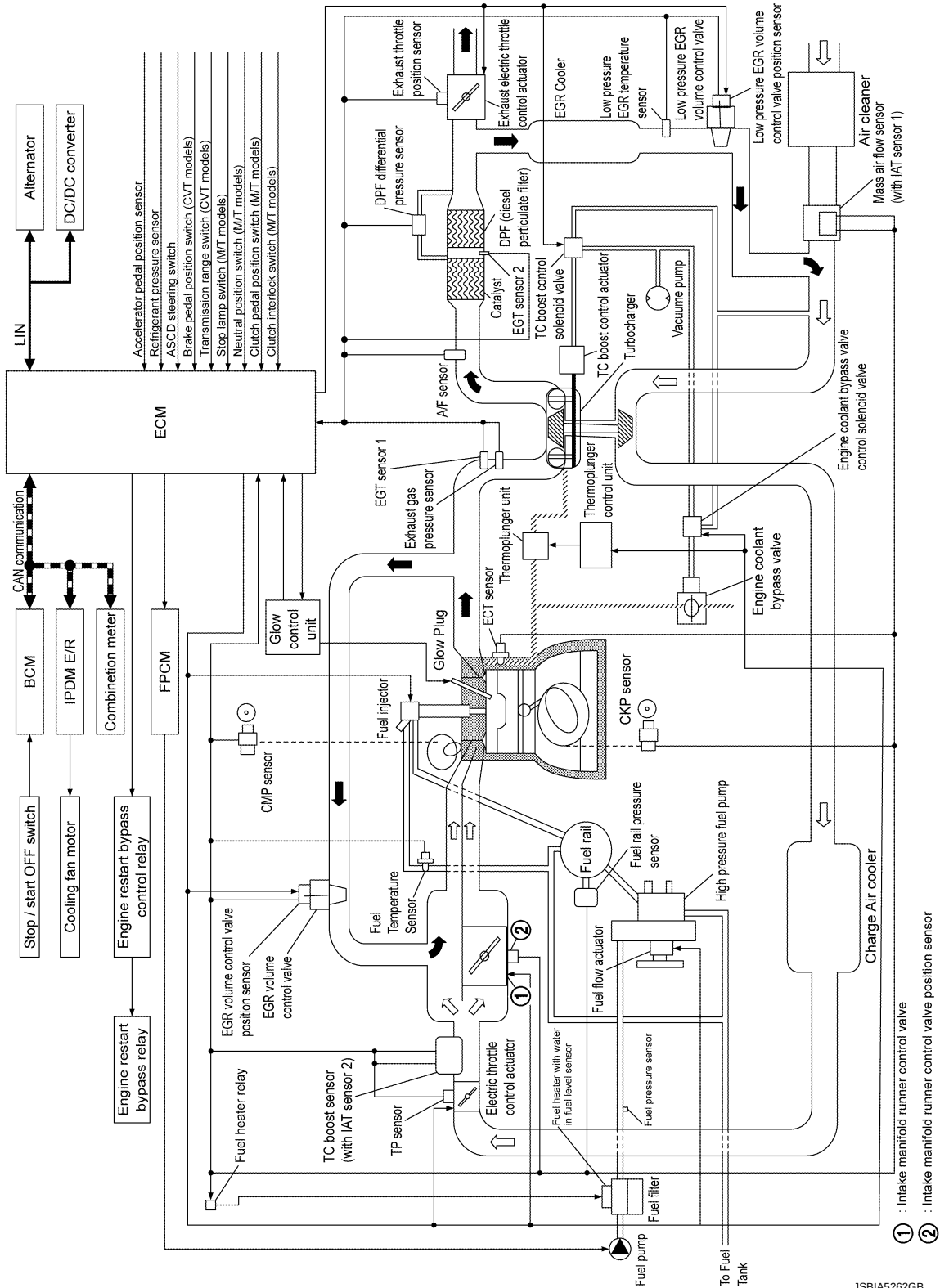
SYSTEM

ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : System Description

INFOID:000000010935560

SYSTEM DIAGRAM



SYSTEM

[R9M]

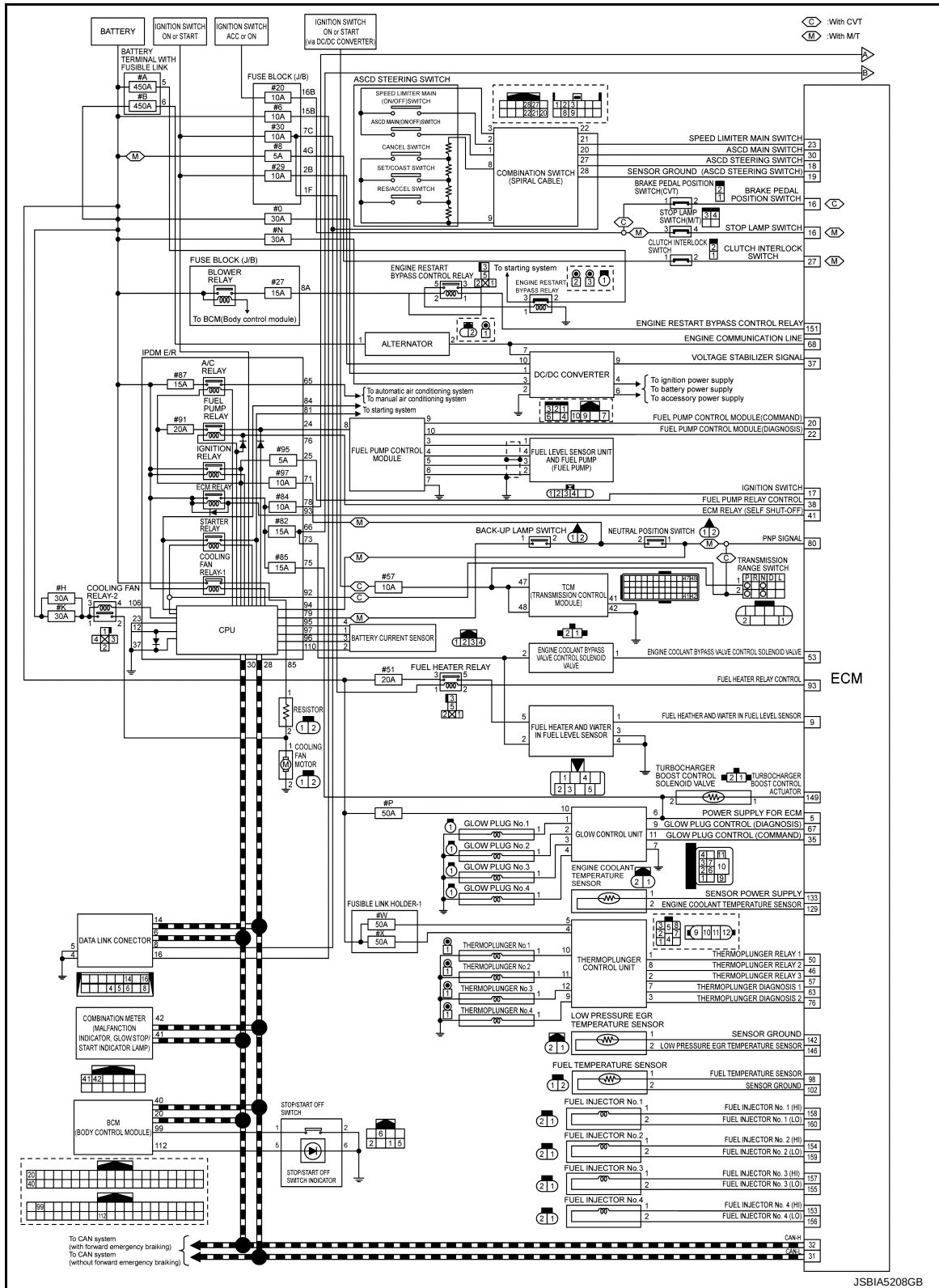
< SYSTEM DESCRIPTION >

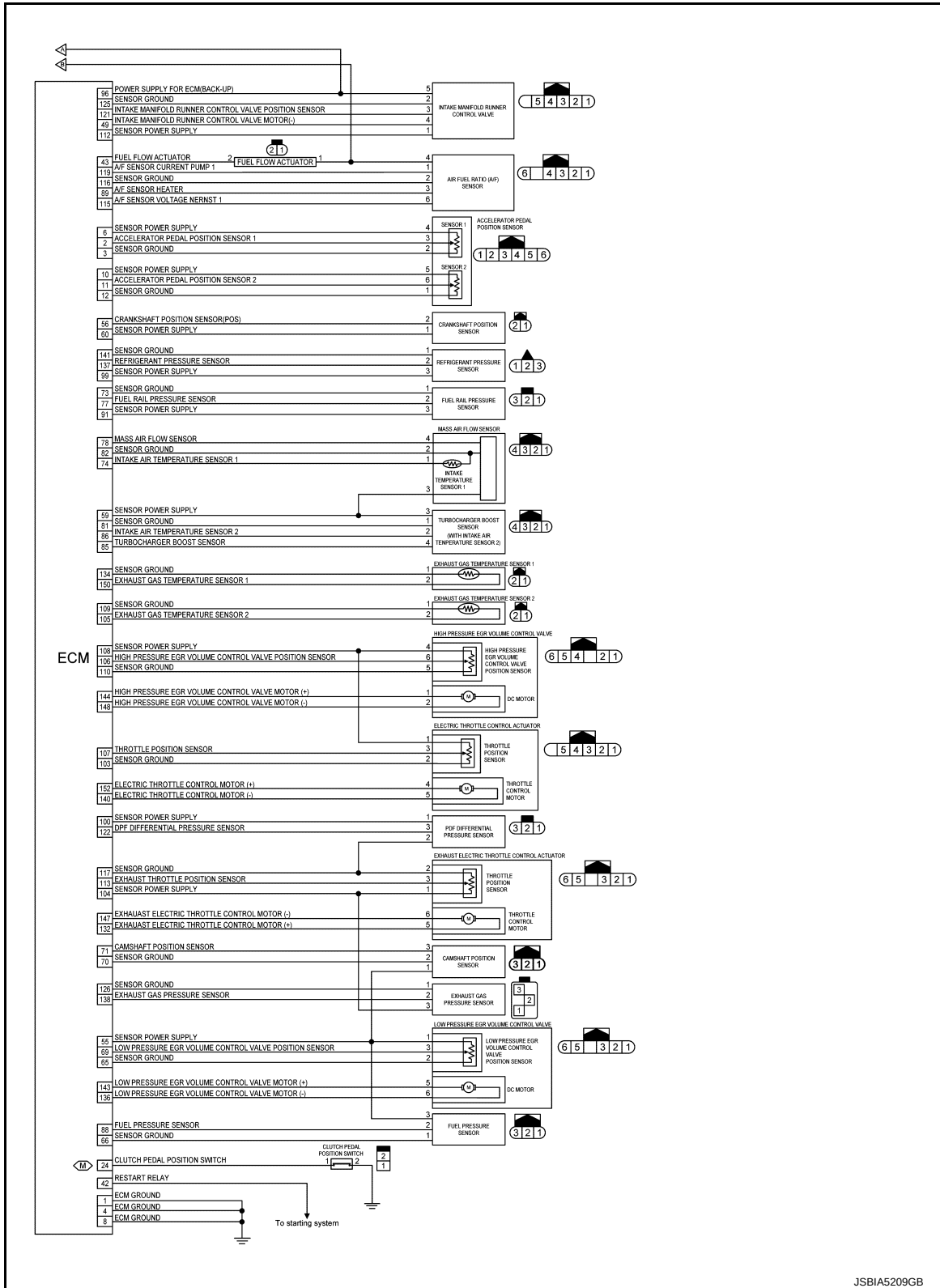
ECM controls the engine by various functions.

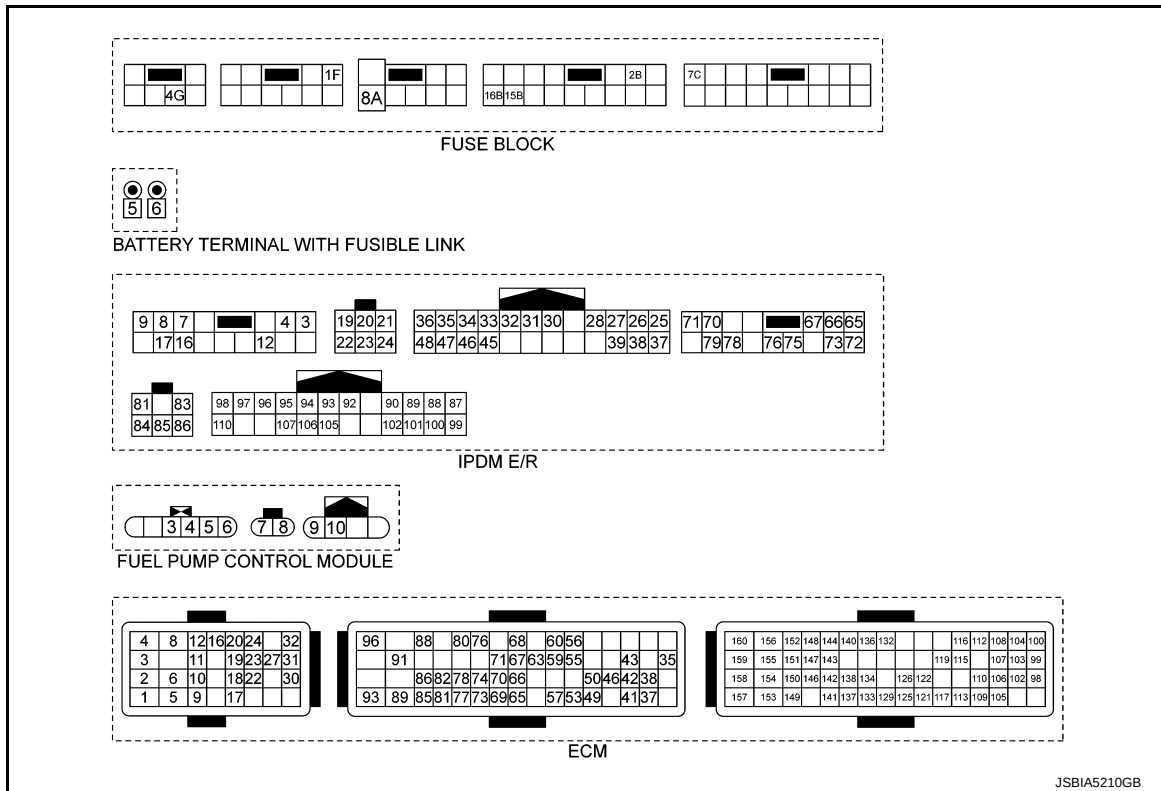
Function	Reference
Engine speed control	EC-835, "ENGINE SPEED CONTROL : System Description"
Powertrain coordination control	EC-835, "POWERTRAIN COORDINATION CONTROL : System Description"
Turbocharger boost control	EC-836, "TURBOCHARGER BOOST CONTROL : System Description"
EGR system	EC-837, "EGR SYSTEM : System Description"
Throttle control	EC-838, "THROTTLE CONTROL : System Description"
Swirl control system	EC-838, "SWIRL CONTROL SYSTEM : System Description"
Engine torque control	EC-839, "ENGINE TORQUE CONTROL : System Description"
Combustion control	EC-841, "COMBUSTION CONTROL : System Description"
After treatment system	EC-843, "AFTER TREATMENT SYSTEM : System Description"
Cooling fan control	EC-843, "COOLING FAN CONTROL : System Description"
Thermostat control	EC-844, "THERMOSTAT CONTROL : System Description"
Glow control	EC-844, "GLOW CONTROL : System Description"
ASCD (Automatic Speed Control Device)	EC-845, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description"
Speed limiter	EC-845, "SPEED LIMITER : System Description"
Gear shift indicator system	EC-847, "GEAR SHIFT INDICATOR SYSTEM : System Description"
Stop/start system	EC-848, "STOP/START SYSTEM : System Description (M/T models)" , EC-856, "STOP/START SYSTEM : System Description (CVT models)"
Energy management system	EC-863, "ENERGY MANAGEMENT SYSTEM : System Description"
CAN communication	EC-868, "CAN COMMUNICATION : System Description"

VACUUM HOSE DRAWING

For vacuum hose drawing, refer to [EC-1225, "Vacuum Layout"](#).







ENGINE CONTROL SYSTEM : Fail-safe

INFOID:0000000011002922

ENGINE CONTROL SYSTEM

DTC No.	Detected items	Engine operating condition in fail-safe mode
U0121		ESP is deactivated
U0415		ESP is deactivated
P0001	Fuel flow actuator circuit	- EGR valve is closed position - Throttle control motor is opened - CSF regeneration forbidden - CCSL deactivation with dashboard message - ESP deactivated - Rail pressure limitation
P0002	Fuel rail pressure	- EGR valve is closed position - Throttle control motor is opened - Rail pressure limitation - Freeshift inhibited - CCSL deactivation - CSF regeneration forbidden - ESP deactivation - AGB in limp home (if present) - PLV opening (if present) - Not limitation of calibrated performance - Prohibit stop/start system - ZFC correction inhibited (if strategy is present) - FMO: Cancellation regulator (if strategy is present) - FMO: Stop of the adaptation (if strategy is present) - Strong vehicle speed limitation (30km/h) - Torque limitation - Overpressure on rail on 5 time - Inhibition of regulation mode of fuel pressure regulator
P0016	Camshaft position- Crankshaft position correlation	Prohibit start/stop system

SYSTEM

< SYSTEM DESCRIPTION >

[R9M]

DTC No.	Detected items	Engine operating condition in fail-safe mode
P0045	Turbo solenoid valve control circuit	• Torque limitation • EGR valve is closed position • Throttle control motor is opened • Boost regulation cut off • CSF regeneration forbidden • Freeshift inhibited • CCSL deactivation
P0095	Intake air temperature sensor 2	• EGR volume control valve is closed position • Throttle control motor is opened • Inhibition of the correction of ZFC • Over torque inhibited • Limitation of temperature at the entry of CSF (TeFAP) • Oil vapor heater activated when engine is running (if present) • Engine speed attachment detection inhibited
P0100 P0101	Mass air flow sensor	• EGR valve is closed position • Throttle control motor is opened • Prohibit DPF regeneration
P0105 P0106	TC boost sensor	• EGR valve is closed position • Throttle control motor is opened • Limited upstream turbine pressure regulation if the sensor is present: Otherwise, the boost pressure regulation is cut • CSF regeneration forbidden • CCSL deactivation with dashboard message • Freeshift Inhibited • Increased idle speed • After sales routines forbidden (for boost / manifold pressure sensor not equipped engine) • Wastegate cut off • Torque limitation
P0110	Intake air temperature sensor 1	• Boost pressure limitation • EGR valve is closed position • Throttle control motor is opened
P0115	Engine coolant temperature sensor circuit	• Engine cooling fan operates at high speed while engine running when engine stopped and operates at low speed. • Engine speed limitation • EGR valve is closed position • Throttle control motor is opened • Prohibit DPF regeneration • EGR cooling valve activated
P0120	Throttle position sensor	• EGR valve is closed position • Throttle control motor is opened • CSF regeneration forbidden • Airflow regulation cut off • Compression test routine forbidden • CCSL deactivated with dashboard message • Freeshift inhibited
P0135 P2244	A/F sensor circuit	Stop closed-loop control
P0190		• EGR valve is closed position • Throttle control motor is opened • Rail pressure limitation • CSF regeneration forbidden • After sale routines forbidden • CCSL deactivation with dashboard message • Freeshift inhibited • ESP deactivated and AGB in limp home mode

SYSTEM

< SYSTEM DESCRIPTION >

[R9M]

DTC No.	Detected items	Engine operating condition in fail-safe mode	
P0200		- EGR valve is closed position - Throttle control motor is opened - After sales routines forbidden - CCSL deactivation with dashboard message - CSF regeneration forbidden - Increased idle speed	A EC
P0201 P0202 P0203 P0204	Fuel injector circuit	- EGR valve is closed position - Throttle control motor is opened - After sales routines forbidden - CCSL deactivation with dashboard message - CSF regeneration forbidden - Increased idle speed	C D
P0217	Brake/accelerator pedal positions	- Cooling FAN Activated - Controlled shutters opening (if present) - Warning overheating lamp activated - Opening of the engine coolant thermostat (request of ineffective opening in that case) (if present) - Prohibit stop/start system - EGR control cut off (if present) - A/C compressor cut-off (if present)	E F
P0225	Accelerator pedal position sensor 1circuit	- Torque limitation - After sales and factory routines inhibited - Freeshift inhibited - CCSL deactivation (considered as abnormal with dashboard message)	G
P0226	Brake/accelerator pedal positions	- Torque limitation - Pedal limp home activated - Aftersales and factory routines inhibited - Freeshift Inhibited - CCSL deactivation (considered as abnormal with dashboard message)	H I
P0335	Crankshaft position sensor	- EGR valve is closed position - Throttle control motor is opened - Prohibit DPF regeneration - Prohibit start/stop system - Torque limitation - Engine speed limitation - ESP deactivated	J K
P0340	Camshaft position sensor circuit	- Synchronization on the exhaust CAM - Intake VVT deactivation - Prohibit stop/start system - Inhibition of the VVT (setpoint = 0) - Inhibition of the VVT command (% PWM = 0) - VVTC angular position set to 0 and inhibition of the VVTC control	L
P0402 P0403	EGR system	- EGR valve is closed position - Throttle control motor is opened - CSF regenerations forbidden - CCSL deactivation with dashboard message - Freeshift inhibited	M N
P0409	High pressure EGR volume control valve control position sensor circuit	- EGR valve is closed position - Stop closed-loop control - CSF regeneration forbidden - CCSL deactivation with dashboard message - Freeshift inhibited	O
P0470	Exhaust gas pressure sensor	- Boost pressure limitation - EGR valve is closed position - Throttle control motor is opened - CCSL deactivation (considered as abnormal with dashboard message) - Freeshift inhibited - CSF regeneration forbidden	P

SYSTEM

< SYSTEM DESCRIPTION >

[R9M]

DTC No.	Detected items	Engine operating condition in fail-safe mode
P0471	Exhaust gas pressure sensor	• Boost pressure limitation • EGR valve is closed position • Throttle control motor is opened • CCSL deactivation (considered as abnormal with dashboard message) • Freeshift inhibited • CSF regeneration forbidden • Torque limitation
P0487	EGR volume command circuit	• EGR valve is closed position • Throttle control motor is opened • Stop closed-loop control • Freeshift inhibited • CSF regeneration forbidden • CCSL deactivation
P0488	EGR valve position control	• EGR valve is closed position • Throttle control motor is opened • Freeshift inhibited • CCSL deactivation • CSF regeneration forbidden
P0544	Exhaust gas temperature sensor 1 circuit	• EGR valve is closed position • Throttle control motor is opened • Prohibit DPF regeneration
P0560	Battery voltage	• Mechanically activated throttle limp-home • Torque limitation • ESP deactivated • Glow plug circuit deactivated • Inhibition of idle speed control • Factory and aftersales routines inhibited • Freeshift Inhibited • CCSL deactivation (considered as abnormal with dashboard message) • Wastegate cut off • AGB in limp home if AGB • Deactivation of the VVT
P060A	ECM	Reset ECU
P060B		• Engine speed limitation • CCSL deactivation • Freeshift inhibited
P061A		• Medium engine speed limitation • CCSL deactivation with dashboard message • Freeshift inhibited (If present)
P062B		• EGR valve is closed position • Throttle control motor is opened • CSF regeneration forbidden • Increased idle speed • CCSL deactivation with dashboard message • Freeshift inhibited • ESP deactivated and AGB in limp home mode • Compression test routine forbidden
P0638 P2100 P2119	Electric throttle control actuator	• EGR valve is closed position • Throttle control motor is opened • CSF regeneration forbidden • Compression test routine inhibited • Airflow regulation cut off • CCSL deactivation with dashboard message • Freeshift inhibited

SYSTEM

< SYSTEM DESCRIPTION >

[R9M]

DTC No.	Detected items	Engine operating condition in fail-safe mode	
P0641	Sensor power supply	• EGR valve is closed position • Throttle control motor is opened • The pressure downstream turbo exists then the limit: Otherwise cut regulation turbo • Limited upstream turbine pressure regulation if the sensor is present: Otherwise, the boost pressure regulation is cut • Torque limitation • Airflow regulation cut off • CSF regeneration forbidden • CCSL deactivation with dashboard message • Freeshift inhibited • Increased idle speed • After sales routines forbidden	A
P0651		• Air conditioner deactivation • Torque limitation • CCSL deactivation with dashboard message • Freeshift inhibited • After sales routines forbidden • FAN 2 activation	EC
P0697		• EGR valve is closed position • Throttle control motor is opened • Rail pressure limitation • CSF regeneration forbidden • After sales routines forbidden • CCSL deactivation with dashboard message • Freeshift inhibited • ESP deactivated and AGB in limp home mode	C
P0833	DPF pressure sensor	CC/SL not available	D
P1010 P1012 P1013	Intake manifold runner control valve	Stop intake manifold runner control valve control (Fully open position)	E
P1011		• Stop intake manifold runner control valve control (Fully open position) • CCSL deactivation • Freeshift inhibition	F
P1453	DPF pressure sensor	• EGR valve is closed position • Throttle control motor is opened • Prohibit DPF regeneration	G
P1480 P1481 P1482 P1483	Exhaust electric throttle control actuator	• EGR valve is closed position • Throttle control motor is opened • Airflow regulation cut off • CSF regeneration forbidden • Compression test routine forbidden • CCSL deactivation with dashboard message • Freeshift inhibited	H
P1484 P1485 P1486 P1487 P1488	Low pressure EGR volume control valve	• EGR valve is closed position • Throttle control motor is opened • CSF regenerations forbidden • CCSL deactivation with dashboard message • Freeshift inhibited	I
P1489		• EGR valve is closed position • Throttle control motor is opened • Temperature sensor after EGR cooler overheat signal diagnostic set of data to call the failure manag.	J
P1544	Exhaust gas temperature sensor 2 circuit	• EGR valve is closed position • Throttle control motor is opened • Prohibit DPF regeneration	K
P1620	ECM	Stop closed-loop control	L

SYSTEM

< SYSTEM DESCRIPTION >

[R9M]

DTC No.	Detected items	Engine operating condition in fail-safe mode
P1641 P1642 P1643	Thermoplunger circuit	Stop thermoplunger control
P2002	Diesel particulate filter	- EGR valve is closed position - Throttle control motor is opened - Prohibit DPF regeneration
P2120	Accelerator pedal position sensor 2 circuit	- Torque limitation - Freeshift inhibited - CCSL deactivation (considered as abnormal with dashboard message) - Aftersales and factory routines inhibited
P2226	Atmosphere pressure sensor	- EGR valve is closed position - Throttle control motor is opened - Prohibit DPF regeneration
P2263	Turbocharger boost pressure sensor circuit	- EGR valve is closed position - Throttle control motor is opened - Torque limitation - CCSL deactivation (considered as abnormal with dashboard message) - Freeshift is inhibited - Wastegate activation is inhibited - ESP deactivation - CSF regeneration forbidden
P2452	Diesel particulate filter pressure sensor circuit	- EGR valve is closed position - Throttle control motor is opened - Prohibit DPF regeneration
P253F		- CSF regeneration is forbidden - Torque limitation - EGR valve is closed position - Throttle control motor is opened
P2681	Engine coolant bypass valve circuit	- Engine cooling fan activation - Throttle control motor is opened - Prohibit start/stop system - Stop EGR control - Stop thermoplunger control

STOP/START SYSTEM

DTC No.	Detected items	Stop/start system operating condition in fail safe mode			
		Idling or driving the vehicle	Stop/start system operating		
			Stop	During cranking (Restart)	
U0298	Engine communication line	—	—	Prohibit the stop/start system operation from the next time	
B1900 B1901 B1902 B1903	DC/DC converter	Prohibit the stop/start system operation	Restart the engine		
B1904		—	—		
P0120	TP sensor	Prohibit the stop/start system operation	Restart the engine		Prohibit the stop/start system operation from the next time
P0833	CPP switch		—	—	
P1512	Starter motor				
P1650	Starter motor relay2		Restart the engine or stall the engine		
P1655 P1656	Engine restart bypass relay	—	—		
P2100	Throttle control motor relay	Prohibit the stop/start system operation			

ENGINE SPEED CONTROL

ENGINE SPEED CONTROL : System Description

INFOID:000000010935561

A

SYSTEM DESCRIPTION

The engine speed control consists of the following functions:

- Curative anti-jerk
- Idle speed control
- Engine speed limitation
- Engine state

EC

C

CURATIVE ANTI-JERK

This function aims to smooth the engine speed through torque corrections out of idle engine speed regulation. The torque correction is made by the anti-jerk function to damp the engine speed vibrations caused by the drive-line vibrations.

D

IDLE SPEED CONTROL

ECM calculates the engine idle speed set point and maintains the engine speed in order to follow the set point. The engine idle speed set-point is computed for the following load and signal:

E

- Post treatment
 - Diesel particulate filter
- Electric consumers
 - Cooling fan
 - Air heater (air conditioning system)
 - Power window
- Alternator output current
- Automatic transmission
 - Automatic transmission idle speed set point function (according to coolant temperature)
 - Automatic transmission idle speed increase request
- Mechanical consumers
 - Air conditioning
 - Power steering
- Diagnosis and protection
 - Diagnosis
 - Engine protection by oil temperature survey
 - CONSULT function
 - Manifold absolute pressure sensor signal

F

G

H

I

J

The final engine idle speed set point is computed from each consumer's engine idle speed set point:

- The final corrective torque of the Idle Speed Regulation is obtained taking into account proportional, integral, and derivative corrections.

K

ENGINE SPEED LIMITATION

ECM calculates the maximum engine speed set point and controls the maximum engine speed in order to follow the set point.

L

- Fail-safe mode
- Maximum available engine speed

M

ENGINE STATE

ECM calculates the engine state from detected engine speed:

- Engine running
 - Driving state
 - Idling state
- Engine stalled
 - Initial state
 - Stalled state

N

O

POWERTRAIN COORDINATION CONTROL

P

POWERTRAIN COORDINATION CONTROL : System Description

INFOID:000000010935562

SYSTEM DESCRIPTION

The powertrain coordination can be explained by following:

- Powertrain coordination inputs
- Preventive anti-jerk

< SYSTEM DESCRIPTION >

- Gear shift indicator (for details, refer to [EC-847, "GEAR SHIFT INDICATOR SYSTEM : System Description".](#))

POWERTRAIN COORDINATION INPUTS

ECM detects following signals necessary to decide the torque set point:

- Gear position
- Torque request from automatic transmission
- Torque request from ABS system
- Brake pedal operation
- Status of Cruise Control System or Speed Limiter

PREVENTIVE ANTI-JERK

The main objective of the preventive anti-jerk function is to decrease discomforts of driver during depress the accelerator pedal and during release the accelerator pedal.

The abrupt change of torque are delivered by engine excites a torsional natural frequencies of drive-line. It causes vehicle jerking and acceleration fluctuations. And they are causes of perception and assessment of performance and comfort for driver and the passengers.

The purpose of this function is to limit drive-line torque excitations. In fact, the engine torque set point is filtered according to requirements of driveability.

TURBOCHARGER BOOST CONTROL

TURBOCHARGER BOOST CONTROL : System Description

INFOID:0000000010935563

DESCRIPTION

Turbocharger is used to increase the air pressure entering the engine. The turbocharger has two separate chambers. The turbocharger consists of the following components:

- A chamber linked to the engine exhaust gas system
- A chamber linked to the engine air inlet system
- A turbine and a compressor, joined together by shaft.

The turbine, driven by exhaust gases, drives the compressor which compresses the inlet air.

CAUTION:

To stop the engine immediately after high-load driving, park the vehicle with the engine at idle before turning OFF the ignition switch.

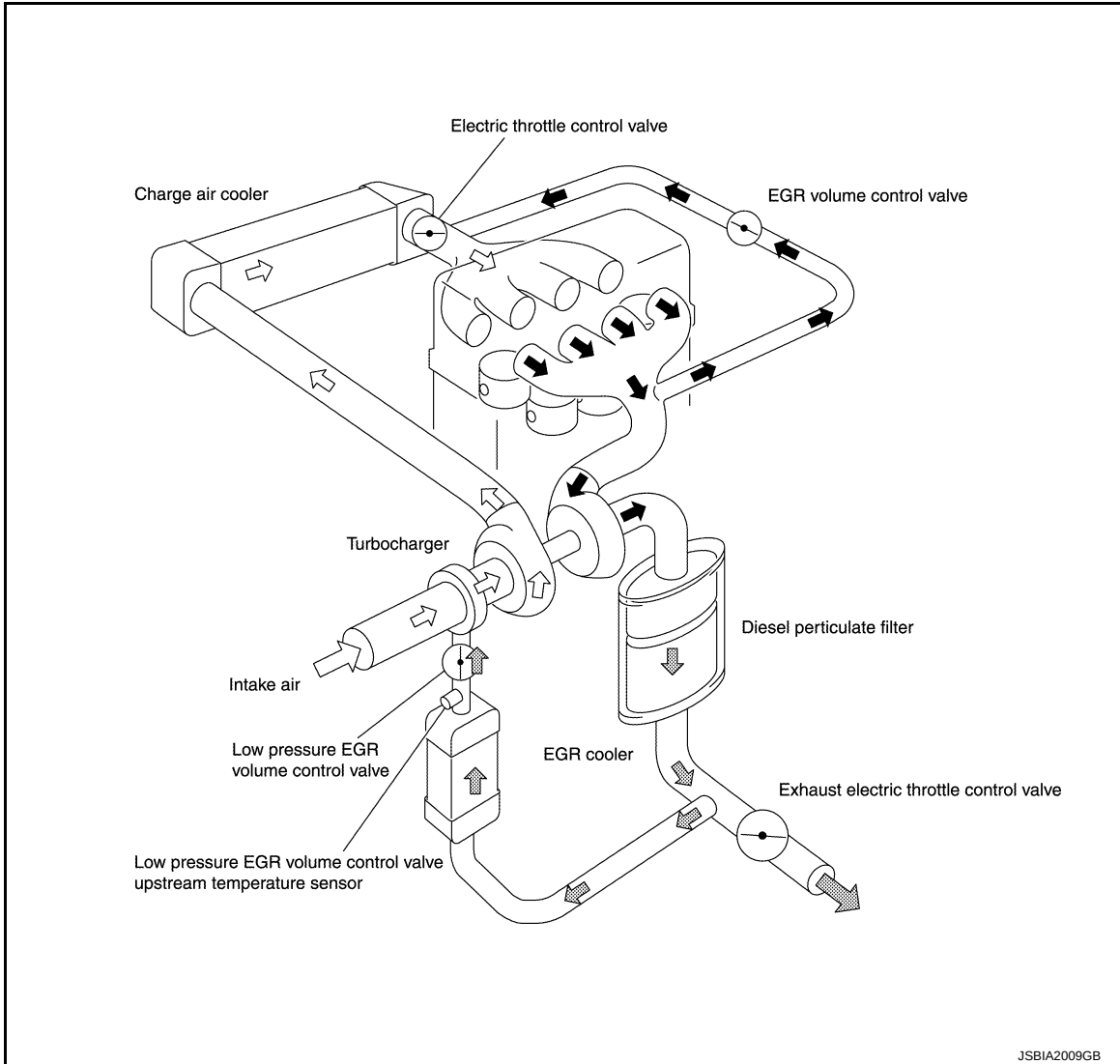
The boost pressure control is able to increase the manifold pressure with respect to the engine operating point. The system has an electric solenoid valve connected on the vacuum circuit to control the flow of exhaust gases through the turbine in order to generate high pressure in the boost circuit.

EGR SYSTEM

EGR SYSTEM : System Description

INFOID:000000010935564

DESCRIPTION



EGR (Exhaust Gas Recirculation) system reduces NOx emissions and improves fuel efficiency by recirculating exhaust gas into the intake manifold.

This engine has two EGR systems (low pressure and high pressure), and one of them is selected depending on condition.

The purpose of the low pressure EGR is to decrease fuel consumption.

The low pressure EGR system and the high pressure EGR system are not activated simultaneously.

LOW PRESSURE EGR SYSTEM

The low pressure EGR system recirculates exhaust gasses in the downstream DPF (Diesel Particulate Filter) to the upstream turbocharger of intake air passage.

If EGR conditions are satisfied when engine coolant temperature is more than 70°C (158°F) and intake air temperature is 20°C (68°F), the opening angle of the exhaust throttle valve is reduced and the low pressure EGR volume control valve angle is adjusted to control EGR for achieving an appropriate EGR rate.

HIGH PRESSURE EGR SYSTEM

High pressure EGR system recirculates exhaust gasses in the exhaust manifold to the intake manifold.

If EGR conditions are satisfied when engine coolant temperature is less than 30°C (86°F), the opening angle of the throttle valve is reduced and the high pressure EGR volume control valve angle is adjusted to control EGR for achieving an appropriate EGR rate.

EGR COOLING SYSTEM

The EGR cooler bypass is controlled by ON/OFF solenoid valve, connected to the vacuum circuit. Control is determined according to the engine coolant temperature, intake air temperature, and the engine operating

point. The gases flow through the cooler during the EGR activation, except when the engine is cold; otherwise, they go through the bypass. There is also a regular bypass activation function to prevent its clogging or jamming.

THROTTLE CONTROL

THROTTLE CONTROL : System Description

INFOID:0000000010935565

DESCRIPTION

This engine has two throttle valves. One of them is installed to the upstream of the intake manifold on the air intake line and used for the high pressure EGR control and smooth engine stop. The other throttle valve is installed to the downstream of DPF (Diesel Particulate Filter) on the exhaust line and used for the low pressure EGR control.

These valves are normally open.

ELECTRIC THROTTLE CONTROL ACTUATOR

- During high pressure EGR control, the electric throttle control actuator reduces the opening angle of the throttle valve and lowers pressure around the EGR feed port so that intake EGR gasses can be efficiently taken in.
- When ignition switch is turned OFF, throttle valve is closed to stop the engine smoothly.
- In DPF regeneration mode, fresh air flow control uses only electric throttle control actuator (EGR valve is fully closed).

EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

The exhaust electric throttle control actuator reduces the opening angle of the exhaust throttle valve and introduces exhaust gasses to the low pressure EGR system.

SWIRL CONTROL SYSTEM

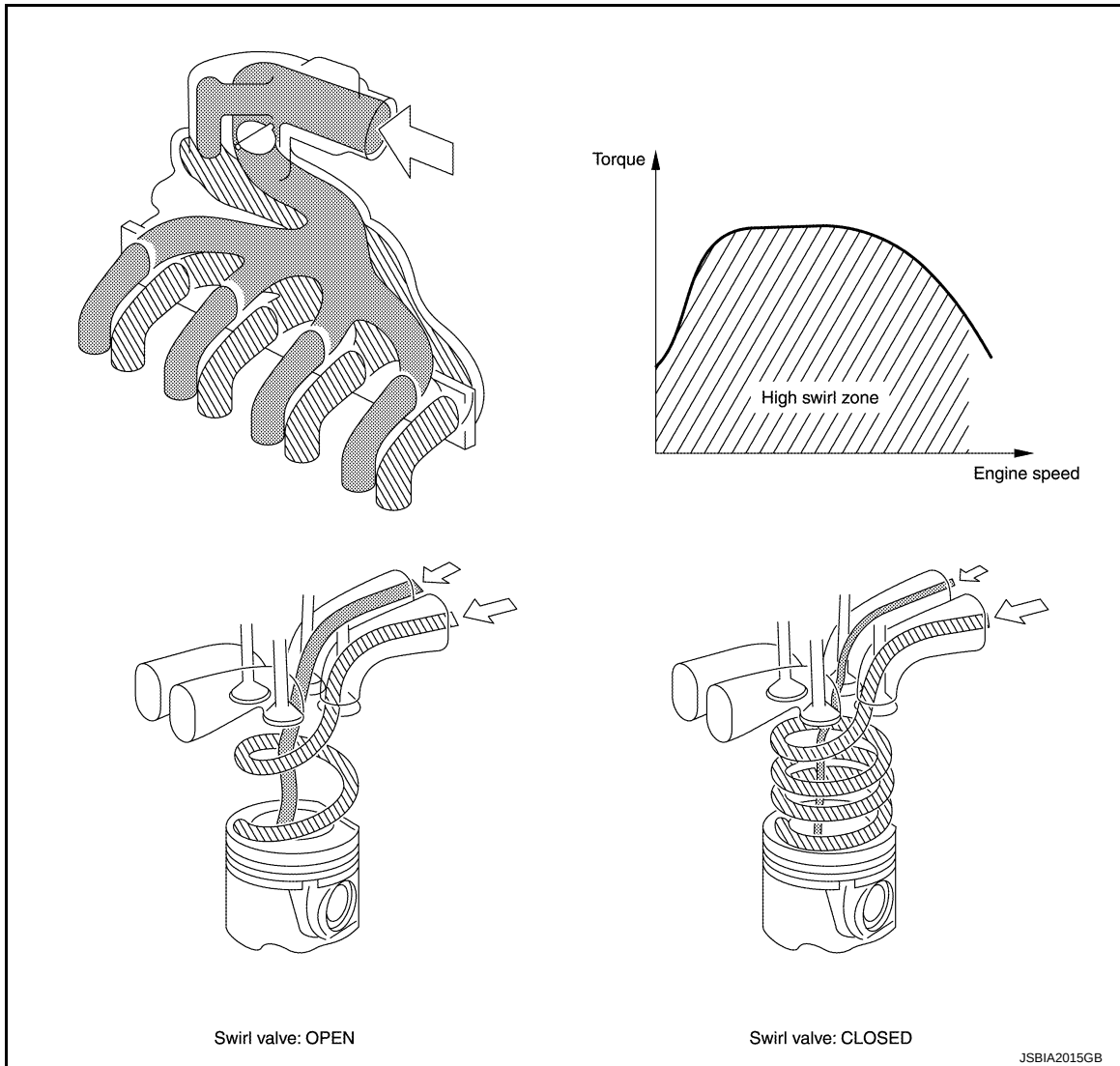
SWIRL CONTROL SYSTEM : System Description

INFOID:0000000010935566

DESCRIPTION

< SYSTEM DESCRIPTION >

The intake manifold runner control valve mounted on the intake manifold generates swirl flow in the combustion chamber. This swirl flow allows air mixture to become even, enabling the obtainment of the steady combustion.



ENGINE TORQUE CONTROL

ENGINE TORQUE CONTROL : System Description

INFOID:0000000010935567

SYSTEM DESCRIPTION

The torque function can be explained by the following:

- Accessories torque management
- Engine torque losses
- Minimum available torque
- Maximum available torque
- Fast set-points to complete torque request
- Final torque requests setting

ACCESSORIES TORQUE MANAGEMENT

Air Conditioning Power

The amount of power absorbed by the air conditioning is useful for the engine control to compute the torque requirement for air conditioning. Therefore, ECM can adapt dynamically the engine speed regulation depending on the load variations.

The power absorbed by the air conditioning depends on the refrigerant pressure and the compressor speed. The air conditioning system power correction for idle speed regulation avoids engine speed undershoots and overshoots at the compressor compressed volume variation.

< SYSTEM DESCRIPTION >

Coolant heaters or air heaters

The air heater is activated on a driver request.

The thermoplunger are exclusively used to increase engine load during DPF (Diesel Particulate Filter) regeneration. When the vehicle is in a regenerating phase and the load is low, the coolant heaters are activated to increase the overall load.

ENGINE TORQUE LOSSES

The torque losses are the sum of three components: the rubbing, the pumping, and the torque losses caused by accessories consumption.

- The basic friction torque loss uses the coolant liquid temperature sensor and the engine speed for the torque correction.
- Accessories' consumption is caused by additional electrical (alternator power) and mechanical (power steering and air conditioning) components.

MINIMUM AVAILABLE TORQUE

The minimum available torque is used for the minimum driver setpoint calculation and the intersystem information.

The minimum torque is designed with a hyperbolic shape depending on the difference between the engine speed and the idle speed set-point:

- When the engine speed is under the idle speed set-point, the minimum torque is equal to the hyperbolic torque which increases to avoid an engine stalling.
- When the engine speed is over an engine speed threshold, the minimum torque reaches the engine torque losses with a ramp.

When the engine starts, a specific torque set-point is calculated to ensure the engine start. This torque is dependent of the engine speed and the coolant temperature.

At first, a calculation of the starting torque value is performed. In case of a difficult start (too long), this torque may be increased thanks to ramp.

The start torque offset is progressively set to zero to ensure a transition with the current torque set-point.

MAXIMUM AVAILABLE TORQUE

The maximum available torque results of a minimum selection including all powertrain constraints:

- Transmission torque limitation
- Maximum engine torque
- Torque reduction for the heating protection
- Torque for smoke limitation
- Fail-safe

Transmission torque limitation

This limitation is the maximum torque to protect the transmission from a mechanical overload:

- For a manual transmission, the limitation value of the torque is function of the engine speed and the transmission ratio.
- For an automatic transmission, the limitation value is directly supplied by the automatic transmission.

Maximum engine torque

The maximum torque depends on the engine speed and the manifold air pressure. It is corrected by:

- The soot mass value in order to take into account the limitations due to the particulate filter
- The atmospheric pressure
- The upstream inlet throttle temperature.

The maximum engine also depends on the combustion mode (the normal or the regeneration combustion mode). In some conditions (DPF clogging, etc.), this maximum available torque is reduced in order to keep the engine within its safety working limits.

Torque for the heating protection

This torque limitation is dedicated to the protection of the engine from an overheating. This limitation calculation depends on the engine speed, the engine coolant temperature, the intake air temperature and the vehicle speed.

Torque for the smoke limitation

This torque limitation is used to reduce the smoke emissions during a high torque driver request. The maximum fuel mass that can be injected is limited according to the maximum richness depending on the gear ratio, the engine speed, and the intake air mass flow. This value is corrected depending on the vehicle speed and the coolant temperature.

Fail-safe

< SYSTEM DESCRIPTION >

The ECM limits a engine torque in case of malfunction of engine component or ECM. Depending on the engine components, ECM activates the fail-safe mode of the torque limitation level 1 (low limitation), the level 2 (mean limitation), or the level 3 (strong limitation function of vehicle speed).

FAST SET-POINTS TO COMPLETE TORQUE REQUEST

For each combustion mode (the normal combustion mode, the regeneration combustion mode, and the protection combustion mode), a torque model is designed to calculate the total fuel mass quantity, the estimated mean effective torque, the combustion efficiency and the current fuel consumption for the final torque set-point and the engine current speed.

The total fuel mass quantity is corrected to take into account the main injection advance deviation and the mass air flow deviation.

For each combustion mode, the after and the post injection relative efficiencies are calculated to determine the fuel mass quantity needed to perform the engine inner torque.

The after injection relative efficiency is equal to one in normal combustion mode and to zero in a regeneration combustion mode or in a protection combustion mode.

The post injection relative efficiency is function of the post injection timing and the difference between the current and the basic post injection timing.

FINAL TORQUE REQUESTS SETTING

The final torque requests are computed by the arbitration with the driver request, the intersystem torque request (VDC/ESP), the torque limitations and the curative anti-jerk correction.

The set-point torque is used for fuel mass calculation. It is filtered by the preventive anti-jerk and corrected by the curative anti-jerk.

COMBUSTION CONTROL

COMBUSTION CONTROL : System Description

INFOID:0000000010935568

SYSTEM DESCRIPTION

The torque set-point is converted into a total fuel quantity injected. This quantity is split in various injections according to a mapped injection pattern. Thus, a fuel quantity and an initial phasing of injection are allocated for each injection. The choice of the number of injection (limited to five maximum) is given with different constraints such as acoustic, performance and emissions.

In the DPF (Diesel Particulate Filter) regeneration phase, post injections do not contribute to the torque elaboration but to the increase of the DPF temperature. Therefore, the fuel consumption increases in the DPF regeneration phase.

FUEL SUPPLY AND PRESSURE CONTROL SYSTEM

Fuel Supply System

The fuel supply system consists of two circuits: the fuel low and high-pressure circuit.

The fuel low-pressure circuit brings fuel from the tank to the high-pressure fuel pump through the fuel filter (with fuel heater).

The high-pressure circuit function is to put the fuel under pressure and distribute it to the injectors:

- High-pressure fuel pump
- Fuel flow actuator
- Common rail
- Fuel injectors

The low-pressure fuel (coming from low-pressure circuit) is transferred to the high-pressure pump part via the fuel flow actuator, which regulates the fuel flow quantity. The high-pressure fuel pump consists of a three-piston pump.

The fuel under pressure goes to the common rail, which distributes the fuel equally to each injector.

Finally, the commanded injectors deliver the fuel flow entering the cylinder.

Fuel Pressure Control

The combustion quality is influenced by the size of the droplets sprayed into the cylinder. In the combustion chamber, smaller fuel droplets will have enough time to burn completely and will produce less smoke and less unburnt particulate matter. To meet pollution requirements, the size of the droplets needs to be reduced and hence so too do the injection orifices.

Since these orifices are smaller, less fuel can be injected for a given pressure, which in turn limits the power. To counter this drawback, it is necessary to increase the quantity of injected fuel, which involves raising the pressure (and the number of orifices on the injector nozzles). The pressure is continuously regulated to high

pressure in the rail. The measurement circuit consists of an pressure sensor on the rail and transmits the pressure signal to ECM.

The high-pressure pump is self-supplied by an integrated gear pump. This supplies the rail, whose pressure is controlled for loading by the fuel flow actuator. The flow regulation actuator allows the high-pressure fuel pump to supply only the necessary quantity of diesel for maintaining pressure in the rail.

Pressure regulation can be done with one actuator in case of magnetic injectors because of their natural leak during injector closing.

INJECTION CONTROL

The injection control parameters are the quantities to inject and their respective advances. The system performs one to five injections.

The injectors are magnetic injectors. An electrical current (pulse) is sent to each injector holder based on the previously computed data.

To control injector, ECM punctually drives energy to obtain actuator deformation and the injector opening.

During the injection time, the length of electrical pulse is computed with the fuel flow demand and injectors corrections. The system has three injector corrections:

- Injector adjustment value registration
- Zero fuel calibration
- Pressure wave correction

Injector Adjustment Value Registration

Injector adjustment value indicates manufacturing tolerance. The injector adjustment value which is correctly stored in ECM is needed for precise fuel injection control. A performance of emission control and a driveability may effect when there is a mismatch between the following two values.

- The injector adjustment value stored in ECM
- The injector adjustment value of the injector which is installed on the vehicle

Zero Fuel Calibration (ZFC)

During the lifetime of an injector, it is subject to thermal and mechanical constraints that modify the injection characteristics. This wear-and-tear on the orifices (blocked or expanded holes) causes drift in the quantity of injected fuel, which can lead to smoke generation or increased noise. To compensate for this drift, ECM implements a teach-in in the raised foot phase and under certain condition, which allows it to regulate the ZFC corrector parameter.

Pressure Wave Correction:

The first injection causes a pressure wave in the pipe between rail and injector and the bores in the injector itself. The quantity of the next injections is influenced by this pressure wave.

Main parameters of this influence are:

- Rail pressure
- Distance between the two injections
- Fuel temperature
- Injection quantities of both injections

The pressure wave correction minimizes the influence of the first injection on the next injections with simple structure and parameters which can be measured.

TEMPERATURE BEFORE TURBINE CONTROL

Upstream turbine temperature control sequentially uses injection parameters:

- Main injection phasing
- Post injection fuel mass
- Total fuel mass quantity
- Maximum torque

In normal combustion mode (without regeneration), the regulation aims to protect the turbine. If the temperature exceeds the recommended limits, the regulation is able to limit total fuel mass quantity and torque demand.

In regeneration mode, to increase the temperature in exhaust line, the regulation controls main injection phasing and post injection.

The purpose is to obtain the highest temperature while respecting the recommended limits. In addition, the regulation protects the turbine when the temperature is too hot.

WATER IN FUEL FUNCTION

The water in fuel detection sensor is an optional sensor integrated in the fuel filter. This function prevents serious damages on the common-rail system caused by water presence.

AFTER TREATMENT SYSTEM

AFTER TREATMENT SYSTEM : System Description

INFOID:000000010935569

DESCRIPTION

This system has two main functions:

- Use the present oxygen in exhaust gases to transform the CO in CO₂, and the HC in CO₂ and H₂O.
- Increase the temperature of exhaust gases (with the exothermal energy of the oxidation reaction) to allow the regeneration in the DPF (Diesel Particulate Filter).

To be effective, the catalytic converter must reach the working temperature of 350 to 400°C (662 to 752°F).

NOX TRAP

On diesel engines, it is possible to reduce the NO_x produced by the engine by inserting a NO_x-trap into the exhaust line. This system works by alternating phase of load and phases of purges.

There are two types of purge, depending on the pollutant type:

- NO_x purge
- SO_x purge

These purges are made of alternative rich and lean phases, so in order to control them a O₂ downstream proportional sensor is added to the system.

The management of these requests has to manage the compromise between:

- Improve the NO_x emission (objective leading to increase the number of purges)
- Do not impact on the customer on the fuel consumption and of the oil change interval (objective leading to decrease the number of purges)

DPF (DIESEL PARTICULATE FILTER)

The DPF filters up to 99% of the soot particulates that have not been filtered out up to this point. These particulates consist essentially of aggregates of variable size. The quantity of particulates and their composition depend on:

- The combustion process (an homogeneous air/fuel mixture minimizes particulate formation)
- The quantity of diesel (increasing the cetane index limits the number of particulates formed)
- The post-processing efficiency (only filtration allows the particulates to be removed efficiently)

The DPF is a porous structure with channels set out in such a way as to force the exhaust gases through the chamber walls.

In normal operation, DPF captures all the particulates emitted by the engine and so fills up progressively. It therefore becomes necessary to eliminate all the accumulated particulates, which is done by combustion (regeneration).

REGULATION OF TEMPERATURE BEFORE DPF

Regulation of the exhaust gas temperature before DPF is needed to complete a secure regeneration. This strategy uses both exhaust line injectors and late post injections (fuel injectors).

ECM computes the fuel mass flow injected by injectors (post injection) according to several parameters:

- Exhaust line temperature before DPF
- Atmospheric pressure
- Intake air temperature
- Differential pressure of the CSF
- Minimum level of fuel
- Engine speed
- Engine torque

COOLING FAN CONTROL

COOLING FAN CONTROL : System Description

INFOID:000000010935570

SYSTEM DESCRIPTION

The cooling of the engine is done by a double speed motor driven fan unit (FAN1: small speed; FAN2: high speed). The ECM controls cooling fan relays through CAN communication line.

When the engine is running

To cool the engine, a request for FAN1 activation is sent when the engine coolant temperature exceeds 94°C (201°F) and a deactivated request is sent when the engine coolant temperature becomes lower than 92°C (197°F).

When the engine coolant temperature continues to increase, a request for FAN2 activation is sent when the engine coolant temperature exceeds 100°C (212°F) and a deactivated request is sent when the engine coolant temperature becomes lower than 98°C (208°F).

When the engine coolant temperature continues to increase and exceeds the alert threshold, ECM judges the engine is over temperature.

In case of an abnormally high engine coolant temperature, the maximum engine torque is reduced; the driver will then feel a lack of engine power.

When the engine is not running

Only a FAN1 activation request can be sent for anti-percolation purpose (engine stopped with high engine coolant temperature). The anti-percolation function is active after ignition switch OFF for a defined maximum time. At ignition switch OFF, a FAN1 activation request is sent if the engine coolant temperature exceeds specified temperature and a cutting request is sent when the engine coolant temperature becomes lower.

When there is a default on the engine coolant temperature signal, the FAN1 activation is permanently requested (engine running).

In addition to this, depending on the equipment mounted on the vehicle, the ECM can also send an activation request for air conditioning needs or automatic transmission needs or DPF (Diesel Particulate Filter) regeneration needs.

THERMOSTAT CONTROL

THERMOSTAT CONTROL : System Description

INFOID:0000000010935571

SYSTEM DRAWING

For system drawing of the thermostat control, Refer to [CO-59. "Engine Cooling System"](#).

DESCRIPTION

This engine has an engine coolant bypass valve and a thermoplunger and uses them for improving a warm-up time.

Thermoplunger

The thermoplunger is installed to the engine coolant line and directly warms up engine coolant.

ECM transmits a thermoplunger operating signal to the thermoplunger control unit when engine coolant temperature is low.

The thermoplunger control unit applies power to the thermoplunger according to the received signal and warms up engine coolant.

In addition, ECM activates the thermoplunger during DPF (Diesel Particulate Filter) regeneration and increases electric load for get more engine load to perform normal DPF regeneration.

ECM controls thermoplunger based on the following information.

- Engine coolant temperature
- Battery voltage
- Engine speed
- Alternator load

Engine Coolant Bypass Valve

The engine coolant bypass valve circulates engine coolant within a narrow range and accelerates a warm-up by closing the valve and cutting off the engine coolant passage.

ECM applies power to the engine coolant bypass valve control solenoid valve when engine coolant temperature is low.

The engine coolant bypass valve control solenoid valve switches the passage of negative pressure (vacuum) sent from the vacuum pump. When power is applied to the solenoid valve, negative pressure is applied to the engine coolant bypass valve. Accordingly, the engine coolant bypass valve closes.

GLOW CONTROL

GLOW CONTROL : System Description

INFOID:0000000010935572

SYSTEM DESCRIPTION

Glow control system operates at engine starting and after engine starting. The system energizes glow plug according to engine coolant temperature to improve engine starting function.

When the ignition switch is turned ON, the glow control system starts Pre-glow and the glow indicator lamp turns ON. When the engine starts, the glow indicator lamp turns OFF and the glow control state changes to After-glow.

Glow time varies according to engine coolant temperature, barometric pressure and battery voltage.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description

INFOID:000000010935573

A

BASIC ASCD SYSTEM

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 170 km/h (105 MPH).

EC

ECM controls fuel injector to regulate engine speed.

Operation status of ASCD is indicated on the information display in the combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.

C

NOTE:

Always drive vehicle in a safe manner according to traffic conditions and obey all traffic laws.

D

SET OPERATION

Press ASCD MAIN switch. (CRUISE indicated on the information display)

When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 170 km/h (105 MPH), press SET/COAST switch. (SET indicated on the information display)

E

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.

F

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.
- Vehicle speed decreased under 15% of the set speed from the set speed.
- TCS system is operated.

G

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator.

- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE indicator may blink slowly.

H

I

J

K

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/COAST switch or RESUME/ACCELERATE 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.

L

COAST OPERATION

When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

M

RESUME OPERATION

When the RESUME/ACCELERATE switch is pressed after cancel operation other than pressing ASCD MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

N

- Brake pedal is released
- Clutch pedal is released
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 170 km/h (105 MPH)

O

SPEED LIMITER

SPEED LIMITER : System Description

INFOID:000000010935574

P

BASIC SPEED LIMITER SYSTEM

The speed limiter is a system that enables to restrict the vehicle speed within the set speed that is selected by the driver. Driver can set vehicle speed between 30 km/h and 180 km/h (in the metric system mode) or 20 MPH and 115 MPH (in the yard/pound system mode). ECM controls fuel injector 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 control.

NOTE:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press speed limiter MAIN switch. (LIMIT indicated on the information display)

By pressing the SET/COAST switch, the vehicle speed can be set within the range between 30 km/h (20 MPH) and 180 km/h (115 MPH). (SET and set speed is indicated on the information display)

When pressing the RESUME/ACCELERATE switch, the set speed can be increased.

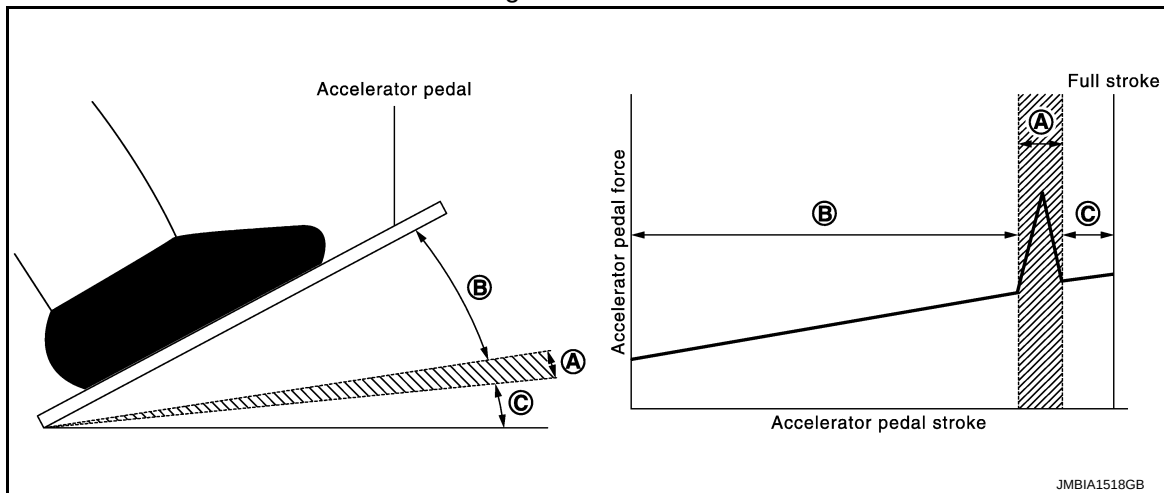
When pressing the SET/COAST switch, the set speed can be decreased.

CANCEL OPERATION

When any of following conditions exist, speed limiter operation will be canceled.

- Speed limiter MAIN switch pressed (Set speed will be cleared)
- ASCD MAIN switch pressed (Set speed will be cleared)
- CANCEL switch is pressed
- Accelerator pedal is fully depressed (kickdown)

When the accelerator pedal is depressed within the range shown in the figure ① below, the accelerator pedal reaction force strengthens. Further depressing the accelerator pedal within the ② range cancels the speed limiter. This allows acceleration in emergencies.



RESUME OPERATION

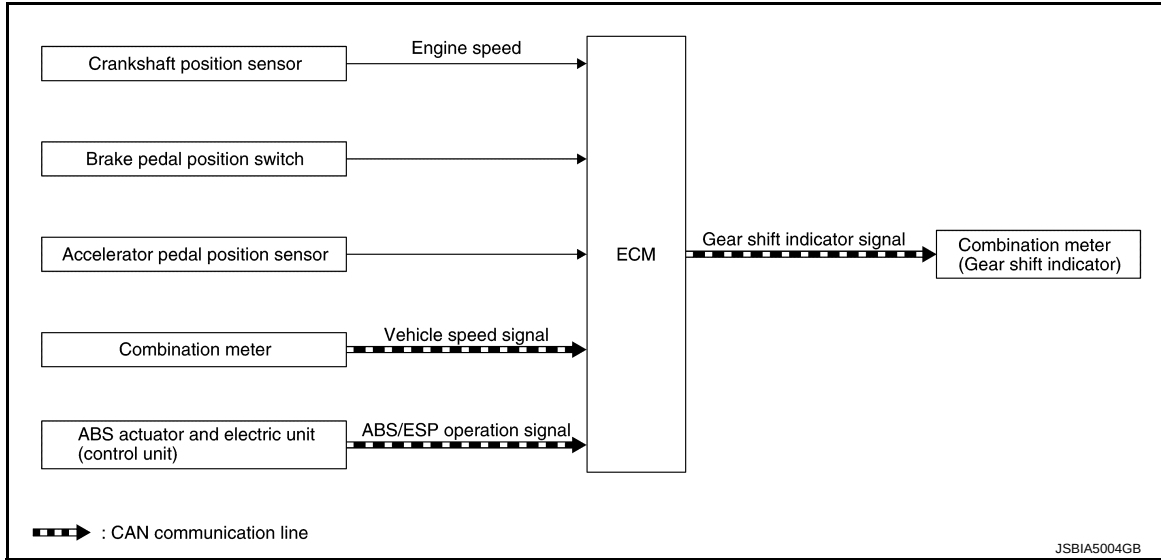
After the speed limiter is released by other method than the MAIN switch, the RESUME/ACCELERATE switch allows to set the vehicle speed again to the one that is previously set before releasing the speed limiter.

GEAR SHIFT INDICATOR SYSTEM

GEAR SHIFT INDICATOR SYSTEM : System Description

INFOID:000000010935575

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

The gear shift indicator is controlled by ECM and indicates recommended gear shift timing on the combination meter.

- Upward arrow indication (↑): Upshift recommendation
- Downward arrow indication (↓): Downshift recommendation

ECM calculates optimal gear shift timing for better fuel consumption, according to the input signal and a gear ratio. In addition, the recommended gear shift timing is corrected, according to driver's operation and road conditions. ECM transmits a gear shift indicator signal to the combination meter via CAN communication line.

The gear shift indicator is deactivated when any of the following conditions is satisfied;

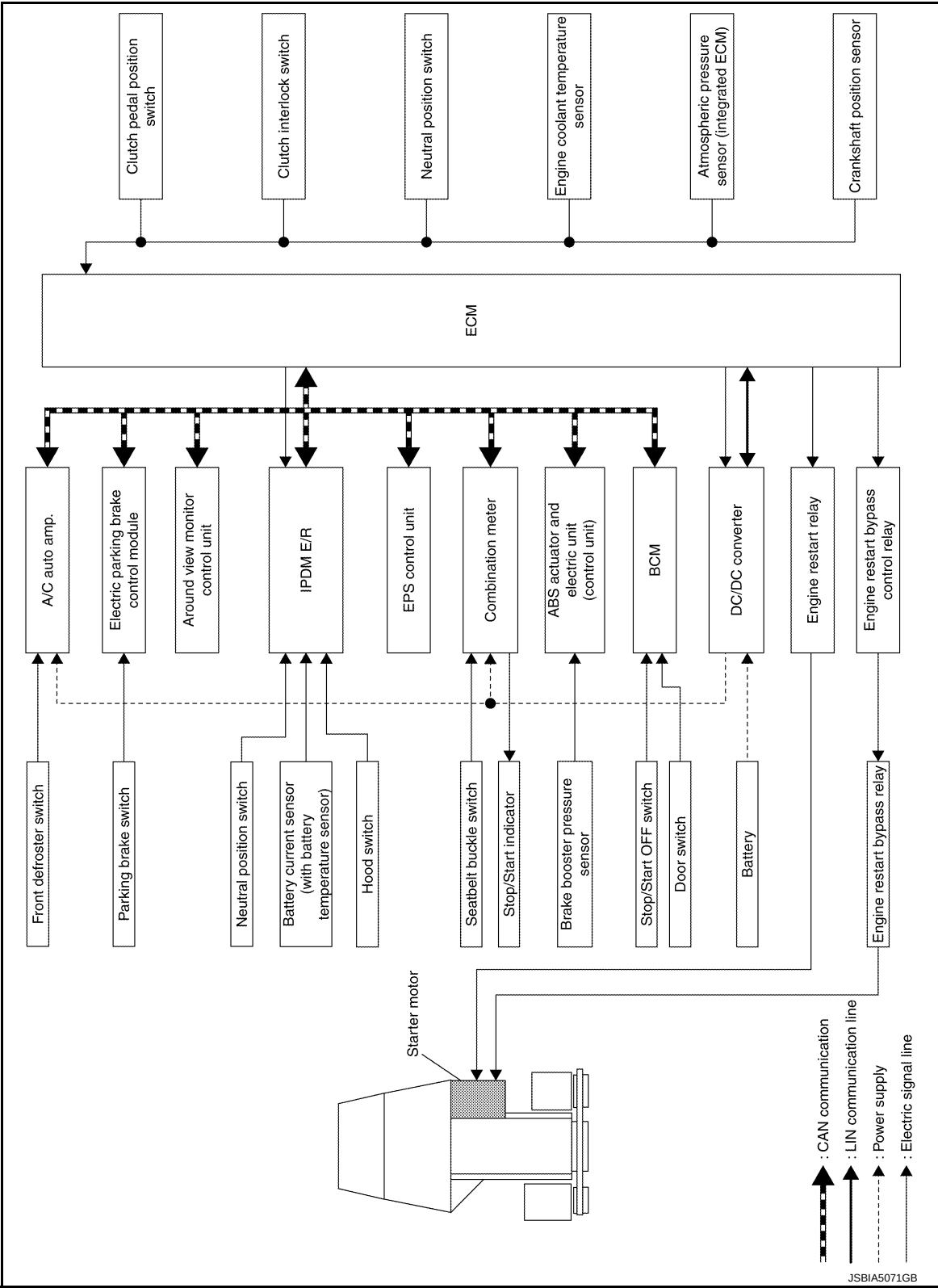
- Shift lever is in neutral position.
- Vehicle is under cruise control (ASCD function) or speed limit (speed limiter function).
- MIL (Malfunction Indicator Lamp) is indicated.
- ABS system or ESP system is operating.

STOP/START SYSTEM

STOP/START SYSTEM : System Description (M/T models)

INFOID:000000010935576

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL CHART

SYSTEM

< SYSTEM DESCRIPTION >

[R9M]

Input/ Output	Transmits/Receives component	Signal name		Description	A
Input	Crankshaft position sensor	Crankshaft position sensor signal		Detects an engine speed.	EC
	Engine coolant temperature sensor	Engine coolant temperature sensor signal		Detects an engine coolant temperature.	
	Clutch pedal position switch	Clutch pedal position switch signal		Detects the clutch pedal is depressed (not released).	C
	Clutch pedal interlock switch	Clutch pedal interlock switch signal		Detects the clutch pedal is depressed (fully depressed).	D
	Neutral position switch	Neutral position switch signal		Detects the neutral position.	
	Atmospheric pressure sensor (integrated in ECM)	Atmospheric pressure sensor signal		Detects an atmospheric pressure.	E
	IPDM E/R	CAN communication	Stop/Start permit signal	Detects the IPDM E/R is ready to operate the stop/start system. For details, refer to CHG-8, "ENERGY MANAGEMENT SYSTEM : System Description" .	F
			Battery current signal	Detects battery current.	G
			Neutral position switch signal	Detects the neutral position.	
			Hood switch signal	Detects engine hood status.	H
			Battery current sensor malfunction signal	Detects the battery current sensor is normal.	
	BCM	CAN communication	Ignition switch status signal	Detects ignition switch status.	I
			Door switch signal	Detects the status of driver side door.	
			Stop/Start OFF switch signal	Detects stop/start OFF switch status.	J
	ABS actuator and electric unit (control unit)	CAN communication	Vehicle speed signal	Detects vehicle speed.	
			Brake booster pressure sensor signal	Detects a pressure in brake booster.	K
			ABS operation signal	Detects ABS operation.	
			ESP operation signal	Detects ESP operation.	L
	EPS control unit	CAN communication	EPS torque signal	Detects an operational state of EPS system.	
			Stop/Start inhibit signal	Receives the intelligent parking assist status signal sent from the around view monitor control unit through the EPS control unit.	M
	A/C auto amp.	CAN communication	Stop/Start permit signal	Detects the air conditioning system is ready to operate the stop/start system. For details, refer to HAC-36, "STOP/START SYSTEM : System Description" .	N
	Combination meter	CAN communication	Seat belt buckle switch signal	Detects driver is sitting on the driver seat.	O
	DC/DC converter	LIN communication	Operation status signal	Detects an operational state of DC/DC converter.	P
			Diagnosis signal	Detects DC/DC converter malfunction.	

SYSTEM

< SYSTEM DESCRIPTION >

[R9M]

Input/ Output	Transmits/Receives component	Signal name		Description
Output	Around view monitor control unit	CAN communica- tion	Stop/Start status signal	Transmits a stop/start status signal
	BCM	CAN communica- tion	Stop/Start status signal	Transmits a stop/start status signal
	ABS actuator and electric unit (control unit)	CAN communica- tion	Stop/Start status signal	Transmits a stop/start status signal
	EPS control unit	CAN communica- tion	Stop/Start status signal	Transmits a stop/start status signal
			EPS assist request signal	Transmits EPS assist permit/inhibit signal.
	A/C auto amp.	CAN communica- tion	Stop/Start status signal	Transmits a stop/start status signal
	Combination meter	CAN communica- tion	Stop/Start status signal	Transmits a stop/start status signal
			Stop/Start indicator lamp request signal	Transmits request signal which turn ON the stop/start indicator lamp.
	DC/DC converter	DC/DC converter operation check signal		Check DC/DC converter operation status.

SYSTEM DESCRIPTION

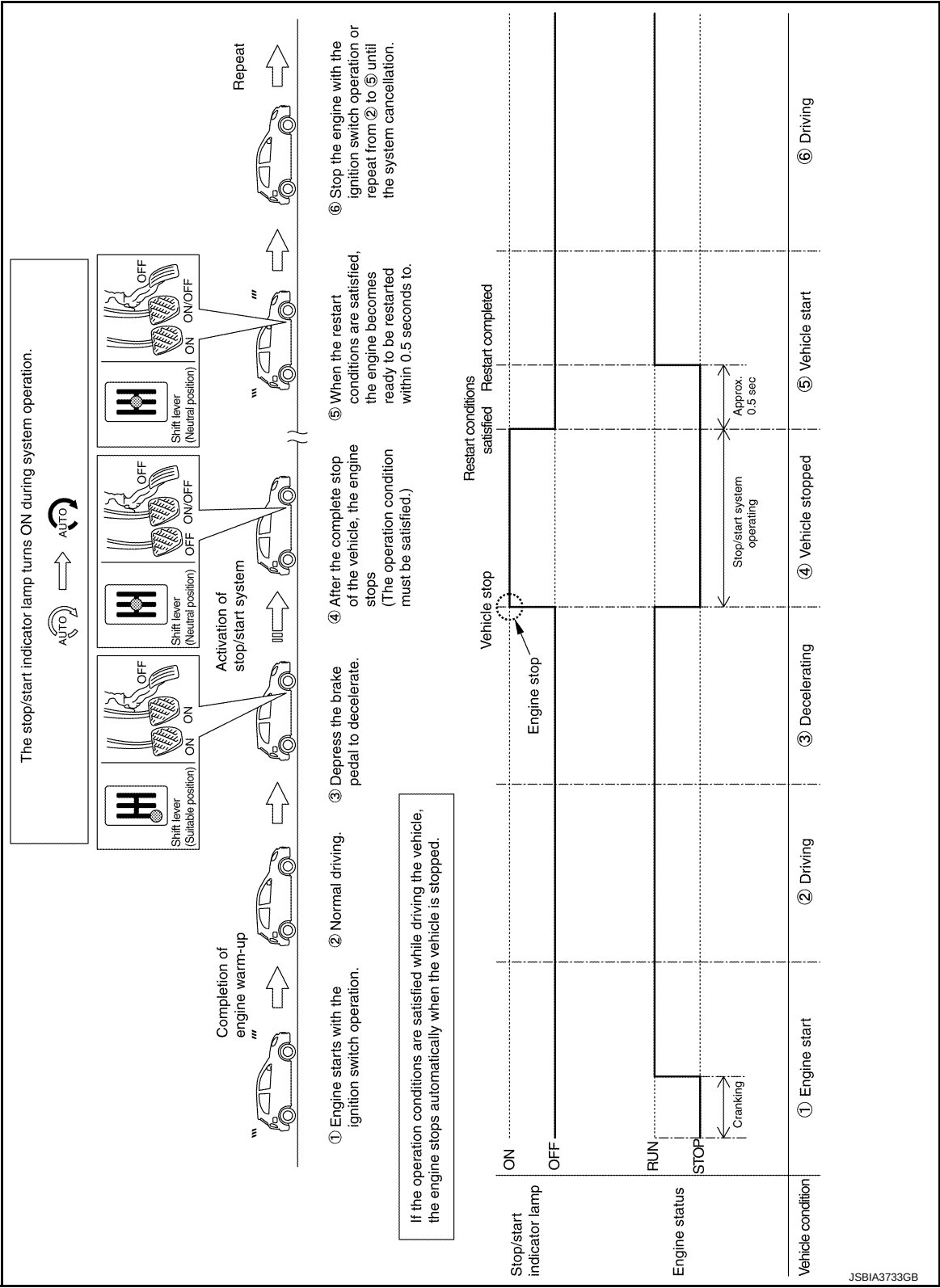
The stop/start system enables the engine to automatically stop/restart with a simple operation and reduces unnecessary idling during stoplight or traffic congestion to improve fuel economy, reduce exhaust gas, and minimize noise.

ECM detects a vehicle condition, engine condition and driver's operation condition based on signals sent from each unit and the sensors to comprehensively control the stop/start system.

The operation condition of the stop/start system is indicated by the stop/start indicator lamp on the combination meter and showing on the information display (dot matrix information display). (Refer to [EC-824, "Stop/Start Indicator Lamp"](#).) If a malfunction is detected in the stop/start system, the system control is automatically deactivated and the malfunction is alerted to the driver by blinking the stop/start indicator lamp and showing the status on the information display (dot matrix information display). When a driver's operation is judged as dangerous one during the stop/start system operation, the stop/start indicator lamp blinks at a high speed and the status is shown on the information display (with dot matrix information display). The buzzer mounted on the combination meter sounds simultaneously to warn the driver of the dangerous operation.

NOTE:

Starting the engine from stop/start system operation is regarded as "Restart".



FUNCTION DESCRIPTION

When the stop/start system readiness conditions are satisfied while the vehicle is moving, the system is ready. When the stop/start system operation conditions are satisfied while the vehicle is in a stop condition, the engine is stopped.

During stop/start system operation, stopping time, the amount of fuel saved by the stop/start system and CO₂ saved information are indicated on the combination meter. (With dot matrix information display. Refer to [MWI-71, "INFORMATION DISPLAY : System Description".](#))

SYSTEM

< SYSTEM DESCRIPTION >

[R9M]

When the engine restart conditions are satisfied, ECM activates the engine restart relay, the engine restart bypass control relay, and the engine restart bypass relay to restart the engine. And the DC/DC converter boosts the voltage during cranking to protect the electrical equipment from low voltage.

After restarting the engine, the stop/start indicator lamp and the indication on the information display turn OFF.

NOTE:

- When engine restart conditions are satisfied during the electric parking brake operation, ECM performs the engine restart after the completion of the electric parking brake operation. This may cause delay in engine restart, compared with a usual engine restart.
- When the electric parking brake operation and engine restart occur simultaneously, the electric parking brake activates after the completion of engine restart.

Stop/Start Readiness Condition

ECM judges stop/start system is ready when the following conditions are satisfied.

Item			Condition
Vehicle	Stop/start OFF switch		OFF (Switch indicator: OFF)
	Stop/start indicator Lamp		Not blink (No malfunction)
	Door (driver side)		Close
	Seat belt (driver side)		Fastened
	Driving history		Drive the vehicle at 20 km/h (12 MPH) or more after start the engine with ignition switch
			Passes 2 minutes or more after start the engine with ignition switch ^{*1}
			Gear position other than neutral is selected after restart
			Drive the vehicle at 4 km/h (2.5 MPH) or more after restart
			Passes 5 seconds or more after restart
	Hood		Close
	Air conditioning	Automatic air conditioning	Not in DEF mode
		Automatic air conditioning	Receives Stop/start permit signal (for details, refer to HAC-21, "AUTOMATIC AIR CONDITIONING SYSTEM : System Description".)
		Manual air conditioning	Not in DEF mode
	ABS		System is normal
			ABS not activated ^{*2}
			ESP not activated
	EPS		System is normal
	Battery status		Receives Stop/start permit signal from IPDM E/R. (for details, refer to CHG-8, "ENERGY MANAGEMENT SYSTEM : System Description".)
	Elevation		2,000 m (6,562 ft) or less
	Intelligent parking assist		OFF
Engine	MIL (Malfunction indicator lamp)		Not illuminate (No malfunction)
	DPF		Not regeneration
	Engine coolant temperature		20 - 105 °C (69 -221 °F)
	Fuel temperature		90 °C (194 °F) or less
	Turbocharger temperature		670 °C (1238 °F) or less
	Starter motor		The number of starter motor operations exceeds the specified times
	High pressure fuel pump		The number of high pressure fuel pump operations exceeds the specified times

*1: Depends on the vehicle conditions.

SYSTEM

< SYSTEM DESCRIPTION >

[R9M]

*2: If ABS system is activated, drive the vehicle at 12 km/h (7.5 MPH) or more after stop the vehicle.

CAUTION:

- The stop/start system may be cancelled when the battery is weak or if a battery other than the stop/start system specific battery is used.
- Even though the vehicle is in above conditions, the stop/start system may be cancelled automatically.

Refer to [EC-810, "Precaution for Stop/Start System Service"](#).

Stop/Start Operation Condition

When the following conditions are satisfied, ECM stops the engine. And the combination meter turns ON a stop/start indicator lamp.

Item		Condition
Vehicle	Stop/start readiness condition	Ready
	Vehicle speed	Vehicle stopped [0 km/h (0 MPH)]
	Steering wheel	Not steer (steering force does not occur)
	Brake booster pressure	Presence of sufficient negative pressure to a brake-force. (Refer to BRC-60, "BRAKE FORCE DISTRIBUTION FUNCTION : System Description" .)
	Clutch pedal position	Released
Engine	Engine speed	Around idle speed (Approx. 850 rpm or less)
Transmission	Shift lever position	Neutral position

NOTE:

During the operation of the stop/start system, the stop/start system continues operating even if the vehicle is stopped by using the parking brake.

Restart Condition

When any of the following conditions is satisfied during stop/start system operating condition (gear position is neutral), ECM restarts the engine. And the combination meter turns OFF the stop/start indicator lamp.

Item		Condition
Stop/start OFF switch		ON (Switch indicator: ON)
Clutch pedal position		Fully depressed*
Air conditioning	Automatic air conditioning	DEF switch is pressed. Air conditioning system cannot keep the performance.
	Manual air conditioning	Mode dial is in DEF position.
Brake booster pressure		Insufficient negative pressure for braking force
Vehicle speed		2 km/h (1.3 MPH) or more
Intelligent parking assist		Intelligent parking assist is activated.
Battery		Poor battery performance (for details, refer to CHG-8, "ENERGY MANAGEMENT SYSTEM : System Description" .)

*: Restart timing varies according to vehicle condition. For details, refer to RELATIONSHIP BETWEEN VEHICLE CONDITION AND RESTART TIMING.

NOTE:

In models with M/T, the stop/start system operates continuously even if the steering wheel is operated during the system operating condition.

Restart Inhibit Mode

When the any of the following condition is satisfied during stop/start system operating condition, ECM inhibits restart of the engine (go into a state in ENGINE STALL). In this case, the engine needs to be started with ignition switch.

Item	Condition
Engine hood	Opened
Driver presence*	Absent: Both of the following conditions are satisfied. • Seat belt (driver side): Released • Door (driver side): Open

*: When the condition is satisfied either door open or seat belt released, ECM transitions to the recovery waiting mode (not ENGINE STALL) for approximately 5 minutes. In this case, the engine is able to start by clutch operation.

RELATIONSHIP BETWEEN VEHICLE CONDITION AND RESTART TIMING

ECM detects clutch pedal position based on the clutch pedal position switch signal and clutch interlock switch signal. The engine restart timing varies with gear position, vehicle speed, and clutch position.

Engine restart condition

x: Restart —: Not restart

Vehicle condition		Clutch pedal position					
Vehicle speed	Gear position	Fully depressed		Half depressed		Released	
		Clutch pedal position SW	Clutch interlock SW	Clutch pedal position SW	Clutch interlock SW	Clutch pedal position SW	Clutch interlock SW
		OFF	ON	OFF	OFF	ON	OFF
Vehicle stopped	Neutral	x		x		—	
	Except neutral	x		—		—	
Vehicle speed occurs	Neutral	x		x		x	
	Except neutral	x		—		—	

NOTE:

If the above mentioned “Not restart” condition occurs during restart, ECM stops cranking and returns to the stop/start system operating condition (engine stop).

ENGINE STALL ASSIST FUNCTION

The engine stall assist function allows the engine to start only with a clutch operation without operating the ignition switch when a clutch operation is unsuccessful during vehicle start.

When an engine stall caused by a clutch operation error is detected, the stop/start system enters the recovery waiting mode and ECM indicates the activation of engine stall assist function by illuminating the stop/start indicator lamp. When the clutch pedal is depressed under this condition, the engine starts.

NOTE:

This function also operates at an engine start other than the one performed during stop/start system operation. This function operates when the following conditions are satisfied:

- After engine warm-up.
- Vehicle stopped. (No vehicle speed input.)
- The battery is charged enough.
- No malfunctions in the engine control system and the stop/start system. (No DTC detected.)

EARLY START-UP CONTROL

ECM detects engine reverse revolution based on the crankshaft position sensor (POS) when the stop/start system is activated and judges a piston position on engine stop to reduce the time for restarting the engine.

VOLTAGE STABILIZER FUNCTION

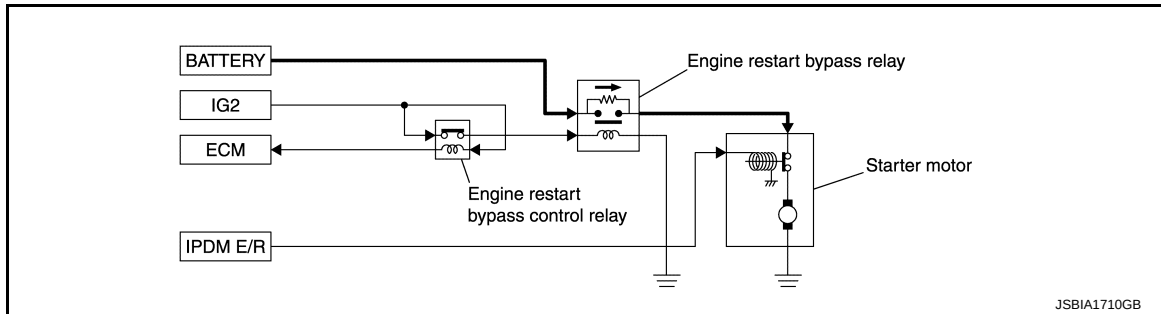
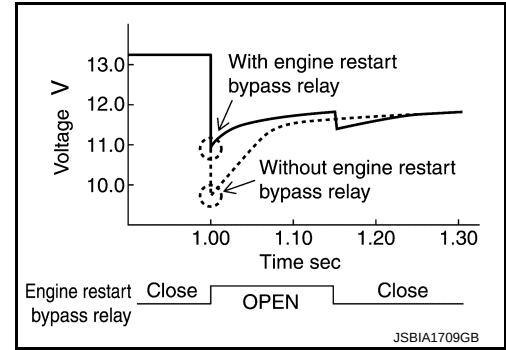
ECM transmits a voltage stabilizer signal to the DC/DC converter during cranking at an engine restart. The DC/DC converter temporarily increases the voltage to prevent the electric equipment from reset due to low voltage. The adoption of the DC/DC converter enables a stable power supply to the electric equipment connected to the DC/DC converter and permits a substantial lowering of the voltage. For the electrical equipment connected to the DC/DC converter, see “SYSTEM DIAGRAM”.

NOTE:

The brightness of the head lamps may be changed due to the voltage reduction at an engine restart because they are not connected to the DC/DC converter.

ENGINE RESTART BYPASS RELAY CONTROL

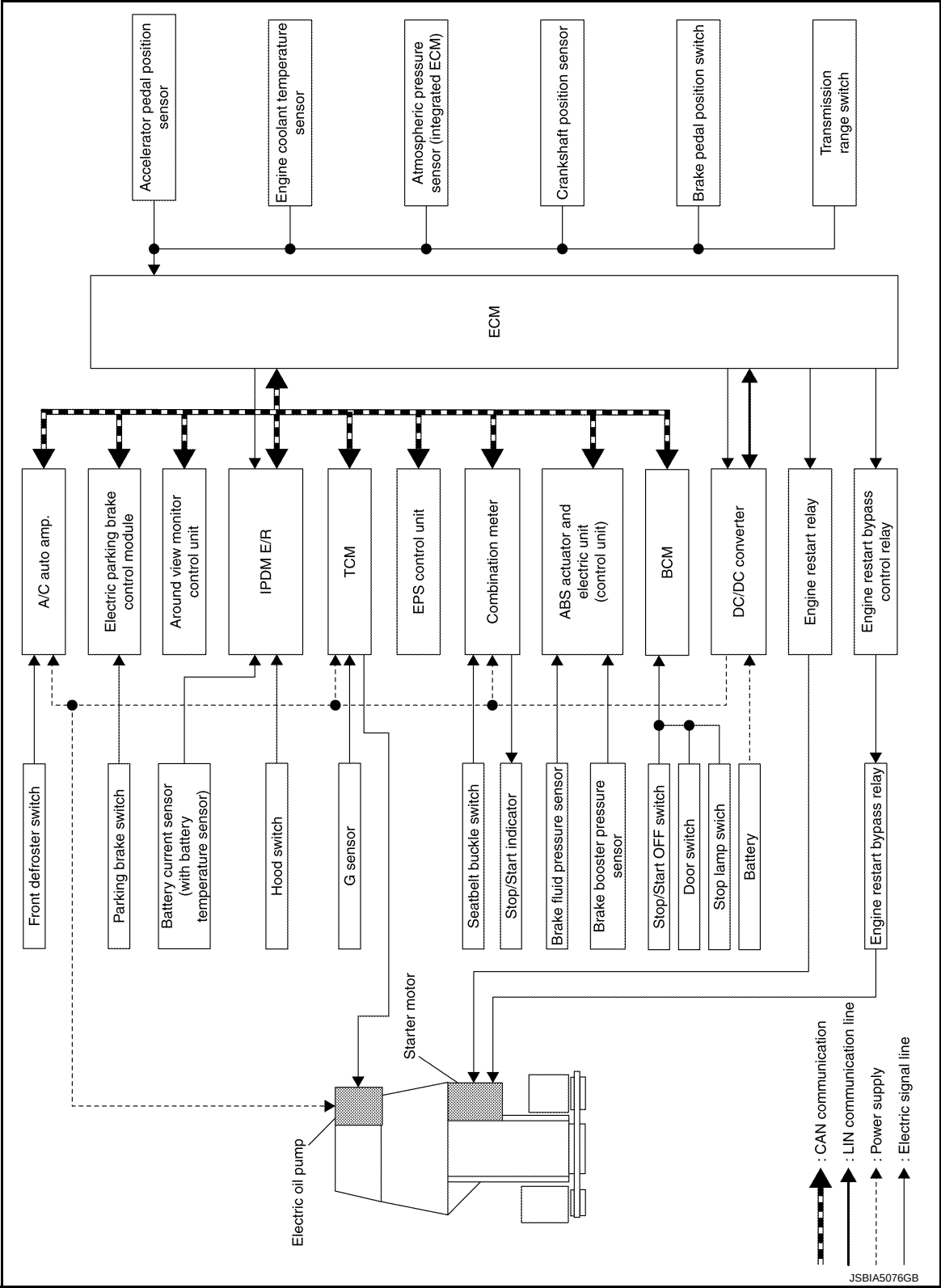
ECM controls the engine restart bypass control relay and activates the engine restart bypass relay. When the restart conditions are satisfied, ECM turns ON the engine restart bypass control relay instantaneously right after the restart and opens the engine restart bypass relay. This allows a current to pass the inner resistance circuit right after the starter motor is activated. When the starter motor is rotating, the voltage is directly supplied to the starter motor without being passed through the inner resistance circuit in the engine restart bypass relay because the engine restart bypass relay is closed. In this way, ECM enables the battery voltage stabilization and reduces the battery deterioration rate by decreasing the battery voltage drop resulted from cranking at an engine restart.



STOP/START SYSTEM : System Description (CVT models)

INFOID:000000010935577

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL CHART

SYSTEM

< SYSTEM DESCRIPTION >

[R9M]

Input/ Output	Transmits/Receives component	Signal name		Description	
Input	Accelerator pedal position sensor (integrated ECM)	Accelerator pedal position sensor signal		Detects an accelerator pedal position.	A
	Brake pedal position switch	Brake pedal position switch signal		Detects the brake pedal is depressed.	EC
	Crankshaft position sensor	Crankshaft position sensor signal		Detects an engine speed.	C
	Engine coolant temperature sensor	Engine coolant temperature sensor signal		Detects an engine coolant temperature.	
	Atmospheric pressure sensor (integrated in ECM)	Atmospheric pressure sensor signal		Detects an atmospheric pressure.	D
	IPDM E/R	CAN communication	Stop/Start permit signal	Detects the transmission is ready to operate the stop/start system.	E
			Battery current signal	Detects battery current.	
			Hood switch signal	Detects engine hood status.	F
			Battery current sensor malfunction signal	Detects the battery current sensor is normal.	
	BCM	CAN communication	Ignition switch status signal	Detects ignition switch status.	G
			Stop lamp switch signal	Detects an accelerator pedal position.	
			Door switch signal	Detects the status of driver side door.	H
			Stop/Start OFF switch signal	Detects stop/start OFF switch status.	
	ABS actuator and electric unit (control unit)	CAN communication	Vehicle speed signal	Detects vehicle speed.	I
			Brake fluid pressure sensor signal	Detects brake fluid pressure.	
			Brake booster pressure sensor signal	Detects a pressure in brake booster.	J
			ABS operation signal	Detects ABS operation.	
			ESP operation signal	Detects ESP operation.	K
			Brake hold readiness signal	Detects the brake hold readiness status judged by the ABS actuator and electric unit (control unit).	
	EPS control unit	CAN communication	EPS torque signal	Detects an operational state of EPS system.	L
			Stop/Start inhibit signal	Receives the intelligent parking assist status signal sent from the around view monitor control unit through the EPS control unit.	M
	A/C auto amp.	CAN communication	Stop/Start permit signal	Detects the air conditioning system is ready to operate the stop/start system.	N
	Combination meter	CAN communication	Seat belt buckle switch signal	Detects driver is sitting on the driver seat.	O
	TCM	CAN communication	Stop/Start permit signal	Detects the transmission is ready to operate the stop/start system.	P
			Shift position signal	Detects the transmission is ready to operate the stop/start system.	
			G sensor signal	Detects vehicle angularity.	
	DC/DC converter	LIN communication	Operation status signal	Detects an operational state of DC/DC converter.	
			Diagnosis signal	Detects DC/DC converter malfunction.	

SYSTEM

< SYSTEM DESCRIPTION >

[R9M]

Input/ Output	Transmits/Receives component	Signal name		Description
Output	Around view monitor control unit	CAN communi- cation	Stop/Start status signal	Transmits a stop/start status signal
	BCM	CAN communi- cation	Stop/Start status signal	Transmits a stop/start status signal
	ABS actuator and electric unit (control unit)	CAN communi- cation	Stop/Start status signal	Transmits a stop/start status signal
			Brake hold request signal	Transmits the brake hold/release re- quest according to the stop/start sys- tem.
	EPS control unit	CAN communi- cation	Stop/Start status signal	Transmits a stop/start status signal
			EPS assist request signal	Transmits EPS assist permit/inhibit signal.
	A/C auto amp.	CAN communi- cation	Stop/Start status signal	Transmits a stop/start status signal
	TCM	CAN communi- cation	Stop/Start status signal	Transmits a stop/start status signal
	Combination meter	CAN communi- cation	Stop/Start status signal	Transmits a stop/start status signal
			Stop/Start indicator lamp request signal	Transmits request signal which turn ON the stop/start indicator lamp.
	DC/DC converter	LIN communi- cation	DC/DC converter operation check signal	Checks DC/DC converter operation status.
		DC/DC voltage request signal		Controls the DC/DC output voltage.

SYSTEM DESCRIPTION

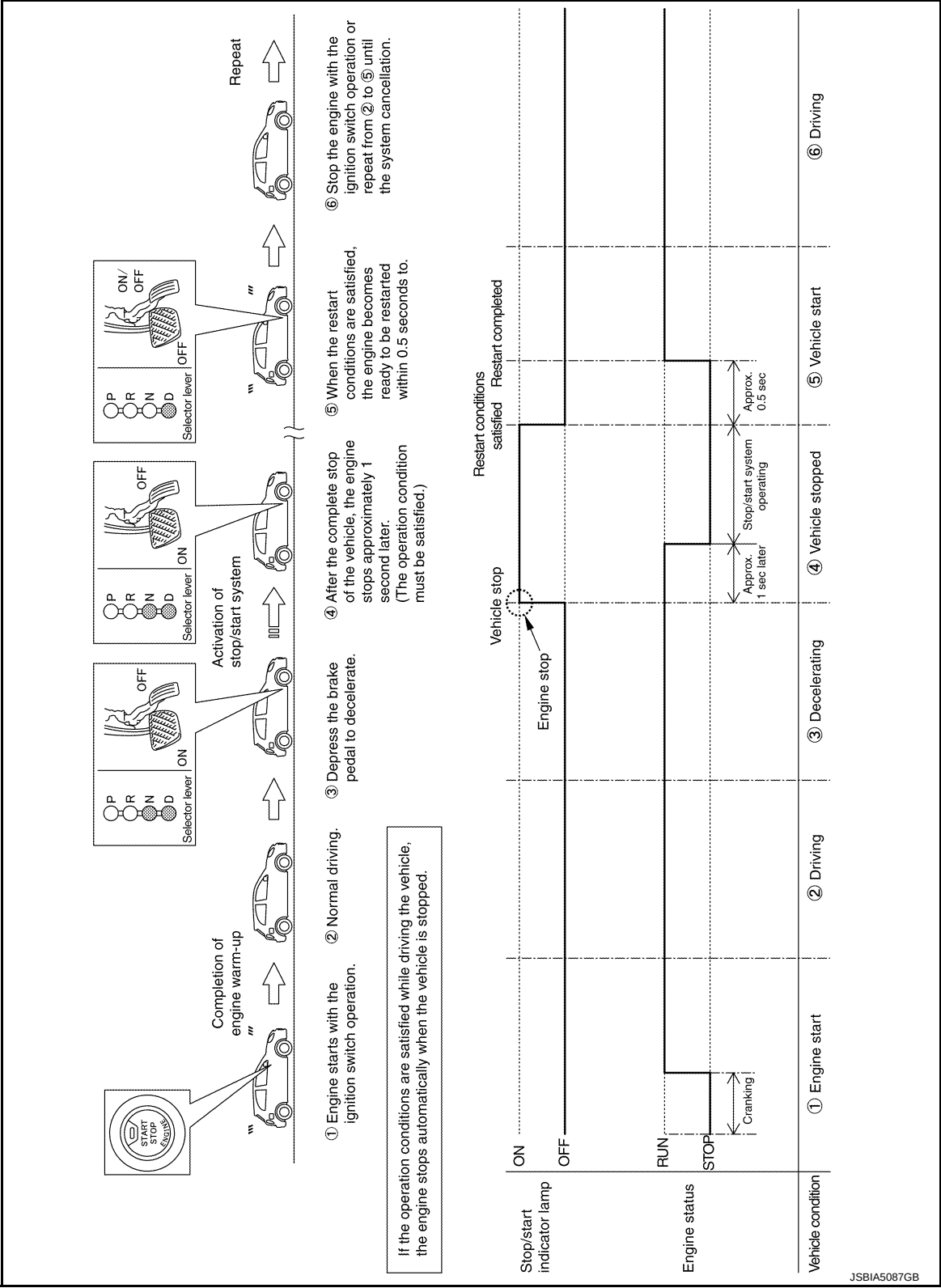
The stop/start system enables the engine to automatically stop/restart with a simple operation and reduces unnecessary idling during stoplight or traffic congestion to improve fuel economy, reduce exhaust gas, and minimize noise.

ECM detects a vehicle condition, engine condition, and driver's operation condition based on signals sent from each unit and the sensors to comprehensively control the stop/start system.

The operation condition of the stop/start system is indicated by the stop/start indicator lamp on the combination meter and showing on the information display (dot matrix information display). (Refer to [EC-824, "Stop/Start Indicator Lamp"](#).) If a malfunction is detected in the stop/start system, the system control is automatically deactivated and the malfunction is alerted to the driver by blinking the stop/start indicator lamp and showing the status on the information display (dot matrix information display). When a driver's operation is judged as dangerous one during the stop/start system operation, the stop/start indicator lamp blinks at a high speed and the status is shown on the information display (with dot matrix information display). The buzzer mounted on the combination meter sounds simultaneously to warn the driver of the dangerous operation.

NOTE:

Starting the engine from stop/start system operation is regarded as "Restart".



FUNCTION DESCRIPTION

When the stop/start system readiness conditions are satisfied while the vehicle is moving, the system is ready. When the stop/start system operation conditions are satisfied while the vehicle is in a stop condition, the engine is stopped. In addition, the CVT electric oil pump is activated to supply oil pressure to the clutch and the pulley.

SYSTEM

< SYSTEM DESCRIPTION >

[R9M]

When the engine restart conditions are satisfied, ECM activates the engine restart relay, the engine restart bypass control relay, and the engine restart bypass relay to restart the engine. And the DC/DC converter boosts the voltage during cranking to protect the electrical equipment from low voltage.

After restarting the engine, the stop/start indicator lamp and the indication on the information display turn OFF.

NOTE:

- When engine restart conditions are satisfied during the electric parking brake operation, ECM performs the engine restart after the completion of the electric parking brake operation. This may cause delay in engine restart, compared with a usual engine restart.
- When the electric parking brake operation and engine restart occur simultaneously, the electric parking brake activates after the completion of engine restart.

Stop/Start Readiness Condition

ECM judges stop/start system is ready when the following conditions are satisfied.

Item			Condition
Vehicle	Stop/start OFF switch		OFF (Switch indicator OFF)
	Stop/start indicator Lamp		Not blink (No malfunction)
	Door (driver side)		Close
	Seat belt (driver side)		Fastened
	Driving history		Drive the vehicle at 20 km/h (12 MPH) or more after start the engine with ignition switch
			Passes 2 minutes or more after start the engine with ignition switch ^{*1}
			Drive the vehicle at 10 km/h (7 MPH) or more after restart ^{*2}
			Passes 5 seconds or more after restart (in D or R position)
			Passes 15 seconds or more after restart (in N or P position)
	Hood		Close
	Air conditioning	Automatic air conditioning	Not in DEF mode
		Manual air conditioning	Not in DEF mode
	ABS		System is normal
			ABS not activated ^{*3}
			ESP not activated
	EPS		System is normal
	Battery status		Receives Stop/start permit signal from IPDM E/R. (for details, refer to CHG-8, "ENERGY MANAGEMENT SYSTEM : System Description" .)
	Elevation		1,500 m (4,921 ft) or less
	Intelligent parking assist		OFF
Engine	MIL (Malfunction indicator lamp)		Not illuminate (No malfunction)
	DPF		Not regeneration
	Engine coolant temperature		20 - 105 °C (69 - 221 °F)
	Fuel temperature		90 °C (194 °F) or less
	Turbocharger temperature		670 °C (1238 °F) or less
	Starter motor		The number of starter motor operations exceeds the specified times
	High pressure fuel pump		The number of high pressure fuel pump operations exceeds the specified times

*1: Depends on the vehicle conditions.

SYSTEM

< SYSTEM DESCRIPTION >

[R9M]

*2: When the selector lever is shifted from R position to D position.

*3: If ABS system is activated, drive the vehicle at 12 km/h (7.5 MPH) or more after stop the vehicle.

CAUTION:

- The stop/start system may be cancelled when the battery is weak or if a battery other than the stop/start system specific battery is used.
- Even though the vehicle is in above conditions, the stop/start system may be cancelled automatically.

Refer to [EC-810, "Precaution for Stop/Start System Service"](#).

Stop/Start Operation Condition

When the following conditions are satisfied, ECM stops the engine. And the combination meter turns ON a stop/start indicator lamp.

	Item	Condition
Vehicle	Vehicle speed	Vehicle stopped [0 km/h (0 MPH)]
	Steering wheel	Not steer (steering force does not occur)
	Brake pedal*	Depressed
	Brake fluid pressure*	0.8 MPa (8 bar, 8.16 kg/cm ² , 116 psi)
	Brake booster pressure	Presence of sufficient negative pressure to a brake-force.
	Vehicle angularity	Approx. 14% or less
Engine	Engine speed	Around idle speed (Approx. 850 rpm or less)
Transmission	Selector lever position	P, D or N

*: The condition are not used in P range.

Restart Condition

When any of the following conditions is satisfied during stop/start system operating condition, ECM restarts the engine. And the combination meter turns OFF the stop/start indicator lamp.

	Item	Condition
Stop/start OFF switch		ON (Switch indicator ON)
Vehicle	Steering wheel	Steered (steering force occurs)
	Door (driver side)	Open
	Seat belt	Released
	Driving history	Passes Approx. 3 minutes after stop/start system activation
Air conditioning	Automatic air conditioning	DEF switch is pressed.
		Air conditioning system cannot keep the performance. (Refer to HAC-21, "AUTOMATIC AIR CONDITIONING SYSTEM : System Description" .)
	Manual air conditioning	Mode dial is in DEF position.
Brake	Brake booster pressure	Insufficient negative pressure for braking force
	Brake fluid pressure	0.4 MPa (4 bar, 4.08 kg/cm ² , 58 psi)
Accelerator pedal	Conditions differ according to shift position. For details, see RELATIONSHIP BETWEEN VEHICLE CONDITION AND RESTART TIMING.	
Selector lever		
Vehicle speed	2 km/h (1.3 MPH) or more	
Intelligent parking assist	Intelligent parking assist is activated.	
Battery	Poor battery performance (for details, refer to CHG-8, "ENERGY MANAGEMENT SYSTEM : System Description" .)	

RELATIONSHIP BETWEEN VEHICLE CONDITION AND RESTART TIMING

SYSTEM

[R9M]

< SYSTEM DESCRIPTION >

P Position

- STOP/START system operation performs when the selector lever is shifted from P position.

Selector lever position	P	→	R	→	N	→	D
Engine status	Stop	→	Restart	→	Stop	→	Restart

- STOP/START system operation by the brake pedal and accelerator pedal operation in the select lever P position.

Vehicle speed	0 km/h (0 MPH)								
Brake pedal	ON				→	OFF			
Accelerator pedal	OFF	→	ON	→	OFF	→	ON*	→	OFF
Engine status	Stop	Restart		Stop		Restart		Stop	

*: When the brake pedal and accelerator pedal are depressed simultaneously, the engine keeps on running.

N Position

- STOP/START system operation performs when the selector lever is shifted from N position.

Selector lever position	P	←	R	←	N	→	D
Engine status	Stop	←	Restart	←	Stop	→	Restart

- STOP/START system operation by the brake pedal and accelerator pedal operation in the select lever N position.

Vehicle speed	0 km/h (0 MPH)									
Brake pedal	ON				→	OFF			→	ON
Accelerator pedal	OFF	→	ON	→	OFF	→	ON*	→	OFF	
Engine status	Stop	Restart		Stop	Restart	Run			Stop	

*: When the brake pedal and accelerator pedal are depressed simultaneously, the engine keeps on running.

D Position

- STOP/START system operation performs when the selector lever is shifted from D position.

Selector lever position	P	←	R	←	N	←	D
Engine status	Stop	←	Restart	←	Stop	←	Stop

- STOP/START system operation by the brake pedal and accelerator pedal operation in the select lever D position.

When driving the vehicle at Approx. 10 km/h or less after restart

Vehicle speed	0 km/h				10 km/h (7 MPH) or less				0 km/h	
Brake pedal	ON				→	OFF			→	ON
Accelerator pedal	OFF	→	ON	→	OFF	→	ON	→	OFF	
Engine status	Stop	Restart		Run						

When driving the vehicle at Approx. 10 km/h or more after restart

Vehicle speed	0 km/h				10 km/h (7 MPH) or more				0 km/h	
Brake pedal	ON				→	OFF			→	ON
Accelerator pedal	OFF	→	ON	→	OFF	→	ON	→	OFF	
Engine status	Stop	Restart		Run						Stop

EARLY START-UP CONTROL

ECM detects engine reverse revolution based on the crankshaft position sensor (POS) when the stop/start system is activated and judges a piston position on engine stop to reduce the time for restarting the engine.

VOLTAGE STABILIZER FUNCTION

ECM transmits a voltage stabilizer signal to the DC/DC converter during cranking at an engine restart. The DC/DC converter temporarily increases the voltage to prevent the electric equipment from reset due to low

SYSTEM

< SYSTEM DESCRIPTION >

[R9M]

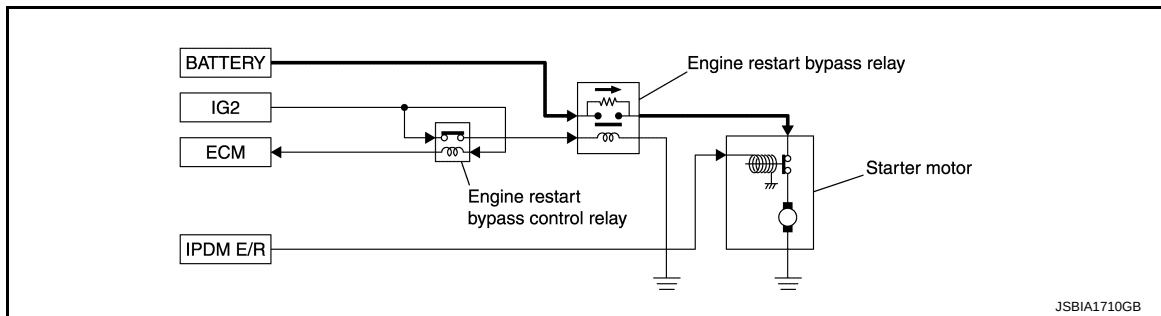
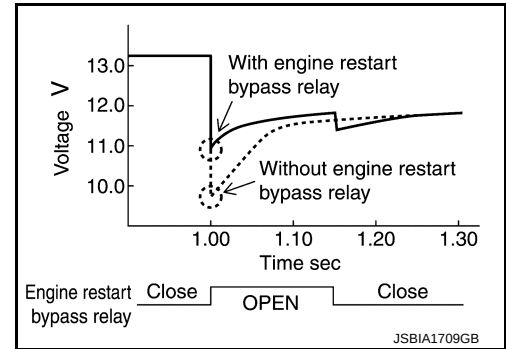
voltage. The adoption of the DC/DC converter enables a stable power supply to the electric equipment connected to the DC/DC converter and permits a substantial lowering of the voltage. For the electrical equipment connected to the DC/DC converter, see "SYSTEM DIAGRAM".

NOTE:

The brightness of the head lamps may be changed due to the voltage reduction at an engine restart because they are not connected to the DC/DC converter.

ENGINE RESTART BYPASS RELAY CONTROL

ECM controls the engine restart bypass control relay and activates the engine restart bypass relay. When the restart conditions are satisfied, ECM turns ON the engine restart bypass control relay instantaneously right after the restart and opens the engine restart bypass relay. This allows a current to pass the inner resistance circuit right after the starter motor is activated. When the starter motor is rotating, the voltage is directly supplied to the starter motor without being passed through the inner resistance circuit in the engine restart bypass relay because the engine restart bypass relay is closed. In this way, ECM enables the battery voltage stabilization and reduces the battery deterioration rate by decreasing the battery voltage drop resulted from clanking at an engine restart.



ENERGY MANAGEMENT SYSTEM

ENERGY MANAGEMENT SYSTEM : System Description

INFOID:0000000010935578

DESCRIPTION

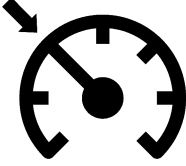
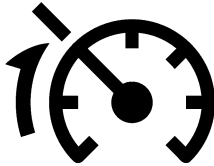
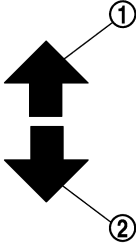
ECM transmits a target power generation voltage signal received from IPDM E/R to the generator via LIN communication.

The generator includes a self-diagnosis function and transmits a diagnosis signal to ECM via LIN communication when detecting a malfunction. When ECM receives a diagnosis signal, ECM detects DTC and transmits a charge warning lamp request signal to the combination meter to turn ON the charge warning lamp.

For details of ENERGY MANAGEMENT SYSTEM, refer to [CHG-8. "ENERGY MANAGEMENT SYSTEM : System Description"](#).

INFORMATION DISPLAY (COMBINATION METER)

INFORMATION DISPLAY (COMBINATION METER) : Indicator/Information INFOID:000000011010025

Item	Symbol	Function
ASCD indicator	 JSCIA0831ZZ Message: - - Km/h / - - MPH	For detail of ASCD function, refer to EC-845, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description".
Speed limiter indicator	 JSCIA0832ZZ Message: - - Km/h / - - MPH	For detail of speed limiter function, refer to EC-845, "SPEED LIMITER : System Description".
Gear shift indicator	 JSCIA0915ZZ	For detail of Gear shift indicator system, refer to EC-847, "GEAR SHIFT INDICATOR SYSTEM : System Description".
Stop/Start status indicator	Start / Stop  JSBIA4032GB Message: • ON • OFF	Indicates the status of stop/start system operation. • ON: Stop/start system ON. (Engine stopped) • OFF: Stop/start system is OFF. (Engine restart or running) For detail of Stop/Start status indicator function, refer to EC-848, "STOP/START SYSTEM : System Description (M/T models)" (M/T models), EC-856, "STOP/START SYSTEM : System Description (CVT models)" (CVT models).

SYSTEM

< SYSTEM DESCRIPTION >

[R9M]

Item	Symbol	Function
Stop/Start warning indicator	Start / Stop  JSBIA4032GB Message: System fault	Indicates the message when a malfunction is detected in stop/start system. For detail of Stop/Start warning indicator function, refer to EC-848. "STOP/START SYSTEM : System Description (M/T models)" (M/T models), EC-856. "STOP/START SYSTEM : System Description (CVT models)" (CVT models).
Stop/Start guidance indicator	Start / Stop  JSBIA4030GB Message: Not available	Indicates the message when the driver performs a dangerous operation shown below: - Driver's seat belt is unbuckled and driver's door is opened. (M/T models) - Hood is opened. For detail of Stop/Start guidance indicator function, refer to EC-848. "STOP/START SYSTEM : System Description (M/T models)" (M/T models), EC-848. "STOP/START SYSTEM : System Description (M/T models)" (CVT models).
	Start / Stop  JSBIA4031GB Message: Push engine start button	Indicates the message when the driver performs a dangerous operation as shown above during stop/start system operation and the above "Not available" indication continues for 5 seconds. For detail of Stop/Start guidance indicator function, refer to EC-848. "STOP/START SYSTEM : System Description (M/T models)" (M/T models), EC-856. "STOP/START SYSTEM : System Description (CVT models)" (CVT models).

INFORMATION DISPLAY (COMBINATION METER) : Engine Oil Pressure Warning

INFOID:00000000.11009992

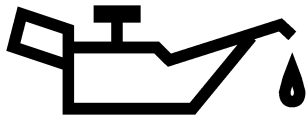
DESIGN/PURPOSE

When engine oil pressure is low, the engine oil pressure warning lamp informs the driver of low oil pressure to prevent damage to the engine.

SYSTEM

< SYSTEM DESCRIPTION >

[R9M]

Symbol	Message
 JPNIA1881ZZ	Low Oil Pressure Stop Vehicle

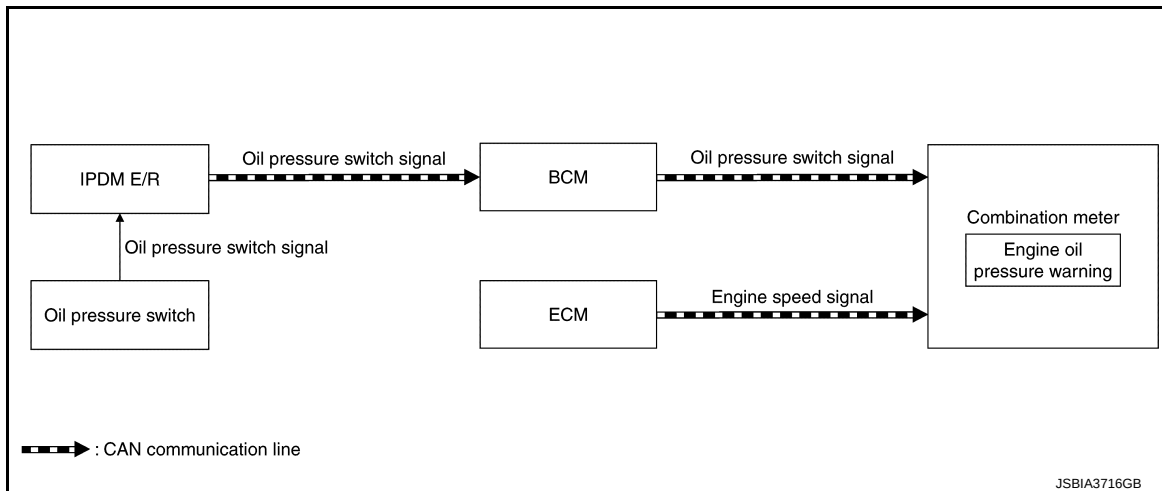
BULB CHECK

Not applicable

OPERATION AT COMBINATION METER CAN COMMUNICATION CUT-OFF OR UNUSUAL SIGNAL

For the operation for CAN communications blackout or abnormal signal reception, refer to [MWI-103. "Fail-Safe"](#).

SYSTEM DIAGRAM



SIGNAL PATH

- IPDM E/R receives a signal from the engine oil pressure switch and transmits an oil pressure switch signal to BCM via CAN communication.
- BCM transmits the received oil pressure switch signal to the combination meter via CAN communication.
- The information display (on combination meter) is SHOWN/HIDDEN the engine oil pressure warning, according to the oil pressure switch signal received from BCM.

LIGHTING CONDITION

When all of the following conditions are satisfied:

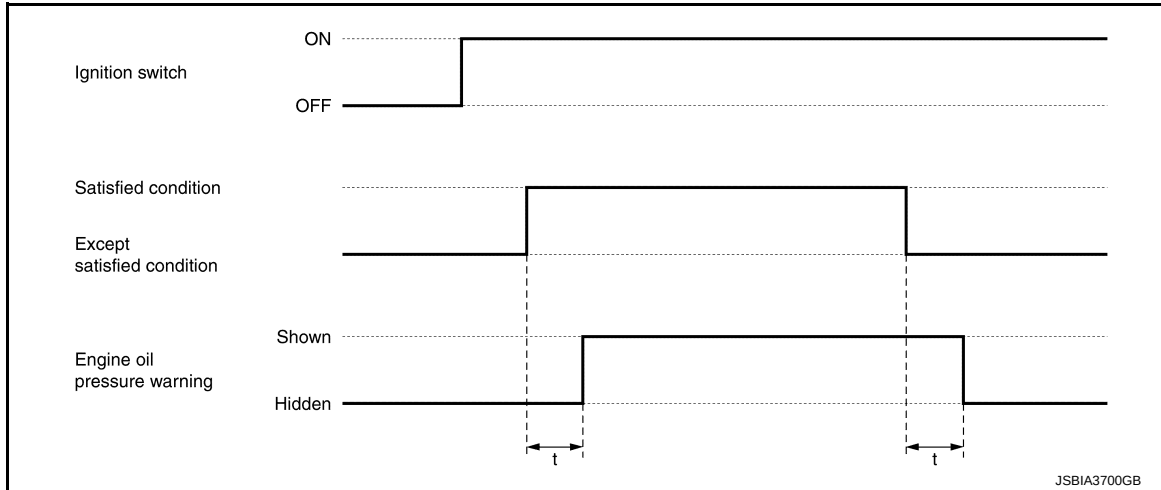
- Ignition switch: ON
- Engine running
- Engine oil pressure is less than the specified value.

SHUTOFF CONDITION

- Ignition switch: OFF
- Engine stop
- Engine oil pressure is the specified value or more.

< SYSTEM DESCRIPTION >

TIMING CHART



t : 100 ms

WARNING/INDICATOR/CHIME LIST

WARNING/INDICATOR/CHIME LIST : Warning lamps/Indicator lamps

INFOID:0000000011009993

NOTE:Regarding the arrangement. Refer to [MWI-10, "METER SYSTEM : Design"](#).

Item	Design	Reference
Malfunction indicator lamp (MIL)		Regarding the function. Refer to MWI-50, "WARNING LAMPS/INDICATOR LAMPS : Malfunction Indicator Lamp (MIL)" .

WARNING/INDICATOR/CHIME LIST : Warning Chime

INFOID:0000000011010026

Item	Reference
Stop/Start warning	Refer to WCS-18, "WARNING CHIME : Stop/Start warning" .

WARNING/INDICATOR/CHIME LIST : Warning/Indicator (On Information Display)

INFOID:0000000011009994

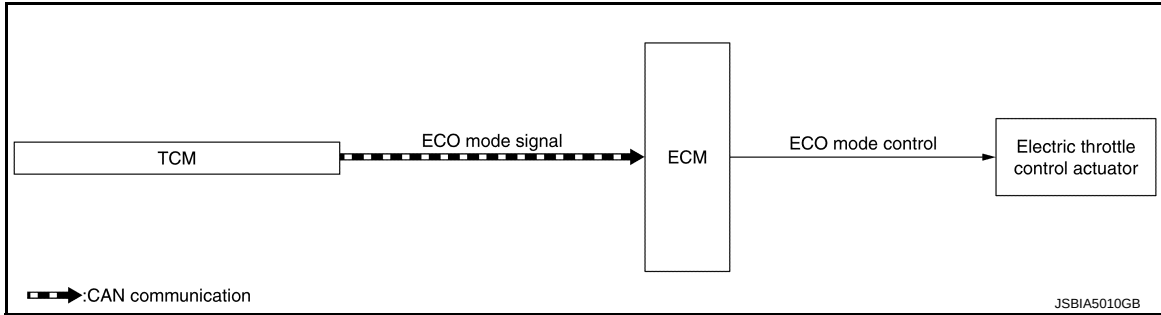
Item	Reference
Engine oil pressure warning	Refer to EC-865, "INFORMATION DISPLAY (COMBINATION METER) : Engine Oil Pressure Warning" .
ASCD indicator	Refer to EC-864, "INFORMATION DISPLAY (COMBINATION METER) : Indicator/Information" .
Speed limiter indicator	Refer to EC-864, "INFORMATION DISPLAY (COMBINATION METER) : Indicator/Information" .
Gear shift indicator	Refer to EC-864, "INFORMATION DISPLAY (COMBINATION METER) : Indicator/Information" .
Stop/Start status indicator	Refer to EC-864, "INFORMATION DISPLAY (COMBINATION METER) : Indicator/Information" .
Stop/Start warning indicator	Refer to EC-864, "INFORMATION DISPLAY (COMBINATION METER) : Indicator/Information" .
Stop/Start guidance indicator	Refer to EC-864, "INFORMATION DISPLAY (COMBINATION METER) : Indicator/Information" .

ECO MODE SYSTEM

ECO MODE SYSTEM : System Description

INFOID:000000011009995

System Diagram



CONTROL

ECM receives an ECO mode signal from TCM via CAN communication and improves the fuel economy by controlling the throttle movement to less than usual.

NOTE:

For the details of the ECO mode, refer to [DMS-7, "ECO MODE CONTROL : System Description"](#).

SYSTEM DISPLAY FUNCTION

ECO Mode Indicator Lamp

When the ECM receives ECO mode signal from TCM, ECM transmits an ECO mode indicator lamp signal to the combination meter via CAN communication, and the combination meter illuminates ECO mode indicator located in itself.

ECO DRIVE NAVIGATOR

ECM transmits an ECO drive navigator signal calculated from the accelerator pedal position and the vehicle speed to the combination meter via CAN communication.

When the acceleration guide is selected in ECO meter display switching function, the suitable accelerator position for fuel economy will be displayed. For display, refer to [DMS-7, "ECO MODE CONTROL : System Description"](#).

CAN COMMUNICATION

CAN COMMUNICATION : System Description

INFOID:000000011093579

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-41, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart"](#), about CAN communication for detail.

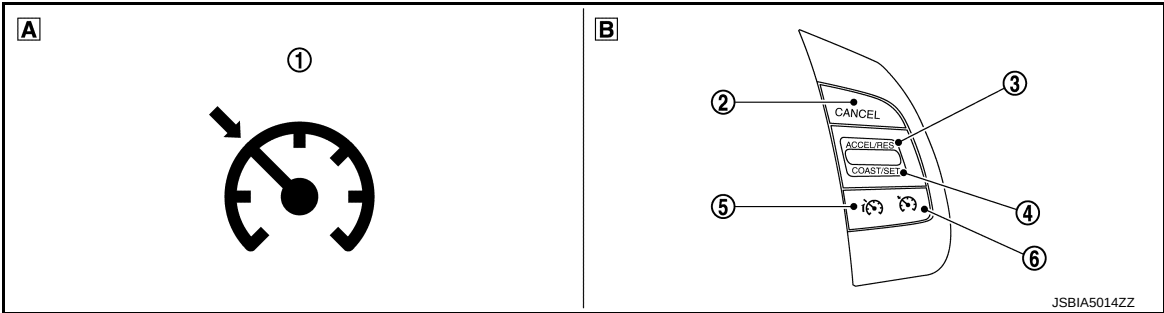
OPERATION

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function

INFOID:0000000010935580

SWITCHES AND INDICATORS



- ① CRUISE indicator
② CANCEL switch
③ ACCL/RES switch
④ COAST/SET switch
⑤ Speed limiter MAIN Switch
⑥ ASCD MAIN switch
A On the combination meter
B On the steering wheel

SET SPEED RANGE

ASCD system can be set the following vehicle speed.

Minimum speed (Approx.)	Maximum speed (Approx.)
40 km/h (25 MPH)	170 km/h (105 MPH)

SWITCH OPERATION

Item	Function
CANCEL switch	Cancels the cruise control driving.
ACCL/RES switch	- Resumes the set speed. - Increases speed incrementally during cruise control driving.
COAST/SET switch	- Sets desired cruise speed. - Decreases speed incrementally during cruise control driving.
ASCD MAIN switch	Master switch to activate the ASCD system.

SPEED LIMITER

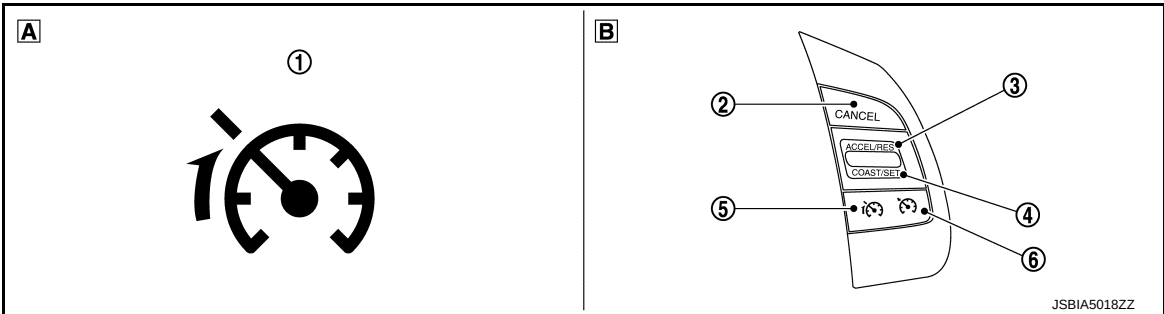
SPEED LIMITER : Switch Name and Function

INFOID:0000000010935581

SWITCHES AND INDICATORS

NOTE:

Shared with ASCD switch.



OPERATION

< SYSTEM DESCRIPTION >

[R9M]

① Speed limiter indicator	② CANCEL switch	③ ACCL/RES switch
④ COAST/SET switch	⑤ Speed limiter MAIN Switch	⑥ ASCD MAIN switch
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)	180 km/h (115 MPH)

SWITCH OPERATION

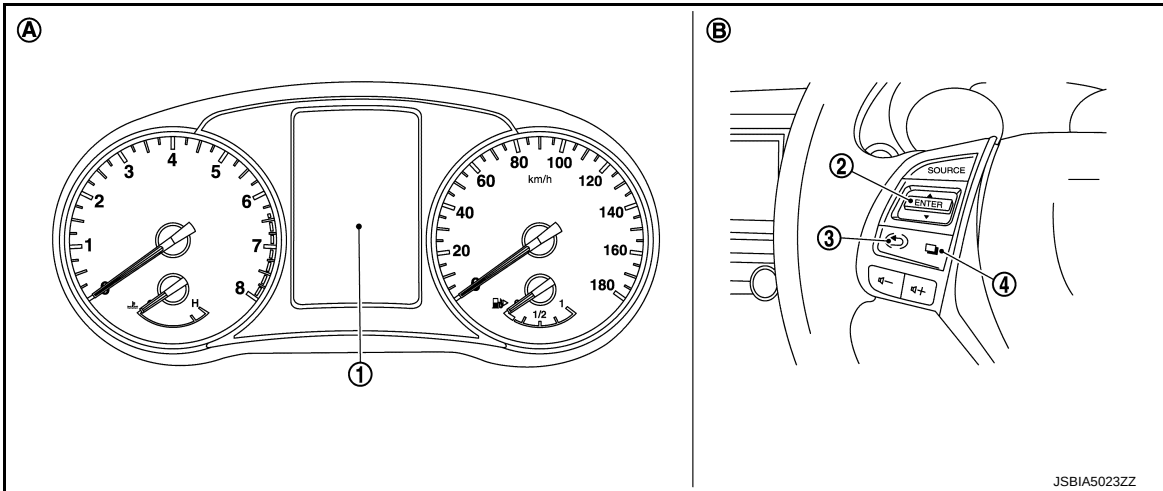
Item	Function
CANCEL switch	Cancels the speed limiter control.
ACCL/RES switch	- Resumes the set speed. - Increases the set speed incrementally.
COAST/SET switch	- Sets desired speed. - Decreases the set speed incrementally.
Speed limiter MAIN switch	Master switch to activate the speed limiter system.

OIL CONTROL SYSTEM

OIL CONTROL SYSTEM : Switch Name and Function

INFOID:0000000010935582

SWITCHES AND INDICATORS



A Combination meter	B Steering	
① Information display	② Enter/Up/Down switch	③ Back switch
④ Display switch		

SWITCH OPERATION

Item	Function
Steering switch	Refer to MWI-82, "Switch Name and Function" .

RESET OPERATION

CAUTION:

When an alert was displayed, change the engine oil, and reset the engine oil data.

- Turn ignition switch ON.
- On information display, select "Settings" >> "Maintenance" >> "Service".

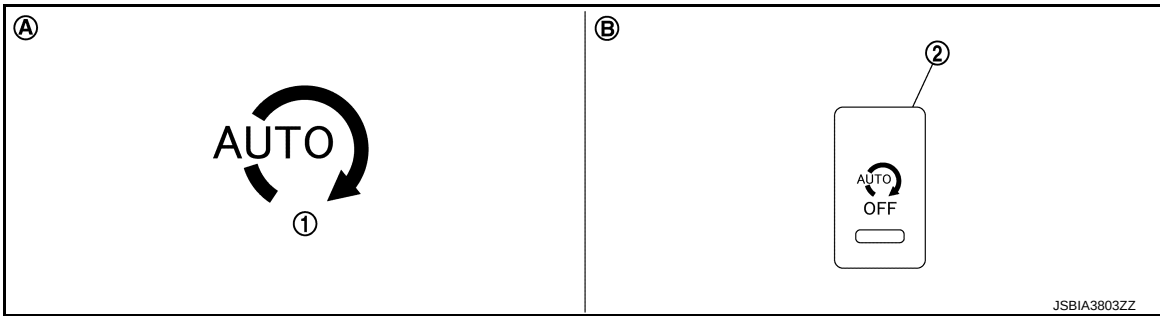
3. Press "ENTER" switch until "YES/NO" is appeared.
4. Select "YES".
5. Check that "—" is displayed.

STOP/START SYSTEM

STOP/START SYSTEM : Switch Name and Function

INFOID:000000010935583

SWITCHES AND INDICATORS



- ① Stop/start indicator lamp
- ② Stop/start OFF switch
- A On the combination meter
- B Lower instrument panel (driver side)

SWITCH OPERATION

Item	Function
Stop/start OFF switch	When the switch is pressed, switch indicator (LED) turns ON and the stop/start system can be deactivated.

NOTE:

If stop/start OFF switch turn ON when stop/start system is operating, stop/start system is canceled and engine restart.

HANDLING PRECAUTION

Precaution for Stop/Start System

INFOID:000000010935584

PRECAUTIONS FOR STOP/START SYSTEM OPERATION

The operation of the stop/start system needs to satisfy various conditions. For details of the conditions, refer to [EC-848, "STOP/START SYSTEM : System Description \(M/T models\)"](#) (M/T models), [EC-856, "STOP/START SYSTEM : System Description \(CVT models\)"](#) (CVT models).

The stop/start system may not operate under the conditions listed below:

- After restarting the engine, the vehicle is repeatedly stopped and started at a low speed due to traffic congestion.
- When driving the vehicle repeatedly back and forth at a low speed due to parallel parking.
- When the intelligent key is not authenticated. (In this case, the KEY warning lamp built in the combination meter blinks.)
- The battery is deteriorated. (High discharge rate.)
- A battery other than the stop/start system-specific battery is used.
- Ambient temperature is extremely low.

HANDLING PRECAUTIONS

- When engine restart conditions are satisfied during the electric parking brake operation, ECM performs the engine restart after the completion of the electric parking brake operation. This may cause delay in engine restart, compared with a usual engine restart.
For a smooth engine restart under the stop/start system operating condition, restart the engine before releasing the parking brake.
- To use the stop/start system, the vehicle needs to recognize the status of battery. For this reason, the stop/start system may not be activated immediately after battery change.
- (For M/T only) When restarting the vehicle under stop/start system operating condition, continue depressing the clutch pedal until the restart completes.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000010935585

DESCRIPTION

This system uses two malfunction indicator lamps. When detecting a system error, ECM turns ON the malfunction indicator lamp to alert the driver of the presence of malfunction.

MALFUNCTION INDICATOR LAMP (MIL) (YELLOW)

ECM turns ON MIL (yellow) when an emission-related malfunction occurs or when a component part specified by European laws and regulations becomes inoperable three trips in a row.

MALFUNCTION INDICATOR LAMP (MIL) (RED)

ECM may turn ON MIL (red) when a malfunction occurs in the engine.

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< SYSTEM DESCRIPTION >

DIAGNOSIS SYSTEM (ECM)

CONSULT Function

INFOID:000000010935586

FUNCTION

Diagnostic test mode	Function
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.
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT unit.
Active test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
ECU identification	ECM part number and homologation number can be read.
Configuration	This function is used to store vehicle specifications to ECM after ECM replacement.

*: 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-908, "DTC Index"](#).

Freeze Frame Data and 1st Trip Freeze Frame Data

Item*		Unit	Remarks
CONSULT screen terms	Full spell		
WATER TEMP	Water temperature	°C or °F	
ENGINE SPEED	Engine speed	rpm	
VEHICLE SPEED	Vehicle speed	km/h or mph	
ENGINE TORQUE	Engine torque	Nm	
COMPUTER SUPPLY VOLT-AGE	Computer supply voltage	V	
RAIL PRES SET	Rail pressure setting	bar	
RAIL PRESSURE	Rail pressure	bar	
FUEL FLOW S/V CURRENT	Fuel flow solenoid valve current	mA	
FLOW RGLTR CRNT REF VAL	Additional Information FDEA	mA	
RAIL PRESS SEN VOLT	Rail pressure sensor voltage	mV	
FUEL FLOW	Fuel flow	mg/cp	
ADDITIONAL INFO FDE1	Additional information FDE1	—	
ADDITIONAL INFO FDE2	Additional information FDE2	—	
ADDITIONAL INFO FD62	Additional information FD62	deg Crs	
ADDITIONAL INFO FDE3	Additional information FDE3	deg Crs	
ADDITIONAL INFO FD61	Additional information FD61	deg Crs	
BOOST PRESSURE	Boost pressure	mbar	
BOOST PRESS REF VALUE	Boost pressure reference value	hpa	
MEASURE AIR FLOW	Measured air flow	kg/h	
TURBOCHARGING SOLE-NOID VALVE OCR	Turbocharging solenoid valve OCR	%	

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[R9M]

Item*		Unit	Remarks	
CONSULT screen terms	Full spell			
DAMPER VALVE UPSTR TEMP	Estimated inlet flap upstream temperature	°C or °F		A
MANIFOLD PRESSURE	Manifold pressure	mbar		EC
INLET AIR TEMPERATURE	Inlet air temperature	°C or °F		
INT AIR TEMP SEN D/STRM TC	Intake air temperature sensor downstream turbocharger	°C or °F		C
EGR POSITION	EGR position	%		
EST. AIR FLOW	Estimated air flow	mg/cp		D
INLET AIR FLOW	Inlet air flow	mg/cp		
ATMOSPHERIC PRESSURE	Atmospheric pressure	mbar		E
TBN UPSTR PRS SEN VOLT	Turbine upstream pressure sensor voltage	mV		
ROUGH TC PRESS	Rough turbocharging pressure	mbar		F
AIR INLET/F REL POS	Air inlet flap relative position	%		
AIR INLET TEMP SEN VOLT	Air inlet temperature sensor voltage	mV		
FUEL TEMPERATURE	Fuel temperature	°C or °F		G
IN FLAP ABSO POSI	Air inlet flap absolute position	%		
INLET/F SEN SUPPLY VOLT	Inlet flap sensor supply voltage	mV		H
DAMPER VALVE SEN VOLT	Damper valve sensor voltage	mV		
DMPR VLV SET POS	Damper valve setpoint position	%		
IN/FLAP CTRL	Inlet flap control	%		I
SEN 1 FEED V	Sensors No. 1 feed voltage	mV		
ADDITIONAL INFO FDE7	Additional information FDE7	—		J
ADDITIONAL INFO FDE8	Additional information FDE8	mV		
ADDITIONAL INFO FD47	Additional information FD47	mV		
OXYGEN RATE	Oxygen rate	—		K
ADDITIONAL INFORMATION FDE5	Additional information FDE5	—		
ADDITIONAL INFO FD9C	Additional information FD9C	°C or °F		L
ADDITIONAL INFO FDF0	Additional information FDF0	hPa		
ADDITIONAL INFO FD9D	Additional information FD9D	—		M
ADDITIONAL INFO FDE6	Additional information FDE6	hPa		
ALTERNATOR LOAD	Alternator load	%		
AIR REG CUT-OFF CNDIT-NS	—	—		N
ADDITIONAL INFO 2069	Additional information 2069	Nm		
SEN 2 FEED V	Sensors No. 2 feed voltage	mV		O
PL PTNMR T2 V	Pedal potentiometer track 2 voltage	mV		
PL PTNMR T1 V	Pedal potentiometer track 1 voltage	mV		P
FUEL PRESSURE (RAW VALUE)	Fuel pressure (raw value)	bar		
FUEL PUMP ACTUATOR PWM	Fuel pump actuator pulse width modulation	%		
HEATER PLUG CONTROL	Heater plug control	%		
EGR VALVE OPENING REFERENCE	EGR valve opening reference	%		

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[R9M]

Item*		Unit	Remarks
CONSULT screen terms	Full spell		
EGR VALVE CONTROL	EGR valve control	%	
LAST EGR VALVE OFFSET	Last EGR valve offset	%	
EGR VALVE FIRST OFFSET	EGR valve first offset	%	
POTN VAL EGR VALVE CLSD	Potentiometer value EGR valve closed	%	
EGR SEN SUPPLY VOLT	—	mV	
EGR POTENTIOMETER VOLTAGE	EGR potentiometer voltage	mV	
EXHAUST SYSTEM FLOW	Exhaust system flow	g/s	
ADDITIONAL INFORMATION 24F3	Additional information 24F3	°C or °F	
TEMP. UPSTREAM OF PF	Temperature upstream of particle filter	°C or °F	
PRS UPSTR OF TBN	Pressure upstream of turbine	mbar	
RFRG TEMP PRESS SEN VOLT	Refrigerant temperature pressure sensor voltage	V	
REFRIGERANT PRESSURE	Refrigerant pressure	bar	
TBN UPSTR TEMP SETP	Turbine upstream temperature setpoint	°C or °F	
TEMP UPSTREAM TURBINE	Temperature upstream of turbine	°C or °F	
TBN UPSTR TMP SEN VOLT	Turbine upstream temperature sensor voltage	V	
RV/LV BUTTON VOLTAGE	RV/LV button voltage	mV	
ENGINE OIL TEMP SENSOR	Engine oil temperature sensor	—	
ADDITIONAL INFO FDEB	Additional information FDEB	—	
ADDITIONAL INFO FDEC	Additional information FDEC	—	
ADDITIONAL INFO FDED	Additional information FDED	—	
ADDITIONAL INFO FDEE	Additional information FDEE	—	
ADDITIONAL INFO FDEF	Additional information FDEF	—	
LAST OFF/V CLOSE	Last offset damper valve closed	%	
LAST OFF/V OPEN	Last offset damper valve open	%	
SEN SUPPLY N-3 VOL	Sensor supply No. 3 voltage	mV	
INT/M RUN VLV OPEN ANGLE	Intake manifold runner valve opening angle	%	
INT/M RUNNER VLV SETPOINT	Intake manifold runner valve setpoint	%	
INT/MANI RUNNER VALVE REQ	Intake manifold runner valve request	%	
IN/M RUN/V LEARN VAL (LAST)	Intake manifold runner valve learning value (last)	%	
IN/M RUN/V LEARN VAL(CRNT)	Intake manifold runner valve learning value (current)	%	
IN/M RUN/V LEARN VAL (1ST)	Intake manifold runner valve learning value (first)	%	
INT/MANI RUNNER VALVE POS	Intake manifold runner valve position	%	
SWIRL FLAP VOLTAGE	Swirl flap voltage	mV	
ADDITIONAL INFO FD2D	Additional information FD2D	—	

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[R9M]

Item*		Unit	Remarks	
CONSULT screen terms	Full spell			
ADDITIONAL INFO FD2F	Additional information FD2F	°C or °F		A
ADDITIONAL INFO FD96	Additional information FD96	mg/Hub		EC
ADDITIONAL INFO FD2E	Additional information FD2E	—		
SOOT IN P/FLT	Soot in the particle filter	G		
EXH THROTTLE POSITION	Exhaust throttle position	%		C
EXHAUST FLAP POSITION SETPOINT	Exhaust flap position setpoint	%		
EXHAUST AIR FLAP OCR	Exhaust air flap OCR	%		D
EXHAUST AIR FLAP OFF-SET	Exhaust air flap offset	%		E
FIRST OFFSET OF THE EX-HAUST AIR FLAP OPEN	First offset of the exhaust air flap open	%		
EXHAUST FLAP ABSOLUTE POSITION	Exhaust flap absolute position	%		F
SUPPLY VOLTAGE EX-HAUST AIR FLAP SENSOR	Supply voltage exhaust air flap sensor	mV		G
FIRST OFFSET OF THE CLOSED EXHAUST FLAP	First offset of the closed exhaust flap	%		
EGR LOW PRESSURE POSITION	EGR low pressure position	%		H
LAST OFFSET OF CLOSED LOW PRESSURE EGR	Last offset of closed low pressure EGR	%		
EGR LOW PRESSURE OCR	EGR low pressure OCR	%		I
LOW PRESSURE EGR POSITION REFERENCE VALUE	Low pressure EGR position reference value	%		J
LOW PRESSURE EGR VALVE SUPPLY VOLTAGE	Low pressure EGR valve supply voltage	mV		
LOW PRESSURE EGR VALVE FIRST OFFSET	Low pressure EGR valve first offset	%		K
HP EGR VALV POS SET-POINT	High pressure exhaust gas recirculation valve position setpoint	%		L
EGR BYPASS VALV SET-POINT	Exhaust gas recirculation bypass valve setpoint	%		
PART.FILTER UPSTREAM TEMP SENSOR VOLTAGE	Part. filter upstream temperature sensor voltage	mV		M
ADDITIONAL INFO 2813	Additional information 2813	°Crk		
POST INJECTION FLOW	Post injection flow	mg/cp		N
POST INJECTION FLOW 1	Post injection flow 1	mg/cp		
FLOW GAS IN DPF	Flow of gas inside the particle filter	m3/h		O
P/FLT DIFF. PRS	Particle filter pressure DIFF.	hPa		
REGEN MALFNC	Number of regeneration failure	—		
DISTANCE SINCE LAST RE-GENERATION SUCCESS	Distance since last regeneration success	km or mile		P
FIRST OFF/V CLOSE	First offset damper valve closed	%		
FIRST OFF/V OPEN	First offset damper valve open	%		
ATMOS PRESS SEN VOLT	Atmospheric pressure sensor voltage	mV		

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[R9M]

Item*		Unit	Remarks
CONSULT screen terms	Full spell		
ADDITIONAL INFO FD45	Additional information FD45	—	
OIL DILUTION INFORMATION	Oil dilution information	%	

*: The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE

NOTE:

The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.

Monitor item	Unit	Description	Remarks
COMP + AFTER IGNITION	—	—	
A/C ATRSTION	—	—	
THERMOPLUNGER1 RELAY	—	—	
THERMOPLUNGER2 RELAY	—	—	
THERMOPLUNGER3 RELAY	—	—	
MOTOR	—	—	
BRAKE PEDAL	—	—	
GEARBOX RATIO	—	—	
CC/SL LMTR	—	—	
CRUISE CONTROL	—	—	
DPF REGENERATION PERMIT	—	—	
PREHEATING REL CNT	—	—	
EGR FUN PROG	—	—	
CLUTCH PEDAL SWITCH	—	—	
CRUISE CONTROL/SPEED LIMITER OPERATION	—	—	
LOW FUEL LEVEL INFORMATION	—	—	
CC/SL DEACT BY DR ACTIN	—	—	
WATER PUMP RELAY COMMAND	—	—	
BRAKE SWITCH	—	—	
FUEL PUMP RELAY	—	—	
WATER IN DIESEL DETECTOR	—	—	
STARTER BUTTON	—	—	
STATIC REGEN (IWRKSHOP)	—	—	
CC/SL LMTR BUTTONS	—	—	
GEARBOX RATIO TARGET	—	—	
VEHICLE SPEED DISPLAYED	—	—	
VEHICLE SPEED MULTIPLEXED INFORMATION	—	—	
ENGAGE REVERSE GEAR	—	—	
CC/SL CONNECTION AFTER CC BUTTON PRESSED	—	—	
CC/SL CONNECTION AFTER SL BUTTON PRESSED	—	—	

DIAGNOSIS SYSTEM (ECM)

[R9M]

< SYSTEM DESCRIPTION >

Monitor item	Unit	Description	Remarks
CL CONTACT WIRE SIGNAL	—	—	
MANUAL OR ASSISTED PARKING BRAKE	—	—	
CRUISE CONTROL INFO MONITORING	—	—	
CC/SL SPEED SIGNAL MONITORING	—	—	
MANUAL GEARBOX LEVER IN NEUTRAL	—	—	
AUTOMATIC GEARBOX IN DEFECT MODE	—	—	
CLUTCH CONTACT MULTIPLEX SIGNAL	—	—	
BRAKING DETECTED MULTIPLEX SIGNAL	—	—	
FIRST START	—	—	
CC OPERATING RELIABLY	—	—	
CLUTCH CONTACT WIRING - START OF TRAVEL	—	—	
VEHICLE SPEED UNIT	—	—	
TURBO REGULATION	—	—	
CAM TDC SYNC	—	—	
CLUTCH INFO UNAVAILABLE	—	—	
CLUTCH INFO ABSENT	—	—	
BRAKE INFO UNAVAILABLE	—	—	
BRAKE INFO ABSENT	—	—	
DECEL W/O BRK DEPR	—	—	
S/DECEL W/O BRK DEPR	—	—	
CC INHIBITED BY INJECTION	—	—	
SL INHIBITED BY INJECTION	—	—	
ACTL VHCL SPD INFO UNAVL	—	—	
DISP VHCL SPD UNAVL	—	—	
ACTL VHCL SPD INFO ABSNT	—	—	
DISP VHCL SPD INFO ABSNT	—	—	
CHANGE OF VHCL SPD UNIT	—	—	
WIRED BRAKE CONTACT	—	—	
FAST IDLE SPD FUNCTION	—	—	
CLUTCH START OF TRAVEL SWITCH	—	—	
TRC/ANTI-YAW CNT	—	—	
PARKING BRAKE	—	—	
MOTOR-DRIVEN FAN UNIT REQUEST	—	—	
REGENERATION COMMAND	—	—	
(TBD)REGENERATION AUTHORISATION	—	—	
1ST IN VAL OPEN PR	—	—	
1ST IN VAL CLOS PR	—	—	

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DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[R9M]

Monitor item	Unit	Description	Remarks
CC/SL CONN AUTHR	—	—	
CC CONT INHI INJ	—	—	
SL INHI SYS INJ	—	—	
COMBUSTION MODE SET	—	—	
COMBUSTION MODE	—	—	
LOW PRESSURE EGR VALVE PROGRAMMING	—	—	
EXHAUST FLAP HIGH SETTING	—	—	
EXHAUST AIR FLAP PROGRAMMING	—	—	
SPEED LIMITER	—	—	
CC/SL STATUS	—	—	
CL START OF TRAVEL SW	—	—	
SPEED LIMITER FUNCTION	—	—	
CRUISE CONTROL FUNCTION	—	—	
CC/SL LMTR BUTTONS	—	—	
ACC. PDL DETECT BLOCK	—	—	
CLUTCH START OF TRAVEL SWITCH	—	—	
CLUTCH END OF TRAVEL SWITCH	—	—	
SWIRL/F CLOSED POS LEARN	—	—	
INJECTION PROTECTION	—	—	
A/C COMMAND	—	—	
ACCELERATED IDLE REQUEST	—	—	
PREHEATER LIGHT	—	—	
RECYC EXGAS COOLING	—	—	
TURB ELEC WTR PMP CMND	—	—	
EXHAUST INJ S/V COMMAND	—	—	
SWIRL/F OPEN POS LEARN	—	—	
INJ ERROR FIND PROCEDURE	—	—	
INLET AIR TEMPERATURE	°C or °F	Intake air temperature is displayed.	
EGR LOW PRESSURE POTENTIOMETER	mV	—	
BOOST PRESSURE	mbar	Turbocharger boost pressure is displayed.	
TEMP UPSTREAM TURBINE	°C or °F	Exhaust gas temperature computed from exhaust gas temperature sensor 1 is displayed.	
ATMOSPHERIC PRESSURE	mbar	Atmospheric pressure is displayed.	
WATER TEMP	°C or °F	Engine coolant temperature is displayed.	
COMPUTER SUPPLY VOLTAGE	V	The power supply voltage of ECM is displayed.	
IN/FLAP CTRL	%	Inlet throttle PWM command is displayed.	
ENGINE SPEED	rpm	Engine speed computed from crankshaft position sensors displayed.	
VEHICLE SPEED	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
NUMBER OF ROT ENG	—	—	

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[R9M]

Monitor item	Unit	Description	Remarks
ENGINE OIL DILUTION RATIO	%	—	
MEASURE AIR FLOW	kg/h	Intake air flow rate computed from the mass air flow sensor signal is displayed.	
RAIL PRESSURE	bar	Fuel rail pressure is displayed.	
RAIL PRES SET	bar	Target fuel rail pressure is displayed.	
TEMP. UPSTREAM OF PF	°C or °F	Exhaust gas temperature before DPF computed from the upstream DPF temperature sensor.	
FUEL FLOW S/V CURRENT	mA	Current value of fuel flow actuator is displayed.	
LAST OFF/V CLOSE	%	Inlet throttle valve offset - last closed learning	
IN FLAP ABSO POSI	%	Raw value of the position in percent of the sensor supply voltage	
FIRST OFF/V OPEN	%	Inlet throttle valve offset - first opened learning	
FIRST OFF/V CLOSE	%	Inlet throttle valve offset - first closed learning	
LAST OFF/V OPEN	%	Inlet throttle valve offset - last opened learning	
REGEN MALFNC	—	Indicates the number of DPF regeneration failures since the last success.	
TEMP. UPSTRM OF CAT CNV	°C or °F	—	
FLOW GAS IN DPF	m3/h	Flow of gas inside the DPF is displayed.	
AIR FLOW REFERENCE	mg/cp	—	
ENGINE OIL TEMP SENSOR	—	—	
ROUGH TC PRESS	mbar	—	
EGR LOW PRESSURE POSITION	%	—	
ENGINE TORQUE	Nm	—	
POST INJECTION FLOW 1	mg/cp	—	
SOOT IN P/FLT	g	Soot mass in the DPF is displayed.	
EXHAUST SYSTEM FLOW	g/s	Exhaust gas air mass flow for estimation of downstream pressure and temperature models	
P/FLT DIFF. PRS	hPa	Differential exhaust gas pressure before/after DPF is displayed.	
EXHAUST AIR FLAP OFFSET	%	—	
PART.FILTER UPSTREAM TEMP SENSOR VOLTAGE	mV	Upstream DPF Temperature Sensor signal voltage is displayed.	
EXHAUST AIR VALVE POSITION SENSOR VOLTAGE	mV	—	
EGR VALVE FIRST OFFSET	%	EGR valve offset - first learning	
LAST EGR VALVE OFFSET	%	EGR valve offset - last learning	
POTN VAL EGR VALVE CLSD	%	Absolute position in percent of the sensor supply voltage	
HP EGR VALV POS SETPOINT	—	—	
FUEL TEMPERATURE	°C or °F	Fuel temperature computed from the fuel temperature sensor is displayed.	
PARTICLE FILTER DIFF. PRESSURE CORRECTION	hpa	—	
MANIFOLD PRESSURE	mbar	Intake manifold pressure computed from the TC boost sensor is displayed.	
RAIL PRESS SEN VOLT	mV	—	
LOW PRESSURE EGR AIR TEMPERATURE	°C or °F	—	

DIAGNOSIS SYSTEM (ECM)

[R9M]

< SYSTEM DESCRIPTION >

Monitor item	Unit	Description	Remarks
LOW PRESSURE EGR VALVE FIRST OFFSET	%	—	
PL PTNMR T1 V	mV	Accelerator pedal position sensor 1 signal voltage is displayed.	
PL PTNMR T2 V	mV	Accelerator pedal position sensor 2 signal voltage is displayed.	
ACCELERATOR PEDAL POSITION	—	Accelerator pedal position is displayed.	
RAIL PRESS LOOP VAR	bar	—	
EGR POTENTIOMETER VOLTAGE	mV	—	
PF PRS SEN VOLT	mV	—	
RV/LV BUTTON VOLTAGE	mV	ASCD/Speed limiter steering switch voltage	
INT AIR TEMP SEN D/STRM TC	—	—	
DAMPER VALVE SEN VOLT	mV	—	
SUPPLY VOLTAGE EXHAUST AIR FLAP SENSOR	—	—	
REFRIGERANT PRESSURE	bar	Refrigerant pressure is displayed.	
DAMPER VALVE UPSTR TEMP	—	—	
Cruise control setting	km or mile	The preset ASCD vehicle speed is displayed.	
FUEL FLOW	mg/cp	Total fuel flow is displayed.	
MILEAGE	km or mile	—	
ADDITIONAL INFO FD23	—	—	
SEN 1 FEED V	mV	Sensors power supply voltage 1 is displayed.	
SEN 2 FEED V	mV	Sensors power supply voltage 2 is displayed.	
SEN SUPPLY N-3 VOL	mV	Sensors power supply voltage 3 is displayed.	
EGR BYPASS VALV SETPOINT	—	—	
VEHICLE SPEED DISPLAYED	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BOOST PRESS REF VALUE	hPa	The boost pressure (determined by the signal voltage of the turbocharger boost sensor) is displayed.	
TURBOCHARGING SOLENOID VALVE OCR	%	Turbocharger boost control solenoid valve open is displayed.	
AIR INLET TEMP SEN VOLT	mV	Intake air temperature sensor 1 signal voltage is displayed.	
FAULT APPEARANCE COUNTER	—	—	
DURATION OF RESUME BUTTON PRESS	s	Duration of resume button press is displayed.	
HEATER PLUG CONTROL	%	Glow plug control PWM command is displayed.	
AIR INLET/F REL POS	%	Throttle opening angle is displayed.	
EGR POSITION	%	EGR position is displayed.	
EGR VALVE OPENING REFERENCE	%	High pressure EGR volume control valve opening reference is displayed.	
EGR VALVE CONTROL	%	High pressure EGR volume control valve PWM command is displayed.	
RFRG TEMP PRESS SEN VOLT	V	—	
DMPR VLV SET POS	%	Throttle opening angle is displayed.	
EST. AIR FLOW	mg/cp	Estimated air flow is displayed	

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[R9M]

Monitor item	Unit	Description	Remarks
ENGINE TORQUE REFER- ENCE VALUE	—	—	
TBN UPSTR PRS SEN VOLT	mV	Exhaust gas pressure sensor 1 signal voltage is displayed.	
MAX PERMISSIBLE SPEED	km/h or mph	—	
ALTERNATOR LOAD	%	Alternator load is displayed.	
INLET AIR FLOW	mg/cp	The inlet air flow (determined by the signal voltage of the mass air flow sensor) is displayed.	
ADDITIONAL INFO FD2E	—	—	
INLET/F SEN SUPPLY VOLT	mV	—	
EGR LOW PRESSURE OCR	%	—	
ALTERNATOR POWER	W	Alternator power	
EGR SEN SUPPLY VOLT	mV	—	
ADDITIONAL INFO FD24	—	—	
BR-ACCL PDL INCONSISTNCY	—	—	
OXYGEN RATE	—	—	
ADDITIONAL INFORMATION 24F3	°C or °F	—	
ADDITIONAL INFO 2813	°Crk	—	
ADDITIONAL INFO FD47	mV	—	
TBN UPSTR TEMP SETP	°C or °F	—	
POST INJECTION FLOW	mg/cp	—	
OIL DILUTION INFORMATION	%	—	
ADDITIONAL INFO FD61	—	—	
ADDITIONAL INFO FD62	—	—	
NUMBER OF STARTING 2	—	—	
AIR REG CUT-OFF CNDITNS	—	—	
NUMBER OF STARTING 1	—	—	
ADDITIONAL INFO FDE1	—	—	
ADDITIONAL INFO FDE2	—	—	
ADDITIONAL INFO FDE3	—	—	
NUMBER OF STARTING 3	—	—	
ADDITIONAL INFO FDE6	hpa	—	
ADDITIONAL INFO FDE7	—	—	
ADDITIONAL INFO FDE8	mV	—	
FLOW RGLTR CRNT REF VAL	mA	—	
ADDITIONAL INFO FDEB	—	—	
ADDITIONAL INFO FDEC	—	—	
ADDITIONAL INFO FDED	—	—	
ADDITIONAL INFO FDEE	—	—	
ADDITIONAL INFO FDEF	—	—	
ADDITIONAL INFO FDF0	hpa	—	
NUMBER OF STARTING 4	—	—	
GROSS INLET MANIFOLD PRESSURE	hpa	—	
ADDITIONAL INFO FD2D	—	—	
ADDITIONAL INFO FD2F	°C or °F	—	

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DIAGNOSIS SYSTEM (ECM)

[R9M]

< SYSTEM DESCRIPTION >

Monitor item	Unit	Description	Remarks
DURATION OF + BUTTON PRESS	s	Duration of SET/+ button press is displayed.	
EXHAUST FLAP POSITION SETPOINT	%	—	
EXHAUST AIR FLAP OCR	%	—	
FIRST OFFSET OF THE EX-HAUST AIR FLAP OPEN	%	—	
EXHAUST FLAP ABSOLUTE POSITION	%	—	
LOW PRESSURE EGR VALVE SUPPLY VOLTAGE	mV	—	
LOW PRESSURE EGR POSITION REFERENCE VALUE	%	—	
EXH THROTTLE POSITION	%	Exhaust throttle opening rate 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	—	Maximum value of blocked button detection counter	
SOOT AFTER REGEN	G	—	
FAST IDLE SPEED	rpm	—	
MAXIMUM VEHICLE SPEED	km/h or mph	—	
ADDITIONAL INFO FD5A	—	—	
ADDITIONAL INFO FD22	—	—	
FIRST OFFSET OF THE CLOSED EXHAUST FLAP	%	—	
LAST OFFSET OF CLOSED LOW PRESSURE EGR	%	—	
ADDITIONAL INFO FD25	—	—	
ADDITIONAL INFO FD26	—	—	
EXH PRESS UPSTREAM DPF	mbar	—	
BRAKE CNT 1 DURATION	S	—	
BRAKE CNT 2 DURATION	S	—	
A/F SENSOR HEATER DUTY	—	—	
VEHICLE SPEED SENSOR	km/h or mph	—	
DPF PRESS SENSOR OFFSET	mbar	—	
ADDITIONAL INFORMATION FDE5	—	—	
ADDITIONAL INFO FD9C	°C or °F	—	
ADDITIONAL INFO FD9D	—	—	
ADDITIONAL INFO FDE6	—	—	
PRS UPSTR OF TBN	mbar	—	
TBN UPSTR TMP SEN VOLT	V	—	
INT/M RUN VLV OPEN ANGLE	%	—	
INT/M RUNNER VLV SETPOINT	%	—	
INT/MANI RUNNER VALVE REQ	%	—	
IN/M RUN/V LEARN VAL (LAST)	%	—	

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[R9M]

Monitor item	Unit	Description	Remarks
IN/M RUN/V LEARN VAL(CRNT)	%	—	
IN/M RUN/V LEARN VAL (1ST)	%	—	
INT/MANI RUNNER VALVE POS	%	—	
SWIRL FLAP VOLTAGE	mV	Intake manifold runner control valve - Voltage supplied to the sensor	
ATMOS PRESS SEN VOLT	mV	—	
ADDITIONAL INFO FD45	—	—	
AFTER REPLAC DPF	km or mile	—	
TIME SINCE LAST REGEN	H	—	
DURATION LAST REGEN	Min	—	
PF UPSTR TEMP. REF VAL	°C or °F	—	
KM SINCE SUCCESS REGEN	km or mile	—	
F/FLOW CORR CYL NO. 1	mg/cp	—	
F/FLOW CORR CYL NO. 2	mg/cp	—	
F/FLOW CORR CYL NO. 3	mg/cp	—	
F/FLOW CORR CYL NO. 4	mg/cp	—	
EGR S/V CONTROL	%	—	
FUEL TEMP SEN V	V	—	
GROSS ENGINE TORQUE	Nm	—	
COOLANT TEMP SEN VOLT	V	—	
CRNKS SYNC LOSS COUN	—	—	
MAIN INJECTION FLOW	mg/cp	—	
ADDITIONAL INFO 287A	—	—	
ADDITIONAL INFO 24D0	—	—	
CARBON MATERIAL RATE	%	—	
ADDITIONAL INFORMATION FE22	—	—	
ADDITIONAL INFORMATION FE23	—	—	
ADDITIONAL INFORMATION FE24	—	—	
ADDITIONAL INFORMATION FE25	—	—	
PREHEATING MODE	%	—	
ENG OIL DILU RATIO	%	Current oil dilution rate for oil wear estimation	

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

WORK SUPPORT MODE

Work Item

Work item	Description	Usage
WRITE V.I.N.	—	—
NUMBER OF STARTING 1	—	—
NUMBER OF STARTING 2	—	—
NUMBER OF STARTING 3	—	—
NUMBER OF STARTING 4	—	—

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[R9M]

Work item	Description	Usage
FUEL PUMP PROGRAMMING	—	—
AIR FLOW METER PROGRAMMING	—	—
ADAPTIVES ON AIR INTAKE FLAP MALFUNCTION	—	—
AIR DAMPER VALVE PROGRAMMING(R088)	—	—
EXHAUST FLAP LOW SETTING	—	—
TURBOCHARGER PROGRAMMING	—	—
MANIFOLD PRESSURE SENSOR PROGRAMMING	—	—
EGR VALVE PROGRAMMING	—	—
LOW PRESSURE EGR VALVE PROGRAMMING	—	—
EGR BYPASS PROGRAMMING	—	—
INJECTION PUMP ADAPTIVES	—	—
RAIL PRESSURE SENSOR ADAPTIVES	—	—
DPF RELATIVE PRESSURE SENSOR	—	—
P/FLT DIFF PRS SEN	—	—
PRPR RICH SEN PROG	—	—
SWIRL FLAP	—	—
SWIRL FLAP PROGRAMMING	—	—
BYPASS SOLENOID VALVE FOR HP TURBINE COMPONENT	—	—
AIR DAMPER VALVE PROGRAMMING(R044)	—	—
WRITE SAVED DATA	In this mode, write data stored by "SAVE COMPUTER DATA" in work support mode to ECM.	When ECM is replaced.*
ENTER INJECTOR CODES	In this mode, fuel injector adjustment value is registered.	• When ECM is replaced.* • When fuel injector(s) is replaced.
SAVE COMPUTER DATA	In this mode, save data that is in ECM.	When ECM is replaced.*
SERVICE REGENERATION	—	—
CYLINDER FUNCTION FAULT FINDING	—	—
High pressure fuel circuit fault finding	This function can perform high pressure fuel pressure check.	When performing high pressure fuel system check.
SPEED LIMITER	—	—
FAST IDLE SPEED MODIFICATION	—	—
AFTER DPF REPLACEMENT	In this mode, estimated PM amount in DPF is cleared.	When DPF is replaced.

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[R9M]

Work item	Description	Usage
ADAPTIVES AFTER RE-GENERATING PF	—	—
INTERVAL OF OIL CHANGE (OCS) OXIDATION	—	—
OIL CHANGE INTERVAL (OCS): DILUTION	—	—
FUEL RAIL PRESSURE TEST	—	—
STATIC TEST	—	—
STARTER OPERATION COUNTER CLEAR	Cumulative number of engine starts, for starter reliability is cleared.	When Starter Motor is replaced.
H/P FUEL PUMP TOTAL STARTS COUNTER CLEAR	—	—
WRITE STARTER OPERATION COUNT	—	—
WRITE H/P FUEL PUMP TOTAL STARTS COUNT	In this mode, high pressure fuel pump total starts counter is cleared.	When high pressure fuel pump 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-944, "Description"](#).

ACTIVE TEST MODE

Test item	Condition	Judgment	Check item (Remedy)
COOLING FAN 2	—	—	—
COOLING FAN 1	—	—	—
EXHAUST THROTTLE	- Ignition switch: ON - Turn exhaust throttle control motor ON and OFF with the CONSULT and confirm the operation.	Exhaust throttle valve is operated.	- Harness and connector - Exhaust electric throttle control actuator
EGR VOLUME CONTROL VALVE	- Ignition switch: ON - Turn high pressure EGR volume control valve ON and OFF with the CONSULT and confirm the operation.	High pressure EGR volume control valve is operated.	- Harness and connector - High pressure EGR volume control valve
THROTTLE VALVE	—	—	—
TURBOCHARGER BOOST PRESSURE	—	—	—
COOLANT FLOW VALVE	—	—	—
GLOW PLUG	—	—	—
A/C COMPRESSOR	—	—	—
THERMO PLUNGER	—	—	—

DIAGNOSIS SYSTEM (ECM)

[R9M]

< SYSTEM DESCRIPTION >

Test item	Condition	Judgment	Check item (Remedy)
FUEL PUMP RELAY	—	—	—
AUTO STOP START	• Engine: After warming up, run engine at idle. • Selector lever position: P or N (CVT) • Gear position: Neutral (M/T) • Stop/Start OFF switch: ON (indicator lamp is ON) CAUTION: Be careful so that a hood operations in the opened state when carry out the work. NOTE: Before performing this test, be sure to check that OK is displayed on BATTERY STATUS in DATA MONITOR of IPDM E/R because this function may not be operate when the battery condition is not satisfied.	Stop/Start system operates normally. (Engine stop/Restart)	Stop/Start system component parts

CONFIGURATION

Function	Description
SPEED LIMITER FUNCTION	This function stores the information to ECM that the vehicle is equipped with Speed Limiter.
CRUISE CONTROL FUNCTION	This function stores the information to ECM that the vehicle is equipped with Cruise Control System.
CC/SL LMTR BUTTONS	This function stores the information to ECM that the vehicle is equipped with ASCD/speed limiter main switch.

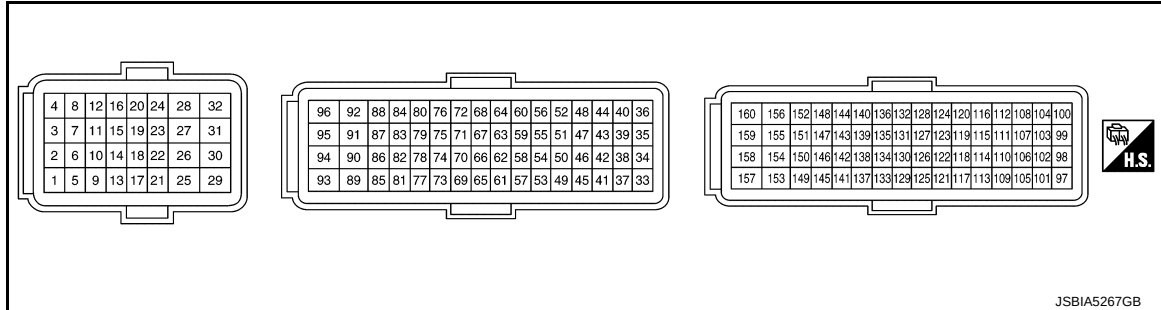
ECU DIAGNOSIS INFORMATION

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Reference Value

INFOID:000000010935587

TERMINAL LAYOUT



PHYSICAL VALUES

NOTE:

- ECM is located near the battery in the engine room.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT.

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
1 (B)	—	ECM ground	—	—	—
2 (W)	3 (Y)	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully re- leased	0.74 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully de- pressed	4.54 V
3 (Y)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—
4 (B)	—	ECM ground	—	—	—
5 (L)	8 (B)	Power supply for ECM	Input	[Ignition switch: OFF]	0 V
				[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
6 (G)	3 (Y)	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5 V
8 (B)	—	ECM ground	—	—	—
9 (L)	8 (B)	Fuel heater and water in fuel level sensor	Input	[Ignition switch: ON]	11.69 V
				[Engine is running] • Warm-up condition • Idle speed	14.0 V
10 (L)	12 (P)	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5 V

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< ECU DIAGNOSIS INFORMATION >

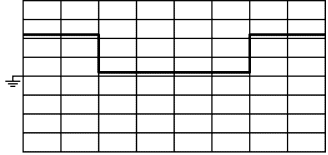
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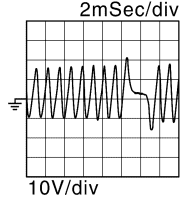
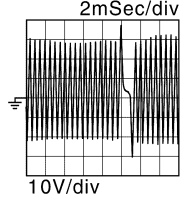
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
11 (V)	12 (P)	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully re- leased	0.38 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully de- pressed	0.27 V
12 (P)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
16 (R)*1 (BG)*2	8 (B)	Brake pedal position switch*1 Stop lamp switch*2	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0 V
				[Ignition switch: OFF] • Brake pedal: Slightly de- pressed	11.83 V
17 (LG)	8 (B)	Ignition switch	Input	[Ignition switch: ON]	11.87 V
18 (G)	19 (BR)	ASCD steering switch	Input	[Ignition switch: ON] • ASCD steering switch: OFF	4 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
19 (BR)	—	Sensor ground (ASCD steering switch)	—	—	—
20 (BR)	8 (B)	Fuel pump control module (command)	Output	[Ignition switch: ON] Fuel pump not activates	0.05 V (PWM duty: less than 14%)
				[Ignition switch: ON] Fuel pump activated	0 – 6.74 V (PWM duty: Approx. 69%)
22 (G)	8 (B)	Fuel pump control module (diagnosis)	Input	[Ignition switch: ON]	11.0 V
23 (V)	8 (B)	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)
24 (R)	8 (B)	Clutch pedal position switch*2	Input	[Ignition switch: ON] • Clutch pedal: Fully released	0 V
				[Ignition switch: ON] • Clutch pedal: Fully depressed	11.25 V
27 (V)	8 (B)	Clutch interlock switch*2	Input	[Ignition switch: ON] • Engine stopped • Clutch pedal: Fully released	0 V
				[Ignition switch: ON] • Engine stopped • Clutch pedal: Fully depressed	BATTERY VOLTAGE (11 - 14 V)
30 (BR)	8 (B)	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)

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< ECU DIAGNOSIS INFORMATION >

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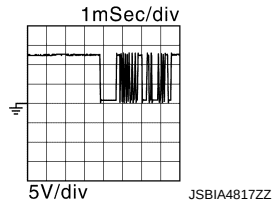
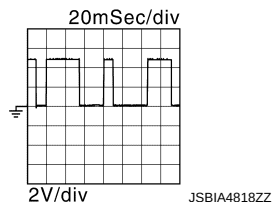
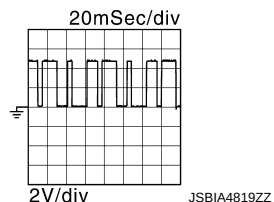
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
31 (P)	—	CAN communication line (CAN-L)	Input/ Output	—	—
32 (L)	—	CAN communication line (CAN-H)	Input/ Output	—	—
35 (R)	8 (B)	Glow plug control (com- mand)	Output	[Engine is running] • Engine coolant temperature: less than 20°C (68°F) • Idle speed	12.91 V
				[Engine is running] • Engine coolant temperature: more than 80°C (176°F) • Idle speed	12.8 V
37 (LG)	8 (B)	Voltage stabilizer signal	Output	[Stop/start system operates] • While cranking of restart	(While operating the starter mo- tor) 100mSec/div  5V/div JSBIA5055GB
				[Engine is running] • Warm-up condition • Idle speed	Battery voltage
				[Ignition switch: ON]	12.39 V
38 (GR)	8 (B)	Fuel pump relay control	Output	[Ignition switch: ON] • Fuel Pump relay always is on	0 – 5.17 V
41 (G)	8 (B)	ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] • A few seconds after turning ig- nition switch OFF	0.78 V
				[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	12.42 V
42 (Y)	8 (B)	Restart relay	Output	[Stop/start system operate] • While cranking of restart	0 V (While operating the starter mo- tor)
				[Engine is running] • Warm-up condition • Idle speed	11.38 V
43 (R)	8 (B)	Fuel flow actuator	Output	[Engine is running] • Warm-up condition • Idle speed	9.6 V
46 (V)	8 (B)	Thermoplunger relay 2	Output	[Engine is running] During diesel particulate filter re- generation mode	0 V
				[Engine is running] Except above	13.20 V
49 (P)	8 (B)	Intake manifold runner con- trol valve motor (-)	Output	[Engine is running] • Warm-up condition • Idle speed	14.43 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
50 (BG)	8 (B)	Thermoplunger relay 1	Output	[Engine is running] During diesel particulate filter re- generation mode	0 V
				[Engine is running] Except above	13.68 V
53 (Y)	8 (B)	Engine coolant bypass con- trol solenoid valve	Output	[Engine is running] Engine cooling temperature: 70°C (158°F) or more	14.42 V
				[Engine is running] Engine coolant temperature: less than 30°C (86°F)	14.42 V
55 (R)	8 (B)	Sensor power supply (Low pressure EGR volume control valve position sen- sor)	—	[Ignition switch: ON]	5 V
56 (B)	8 (B)	Crankshaft position sensor	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes de- pending on rpm at idle	
				[Engine is running] • Engine speed: 2,000 rpm	
57 (SB)	8 (B)	Thermoplunger relay 3	Output	[Engine is running] During diesel particulate filter re- generation mode	0 V
				[Engine is running] Except above	13.67 V
59 (Y)	8 (B)	Sensor power supply (Turbocharger boost sensor, mass air flow sensor)	—	[Ignition switch: ON]	5.0 V
60 (R)	8 (B)	Sensor power supply (Crankshaft position sensor)	—	[Ignition switch: ON]	5.0 V
63 (LG)	8 (B)	Thermoplunger diagnosis 1	Input	[Engine is running] • Idle speed • No malfunction in ther- moplunger system.	13.97 V
65 (SB)	—	Sensor ground (Low pressure EGR volume control valve position sen- sor)	—	—	—
66 (SB)	—	Sensor ground (Fuel pressure sensor)	—	—	—

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< ECU DIAGNOSIS INFORMATION >

[R9M]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
67 (W)	—	Glow plug control unit (diagnosis)	Input	[Engine is running] • Idle speed • No malfunction in glow control system.	1.50 V
68 (G)	8 (B)	Engine communication line	Input/ Output	[Ignition switch: ON]	
69 (GR)	8 (B)	Low pressure EGR volume control valve position sensor	Input	Ignition switch: ON	1.21 V Output voltage varies with low pressure EGR control valve position.
70 (Y)	—	Sensor ground (Camshaft position sensor)	—	—	—
71 (L)	70 (Y)	Camshaft position sensor	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	
				[Engine is running] • Engine speed is 2,000 rpm	
73 (B)	—	Sensor ground (Fuel rail pressure sensor)	—	—	—
74 (BR)	82 (V)	Intake air temperature sensor 1	Input	[Engine is running] • Warm-up condition	2.38 V Output voltage varies with intake air temperature.
76 (BR)	8 (B)	Thermoplunger diagnosis 2	Input	[Engine is running] • Idle speed • No malfunction in thermoplunger system.	13.9 V
77 (L)	66 (SB)	Fuel rail pressure sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.13 V
				[Engine is running] • Warm-up condition • Revving engine from idle to 2,000 rpm quickly	1.77 V

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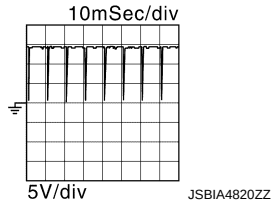
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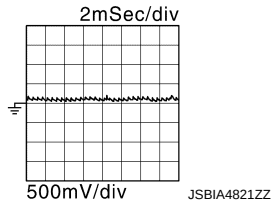
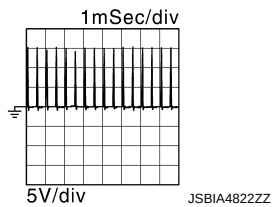
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
78 (GR)	82 (V)	Mass air flow sensor	Input	[Engine is running] • Warm-up condition • Idle speed	4.49 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	4.58 V
80 (W)	8 (B)	PNP signal	Input	[Ignition switch: ON] • Selector lever: Neutral	11.88 V
				[Ignition switch: ON] • Selector lever: Except above	0 V
81 (P)	—	Sensor ground (Turbocharger boost sensor, Intake air temperature sen- sor 2)	—	—	—
82 (V)	—	Sensor ground (Mass air flow sensor, intake air temprature sensor 1)	—	—	—
85 (G)	81 (P)	Turbocharger boost sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.17 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	1.15 V
86 (R)	81 (P)	Intake air temperature sen- sor 2	Input	[Engine is running] • Warm-up condition • Idle speed	2.33 V Output voltage varies with intake air temperature.
88 (W)	66 (SB)	Fuel pressure sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.13 V
				[Engine is running] • Warm-up condition • Revving engine from idle to 2,000 rpm quickly	1.77 V
89 (BR)	8 (B)	A/F sensor heater	Input	[Engine is running] After the vehicles is driven for 6 minutes under the following con- ditions • Warm-up condition • Vehicle speed: 80 km/h (50 MPH) or more • Shift lever: Suitable gear posi- tion	
91 (G)	73 (B)	Sensor power supply (Fuel rail pressure sensor)	—	[Ignition switch: ON]	5.0 V
93 (B)	8 (B)	Fuel heater relay control	Output	[Ignition switch: ON] • Fuel temperature: less than 45°C (113°F)	0.05 V
				[Engine is running] • Warm-up condition • Fuel temperature: 65°C (149°F) or more	14.43 V
96 (R)	8 (B)	Power supply for ECM (back-up)	Input	[Ignition switch: OFF]	0 V
				[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

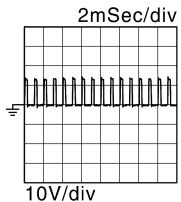
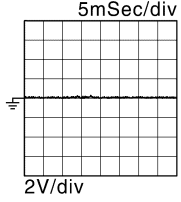
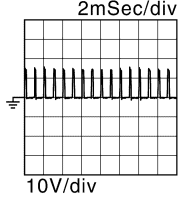
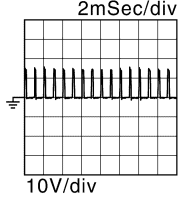
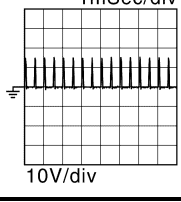
ECM

< ECU DIAGNOSIS INFORMATION >

[R9M]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
98 (P)	24 (R)	Fuel temperature sensor	Input	[Engine is running] • Warm-up condition • Idle speed	2.22 V Output voltage varies with fuel temperature.
99 (L)	141 (V)	Sensor power supply (Refrigerant pressure sensor)	—	[Ignition switch: ON]	5.0 V
100 (R)	117 (Y)	Sensor power supply (DPF differential pressure sensor)	—	[Ignition switch: ON]	5.0 V
102 (G)	—	Sensor ground (Fuel temperature sensor)	—	—	—
103 (GR)	—	Sensor ground (Throttle position sensor)	—	—	—
104 (LG)	117 (Y)	Sensor power supply (Exhaust throttle position sensor)	—	[Ignition switch: ON]	5.0 V
105 (LG)	109 (V)	Exhaust gas temperature sensor 2	Input	[Engine is running] • Warm-up condition • Idle speed	4.16 V Output voltage varies with exhaust gas temperature.
106 (BG)	110 (L)	High pressure EGR volume control valve control position sensor	Input	[Engine is running] • Warm-up condition • Idle speed	0.73 V
107 (Y)	103 (GR)	Throttle position sensor	Input	[Ignition switch: OFF] For 20 seconds after turning ignition switch OFF NOTE: Repeat several times opening and shutting after turning ignition switch OFF.	0 – 4.45 V Output voltage fluctuates between 0 V and 4.0 V.
108 (R)	110 (L)	Sensor power supply (High pressure EGR volume control valve control position sensor)	—	[Ignition switch: ON]	5.0 V
109 (V)	—	Sensor ground (Exhaust gas temperature sensor 2)	—	—	—
110 (L)	—	Sensor ground (High pressure EGR volume control valve control position sensor)	—	—	—
112 (LG)	125 (W)	Sensor power supply (Intake manifold runner control valve position sensor)	—	[Ignition switch: ON]	5.0 V
113 (R)	117 (Y)	Exhaust throttle position sensor	Input	Ignition switch: ON	4.02 V
115 (B)	116 (W)	A/F sensor voltage nernst 1	Input	[Engine is running] • Warm-up condition	0.01 - 0.28 V
116 (W)	—	Sensor ground [Air fuel ratio (A/F) sensor 1]	—	—	—
117 (Y)	—	Sensor ground (Exhaust throttle position sensor)	—	—	—
119 (BG)	116 (W)	A/F sensor current pump 1	Input	[Engine is running] • Warm-up condition	0.01 - 0.11 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
121 (L)	125 (W)	Intake manifold runner control valve position sensor	Input	Ignition switch: ON	4.42 V
122 (Y)	117 (Y)	DPF differential pressure sensor	Input	[Engine is running] • Warm-up condition • Idle speed	0.52 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.55 V
125 (W)	—	Sensor ground (Intake manifold runner control valve position sensor)	—	—	—
126 (W)	—	Sensor ground (Exhaust gas pressure sensor)	—	—	—
129 (P)	8 (B)	Engine coolant temperature sensor	Input	Engine coolant temperature: 25°C (77°F)	2.89 V
				Engine coolant temperature: 80°C (176°F)	0.84 V
132 (BR)	147 (GR)	Exhaust electric throttle control motor (+)	Output	[Engine is running] • Engine coolant temperature: more than 70°C (158°F) • Intake air temperature: more than 20°C (68°F) • Idle speed	
133 (B)	8 (B)	Sensor power supply (Engine coolant temperature sensor)	—	[Ignition switch: ON]	5.0 V
134 (R)	—	Sensor ground (Exhaust gas temperature sensor 1)	—	—	—
136 (W)	8 (B)	Low pressure EGR volume control valve motor (-)	Output	[Engine is running] • Engine coolant temperature: more than 70°C (158°F) • Intake air temperature: more than 20°C (68°F) • Idle speed NOTE: The duty cycle changes depending on low pressure EGR volume control valve operation.	
137 (SB)	141 (V)	Refrigerant pressure sensor	Input	[Engine is running] • Warm-up condition • Both A/C switch and blower fan switch: ON (Compressor operates)	1.52 V
138 (L)	134 (R)	Exhaust gas pressure sensor	Input	[Engine is running] • Warm-up condition • Idle speed	0.88 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.11 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
140 (W)	8 (B)	Electric throttle control motor (-)	Output	[Ignition switch: OFF] For 20 seconds after turning ignition switch OFF NOTE: Repeat several times opening and shutting after turning ignition switch OFF.	
				[Ignition switch: OFF] More than 20 seconds after turning ignition switch OFF	0.08 V
141 (V)	—	Sensor ground (Refrigerant pressure sensor)	—	—	—
142 (G)	—	Sensor ground (Low pressure EGR temperature sensor)	—	—	—
143 (B)	8 (B)	Low pressure EGR volume control valve motor (+)	Output	[Engine is running] • Engine coolant temperature: more than 70°C (158°F) • Intake air temperature: more than 20°C (68°F) • Idle speed NOTE: The duty cycle changes depending on low pressure EGR volume control valve operation.	
				[Engine is running] • Engine coolant temperature: less than 30°C (86°F) • Idle speed NOTE: The duty cycle changes depending on EGR volume control valve operation.	
144 (B)	8 (B)	High pressure EGR volume control valve motor (+)	Input	[Engine is running] • Engine coolant temperature: more than 70°C (158°F) • Intake air temperature: more than 20°C (68°F) • Idle speed NOTE: The duty cycle changes depending on EGR volume control valve operation.	
146 (BR)	142 (G)	Low pressure EGR temperature sensor	Input	[Engine is running] • Engine coolant temperature: more than 70°C (158°F) • Intake air temperature: more than 20°C (68°F) • Idle speed	0.54 V Output voltage varies with low pressure EGR gas temperature.
147 (GR)	8 (B)	Exhaust electric throttle control motor (-)	Output	[Engine is running] • Engine coolant temperature: more than 70°C (158°F) • Intake air temperature: more than 20°C (68°F) • Idle speed	

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Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
148 (W)	8 (B)	High pressure EGR volume control valve motor (-)	Input	[Engine is running] - Engine coolant temperature: less than 30°C (86°F) - Idle speed NOTE: The duty cycle changes depending on EGR volume control valve operation.	 10V/div JSBIA4827ZZ
149 (R)	8 (B)	Turbocharger boost control actuator	Output	[Engine is running] Turbocharger: Not operated	8.8 V
				[Engine is running] Turbocharger: Operated	10 V
150 (Y)	134 (R)	Exhaust gas temperature sensor 1	Input	[Engine is running] - Warm-up condition - Idle speed	0.91 V Output voltage varies with exhaust gas temperature.
151 (G)	8 (B)	Engine restart bypass control relay	Output	[Engine is running] - Warm-up condition - Idle speed	11.53 V
				[Stop/start system operate] While cranking of restart	0 V
152 (SB)	8 (B)	Electric throttle control motor (+)	Output	[Ignition switch: OFF] For 20 seconds after turning ignition switch OFF NOTE: Repeat several times opening and shutting after turning ignition switch OFF.	 10V/div JSBIA4828ZZ
				[Ignition switch: OFF] More than 20 seconds after turning ignition switch OFF	1.23 V
153 (V)	8 (B)	FUEL INJECTOR No.4 (HI)	Output	[Engine is running] - Warm-up condition - Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	 50V/div JSBIA4829ZZ
				[Engine is running] - Warm-up condition - Engine speed: 2,000 rpm	 50V/div JSBIA4830ZZ

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[R9M]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
154 (BG)	8 (B)	FUEL INJECTOR No.2 (HI)	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	
155 (G)	8 (B)	FUEL INJECTOR No.3 (LO)	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	
156 (L)	8 (B)	FUEL INJECTOR No.4 (LO)	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	

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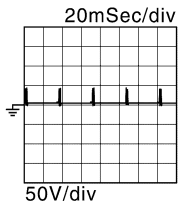
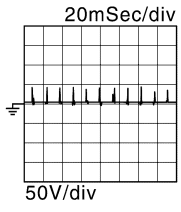
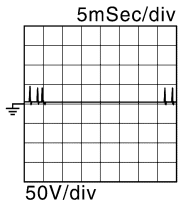
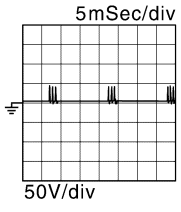
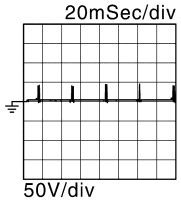
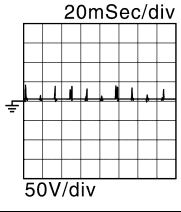
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[R9M]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
157 (R)	8 (B)	FUEL INJECTOR No.3 (HI)	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	 JSBIA4837ZZ
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	 JSBIA4838ZZ
158 (P)	8 (B)	FUEL INJECTOR No.1 (HI)	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	 JSBIA4839ZZ
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	 JSBIA4840ZZ
159 (W)	8 (B)	FUEL INJECTOR No.2 (LO)	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	 JSBIA4841ZZ
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	 JSBIA4842ZZ

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[R9M]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
160 (L)	8 (B)	FUEL INJECTOR No.1 (LO)	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	

*1: CVT models

*2: M/T models

Fail-safe

INFOID:0000000010935588

ENGINE CONTROL SYSTEM

DTC No.	Detected items	Engine operating condition in fail-safe mode
U0121		ESP is deactivated
U0415		ESP is deactivated
P0001	Fuel flow actuator circuit	• EGR valve is closed position • Throttle control motor is opened • CSF regeneration forbidden • CCSL deactivation with dashboard message • ESP deactivated • Rail pressure limitation
P0002	Fuel rail pressure	• EGR valve is closed position • Throttle control motor is opened • Rail pressure limitation • Freeshift inhibited • CCSL deactivation • CSF regeneration forbidden • ESP deactivation • AGB in limp home (if present) • PLV opening (if present) • Not limitation of calibrated performance • Prohibit stop/start system • ZFC correction inhibited (if strategy is present) • FMO: Cancellation regulator (if strategy is present) • FMO: Stop of the adaptation (if strategy is present) • Strong vehicle speed limitation (30km/h) • Torque limitation • Overpressure on rail on 5 time • Inhibition of regulation mode of fuel pressure regulator
P0016	Camshaft position- Crankshaft position correlation	Prohibit start/stop system

DTC No.	Detected items	Engine operating condition in fail-safe mode
P0045	Turbo solenoid valve control circuit	• Torque limitation • EGR valve is closed position • Throttle control motor is opened • Boost regulation cut off • CSF regeneration forbidden • Freeshift inhibited • CCSL deactivation
P0095	Intake air temperature sensor 2	• EGR volume control valve is closed position • Throttle control motor is opened • Inhibition of the correction of ZFC • Over torque inhibited • Limitation of temperature at the entry of CSF (TeFAP) • Oil vapor heater activated when engine is running (if present) • Engine speed attachment detection inhibited
P0100 P0101	Mass air flow sensor	• EGR valve is closed position • Throttle control motor is opened • Prohibit DPF regeneration
P0105 P0106	TC boost sensor	• EGR valve is closed position • Throttle control motor is opened • Limited upstream turbine pressure regulation if the sensor is present: Otherwise, the boost pressure regulation is cut • CSF regeneration forbidden • CCSL deactivation with dashboard message • Freeshift Inhibited • Increased idle speed • After sales routines forbidden (for boost / manifold pressure sensor not equipped engine) • Wastegate cut off • Torque limitation
P0110	Intake air temperature sensor 1	• Boost pressure limitation • EGR valve is closed position • Throttle control motor is opened
P0115	Engine coolant temperature sensor circuit	• Engine cooling fan operates at high speed while engine running when engine stopped and operates at low speed. • Engine speed limitation • EGR valve is closed position • Throttle control motor is opened • Prohibit DPF regeneration • EGR cooling valve activated
P0120	Throttle position sensor	• EGR valve is closed position • Throttle control motor is opened • CSF regeneration forbidden • Airflow regulation cut off • Compression test routine forbidden • CCSL deactivated with dashboard message • Freeshift inhibited
P0135 P2244	A/F sensor circuit	Stop closed-loop control
P0190		• EGR valve is closed position • Throttle control motor is opened • Rail pressure limitation • CSF regeneration forbidden • After sale routines forbidden • CCSL deactivation with dashboard message • Freeshift inhibited • ESP deactivated and AGB in limp home mode

ECM

< ECU DIAGNOSIS INFORMATION >

[R9M]

DTC No.	Detected items	Engine operating condition in fail-safe mode
P0200		- EGR valve is closed position - Throttle control motor is opened - After sales routines forbidden - CCSL deactivation with dashboard message - CSF regeneration forbidden - Increased idle speed
P0201 P0202 P0203 P0204	Fuel injector circuit	- EGR valve is closed position - Throttle control motor is opened - After sales routines forbidden - CCSL deactivation with dashboard message - CSF regeneration forbidden - Increased idle speed
P0217	Brake/accelerator pedal positions	- Cooling FAN Activated - Controlled shutters opening (if present) - Warning overheating lamp activated - Opening of the engine coolant thermostat (request of ineffective opening in that case) (if present) - Prohibit stop/start system - EGR control cut off (if present) - A/C compressor cut-off (if present)
P0225	Accelerator pedal position sensor 1circuit	- Torque limitation - After sales and factory routines inhibited - Freeshift inhibited - CCSL deactivation (considered as abnormal with dashboard message)
P0226	Brake/accelerator pedal positions	- Torque limitation - Pedal limp home activated - Aftersales and factory routines inhibited - Freeshift Inhibited - CCSL deactivation (considered as abnormal with dashboard message)
P0335	Crankshaft position sensor	- EGR valve is closed position - Throttle control motor is opened - Prohibit DPF regeneration - Prohibit start/stop system - Torque limitation - Engine speed limitation - ESP deactivated
P0340	Camshaft position sensor circuit	- Synchronization on the exhaust CAM - Intake VVT deactivation - Prohibit stop/start system - Inhibition of the VVT (setpoint = 0) - Inhibition of the VVT command (% PWM = 0) - VVTC angular position set to 0 and inhibition of the VVTC control
P0402 P0403	EGR system	- EGR valve is closed position - Throttle control motor is opened - CSF regenerations forbidden - CCSL deactivation with dashboard message - Freeshift inhibited
P0409	High pressure EGR volume control valve control position sensor circuit	- EGR valve is closed position - Stop closed-loop control - CSF regeneration forbidden - CCSL deactivation with dashboard message - Freeshift inhibited
P0470	Exhaust gas pressure sensor	- Boost pressure limitation - EGR valve is closed position - Throttle control motor is opened - CCSL deactivation (considered as abnormal with dashboard message) - Freeshift inhibited - CSF regeneration forbidden

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DTC No.	Detected items	Engine operating condition in fail-safe mode
P0471	Exhaust gas pressure sensor	• Boost pressure limitation • EGR valve is closed position • Throttle control motor is opened • CCSL deactivation (considered as abnormal with dashboard message) • Freeshift inhibited • CSF regeneration forbidden • Torque limitation
P0487	EGR volume command circuit	• EGR valve is closed position • Throttle control motor is opened • Stop closed-loop control • Freeshift inhibited • CSF regeneration forbidden • CCSL deactivation
P0488	EGR valve position control	• EGR valve is closed position • Throttle control motor is opened • Freeshift inhibited • CCSL deactivation • CSF regeneration forbidden
P0544	Exhaust gas temperature sensor 1 circuit	• EGR valve is closed position • Throttle control motor is opened • Prohibit DPF regeneration
P0560	Battery voltage	• Mechanically activated throttle limp-home • Torque limitation • ESP deactivated • Glow plug circuit deactivated • Inhibition of idle speed control • Factory and aftersales routines inhibited • Freeshift Inhibited • CCSL deactivation (considered as abnormal with dashboard message) • Wastegate cut off • AGB in limp home if AGB • Deactivation of the VVT
P060A	ECM	Reset ECU
P060B		• Engine speed limitation • CCSL deactivation • Freeshift inhibited
P061A		• Medium engine speed limitation • CCSL deactivation with dashboard message • Freeshift inhibited (If present)
P062B		• EGR valve is closed position • Throttle control motor is opened • CSF regeneration forbidden • Increased idle speed • CCSL deactivation with dashboard message • Freeshift inhibited • ESP deactivated and AGB in limp home mode • Compression test routine forbidden
P0638 P2100 P2119	Electric throttle control actuator	• EGR valve is closed position • Throttle control motor is opened • CSF regeneration forbidden • Compression test routine inhibited • Airflow regulation cut off • CCSL deactivation with dashboard message • Freeshift inhibited

DTC No.	Detected items	Engine operating condition in fail-safe mode	
P0641	Sensor power supply	• EGR valve is closed position • Throttle control motor is opened • The pressure downstream turbo exists then the limit: Otherwise cut regulation turbo • Limited upstream turbine pressure regulation if the sensor is present: Otherwise, the boost pressure regulation is cut • Torque limitation • Airflow regulation cut off • CSF regeneration forbidden • CCSL deactivation with dashboard message • Freeshift inhibited • Increased idle speed • After sales routines forbidden	A EC C D
P0651		• Air conditioner deactivation • Torque limitation • CCSL deactivation with dashboard message • Freeshift inhibited • After sales routines forbidden • FAN 2 activation	E F
P0697		• EGR valve is closed position • Throttle control motor is opened • Rail pressure limitation • CSF regeneration forbidden • After sales routines forbidden • CCSL deactivation with dashboard message • Freeshift inhibited • ESP deactivated and AGB in limp home mode	G H
P0833	DPF pressure sensor	CC/SL not available	I
P1010 P1012 P1013	Intake manifold runner control valve	Stop intake manifold runner control valve control (Fully open position)	J
P1011		• Stop intake manifold runner control valve control (Fully open position) • CCSL deactivation • Freeshift inhibition	K
P1453	DPF pressure sensor	• EGR valve is closed position • Throttle control motor is opened • Prohibit DPF regeneration	L
P1480 P1481 P1482 P1483	Exhaust electric throttle control actuator	• EGR valve is closed position • Throttle control motor is opened • Airflow regulation cut off • CSF regeneration forbidden • Compression test routine forbidden • CCSL deactivation with dashboard message • Freeshift inhibited	M
P1484 P1485 P1486 P1487 P1488	Low pressure EGR volume control valve	• EGR valve is closed position • Throttle control motor is opened • CSF regenerations forbidden • CCSL deactivation with dashboard message • Freeshift inhibited	N O
P1489		• EGR valve is closed position • Throttle control motor is opened • Temperature sensor after EGR cooler overheat signal diagnostic set of data to call the failure manag.	P
P1544	Exhaust gas temperature sensor 2 circuit	• EGR valve is closed position • Throttle control motor is opened • Prohibit DPF regeneration	
P1620	ECM	Stop closed-loop control	

DTC No.	Detected items	Engine operating condition in fail-safe mode
P1641 P1642 P1643	Thermoplunger circuit	Stop thermoplunger control
P2002	Diesel particulate filter	- EGR valve is closed position - Throttle control motor is opened - Prohibit DPF regeneration
P2120	Accelerator pedal position sensor 2 circuit	- Torque limitation - Freeshift inhibited - CCSL deactivation (considered as abnormal with dashboard message) - Aftersales and factory routines inhibited
P2226	Atmosphere pressure sensor	- EGR valve is closed position - Throttle control motor is opened - Prohibit DPF regeneration
P2263	Turbocharger boost pressure sensor circuit	- EGR valve is closed position - Throttle control motor is opened - Torque limitation - CCSL deactivation (considered as abnormal with dashboard message) - Freeshift is inhibited - Wastegate activation is inhibited - ESP deactivation - CSF regeneration forbidden
P2452	Diesel particulate filter pressure sensor circuit	- EGR valve is closed position - Throttle control motor is opened - Prohibit DPF regeneration
P253F		- CSF regeneration is forbidden - Torque limitation - EGR valve is closed position - Throttle control motor is opened
P2681	Engine coolant bypass valve circuit	- Engine cooling fan activation - Throttle control motor is opened - Prohibit start/stop system - Stop EGR control - Stop thermoplunger control

STOP/START SYSTEM

DTC No.	Detected items	Stop/start system operating condition in fail safe mode			
		Idling or driving the vehicle	Stop/start system operating		
			Stop	During cranking (Restart)	
U0298	Engine communication line	—	—	Prohibit the stop/start system operation from the next time	
B1900 B1901 B1902 B1903	DC/DC converter	Prohibit the stop/start system operation	Restart the engine		
B1904		—	—		
P0120	TP sensor	Prohibit the stop/start system operation	Restart the engine		Prohibit the stop/start system operation from the next time
P0833	CPP switch		—	—	
P1512	Starter motor				
P1650	Starter motor relay2		Restart the engine or stall the engine		
P1655 P1656	Engine restart bypass relay	—	—		
P2100	Throttle control motor relay	Prohibit the stop/start system operation			

DTC Inspection Priority Chart

INFOID:000000010935589

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	DTC	Detected items
1	U0111	LIN communication
	U0121, U0315, U0415	CAN communication line
	U0298, U0299, B1900, B1901, B1902, B1903, B1904	DC/DC converter
	P0016	Crankshaft position - camshaft position correlation
	P0095	Intake air temperature sensor 2
	P0100, P0101	Mass air flow sensor
	P0105, P0106	Turbocharger boost sensor
	P0110	Intake air temperature sensor 1
	P0115	Engine coolant temperature sensor
	P0120	Throttle position sensor
	P0135, P2243, P2244, P2626, P2A06	Air fuel ratio (A/F) sensor
	P0190	Fuel rail pressure sensor
	P0225, P0226, P2120	Accelerator pedal sensor
	P025B	Fuel pump control module (FPCM)
	P0335	Crankshaft position sensor
	P0340	Camshaft position sensor
	P0409	High pressure EGR volume control valve control position sensor
	P0470, P0471	Exhaust gas pressure sensor 1
	P0530	Refrigerant pressure sensor
	P0544, P2080	Exhaust gas temperature sensor 1
	P060A, P060B, P061A, P062B, P160C, P160D, P1620	ECM
	P0641, P0651, P0697	Sensor power supply
	P1013	Intake manifold runner control valve position sensor
	P1453, P2452	DPF pressure sensor
	P1482, P1483	Exhaust throttle valve position sensor
	P1486, P1489	Low pressure EGR volume control valve control position sensor
	P1544	Exhaust gas temperature sensor 2
	P1589	Neutral switch
	P158A	Clutch switch
	P1650	Thermoplunger control unit
	P2226	Atmosphere pressure sensor

Priority	DTC	Detected items
2	P0001, P0002	High pressure supply pump (volumetric control valve)
	P0045	Turbocharger boost control solenoid valve
	P0200, P0201, P0202, P0203, P0204	Fuel injector
	P025A	Fuel pump relay
	P0403	High pressure EGR volume control valve
	P0560	Battery voltage
	P0627	Fuel pump relay
	P0638, P2100, P2119	Electric throttle control actuator
	P0657	ECM relay
	P0833	Clutch pedal position switch
	P1010, P1011, P1012	Intake manifold runner control valve
	P1480, P1481	Exhaust electric throttle control actuator
	P1484, P1485, P1487, P1488	Low pressure EGR volume control valve
	P1512	Starter motor
	P1641, P1642, P1643	Thermoplunger
	P1655, P1656	Engine restart bypass relay
	P2681	Engine coolant bypass valve
3	P0217, P1675	Engine over temperature (Overheat)
	P0380	Glow control system
	P0402, P0487, P0488	EGR system
	P0564, P0575	ASCD steering switch
	P148A	High pressure EGR volume control valve
	P148B	Low pressure EGR volume control valve
	P148C	Exhaust electric throttle control actuator
	P1525	ASCD system
	P1546, P2002	Diesel particulate filter
	P2263	Turbocharger system
	P2264	Water diesel detector
	P2504	Alternator
	P253F	Engine oil dilution

DTC Index

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DTC*	Items (CONSULT screen terms)	Trip	MI lighting up		Reference
			Yellow	Red	
U0111	LOST COMMUNICATION WITH BATTERY ENERGY FROM LIN	10	—	×	EC-966
U0121	MLTIPLXD TRACTION CNTRL CONN	10	—	—	EC-968
U0298	—	1	—	—	EC-969
U0299	—	1	—	—	EC-971
U0315	VEHICLE SPEED	1	—	—	EC-973
U0415	MLTIPLXD TRACTION CNTRL CONN	3 or 10	—	—	EC-974
B1900	—	1	—	—	EC-975
B1901	—	1	—	—	EC-977
B1902	—	1	—	—	EC-979

ECM

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[R9M]

DTC*	Items (CONSULT screen terms)	Trip	MI lighting up		Reference
			Yellow	Red	
B1903	—	1	—	—	EC-981
B1904	—	1	—	—	EC-983
P0001	FUEL FLOW REGULATOR CIRCUIT	3 or 10	—	×	EC-985
P0002	FLOW CONTROL ADAPTIVE	3	—	×	EC-987
P0016	COHER BTWN CSFT SEN/ENG SPD	3	×	—	EC-990
P0045	TC SOLENOID VALVE CNTRL CIRC	3	×	—	EC-993
P0095	AIR TEMP SEN/CIRC	3 or 10	×	—	EC-995
P0100	AIR FLOW SENSOR CIRCUIT	3	×	—	EC-997
P0101	AIR FLOW SENSOR INFORMATION	1	×	—	EC-999
P0105	INLET MANIF PRS SEN CIRC	3	×	—	EC-1001
P0106	INLET PRESSURE CONSISTENCY	3	×	—	EC-1003
P0110	AIR TEMP SEN/CIRC	3	×	—	EC-1006
P0115	WATER TEMPERATURE SENSOR CIRC	3	×	—	EC-1008
P0120	INLET AIR FLAP POSITION SEN	3	×	—	EC-1010
P0135	PROPOR RICH SEN HEAT CIRC	10	—	—	EC-1012
P0190	RAIL PRESSURE SENSOR CIRCUIT	3	—	×	EC-1014
P0200	INJECTOR CONTROL CIRCUIT	10	—	×	EC-1016
P0201	CYLINDER 1 INJECTOR CIRC	3	×	×	EC-1018
P0202	CYLINDER 2 INJECTOR CIRC	3	×	×	EC-1018
P0203	CYLINDER 3 INJECTOR CIRC	3	×	×	EC-1018
P0204	CYLINDER 4 INJECTOR CIRC	3	×	×	EC-1018
P0217	ENGINE OVERHEATING	10	—	—	EC-1021
P0225	PEDAL POTENTIOMETER CIRCUIT TRACK 1	3	×	—	EC-1024
P0226	BRAKE/ACCELERATOR PEDAL POSITIONS	3 or 10	×	×	EC-1026
P025A	FUEL PUMP MODULE CONTROL CIRCUIT	2	—	—	EC-1026
P025B	FUEL PUMP MODULE CONTROL CIRCUIT	2	—	—	EC-1026
P0335	ENGINE SPEED SENSOR SIGNAL	3	×	—	EC-1032
P0340	CAMSHAFT SENSOR CIRCUIT	3	×	—	EC-1034
P0380	PREHEATING UNIT DIAG CONN	3	—	—	EC-1036
P0402	EGR VALVE JAMMED OPEN	3	×	—	EC-1039
P0403	EGR VLV CMD CIRC	3	—	—	EC-1041
P0409	EGR VALVE POSITION SEN CIRC	3	×	—	EC-1044
P0470	TBN UPSTR PRS SEN CIRC	3	×	—	EC-1046
P0471	PRS UPSTR OF TBN	3	×	—	EC-1049
P0487	EGR VLV CMD CIRC	1	×	—	EC-1052
P0488	EGR VALVE POSITION CNTRL	1 or 3	×	—	EC-1054
P0530	RFRG TEMP PRESS SEN VOLT	1	—	—	EC-1056
P0544	TBN UPSTR TEMP SEN CIRC	3	×	—	EC-1058
P0560	COMPUTER SUPPLY VOLTAGE	3	—	—	EC-1060
P0564	SL LMTR/CC FNC	1	—	—	EC-1062
P0575	CC/SL LMTR BUTTONS	1	—	—	EC-1065
P060A	—	1	—	—	EC-1067
P060B	—	1	×	—	EC-1067

DTC*	Items (CONSULT screen terms)	Trip	MI lighting up		Reference
			Yellow	Red	
P061A	—	1 or 10	× or —	—	EC-1069
P0627	LOW PRES PMP REL CIRC	10	—	—	EC-1070
P062B	COMPUTER	3	—	×	EC-1072
P0638	INLET AIR FLAP POSITION CTRL	1 or 3	×	—	EC-1073
P0641	SEN SUPPLY N-1 VOL	3	—	×	EC-1075
P0651	SEN SUPPLY N-2 VOL	3	×	—	EC-1077
P0657	MAIN RELAY CONTROL CIRCUIT	10	—	—	EC-1079
P0697	SEN SUPPLY N-3 VOL	3	—	×	EC-1081
P0833	CLUTCH SWITCH SIGNAL CONSISTENCY	10	—	—	EC-1083
P1010	SWIRL FLAP	3	× or —	—	EC-1086
P1011	SWIRL FLAP CONTROL CIRCUIT	3	—	—	EC-1088
P1012	SWIRL FLAP	3	×	—	EC-1090
P1013	SWIRL FLAP POSITION SENSOR	3	—	—	EC-1092
P1453	DIFF. PRESSURE SENSOR CIRCUIT, PARTICLE FILTER	3	×	—	EC-1094
P1480	EXHAUST AIR FLAP FUNCTION	3	×	—	EC-1096
P1481	EXHAUST E/THROTTLE CONT ACTUATOR	3	—	—	EC-1099
P1482	EXHAUST THROTTLE POSITION SENSOR	3	×	—	EC-1102
P1483	EXHAUST AIR FLAP OFFSET	3	×	—	EC-1104
P1484	LOW PRESSURE EGR VALVE	3	×	—	EC-1107
P1485	LOW PRESSURE EGR VALVE CIRCUIT	3	—	—	EC-1110
P1486	LOW PRESSURE EGR VALVE POSITION SENSOR	3	×	—	EC-1113
P1487	LOW PRESSURE EGR VALVE	3	×	—	EC-1116
P1488	LOW PRESSURE EGR VALVE	3	×	—	EC-1119
P1489	LOW PRESSURE EGR VALVE TEMPERATURE SENSOR	1 or 3	—	—	EC-1122
P148A	HIGH PRESSURE EGR VALVE FUNCTION	3	—	—	EC-1122
P148B	LOW PRESSURE EGR VALVE FUNCTION	3	—	—	EC-1122
P148C	EXHAUST AIR FLAP FUNCTION	3	—	—	EC-1122
P1512	STARTER	1	—	—	EC-1122
P1525	CONSISTENT MULTIPLEX SIGNALS FOR CC/SL	1	—	—	EC-1133
P1544	TEMP SEN UPSTREAM OF PF	3	× or —	× or —	EC-1134
P1546	TEMP. UPSTREAM OF PF	10	—	×	EC-1137
P1589	GEAR BOX NEUTRAL CONTACTOR	10	—	—	EC-1137
P158A	END STROKE CLUTCH CONTACTOR	1	—	—	EC-1143
P160C	COMPUTER	3	×	—	EC-1145
P160D	COMPUTER	10	—	×	EC-1145
P1620	PROPOR RICH SEN FNC	10	—	—	EC-1146
P1641	THMPR 1 RLY C/CIR	10	—	—	EC-1148
P1642	THMPR 2 RLY C/CIR	10	—	—	EC-1151
P1643	THMPR 3 RLY C/CIR	10	—	—	EC-1154
P1650	STR MTR RELAY 2	1	—	—	EC-1157
P1655	ENGINE RESTART BYPASS RELAY	1	—	—	EC-1161
P1656	ENGINE RESTART BYPASS RELAY	1 or 10	—	—	EC-1165

ECM

< ECU DIAGNOSIS INFORMATION >

[R9M]

DTC*	Items (CONSULT screen terms)	Trip	MI lighting up		Reference
			Yellow	Red	
P1675	—	1	—	—	EC-1169
P2002	PARTICLE FILTER	1 or 2 or 3	× or —	× or —	EC-1172
P2080	TBN DOWNS TEMP REG	3	×	—	EC-1174
P2100	INLET AIR FLAP CIRCUIT	3	×	—	EC-1176
P2119	AIR INLET FLAP	3	×	—	EC-1179
P2120	PEDAL POTENTIOMETER CIRCUIT TRACK 2	3	×	—	EC-1180
P2226	ATMOS PRESS SEN	3	×	—	EC-1183
P2243	PROPOR RICH SEN CIRC	10	—	—	EC-1184
P2244	PROPOR RICH SEN CIRC	10	—	—	EC-1186
P2263	BOOST PRESSURE CIRCUIT	1	×	—	EC-1188
P2264	WATER IN DIESEL DETECTOR	10	—	—	EC-1191
P2452	P/FLT DIFF PRS SEN	3	×	—	EC-1193
P2504	CHARGING SYSTEM VOLTAGE	10	—	×	EC-1196
P253F	ENG OIL DILUTION	3	×	—	EC-1197
P2626	PROPOR RICH SEN CIRC	10	—	—	EC-1198
P2681	COOLANT CIRC SWITCHING S/V	10	—	× or —	EC-1200
P2A06	PROPOR RICH SEN CIRC	10	—	—	EC-1203

*: This number is prescribed by SAE J2012/ISO 15031-6.

DC/DC CONVERTER

< ECU DIAGNOSIS INFORMATION >

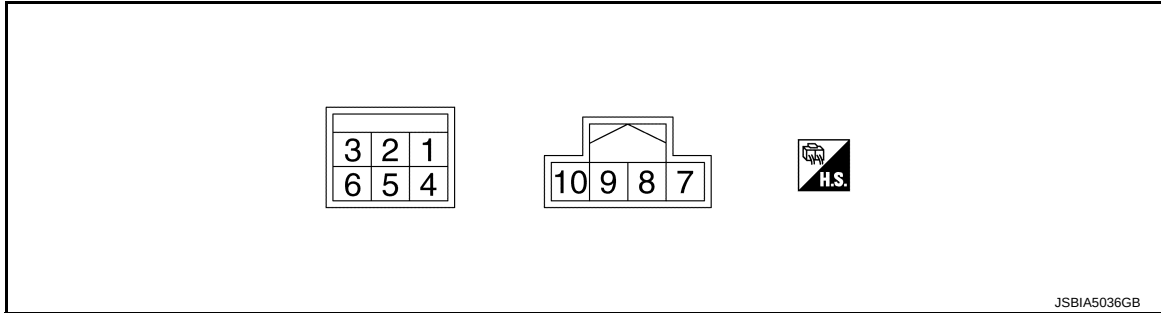
[R9M]

DC/DC CONVERTER

Reference Value

INFOID:000000010935591

TERMINAL LAYOUT



PHYSICAL VALUES

NOTE:

- DC/DC converter is located behind the glove upper box assembly. For this inspection, remove passenger side instrument lower panel.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT.

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
1 (LG)	2 (B)	Power supply input 1	Input	[Ignition switch: OFF]	9 - 13 V
2 (B)	—	Ground	—	—	—
3 (L)	2 (B)	Power supply input 2	Input	[Ignition switch: OFF]	9 - 13 V
4 (G)	2 (B)	Power supply output 1	Output	[Stop/start system operate] • While cranking of restart	12 V
				Except above	9 - 13 V
6 (W)	2 (B)	Power supply output 2	Output	[Stop/start system operate] • While cranking of restart	12 V
				Except above	9 - 13 V
7 (SB)	2 (B)	Engine communication line	Input/ Output	[Ignition switch: ON]	★ 0 - 12 V 1mSec/div 5V/div JPBIA4273ZZ
9 (LG)	2 (B)	Voltage stabilizer signal	Input	[Stop/start system operates] • While cranking of restart	★ Less than 2 V 100mSec/div 5V/div JSBIA5055GB
				Except above	Battery voltage

DC/DC CONVERTER

< ECU DIAGNOSIS INFORMATION >

[R9M]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
10 (R)	2 (B)	Ignition signal	Input	[Ignition switch: ON]	9 - 13 V
				[Ignition switch: OFF]	0 V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

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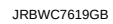
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[R9M]

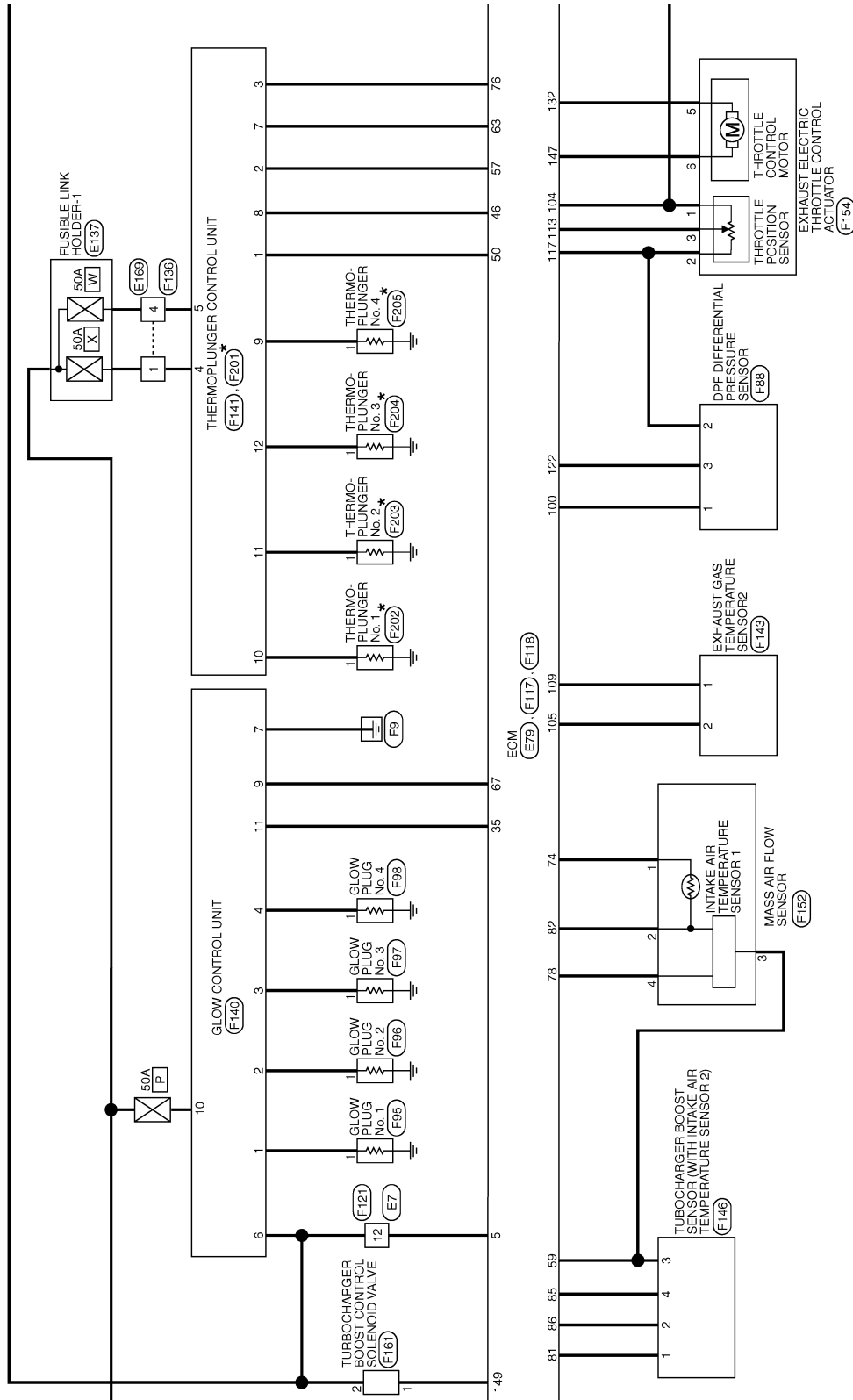
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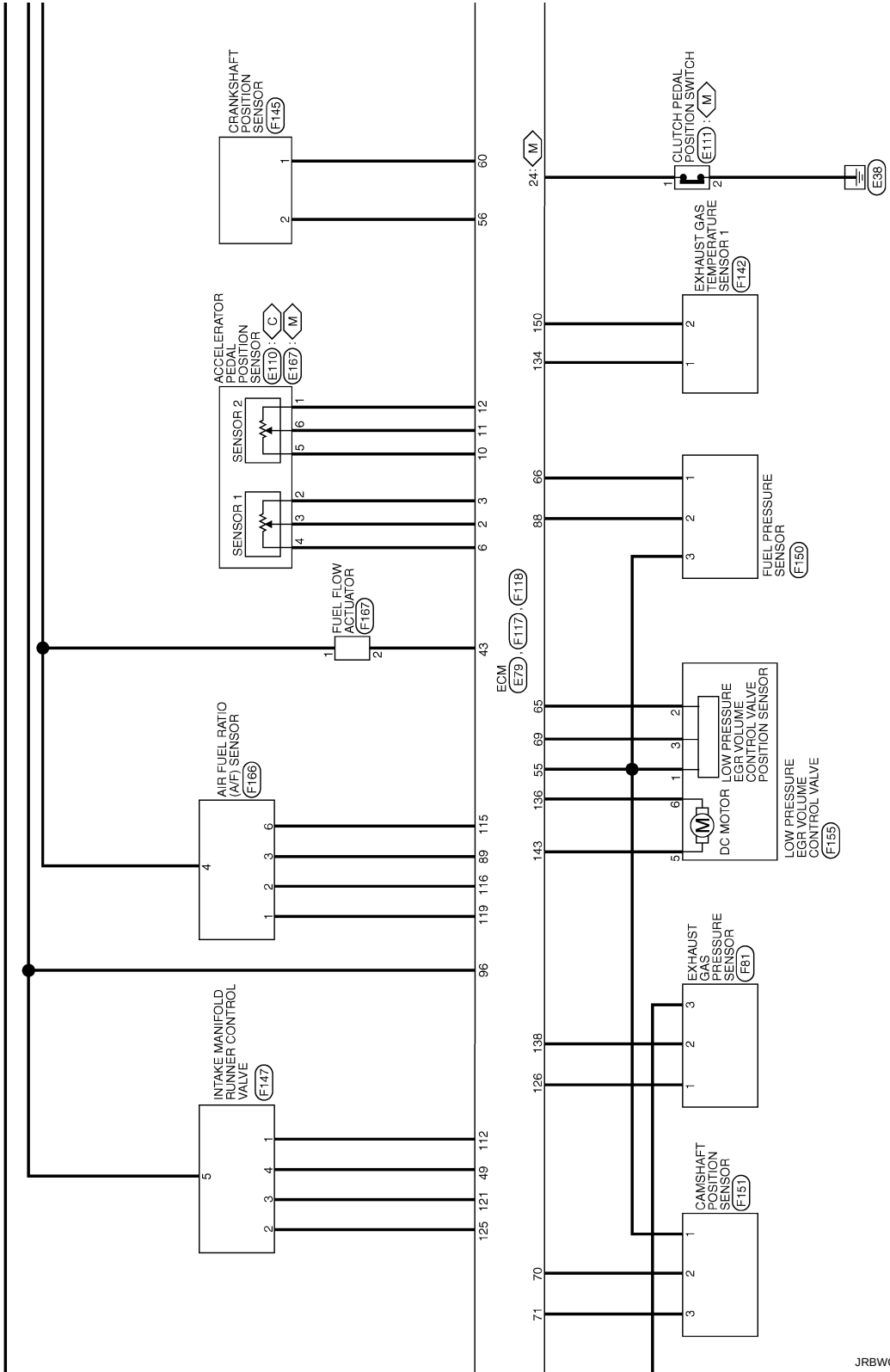
ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[R9M]

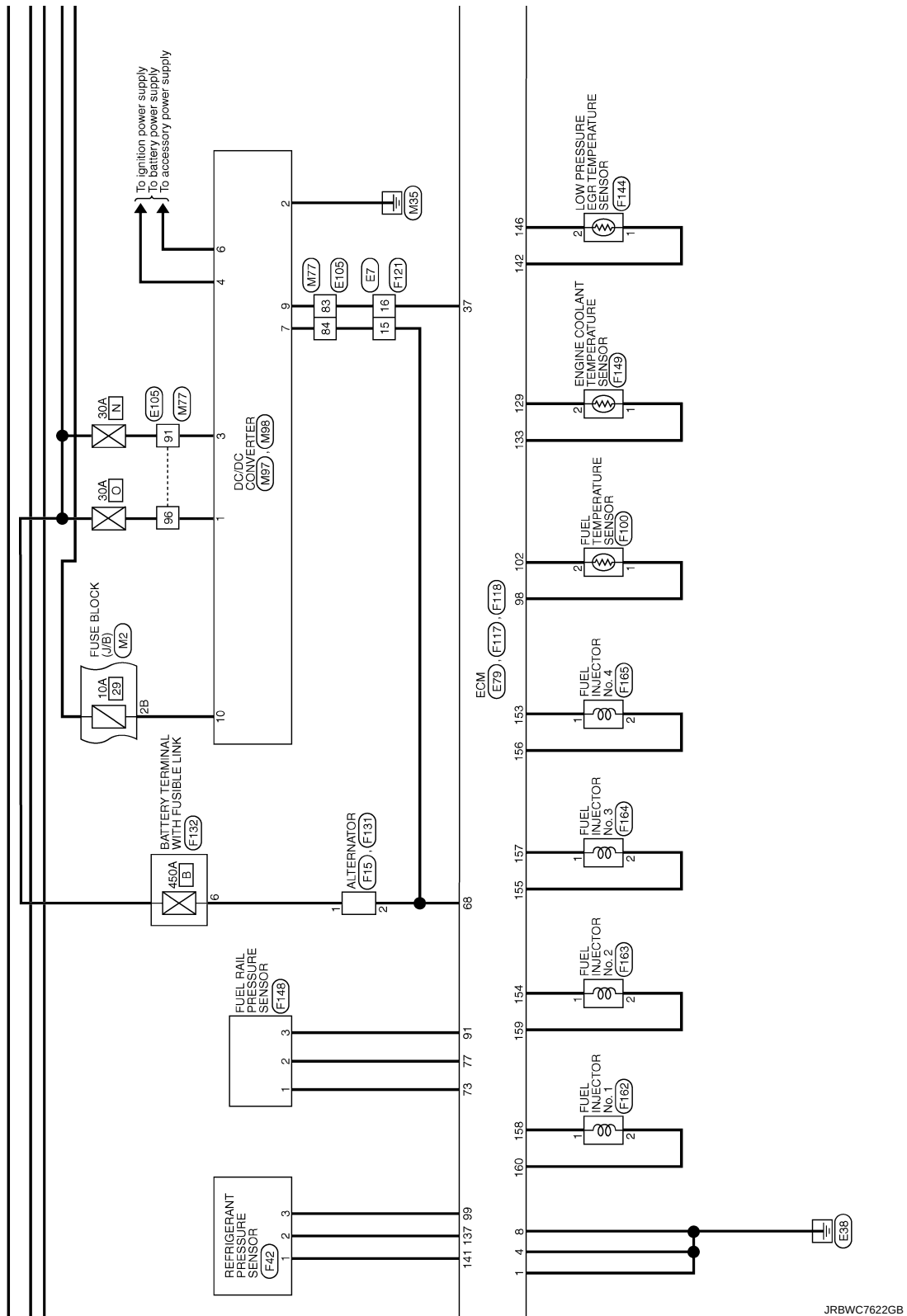


JRBWC7620GB



JRBWC7621GB

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[R9M]

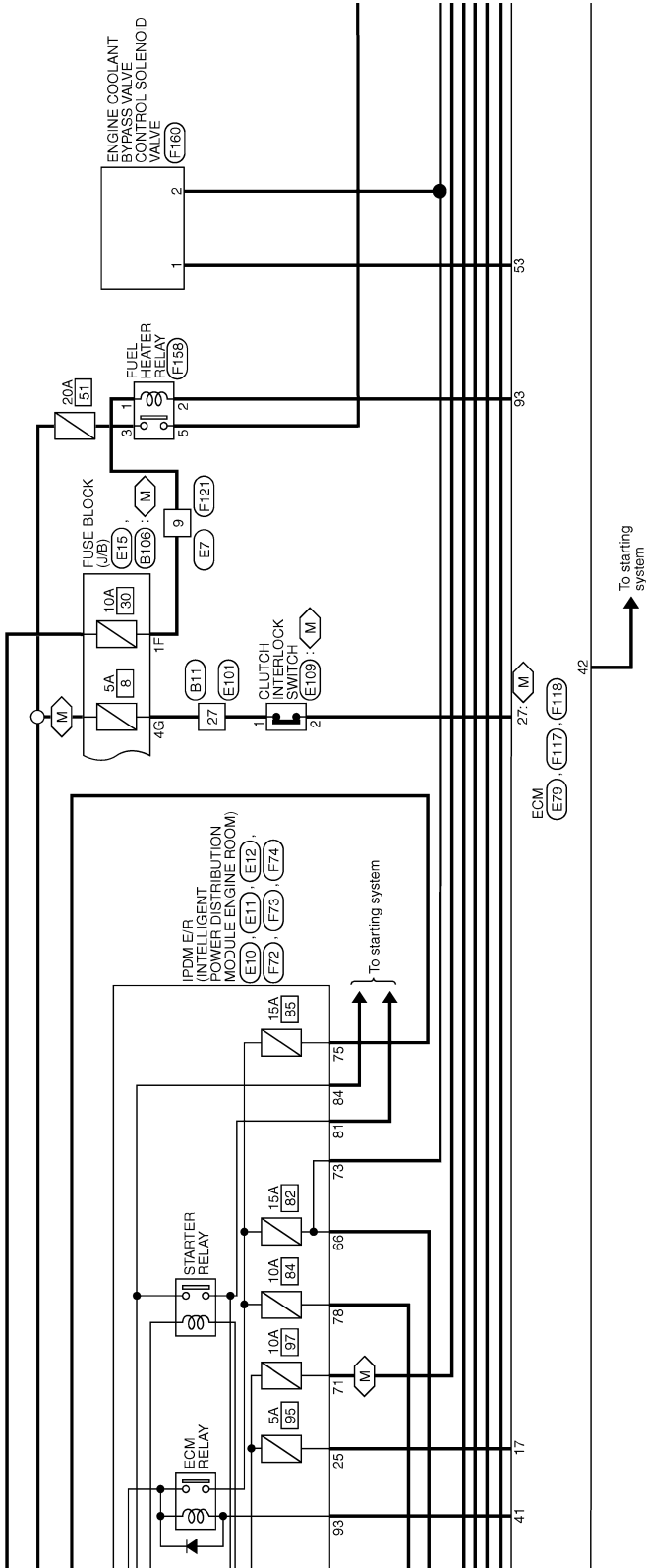
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ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[R9M]



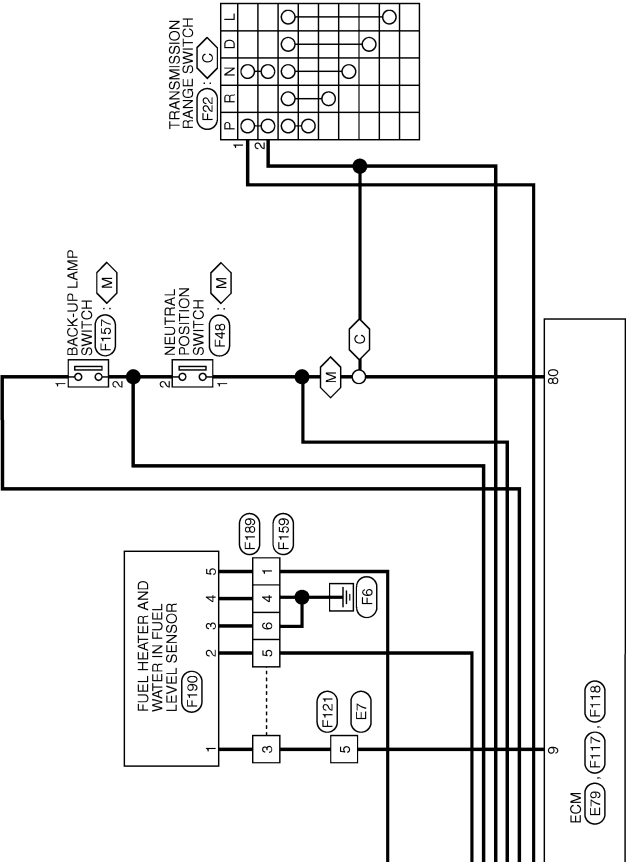
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ENGINE CONTROL SYSTEM

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[R9M]

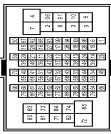
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ENGINE CONTROL SYSTEM (R9M ENGINE)

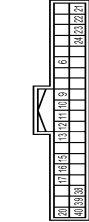
Connector No.	B1
Connector Name	WIRE TO WIRE
Connector Type	TH80MW-CS16-TM4



Connector No.	B11
Connector Name	WIRE TO WIRE
Connector Type	TH80MDGY-CS16-TM4



Connector No.	B47
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	TH40FC-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	-
2	LAY	-
6	V	-
7	LAV	-
20	LAL	- [With diesel engine]
21	B	- [With gasoline engine]
21	LAB	- [With diesel engine]
24	G	-
25	BR	-
73	LAY	-
74	R	-
75	R	-
84	L	-
85	L	-
92	LAR	-
93	LAL	-
95	LABR	-
97	L	-
98	Y	-
99	LAP	-
100	GR	- [With diesel engine]
100	LALGR	- [With gasoline engine]

Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	LABR	-
5	BG	-
11	BR	-
12	W	-
13	P	-
14	SB	-
15	V	-
16	P	-
17	P	-
18	G	-
19	P	-
20	R	-
21	BR	-
22	Y	-
23	BG	-
24	SB	-
25	G	-
26	B	-
27	P	-
28	R	-
29	LG	-
30	P	-
92	BR	-
93	GR	-
94	Y	-
95	LG	-
97	LG	-

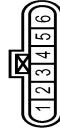
Terminal No.	Color Of Wire	Signal Name [Specification]
6	R	BACK DOOR OPENER REQUEST SW
9	G	HANDS FREE SENSOR
10	W	REAR RH DOOR SW
11	LG	BACK DOOR SW
12	R	REAR LH DOOR SW
13	SB	PASSENGER DOOR SW
15	LAG	REAR WIPER AUTO STOP
16	Y	BACK DOOR OPENER SW
17	SB	DRIVER DOOR SW
20	L	CANH
21	BR	BUMPER ANTENNA(-)
22	Y	REAR ANTENNA(-)
23	L	REAR ANTENNA(+)
24	G	BUMPER ANTENNA(+)
38	V	SIREN
39	LAW	HIGH-MOUNTED STOP LAMP
40	P	CAN-L

Connector No.	B106
Connector Name	FUSE BLOCK (JIB)
Connector Type	NS06FW-CS



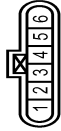
Terminal No.	Color Of Wire	Signal Name [Specification]
1G	LA/R	-
2G	P	-
3G	G	-
4G	P	-
5G	G	-

Connector No.	B130
Connector Name	FUEL LEVEL SENSOR UNIT AND FUEL PUMP
Connector Type	ED06FGY-RS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	GY	-
2	GR	-
3	GY	-
4	GR	-
5	W	-
6	B	-

Connector No.	B131
Connector Name	FUEL PUMP CONTROL MODULE
Connector Type	ED06FGY-RS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	-
2	W	-
3	GY	-
4	GR	-

ENGINE CONTROL SYSTEM (R9M ENGINE)

5	G/Y	-
6	G/R	-

Connector No.	B132
Connector Name	FUEL PUMP CONTROL MODULE
Connector Type	FEA02FBR-RZ



Terminal No.	7	8
Color Of Wire	B	GR
Signal Name [Specification]	-	-

Connector No.	B133
Connector Name	FUEL PUMP CONTROL MODULE
Connector Type	RH-MFB



Terminal No.	9	10	11	12
Color Of Wire	BR	G	L	B
Signal Name [Specification]	-	-	-	-

Connector No.	E7
Connector Name	WIRE TO WIRE
Connector Type	NS16MBR-CS



1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21

Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	- [With MR20 or QR25 engine]
2	SB	- [With R9M engine]
3	GR	- [With MR20 or QR25 engine]
4	GR	- [With R9M engine]
5	B	- [With MR20 engine]
6	L	- [With QR25 engine]
7	G	- [With R9M engine]
8	V	- [With MR20 engine or R9M engine]
9	BR	- [With QR25 engine]
10	BR	- [With R9M engine]
11	Y	- [With MR20 engine]
12	L	- [With R9M engine]
13	BR	- [With QR25 engine]
14	R	- [With MR20 or QR25 engine]
15	L	- [With R9M engine]
16	SB	-

Connector No.	E10
Connector Name	FROM INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	NS16FGY-CS



9	8	7	6	5	4	3
17	16	15	14	13	12	11

Terminal No.	Color Of Wire	Signal Name [Specification]
3	P	-
4	Y	-
7	L	-
8	RG	-
9	L	-
12	B	-
16	G	-
17	W	-

Connector No.	E11
Connector Name	FROM INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	reseat: 2434D5408R



19	20	21
22	23	24

Terminal No.	Color Of Wire	Signal Name [Specification]
19	V	-
20	R	-
21	LG	-
22	Y	-
23	B	-
24	W	-

Connector No.	E12
Connector Name	FROM INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	TH24FGY-NH



136	135	134	133	132	131	130
129	128	127	126	125	124	123
122	121	120	119	118	117	116

Terminal No.	Color Of Wire	Signal Name [Specification]
25	LG	-
26	W	-
27	SB	-
28	P	-
30	L	-
31	G	-
32	B	-
33	BG	-
34	LG	-
35	V	-
36	Y	-
37	B	-
38	GR	-
39	BR	-
45	L	-
46	P	-
47	W	-
48	R	-

Connector No.	E15
Connector Name	FUSE BLOCK (J/B)
Connector Type	NS10FW-CS



14	13	12	11	10	9	8
7	6	5	4	3	2	1

ENGINE CONTROL SYSTEM

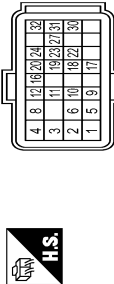
< WIRING DIAGRAM >

[R9M]

ENGINE CONTROL SYSTEM (R9M ENGINE)

Terminal No.	Color Of Wire	Signal Name [Specification]
10F	L	-
1F	W	-
5F	V	-
6F	Y	-

Connector No.	E79
Connector Name	ECM
Connector Type	RH24FB-R28-R-RH



Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	ECM GROUND
2	W	ACCELERATOR PEDAL POSITION SENSOR 1
3	Y	SENSOR GROUND ACCELERATOR PEDAL POSITION SENSOR 1
4	B	ECM GROUND
5	L	POWER SUPPLY FOR ECM
6	G	SENSOR POWER SUPPLY ACCELERATOR PEDAL POSITION SENSOR 1
8	B	ECM GROUND
9	L	FUEL HEATER AND WATER IN FUEL LEVEL SENSOR
10	L	SENSOR POWER SUPPLY FUEL INJECTOR PEDAL POSITION SENSOR 2
11	V	ACCELERATOR PEDAL POSITION SENSOR 2
12	P	SENSOR GROUND ACCELERATOR PEDAL POSITION SENSOR 2
16	BG	STOP LAMP SWITCH [With M/T]
16	R	BRAKE PEDAL POSITION SWITCH [With CVT]
17	LG	IGNITION SWITCH
18	G	ASCD STEERING SWITCH
19	BR	SENSOR GROUND (ASCD STEERING SWITCH)
20	BR	FUEL PUMP CONTROL MODULE (COMMAND)
22	G	FUEL PUMP CONTROL MODULE (DIAGNOSIS)
23	V	SPEED LIMITER MAIN SWITCH
24	R	CLUTCH PEDAL POSITION SWITCH
27	V	CLUTCH INTERLOCK SWITCH
30	BR	ASCD MAIN SWITCH
31	P	CANH
32	L	CANH

Connector No.	E101
Connector Name	WIRE TO WIRE
Connector Type	TH80FDGY-C516-TM4



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	W	-
5	G	-
11	BR	-
12	W	-
13	P	-
14	SB	-
15	V	-
16	P	-
17	P	-
18	G	-
19	P	-
20	G	-
21	BR	-
22	LG	-
23	Y	-
24	SB	-
25	G	-
26	B	-
27	P	-
28	R	-
29	LG	-
30	P	-
92	BR	-
93	GR	-
94	R	-
95	L	-
97	LG	-

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-C516-TM4



Terminal No.	Color Of Wire	Signal Name [Specification]
2	W	-
5	V	- [Without ISS]
8	W	- [With ISS]
9	L	-
10	LG	-
20	W	-
21	B	-
22	SHIELD	-
31	Y	-
32	W	-
33	SB	-
34	LG	-
35	BG	-
36	LG	-
37	V	-
38	G	-
39	BR	-
40	L	-
41	P	-
47	GR	-
48	SB	-
51	P	-
52	L	-
53	W	-
54	Y	-
55	BR	-
56	P	-
57	B	-
58	L	-
59	W	-
60	G	-
61	BR	-
62	V	-
63	BR	-
64	GR	-

65	LG	-
66	BG	-
67	L	-
68	R	-
71	V	-
72	L	-
73	R	-
76	L	-
77	V	-
78	LG	-
79	SHIELD	-
80	GR	-
82	Y	-
83	SB	-
84	L	-
85	G	-
86	Y	-
87	B	-
88	B	-
91	R	-
92	BR	-
93	W	-
96	GR	-
97	R	-
98	V	-
99	Y	-

Connector No.	E109
Connector Name	CLUTCH INTERLOCK SWITCH
Connector Type	M02FBR-LC



Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	-
2	V	-

JRBWC7628GB

ENGINE CONTROL SYSTEM (R9M ENGINE)

Connector No.	E110
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Type	RH06FB



Connector No.	E112
Connector Name	BRAKE PEDAL POSITION SWITCH
Connector Type	M02FBR-LC



Connector No.	E137
Connector Name	FUSIBLE LINK HOLDER-1
Connector Type	24390_JL00A



Connector No.	E169
Connector Name	WIRE TO WIRE
Connector Type	M06MW-LC



Terminal No.	Color Of Wire	Signal Name [Specification]
1	LG	- [With MR20 or QR25 Engine]
1	P	- [With R9M Engine]
2	R	- [With MR20 or QR25 Engine]
2	Y	- [With R9M Engine]
3	GR	- [With MR20 or QR25 Engine]
3	W	- [With R9M Engine]
4	G	- [With R9M Engine]
4	V	- [With MR20 or QR25 Engine]
5	L	- [With R9M Engine]
5	SB	- [With MR20 or QR25 Engine]
6	V	- [With R9M Engine]
6	Y	- [With MR20 or QR25 Engine]

Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	-
2	GR	- [With MR20 or QR25 Engine]
2	R	- [With R9M Engine]

Terminal No.	Color Of Wire	Signal Name [Specification]
W	W	-
X	W	-

Connector No.	E121
Connector Name	STOP LAMP SWITCH
Connector Type	M04FW-LC



Connector No.	E167
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Type	RH06FB



Connector No.	E111
Connector Name	CLUTCH PEDAL POSITION SWITCH
Connector Type	M02FBR-LC



Terminal No.	Color Of Wire	Signal Name [Specification]
1	V	-
2	LG	-
3	Y	-
4	W	-

Terminal No.	Color Of Wire	Signal Name [Specification]
1	LG	- [With MR20 engine]
1	P	- [With R9M Engine]
2	R	- [With MR20 engine]
2	Y	- [With R9M Engine]
3	GR	- [With MR20 engine]
3	W	- [With R9M Engine]
4	G	- [With MR20 engine]
4	V	- [With R9M Engine]
5	L	- [With MR20 engine]
5	SB	- [With R9M Engine]
6	V	- [With MR20 engine]
6	Y	- [With MR20 engine]

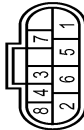
Connector No.	F15
Connector Name	ALTERNATOR
Connector Type	RH02FB



Terminal No.	Color Of Wire	Signal Name [Specification]
2	G	-

ENGINE CONTROL SYSTEM (R9M ENGINE)

Connector No.	F22
Connector Name	TRANSMISSION RANGE SWITCH
Connector Type	YDX06FB-HS4



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	-
2	GR	-
3	W	-
4	V	-
5	G	-
6	BR	-
7	Y	-
8	GR	-

Connector No.	F42
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Type	RK03FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	- [With QR25 engine]
1	R	- [With MR20 engine]
1	V	- [With R9M Engine]
2	P	- [With MR20 or QR25 Engine]
2	SB	- [With R9M Engine]
3	BG	- [With QR25 engine]
3	I	- [With R9M Engine]
3	Y	- [With MR20 engine]

Connector No.	F43
Connector Name	BATTERY CURRENT SENSOR
Connector Type	RH4FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	OUTPUT
2	W	GND
3	SB	TEMP
4	LG	PWR

Connector No.	F48
Connector Name	NEUTRAL POSITION SWITCH
Connector Type	RK02FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	SB	-
2	R	-

Connector No.	F72
Connector Name	POWER INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	INS16FM-CS



Terminal No.	Color Of Wire	Signal Name [Specification]
65	P	-
66	L	- [With R9M Engine]
66	R	- [With MR20 or QR25 Engine]
67	V	-
70	BG	- [With CVT]
70	GR	- [With MT]
71	SB	-
72	GR	-
73	R	- [With R9M Engine]
73	Y	- [With MR20 or QR25 Engine]
75	BR	- [With MR20 or QR25 Engine]
75	L	- [With R9M Engine]
76	P	-
78	L	- [With QR25 engine]
78	R	- [With R9M Engine]
79	G	-

Connector No.	F73
Connector Name	POWER INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	YLA06FGY



Terminal No.	Color Of Wire	Signal Name [Specification]
81	G	-
83	L	-
84	GR	-
85	P	-

86	LG	-

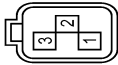
Connector No.	F74
Connector Name	POWER INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	TH24FB-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
87	L	-
88	P	-
88	W	-
90	R	-
92	GR	-
93	G	- [With R9M Engine]
93	P	- [With MR20 or QR25 Engine]
94	SB	-
95	LG	-
96	W	-
97	P	-
98	Y	-
99	BG	-
100	LG	-
101	V	-
102	Y	-
105	W	-
106	BR	-
107	V	-
110	SB	-

ENGINE CONTROL SYSTEM (R9M ENGINE)

Connector No.	F81
Connector Name	EXHAUST GAS PRESSURE SENSOR
Connector Type	AZZ03FB1



Terminal No.	Wire	Signal Name [Specification]
1	W	-
2	L	-
3	R	-

Connector No.	F88
Connector Name	DPF DIFFERENTIAL PRESSURE SENSOR
Connector Type	BOSCH 1929404873



Terminal No.	Wire	Signal Name [Specification]
1	R	-
2	L	-
3	Y	-

Connector No.	F95
Connector Name	GLOW PLUG No.1
Connector Type	AZZ01FB-1V



Terminal No.	Wire	Signal Name [Specification]
1	W	-

Connector No.	F96
Connector Name	GLOW PLUG No.2
Connector Type	AZZ01FB-1V



Terminal No.	Wire	Signal Name [Specification]
1	G	-

Connector No.	F97
Connector Name	GLOW PLUG No.3
Connector Type	AZZ01FB-1V



Terminal No.	Wire	Signal Name [Specification]
1	LG	-

Connector No.	F98
Connector Name	GLOW PLUG No.4
Connector Type	AZZ01FB-1V



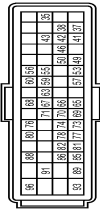
Terminal No.	Wire	Signal Name [Specification]
1	L	-

Connector No.	F100
Connector Name	FUEL TEMPERATURE SENSOR
Connector Type	FEA02GV-LC



Terminal No.	Wire	Signal Name [Specification]
1	P	-
2	G	-

Connector No.	F117
Connector Name	ECM
Connector Type	RH56FB-EZ8-R-LH



Terminal No.	Color Of Wire	Signal Name [Specification]
35	R	GLOW PLUG CONTROL (COMMAND)
37	LG	VOLTAGE STABILIZER SIGNAL
38	GR	FUEL PUMP RELAY CONTROL
41	G	ECM RELAY (SELF SHUT-OFF)
42	Y	RESTART RELAY
43	R	FUEL FLOW ACTUATOR
46	V	THERMOPLUNGER RELAY 2
49	P	INTAKE MANIFOLD INJETER CONTROL VALVE MOTOR (2)
50	BG	THERMOPLUNGER RELAY 1
53	Y	THERMAL MANAGEMENT CONTROL VALVE
55	R	CRANKSHAFT POSITION SENSOR (POS)
56	B	THERMOPLUNGER RELAY 3
57	SB	SENSOR POWER SUPPLY (CRANKSHAFT POSITION SENSOR)
59	Y	SENSOR POWER SUPPLY (THERMOPLUNGER RELAY 3)
60	R	SENSOR POWER SUPPLY (THERMOPLUNGER RELAY 2)
63	LG	THERMOPLUNGER DIAGNOSIS 1
65	SB	SENSOR GROUND (FUEL PRESSURE SENSOR)
66	SB	SENSOR GROUND (FUEL PRESSURE SENSOR)
67	W	GLOW PLUG CONTROL (DIAGNOSIS)
68	G	ENGINE COMMUNICATION LINE
69	GR	LOW PRESSURE FUEL VOLUME CONTROL VALVE POSITION SENSOR
70	Y	SENSOR GROUND (CAMSHAFT POSITION SENSOR)
71	L	CAMSHAFT POSITION SENSOR
73	B	SENSOR GROUND (FUEL RAIL PRESSURE SENSOR)
74	BR	INTAKE AIR TEMPERATURE SENSOR 1
76	BR	THERMOPLUNGER DIAGNOSIS 2
77	L	FUEL RAIL PRESSURE SENSOR
78	GR	MASS AIR FLOW SENSOR
80	W	PNP SIGNAL
81	P	PNP SIGNAL
82	V	SENSOR POWER SUPPLY (TURBOCHARGER BOOST SENSOR)
85	G	TURBOCHARGER BOOST SENSOR
86	R	INTAKE AIR TEMPERATURE SENSOR 2
88	W	FUEL PRESSURE SENSOR
89	BR	AF SENSOR HEATER
91	G	SENSOR POWER SUPPLY (FUEL RAIL PRESSURE SENSOR)

ENGINE CONTROL SYSTEM

[R9M]

< WIRING DIAGRAM >

ENGINE CONTROL SYSTEM (R9M ENGINE)

93	B	FUEL HEATER RELAY CONTROL
96	R	POWER SUPPLY FOR ECM (BACK-UP)

Connector No.	F118
Connector Name	ECM
Connector Type	RH46FGY-R28-R-LH



Terminal No.	Color Of Wire	Signal Name [Specification]
98	P	FUEL TEMPERATURE SENSOR
99	L	SENSOR POWER SUPPLY (DEPENDENT PRESSURE SENSOR)
100	R	SENSOR POWER SUPPLY (DEPENDENT PRESSURE SENSOR)
102	G	SENSOR GROUND (FUEL TEMPERATURE SENSOR)
103	GR	SENSOR GROUND (THROTTLE POSITION SENSOR)
104	LG	SENSOR POWER SUPPLY (BOOST THROTTLE POSITION SENSOR)
105	LG	EXHAUST GAS TEMPERATURE SENSOR 2
106	BG	HIGH-PRESSURE OIL VOLUME CONTROL VALVE POSITION SENSOR
107	Y	THROTTLE POSITION SENSOR
108	R	SENSOR GROUND (EXHAUST GAS TEMPERATURE SENSOR 2)
109	V	SENSOR GROUND (THROTTLE POSITION SENSOR)
110	L	SENSOR GROUND (DEPENDENT PRESSURE SENSOR)
112	LG	SENSOR POWER SUPPLY (DEPENDENT PRESSURE SENSOR)
113	R	EXHAUST THROTTLE POSITION SENSOR
115	B	A/F SENSOR VOLTAGE NERNST 1
116	W	SENSOR GROUND (A/F FUEL RATE (A/F) SENSOR 1)
117	Y	SENSOR GROUND (EXHAUST THROTTLE POSITION SENSOR)
119	BG	A/F SENSOR CURRENT PUMP 1
121	L	IN-TAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR
122	Y	DPF DIFFERENTIAL PRESSURE SENSOR
125	W	SENSOR GROUND (EXHAUST GAS TEMPERATURE SENSOR)
126	W	SENSOR GROUND (EXHAUST GAS TEMPERATURE SENSOR)
129	P	ENGINE COOLANT TEMPERATURE SENSOR
132	BR	EXHAUST ELECTRIC THROTTLE CONTROL MOTOR (1)
133	B	SENSOR POWER SUPPLY (ENGINE COOLANT TEMPERATURE SENSOR)
134	R	SENSOR GROUND (EXHAUST GAS TEMPERATURE SENSOR)
136	W	SENSOR GROUND (EXHAUST GAS TEMPERATURE SENSOR)
137	SB	REFRIGERANT PRESSURE SENSOR
138	W	EXHAUST GAS PRESSURE SENSOR
140	W	ELECTRIC THROTTLE CONTROL MOTOR (2)
141	V	SENSOR GROUND (REFRIGERANT PRESSURE SENSOR)
142	G	SENSOR GROUND (LOW PRESSURE EST. IN-TAKE VOLUME SENSOR)

33	L	CANH
34	W	OUTPUT PRESSURE SENSOR
35	GR	PRIMARY SPEED SENSOR
37	Y	SELECT SOLENOID VALVE
38	G	TORQUE CONVERTER CLUTCH SOLENOID VALVE
39	W	SECONDARY PRESSURE SOLENOID VALVE
40	V	PRIMARY PRESSURE SOLENOID VALVE
41	B	GROUND
42	B	GROUND
45	V	BATTERY POWER SUPPLY
46	V	BATTERY POWER SUPPLY
47	BG	IGNITION POWER SUPPLY
48	BG	IGNITION POWER SUPPLY

Connector No.	F121
Connector Name	WIRE TO WIRE
Connector Type	NS16FBR-CS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	- [With MR20 or QR25 engine]
1	P	- [With R3M engine]
2	BR	- [With MR20 engine]
2	GR	- [With QR25 engine]
2	Y	- [With R3M engine]
3	G	-
4	BG	-
5	B	- [With MR20 engine]
5	L	- [With R3M engine]
5	LG	- [With QR25 engine]
6	V	-
7	G	-
8	V	- [With MR20 engine or R3M engine]
8	W	- [With QR25 engine]
9	B	- [With MR20 engine]
9	W	- [With R3M engine]
10	BR	- [Without ISS]
11	P	- [Without ISS]
11	R	- [With ISS]
12	G	- [With QR25 engine]
12	L	- [With R3M engine]

13	R	- [With R3M engine]
13	Y	- [With MR20 or QR25 engine]
15	L	-
16	LG	-

Connector No.	F131
Connector Name	ALTERNATOR
Connector Type	24340-EN013



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	-

Connector No.	F132
Connector Name	BATTERY TERMINAL WITH FUSIBLE LINK
Connector Type	24340-1M32A



Terminal No.	Color Of Wire	Signal Name [Specification]
6	BR	-

JRBWC7632GB

ENGINE CONTROL SYSTEM (R9M ENGINE)

Connector No.	F133
Connector Name	BATTERY TERMINAL WITH FUSIBLE LINK
Connector Type	24340_JA040



Connector No.	F136
Connector Name	WIRE TO WIRE
Connector Type	M06FW-LC



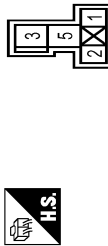
Connector No.	F138
Connector Name	ENGINE RESTART BYPASS RELAY
Connector Type	E-BAG



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	G	-
3	LG	-
4	L	-
6	R	-
7	GR	-
9	W	-
10	W	-
11	R	-

Terminal No.	5
Color Of Wire	B/R
Signal Name [Specification]	-

Connector No.	F134
Connector Name	ENGINE RESTART BYPASS CONTROL RELAY
Connector Type	24381_4B1A



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	-
2	BG	-
3	L	-
4	W	-
5	BG	-
6	W	-

Terminal No.	3
Color Of Wire	B/R
Signal Name [Specification]	-

Connector No.	F139
Connector Name	ENGINE RESTART BYPASS RELAY
Connector Type	X01FGY



Connector No.	F141
Connector Name	THERMOPLUNGER CONTROL UNIT
Connector Type	F14005B-ANZZ

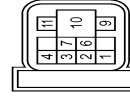


Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	L	-
3	W	-
5	R	-

Terminal No.	1
Color Of Wire	R
Signal Name [Specification]	-

Terminal No.	2
Color Of Wire	B/R
Signal Name [Specification]	-

Connector No.	F140
Connector Name	GLOW CONTROL UNIT
Connector Type	renault_8200594070



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	-
2	SB	-
3	BR	-
4	L	-
5	W	-
7	LG	-
8	V	-

ENGINE CONTROL SYSTEM (R9M ENGINE)

Connector No.	F142
Connector Name	EXHAUST TEMPERATURE SENSOR 1
Connector Type	RHD2FBR



Connector No.	F144
Connector Name	LOW PRESSURE EGR TEMPERATURE SENSOR
Connector Type	RHD2FB



Connector No.	F146
Connector Name	TURBOCHARGER BOOST SENSOR WITH INTAKE AIR TEMPERATURE SENSOR-2
Connector Type	RHD4FB



Connector No.	F148
Connector Name	FUEL RAIL PRESSURE SENSOR
Connector Type	Renault 8200221874



Terminal Color Of No.	Wire	Signal Name [Specification]
1	R	-
2	Y	-

Terminal Color Of No.	Wire	Signal Name [Specification]
1	G	-
2	BR	-

Terminal Color Of No.	Wire	Signal Name [Specification]
1	P	-
2	R	-
3	Y	-
4	G	-

Terminal Color Of No.	Wire	Signal Name [Specification]
1	B	-
2	L	-
3	G	-

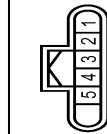
Connector No.	F143
Connector Name	EXHAUST GAS TEMPERATURE SENSOR2
Connector Type	RHD2FLGY



Connector No.	F145
Connector Name	CRANKSHAFT POSITION SENSOR
Connector Type	RHD2FGY



Connector No.	F147
Connector Name	INTAKE MANIFOLD RUNNER CONTROL VALVE
Connector Type	RHD6FB



Connector No.	F149
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Type	RHD2FB



Terminal Color Of No.	Wire	Signal Name [Specification]
1	V	-
2	LG	-

Terminal Color Of No.	Wire	Signal Name [Specification]
1	R	-
2	B	-

Terminal Color Of No.	Wire	Signal Name [Specification]
1	LG	-
2	W	-
3	L	-
4	P	-
5	R	-

Terminal Color Of No.	Wire	Signal Name [Specification]
1	B	-
2	P	-

ENGINE CONTROL SYSTEM (R9M ENGINE)

Connector No.	F150
Connector Name	FUEL PRESSURE SENSOR
Connector Type	RH03FB



Connector No.	F152
Connector Name	MASS AIR FLOW SENSOR
Connector Type	RH04FB



Connector No.	F154
Connector Name	EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR
Connector Type	RH06FB



Connector No.	F156
Connector Name	HIGH PRESSURE EGR VOLUME CONTROL VALVE
Connector Type	RH06FB



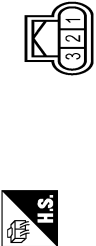
Terminal Color Of No.	Wire	Signal Name [Specification]
1	SB	-
2	W	-
3	L	-

Terminal Color Of No.	Wire	Signal Name [Specification]
1	BR	SGN
2	Y	SV
3	L	GND
4	GR	SGN

Terminal Color Of No.	Wire	Signal Name [Specification]
1	LG	+
2	Y	GND
3	B	SGN
4	BR	MOR
5	GR	MOR

Terminal Color Of No.	Wire	Signal Name [Specification]
1	B	MOR+
2	W	MOR-
3	R	+SV
4	L	GND
5	BG	SGN

Connector No.	F151
Connector Name	CAMSHAFT POSITION SENSOR
Connector Type	RH03FB



Connector No.	F153
Connector Name	ELECTRIC THROTTLE CONTROL ACTUATOR
Connector Type	RH06FB



Connector No.	F155
Connector Name	LOW PRESSURE EGR VOLUME CONTROL VALVE
Connector Type	RH06FB



Connector No.	F157
Connector Name	BACK-UP LAMP SWITCH
Connector Type	RH02FB



Terminal Color Of No.	Wire	Signal Name [Specification]
1	R	-
2	Y	-
3	L	-

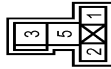
Terminal Color Of No.	Wire	Signal Name [Specification]
1	L	+SV
2	GR	GND
3	Y	SGN
4	SB	MOR+
5	W	MOR-

Terminal Color Of No.	Wire	Signal Name [Specification]
1	R	+SV
2	SB	GND
3	GR	SGN
4	B	MOR
5	W	MOR
6	W	MOR

Terminal Color Of No.	Wire	Signal Name [Specification]
1	G	-
2	W	-

ENGINE CONTROL SYSTEM (R9M ENGINE)

Connector No.	F158
Connector Name	FUEL HEATER RELAY
Connector Type	24381-4BA1A



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	B	-
3	R	-
5	W	-

Connector No.	F159
Connector Name	WIRE TO WIRE
Connector Type	RS06FB-PR



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
3	L	-
4	B	-
5	R	-
6	B	-

Connector No.	F160
Connector Name	ENGINE COOLANT BYPASS VALVE CONTROL SOLENOID VALVE
Connector Type	BS02FB-AHY-S



Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	-
2	R	-

Connector No.	F161
Connector Name	TURBOCHARGER BOOST CONTROL SOLENOID VALVE
Connector Type	BS02FB-AHY-S



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	L	-

Connector No.	F162
Connector Name	FUEL INJECTOR No.1
Connector Type	BOSCH 1929404072



Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	-
2	L	-

Connector No.	F163
Connector Name	FUEL INJECTOR No.2
Connector Type	BOSCH 1929404072



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	-
2	W	-

Connector No.	F164
Connector Name	FUEL INJECTOR No.3
Connector Type	BOSCH 1929404072



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	G	-

Connector No.	F165
Connector Name	FUEL INJECTOR No.4
Connector Type	BOSCH 1929404072



Terminal No.	Color Of Wire	Signal Name [Specification]
1	V	-
2	L	-

ENGINE CONTROL SYSTEM (R9M ENGINE)

Connector No.	F166
Connector Name	AIR FUEL RATIO (AF) SENSOR
Connector Type	RH46FB



Connector No.	F168
Connector Name	COOLING FAN RELAY-2
Connector Type	24347_9F900



Connector No.	F170
Connector Name	RESISTOR
Connector Type	renault_8200573202



Connector No.	F190
Connector Name	FUEL HEATER AND WATER IN FUEL LEVEL SENSOR
Connector Type	RS08FGY-1V



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	-
2	W	-
3	BR	-
4	G	-
6	B	-

Connector No.	F167
Connector Name	FUEL FLOW ACTUATOR
Connector Type	BOSCH_1929404072



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	-
2	BR	-
3	BR	-
4	BR	-

Connector No.	F169
Connector Name	COOLING FAN MOTOR
Connector Type	renault_243407063R



Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	-
2	G	-

Connector No.	F189
Connector Name	WIRE TO WIRE
Connector Type	RS06MB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
3	L	-
4	B	-
5	R	-
6	B	-

Terminal No.	Color Of Wire	Signal Name [Specification]
9	-	BOUGIE 4 (B4)
10	-	BOUGIE 1 (B1)
11	-	BOUGIE 2 (B2)
12	-	BOUGIE 3 (B3)

Connector No.	F201
Connector Name	THERMOPIPLINGER CONTROL UNIT
Connector Type	renault_8200538707



ENGINE CONTROL SYSTEM (R9M ENGINE)

Connector No.	F202
Connector Name	THERMOPLUNGER No.1
Connector Type	SIAC, 5721-M



Terminal No.	Color Of Wire	Signal Name [Specification]
1	-	THERMOPLUNGER No. 3

Connector No.	F205
Connector Name	THERMOPLUNGER No.4
Connector Type	SIAC, 5721-M



Terminal No.	Color Of Wire	Signal Name [Specification]
1	-	THERMOPLUNGER No. 1

Connector No.	F203
Connector Name	THERMOPLUNGER No.2
Connector Type	SIAC, 5721-M

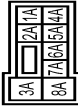


Terminal No.	Color Of Wire	Signal Name [Specification]
1	-	THERMOPLUNGER No. 2

Connector No.	F204
Connector Name	THERMOPLUNGER No.3
Connector Type	SIAC, 5721-M

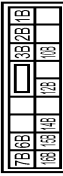


Terminal No.	Color Of Wire	Signal Name [Specification]
1A	L	-
2A	LG	-
3A	Y	-
4A	LG	-
5A	R	-
6A	BG	-
7A	BR	-
8A	SB	-



Connector No.	M1
Connector Name	FUSE BLOCK (J/B)
Connector Type	NS96FW-42

Connector No.	M2
Connector Name	FUSE BLOCK (J/B)
Connector Type	NS16FRC-5



Terminal No.	Color Of Wire	Signal Name [Specification]
10B	GR	- [With MR20 engine or R3M engine]
11B	LA/GR	- [With CR25 Engine]
12B	BR	-
13B	W	-
14B	W	-
15B	GR	-
16B	GR	-
1B	G	-
2B	R	-
3B	V	-
6B	LAV	-
7B	LAV	-

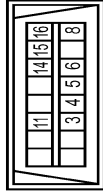
Connector No.	M3
Connector Name	FUSE BLOCK (J/B)
Connector Type	NS16FW-CS



Terminal No.	Color Of Wire	Signal Name [Specification]
10C	LG	-
13C	LA/G	-
14C	R	-
15C	L	-
16C	LA/W	-
1C	R	-
2C	G	-
3C	Y	-
4C	LG	-

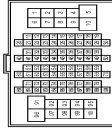
5C	GR	-
6C	LA/R	-
7C	Y	-
8C	BR	- [With ISS]
8C	LA/BR	- [Without ISS]
9C	L	-

Connector No.	M4
Connector Name	DATA LINK CONNECTOR
Connector Type	BD16FW



Terminal No.	Color Of Wire	Signal Name [Specification]
3	LG	-
4	B	-
5	B	-
6	L	-
8	Y	-
11	SB	-
14	P	-
15	BR	-
16	W	-

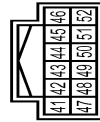
Connector No.	M11
Connector Name	WIRE TO WIRE
Connector Type	TH89FW-CS16-TM4



Terminal No.	Color Of Wire	Signal Name [Specification]
1	V	-
2	Y	-
6	GR	-

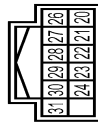
ENGINE CONTROL SYSTEM (R9M ENGINE)

Connector No.	M42
Connector Name	COMBINATION METER
Connector Type	TH12FM-NH



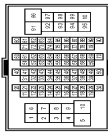
Terminal No.	Color	Wire	Signal Name [Specification]
41	L	P	CANH
42	L	P	CANL
43	W	W	ILLUMINATION CONTROL SIGNAL
44	L	B	FUEL LEVEL SENSOR GROUND
45	L	B	BATTERY POWER SUPPLY
46	V	B	IGNITION SIGNAL (Without ISS)
47	SB	W	IGNITION SIGNAL (With ISS)
48	LG	W	AV COMMUNICATION SIGNAL (H)
49	Y	W	AV COMMUNICATION SIGNAL (L)
50	B	G	OIL LEVEL SENSOR SIGNAL
51	L	L	FUEL LEVEL SENSOR SIGNAL
52	B	B	GROUND

Connector No.	M43
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Type	TH12FM-NH



Terminal No.	Color	Wire	Signal Name [Specification]
20	P	P	CRUISE CTRL
21	V	V	SPEED LIMIT
22	G	G	IGN
23	L	L	-
24	GR	GR	-
26	B	B	-
27	L	L	-
28	L	L	-
29	Y	Y	-
30	B	B	-
31	R	R	-

Connector No.	M77
Connector Name	WIPE TO WIRE
Connector Type	TH80MW-CS16-TM4



Terminal No.	Color	Wire	Signal Name [Specification]
2	L	L	-
5	V	V	-
8	W	W	-
9	G	G	-
10	Y	Y	-
20	W	W	-
21	B	B	-
22	SHIELD	SHIELD	-
31	V	V	-
32	GR	GR	-
33	G	G	-
34	LG	LG	-
35	B	B	-
36	LG	LG	-
37	V	V	-
38	G	G	-
39	BR	BR	-
40	L	L	-
41	P	P	-
47	Y	Y	-
48	B	B	-
51	GR	GR	-
52	SB	SB	-
53	R	R	-
54	L	L	-
55	BR	BR	-
56	P	P	-
57	B	B	-
58	W	W	-
59	L	L	-
60	L	L	-
61	P	P	-
62	V	V	-
63	L	L	-
64	Y	Y	-

Connector No.	M85
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	TH40FB-NH



Terminal No.	Color	Wire	Signal Name [Specification]
81	L	L	KEY SWITCH
82	L	L	KEY SW (ST) (Without Intelligent key)
82	W	W	PASS DOOR REED SW (With Intelligent key)
84	BR	BR	COMBI SW OUTPUT 2
85	SB	SB	COMBI SW OUTPUT 1
86	P	P	COMBI SW OUTPUT 3
87	B	B	COMBI SW OUTPUT 4

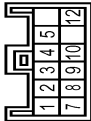
ENGINE CONTROL SYSTEM (R9M ENGINE)

Terminal No.	Wire	Signal Name [Specification]
88	W	PUSH/IGN SW /ILL CONT
90	Y	SIL CONDITION
94	G	DETENTION SW
95	V	EXTENDED STORAGE FUSE SW
99	R	STOP/START OFF SW
100	V	DRIVER DOOR ANT +
101	Y	PUSH SW
104	R	DR DOOR UNLK SENS
105	Y	DR DOOR REQ SW
106	W	ACC OUTPUT
107	V	SENSOR CANCEL SW
109	P	NATS ANTENNA AMP.
110	BG	DIMMER SIGNAL
111	R	DOOR LK STAT IND OUTPUT
112	SB	STOP/START OFF SW INDICATOR
113	LG	NATS ANTENNA AMP
114	Y	NATS ANTENNA AMP
115	W	NATS ANTENNA AMP.
116	BG	ROOM ANT 1 +
117	GR	ROOM ANT 1 -
118	SB	PASSENGER DOOR ANT -
119	P	PASSENGER DOOR ANT +
120	BR	DRIVER DOOR ANT +



Terminal No.	Wire	Signal Name [Specification]
7	SB	LIN
9	LG	VOLTAGE STABILIZER SIGNAL
10	R	POWER SUPPLY (IGNITION)

Connector No.	M983
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Type	TH12FW-MH



Connector No.	M97
Connector Name	DC / DC CONVERTER
Connector Type	M06FW-LC



Terminal No.	Wire	Signal Name [Specification]
1	LG	POWER SUPPLY (BATTERY)
2	B	GROUND
3	L	POWER SUPPLY (BATTERY)
4	G	VOLTAGE OUTPUT
6	W	VOLTAGE OUTPUT

Terminal No.	Wire	Signal Name [Specification]
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-
7	-	-
8	-	-
9	-	-
10	-	-
12	-	-

BASIC INSPECTION

BASIC INSPECTION

Work Procedure

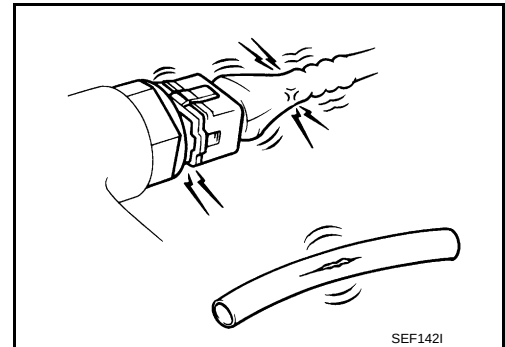
INFOID:0000000010935593

EC

1.INSPECTION START

1. Check service records for any recent repairs that may indicate a related incident.
2. Check the current need for scheduled maintenance, especially for fuel filter and air cleaner filter. Refer to [MA-8, "Periodic Maintenance"](#).
3. Open engine hood and check the following:
 - Harness connectors for improper connections
 - Vacuum hoses for splits, kinks, or improper connections
 - Wiring for improper connections, pinches, or cuts
4. Start engine and warm it up to the normal operating temperature.

>> GO TO 2.



2.CHECK IDLE SPEED

Check idle speed.

For procedure, refer to [EC-1224, "Inspection"](#).For specification, refer to [EC-1232, "Idle Speed"](#).Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

3.CHECK FOR INTAKE AIR LEAK

1. Stop engine.
2. Listen for an intake air leak after the mass air flow sensor.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace. Refer to [EM-308, "Exploded View"](#).

4.CHECK IDLE SPEED AGAIN

Check idle speed.

For procedure, refer to [EC-1224, "Inspection"](#).For specification, refer to [EC-1232, "Idle Speed"](#).Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

5.DRAIN WATER FROM FUEL FILTER

1. Stop engine.
2. Drain water from fuel filter. Refer to [FL-38, "Draining Water from Fuel Filter"](#).

>> GO TO 6.

6.CHECK IDLE SPEED AGAIN

Check idle speed.

For procedure, refer to [EC-1224, "Inspection"](#).For specification, refer to [EC-1232, "Idle Speed"](#).

BASIC INSPECTION

[R9M]

< BASIC INSPECTION >

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 7.

7. CHECK AIR CLEANER FILTER

1. Stop engine.
2. Check air cleaner filter for clogging or breaks.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace air cleaner filter. Refer to [EM-308, "Removal and Installation"](#).

8. CHECK BATTERY VOLTAGE

Check battery voltage.

Voltage: More than 12.13V

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. CHECK BATTERY

Refer to [PG-118, "R9M : How to Handle Battery"](#).

Is the inspection result normal?

YES >> Check charging system. Refer to [CHG-14, "Work Flow"](#).
NO >> Repair or replace. Refer to [PG-139, "R9M : Removal and Installation"](#).

10. CHECK COMPRESSION PRESSURE

Check compression pressure.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace error-detected parts.

11. CHECK IDLE SPEED AGAIN

Check idle speed.

For procedure, refer to [EC-1224, "Inspection"](#).

For specification, refer to [EC-1232, "Idle Speed"](#).

Is the inspection result normal?

YES >> INSPECTION END
NO >> 1. Replace fuel injector. Refer to [EM-339, "Removal and Installation"](#).
2. Perform [EC-947, "Work Procedure"](#).
3. GO TO 2.

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

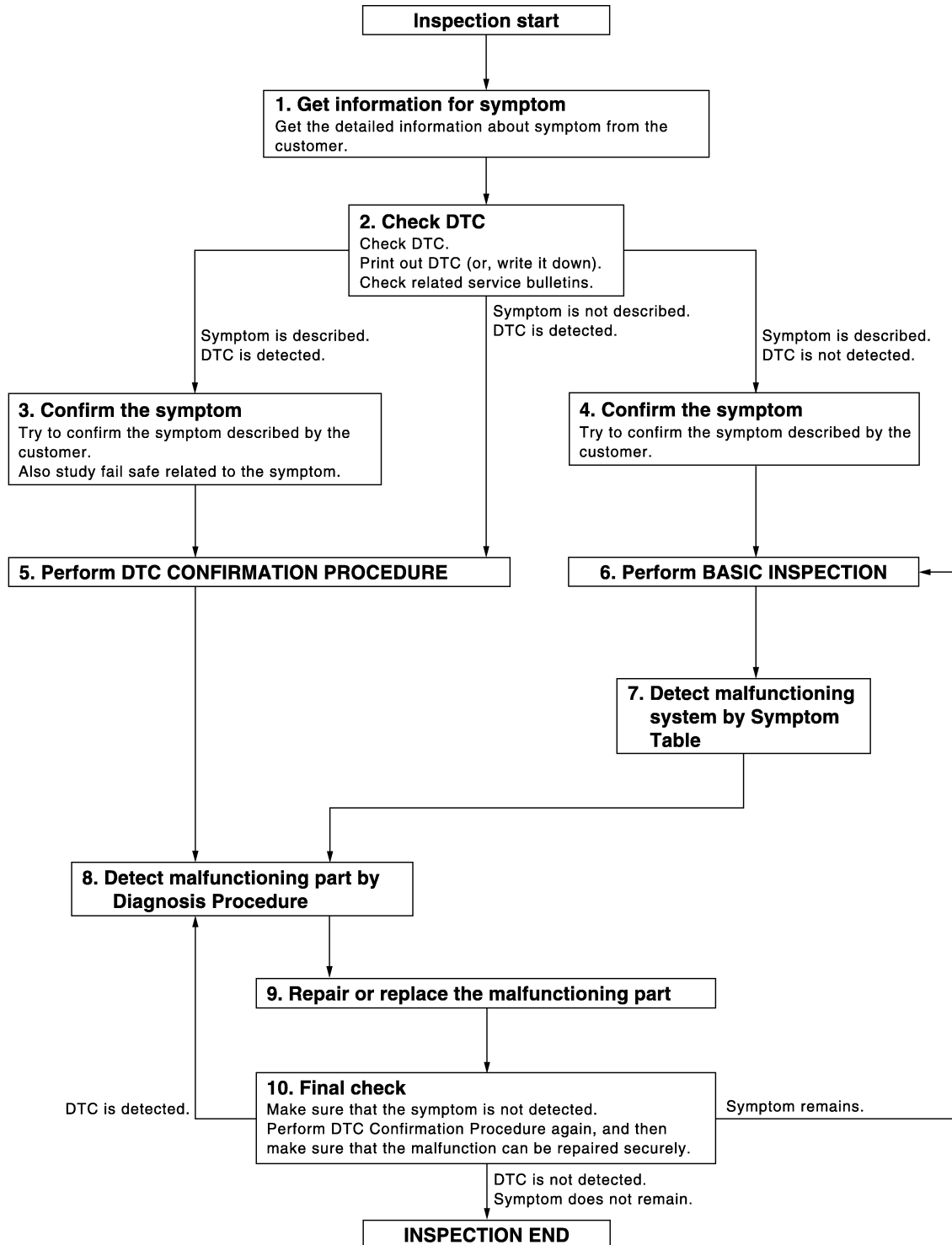
[R9M]

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000110935594

OVERALL SEQUENCE



JMBIA1804GB

DETAILED FLOW

1.GET INFORMATION FOR SYMPTOM

DIAGNOSIS AND REPAIR WORKFLOW

[R9M]

< BASIC INSPECTION >

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-941, "Diagnostic Work Sheet"](#).)

>> GO TO 2.

2.CHECK DTC

1. Check DTC.
2. Perform the following procedure if DTC is displayed.
 - Record DTC. (Print them out with CONSULT or GST.)
 - Erase DTC.
 - Study the relationship between the cause detected by DTC and the symptom described by the customer. [Symptom Table or diagnosis procedure is useful. Refer to [EC-1218, "Symptom Table"](#) (for engine control system) or [EC-1221, "Diagnosis Procedure"](#) (for stop/start system).]
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 fail safe related to the symptom. Refer to [EC-901, "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.

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.

If two or more DTCs are detected, refer to [EC-907, "DTC Inspection Priority Chart"](#) and determine trouble diagnosis order.

NOTE:

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 8.

NO >> Check according to [GI-44, "Intermittent Incident"](#).

6.PERFORM BASIC INSPECTION

Perform [EC-937, "Work Procedure"](#).

>> GO TO 7.

7.DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to [EC-1218, "Symptom Table"](#) (for engine control system) or [EC-1221, "Diagnosis Procedure"](#) (for stop/start system) based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 8.

8. 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-46, "Circuit Inspection"](#).

Is malfunctioning part detected?

YES >> GO TO 9.

NO >> Monitor input data from related sensors or check voltage of related ECM terminals using CONSULT. Refer to [EC-889, "Reference Value"](#).

9. 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 [EC-873, "Diagnosis Description"](#).

>> GO TO 10.

10. 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 8.

YES-2 >> Symptom remains: GO TO 6.

NO >> Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM.

Diagnostic Work Sheet

INFOID:0000000010935595

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 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

[R9M]

WORKSHEET SAMPLE

MTBL0017

SERVICE AFTER REPLACING OR REMOVING ENGINE PARTS

< BASIC INSPECTION >

[R9M]

SERVICE AFTER REPLACING OR REMOVING ENGINE PARTS

Special Repair Requirement List

INFOID:000000010935596

×:Applicable

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EC

C

D

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P

Part name	Service performed		Required service	Reference
	Replace- ment	Removal*1		
ECM	×	—	Additional service when replacing ECM	EC-944
Fuel injector	×	—	Injector adjustment value registration	EC-947
Electric throttle control actuator	×	×	Throttle valve position learning	EC-949
Exhaust electric throttle control actuator	×	×	Exhaust throttle valve position learning	EC-950
High pressure EGR volume control valve	×	×	High pressure EGR volume control valve position learning	EC-951
Low pressure EGR volume control valve	×	×	Low pressure EGR volume control valve position learning	EC-952
Intake manifold runner control valve	×	×	Intake manifold runner control valve position learning	EC-953
DPF (Diesel Particulate Filter)	×	—	DPF (Diesel Particulate Filter) data clear	EC-957
High pressure fuel pump	×	—	Fuel pump learning value clearing	EC-958
Starter motor	×	—	Starter motor operating counter clear	EC-960
Engine oil	×	—	Oil change remaining distance reset	EC-959

*1:Harness connector disconnection included.

ADDITIONAL SERVICE WHEN REPLACING ECM

< BASIC INSPECTION >

[R9M]

ADDITIONAL SERVICE WHEN REPLACING ECM

Description

INFOID:0000000010935597

When replacing ECM, this procedure must be performed.

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-944, "Work Procedure"](#).

Work Procedure

INFOID:0000000010935598

1.SAVE ECM DATA

1. Turn ignition switch OFF and wait at least 1 minute.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Select "SAVE COMPUTER DATA" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
5. Follow the instruction of CONSULT display.

NOTE:

Necessary data in ECM is copied and saved to CONSULT.

Is operation completed successfully?

YES >> GO TO 2.

NO >> GO TO 7.

2.REPLACE ECM

1. Turn ignition switch OFF and wait at least 1 minute.
2. Replace ECM. Refer to [EC-1226, "Removal and Installation"](#).

>> GO TO 3.

3.PERFORM PROGRAMMING

Refer to "CONSULT Operation Manual".

>> GO TO 4.

4.PERFORM ECM KEY ID REGISTRATION

Refer to "CONSULT Operation Manual NATS-IVIS/NVIS".

>> GO TO 5.

5.PERFORM CONFIGURATION REGISTRATION

1. Turn ignition switch OFF and wait at least 1 minute.
2. Turn ignition switch ON.
3. Check that the battery voltage is between 11 V and 14 V.
4. Wait at least 10 seconds.

CAUTION:

During this step, never perform any vehicle operation.

5. If necessary, perform configuration registration using CONSULT function.

>> GO TO 6.

6.WRITE ECM DATA

1. Select "WRITE SAVED DATA" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
2. Follow the instruction of CONSULT display.

NOTE:

The data saved by "WRITE SAVED DATA" is written to ECM.

Is operation completed successfully?

YES >> GO TO 12.

NO >> GO TO 10.

ADDITIONAL SERVICE WHEN REPLACING ECM

< BASIC INSPECTION >

[R9M]

7. REPLACE ECM

1. Turn ignition switch OFF and wait at least 1 minute.
2. Replace ECM. Refer to [EC-1226, "Removal and Installation"](#).

>> GO TO 8.

8. PERFORM PROGRAMMING

Refer to "CONSULT Operation Manual".

>> GO TO 9.

9. PERFORM ECM KEY ID REGISTRATION

Refer to "CONSULT Operation Manual NATS-IVIS/NVIS".

>> GO TO 10.

10. PERFORM CONFIGURATION REGISTRATION

1. Turn ignition switch OFF and wait at least 1 minute.
2. Turn ignition switch ON.
3. Check that the battery voltage is between 11 V and 14 V.
4. Wait at least 10 seconds.

CAUTION:

During this step, never perform any vehicle operation.

5. If necessary, perform configuration registration using CONSULT function.

>> GO TO 11.

11. PERFORM INJECTOR ADJUSTMENT VALUE REGISTRATION

Perform [EC-947, "Work Procedure"](#).

>> GO TO 12.

12. PERFORM THROTTLE VALVE POSITION LEARNING

Perform [EC-949, "Work Procedure"](#).

>> GO TO 13.

13. PERFORM EXHAUST THROTTLE VALVE POSITION LEARNING

Perform [EC-950, "Work Procedure"](#).

>> GO TO 14.

14. PERFORM HIGH PRESSURE EGR VOLUME CONTROL VALVE POSITION LEARNING

Perform [EC-951, "Work Procedure"](#).

>> GO TO 15.

15. PERFORM LOW PRESSURE EGR VOLUME CONTROL VALVE POSITION LEARNING

Perform [EC-952, "Work Procedure"](#).

>> GO TO 16.

16. PERFORM INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION LEARNING

Perform [EC-953, "Work Procedure"](#).

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ADDITIONAL SERVICE WHEN REPLACING ECM

[R9M]

< BASIC INSPECTION >

>> GO TO 17.

17.PERFORM SERVICE REGENERATION

Perform [EC-954, "Work Procedure"](#).

>> GO TO 18.

18.CHANGE ENGINE OIL

Refer to [LU-39, "Draining"](#) or [LU-39, "Refilling"](#).

>> GO TO 19.

19.PERFORM ENGINE OIL DATA RESET

Perform [EC-959, "Work Procedure"](#).

>> GO TO 20.

20.CHECK DTC

1. Turn ignition switch OFF and wait at least 1 minute.
2. Turn ignition switch ON.
3. Check DTC. If DTC is displayed, erase it.

>> END

INJECTOR ADJUSTMENT VALUE REGISTRATION

< BASIC INSPECTION >

[R9M]

INJECTOR ADJUSTMENT VALUE REGISTRATION

Description

INFOID:000000010935599

Injector adjustment value indicates manufacturing tolerance and the value is printed on the top of fuel injector.

The injector adjustment value which is correctly stored in ECM is needed for precise fuel injection control.

A performance of emission control and a driveability may effect when there is a mismatch between the following two values.

- The injector adjustment value stored in ECM
- The injector adjustment value of the injector which is installed on the vehicle

Injector Adjustment Value Registration must be performed after the following cases.

- Injector(s) are replaced.
 - Injector Adjustment Value Registration for the replaced fuel injector must be performed.
- ECM is replaced.
 - Injector Adjustment Value Registration for all the fuel injectors must be performed.

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-944, "Work Procedure"](#).

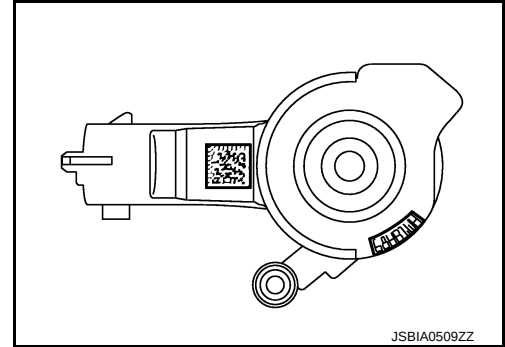
For injector adjustment value, refer to the following table.

NOTE:

"J" and "Q", "9" and "0 (zero)" are not applied.

Input character	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Stamping on injector	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Input character	1	2	3	4	5	6	7	8	9	0																
Stamping on injector	1	2	3	4	5	6	7	8	9	0																

JMBIA2928GB



Work Procedure

INFOID:000000010935600

1.START

NOTE:

- **Before performing this procedure, record injector adjustment value printed on a fuel injector.**

1. Turn ignition switch ON (engine stopped).
2. Select "ENTER INJECTOR CODES" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
3. Touch "START".

NOTE:

When touching "START", CONSULT reads injector adjustment values stored in ECM.

4. Select the number of the cylinder which needs Injector Adjustment Value Registration.
5. Input injector adjustment value.

NOTE:

- For injector adjustment value, refer to the following table.

INJECTOR ADJUSTMENT VALUE REGISTRATION

< BASIC INSPECTION >

[R9M]

- “J” and “Q”, “9” and “0 (zero)” are not applied.

Input character	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Stamping on injector	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Input character	1	2	3	4	5	6	7	8	9	0																
Stamping on injector	1	2	3	4	5	6	7	8	9	0																

JMBIA2928GB

- Repeat step 4 - 5 till there is no cylinder which needs Injector Adjustment Value Registration, and touch “START”.

NOTE:

When touching “START”, injector adjustment values stored in CONSULT are written onto ECM memory.

- Check that the following values are same for each cylinder.
 - Injector adjustment value which is printed on a fuel injector.
 - Injector adjustment value which is displayed on CONSULT screen.

NOTE:

- In this step, CONSULT reads injector adjustment values stored in ECM and displays the values on the CONSULT screen. This is for checking if injector adjustment values are written onto ECM memory correctly.
 - If DTC is detected, perform DTC Confirmation Procedure for the DTC, and check if the same DTC is detected again.
- Turn ignition switch OFF and wait at least 1 minute.

>> END

THROTTLE VALVE POSITION LEARNING

< BASIC INSPECTION >

[R9M]

THROTTLE VALVE POSITION LEARNING

Description

INFOID:0000000010935601

Throttle valve 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-944, "Work Procedure"](#).

Work Procedure

INFOID:0000000010935602

1.START

1. Check that accelerator pedal is fully released.
2. Turn ignition switch ON and wait at least 10 seconds.
3. Turn ignition switch OFF and wait at least 1 minute.

NOTE:

Check that throttle valve moves by confirming the operating sound.

>> END

EXHAUST THROTTLE VALVE POSITION LEARNING

< BASIC INSPECTION >

[R9M]

EXHAUST THROTTLE VALVE POSITION LEARNING

Description

INFOID:0000000010935603

Exhaust throttle valve position learning is an operation to learn the fully closed position of the exhaust throttle valve. It must be performed each time harness connector of exhaust electric throttle control actuator or ECM is disconnected.

- Exhaust electric throttle control actuator is removed.
- Exhaust 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-944, "Work Procedure"](#).

Work Procedure

INFOID:0000000010935604

1.START

1. Turn ignition switch ON and wait at least 10 seconds.
2. Turn ignition switch OFF and wait at least 1 minute.

NOTE:

Check that throttle valve moves by confirming the operating sound.

>> END

EGR VOLUME CONTROL VALVE POSITION LEARNING

< BASIC INSPECTION >

[R9M]

EGR VOLUME CONTROL VALVE POSITION LEARNING

Description

INFOID:000000010935605

EGR volume control valve position learning is an operation to learn the fully closed position of the high pressure EGR volume control valve by monitoring the high pressure EGR volume control valve position sensor output signal. It must be performed under any of the following conditions:

- High pressure EGR volume control valve is removed.
- High pressure EGR volume control valve 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-944, "Work Procedure"](#).

Work Procedure

INFOID:000000010935606

1.START

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON and wait for 1 minute.

NOTE:

Check that high pressure EGR volume control valve moves by confirming the operating sound.

>> END

LOW PRESSURE EGR VOLUME CONTROL VALVE POSITION LEARNING

< BASIC INSPECTION >

[R9M]

LOW PRESSURE EGR VOLUME CONTROL VALVE POSITION LEARNING

Description

INFOID:0000000010935607

Low pressure EGR volume control valve position learning is an operation to learn the fully closed position of the low pressure EGR volume control valve by monitoring the low pressure EGR volume control valve position sensor output signal. It must be performed under any of the following conditions:

- Low pressure EGR volume control valve is removed.
- Low pressure EGR volume control valve 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-944, "Work Procedure"](#).

Work Procedure

INFOID:0000000010935608

1.START

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON and wait for 1 minute.

NOTE:

Check that low pressure EGR volume control valve moves by confirming the operating sound.

>> END

INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION LEARNING

< BASIC INSPECTION >

[R9M]

INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION LEARNING

Description

INFOID:0000000010935609

Intake manifold runner control valve position learning is an operation to learn the fully closed position of the intake manifold runner control valve. It must be performed each time harness connector of intake manifold runner control valve actuator or ECM is disconnected.

- Intake manifold runner control valve is removed.
- Intake manifold runner control valve 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-944, "Work Procedure"](#).

Work Procedure

INFOID:0000000010935610

1.START

1. Check that accelerator pedal is fully released.
2. Turn ignition switch ON and wait at least 10 seconds.
3. Turn ignition switch OFF and wait at least 1 minute.

NOTE:

Check that throttle valve moves by confirming the operating sound.

>> END

SERVICE REGENERATION

Description

INFOID:000000010935611

Certain types of driving conditions (e.g. urban driving) may load to heavy loads in DPF (Diesel Particulate Filter). This soot mass may adversely affect the driving. This function can perform DPF regeneration under vehicle stop condition.

Service regeneration is performed with CONSULT to reduce particulate matter in DPF (Diesel Particulate Filter). Service regeneration should be performed in the following cases.

- ECM enters fail-safe mode because the amount of particulate matter in DPF reaches the specified level.

NOTE:

When ECM enters fail-safe mode because the amount of particulate matter in DPF reaches the specified level, check whether or not DTC P2002 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 DPF 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 can not perform regeneration control correctly. So, perform service regeneration to make the amount of particulate matter in DPF zero.
- 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-944, "Work Procedure"](#).
- Component inspection for DPF is performed.

CAUTION:

Oil change is required, depending on service regeneration procedure. Because fuel mixes with engine oil during service regeneration. The mixture does not occur during the regeneration which is automatically performed under normal operation.

Work Procedure

INFOID:000000010935612

1.CHECK DTC

1. Turn ignition switch OFF and wait at least 1 minute.
2. Turn ignition switch ON.
3. Check DTC.

Is any DTC detected?

- YES >> Perform trouble diagnosis for detected DTC. Refer to [EC-908, "DTC Index"](#).
 NO >> GO TO 2.

2.CHECK ENGINE OIL LEVEL

Refer to [LU-38, "Inspection"](#).

CAUTION:

When the oil level reaches maximum, drain engine oil as to be in MIN and HALF.

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Drain or refill engine oil. And then GO TO 3.

3.PERFORM OK OR NG JUDGEMENT FOR SERVICE REGENERATION

1. Close the engine hood.
2. Start engine and warm it up to normal operating temperature.

NOTE:

For best results, warm up the engine until "WATER TEMP" on "DATA MONITOR" mode of "ENGINE" using CONSULT reaches at least 80°C (176°F).

3. Select "PARTICLE FILTER REGENERATION" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
4. Touch "START".

Which is displayed on CONSULT screen?

Judged OK>>GO TO 4.

SERVICE REGENERATION

[R9M]

< BASIC INSPECTION >

Judged NG>>GO TO 8.

4.PERFORM SERVICE REGENERATION

Touch "START" and wait for approximately 40 minutes.

CAUTION:

Never perform any vehicle operation during service regeneration.

NOTE:

It takes approximately 40 minutes until "COMPLETE" is displayed.

Which is displayed on CONSULT screen?

COMPLETE>>GO TO 7.

INCOMPLETE>>GO TO 5.

5.CHECK DPF TEMPERATURE

Check "EXH GAS TEMP (UPSTM CAT)" in "DATA MONITOR" mode of "ENGINE" using CONSULT.

Is the indication value more than 400°C (752°F)?

YES >> GO TO 6.

NO >> Check exhaust system.

6.PERFORM SERVICE REGENERATION AGAIN

1. Turn ignition switch OFF.
2. Open the engine hood.
3. Cool the engine at least 2 hours.
4. Check engine oil level. Refer to [LU-38, "Inspection"](#).
5. Close the engine hood.
6. Start the engine.
7. Perform "PARTICLE FILTER REGENERATION" again.

Which is displayed on CONSULT screen?

COMPLETE>>GO TO 7.

INCOMPLETE>>GO TO 8.

7.PERFORM RESET AFTER SERVICE REGENERATION

1. Select "AFTER DPF REGENERATION" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
2. Touch "START".
3. Check that "COMPLETE" is displayed on CONSULT screen.
4. Touch "END".

>> GO TO 9.

8.REPLACE DPF

1. Turn ignition switch OFF.
2. Replace DPF. Refer to [EX-17, "Exploded View"](#).
3. Turn ignition switch ON.
4. Perform "AFTER DPF REPLACEMENT" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.

>> GO TO 9.

9.CHECK DTC

1. Turn ignition switch OFF and wait at least 1 minute.
2. Turn ignition switch ON.
3. Check DTC.

Is DTC "P253F" detected?

YES >> GO TO 10.

NO >> END

10.CHANGE ENGINE OIL

1. Change engine oil. Refer to [LU-39, "Draining"](#) or [LU-39, "Refilling"](#).
2. Perform "ENGINE OIL DATA RESET". Refer to [EC-959, "Work Procedure"](#).
3. Erase DTC.

SERVICE REGENERATION

< BASIC INSPECTION >

[R9M]

>> END

DIESEL PARTICULATE FILTER DATA CLEAR

< BASIC INSPECTION >

[R9M]

DIESEL PARTICULATE FILTER DATA CLEAR

Description

INFOID:0000000010935613

Perform "DPF DATA CLEAR" in "WORK SUPPORT" mode with CONSULT when oxidation catalyst with diesel particulate filter is replaced with a 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 with a 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 "AFTER DPF REPLACEMENT" in "WORK SUPPORT" mode of "ENGINE" using CONSULT to clear diesel particulate filter data stored in ECM.

CAUTION:

Never perform "AFTER DPF REPLACEMENT" in "WORK SUPPORT" mode of "ENGINE" using CONSULT when oxidation catalyst with diesel particulate filter is not replaced with a new one. Diesel particulate filter may be damaged because regeneration is not performed at appropriate timing.

Special Repair Requirement

INFOID:0000000010935614

1.START

1. Turn ignition switch ON.
2. Select "AFTER DPF REPLACEMENT" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
3. Touch "CLEAR" and wait a few seconds.
4. Make sure that "CMPLT" is displayed on CONSULT screen.

>> END

FUEL PUMP LEARNING VALUE CLEARING

Description

INFOID:0000000010935615

High Pressure Fuel Pump Total Starts Counter Reset is a function to erase the accumulated number of high pressure fuel pump operation with engine start. It must be performed when high pressure fuel pump is replaced.

CAUTION:

Never perform High Pressure Fuel Pump Total Starts Counter Reset when the high pressure fuel pump is not replaced as new one.

Special Repair Requirement

INFOID:0000000010935616

1.START

 With CONSULT

1. Turn ignition switch ON.
2. On the CONSULT screen, select "ENGINE" >> "WORK SUPPORT" >> "H/P FUEL PUMP TOTAL STARTS COUNTER RESET".
3. Touch "CLEAR" and wait a few seconds.
4. Make sure that "CMPLT" is displayed on CONSULT screen.

>> END

ENGINE OIL DATA RESET

< BASIC INSPECTION >

[R9M]

ENGINE OIL DATA RESET

Description

INFOID:000000010935617

The oil change alert function allows calculating the remaining distance to drive before oil change request. The engine oil data reset must be performed after engine oil is changed.

EC

Work Procedure

INFOID:000000010935618

1. ENGINE OIL OXIDATION DATA RESET

1. Select "ENGINE OIL OXIDATION DATA RESET" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
2. Follow the instruction of CONSULT display.

>> GO TO 2.

2. ENGINE OIL DILUTION DATA RESET

1. Select "ENGINE OIL DILUTION DATA RESET" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
2. Follow the instruction of CONSULT display.

>> END

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STARTER OPERATION COUNTER CLEAR

< BASIC INSPECTION >

[R9M]

STARTER OPERATION COUNTER CLEAR

Description

INFOID:0000000010935619

Starter Operation Counter Clear is a function of ECM to erase the starter motor operation counter. It must be performed when starter motor is replaced.

CAUTION:

Performed this function when starter motor is replaced.

Work Procedure

INFOID:0000000010935620

1.ERASE STARTER OPERATION COUNTER

Ⓔ With CONSULT

1. Turn ignition switch ON.
2. Select "STRT OPRTN CNTR CLEAR" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
3. Touch "CLEAR" and erase starter operation counter.

>> INSPECTION END

ACCELERATOR PEDAL

< BASIC INSPECTION >

[R9M]

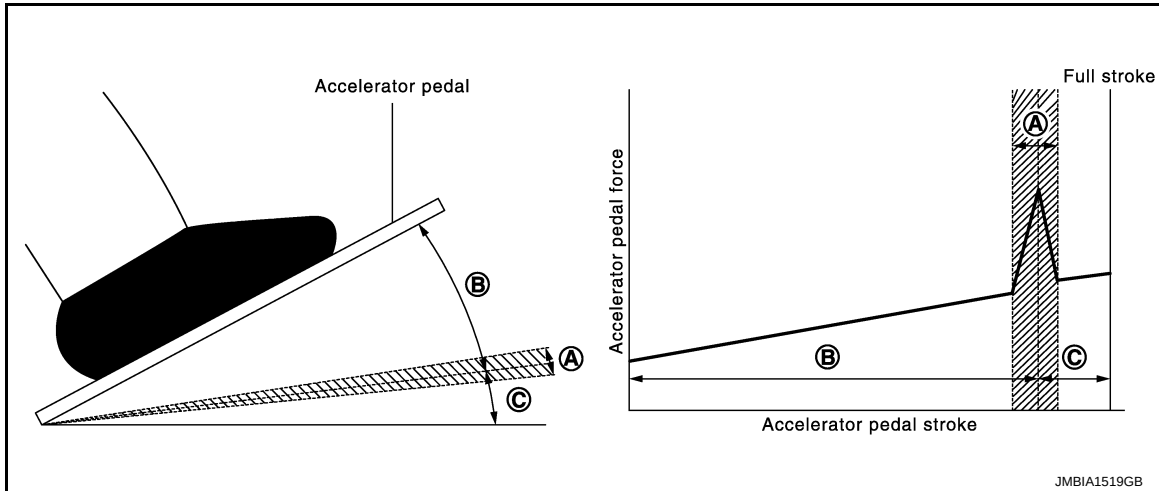
ACCELERATOR PEDAL

Work Procedure

INFOID:000000010935621

1.PERFORM ACCELERATOR PEDAL FORCE-I

1. Turn ignition switch OFF.
2. Depress the accelerator pedal and check if there is a specific point ① in the pedal stroke where the pedal force increase as shown in the figure.



Is the inspection result normal?

YES-1 >> GO TO 2.

NO >> Replace accelerator pedal assembly. Refer to [ACC-4, "Removal and Installation"](#).

2.PERFORM ACCELERATOR PEDAL FORCE-II

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground under the following conditions.

ECM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
E79	2 (APP sensor 1)	3	Depressing range of the accelerator pedal:	More than 4.35 V
	11 (APP sensor 2)	12	Within ③ as indicated in the figure	More than 2.17 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal assembly. Refer to [ACC-4, "Removal and Installation"](#).

FUEL PRESSURE CHECK

< BASIC INSPECTION >

[R9M]

FUEL PRESSURE CHECK

Work Procedure

INFOID:0000000010935622

1.START

1. Start engine and warm it up until engine coolant temperature is 80°C (176°F) or more.
2. On CONSULT screen, select "ENGINE" >> "WORK SUPPORT" >> "High pressure fuel circuit fault finding".
3. Touch "START" and wait a few seconds.
4. Make sure that CMPLT is displayed on CONSULT screen.

>> END

DTC/CIRCUIT DIAGNOSIS**POWER SUPPLY AND GROUND CIRCUIT****ECM****ECM : Diagnosis Procedure**

INFOID:0000000010935623

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that the following fuse is not fusing.

Fuse No.	Capacity
#84	10 A
#85	15 A
#95	5 A

Is the fuse fusing?

- YES >> Replace the fuse after repairing the applicable circuit.
 NO >> GO TO 2.

2.CHECK GROUND CONNECTION

Check ground connection E5. Refer to Ground Inspection in [GI-46, "Circuit Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Repair or replace ground connection.

3.CHECK ECM POWER SUPPLY (ECM RELAY)

1. Reinsert the fuse which pulled out.
2. Turn ignition switch ON.
3. Check the voltage between IPDM E/R terminal and ground.

+		-	Voltage
IPDM E/R			
Connector	Terminal		
F72	75	Ground	Battery voltage
	78		

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> GO TO 4.

4.CHECK ECM RELAY CONTROL SIGNAL CIRCUIT

1. Turn ignition 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	
F117	41	F74	93	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> GO TO 6.

POWER SUPPLY AND GROUND CIRCUIT

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

5.CHECK ECM POWER SUPPLY (IGNITION POWER SUPPLY)

Check the voltage between IPDM E/R and ground.

+		-	Voltage
IPDM E/R			
Connector	Terminal		
E12	25	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.CHECK IPDM E/R POWER SUPPLY AND GROUND

Check IPDM E/R power supply and ground. Refer to [PCS-59, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to [PCS-60, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

7.CHECK ECM GROUND CIRCUIT FOR OPEN

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E79	1	Ground	Existed
	4		
	8		

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.CHECK ECM POWER SUPPLY CIRCUIT

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		-		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E79	17	E12	25	Existed
	5	F72	75	
F117	96		78	

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

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U0111 LIN COMMUNICATION

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

U0111 LIN COMMUNICATION

DTC Description

INFOID:0000000010935624

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U0111	LOST COMMUNICATION WITH BATTERY ENERGY FROM LIN (Lost communication with battery energy control module "A") • 1.DEF: NO BUS SIGNAL • 2.DEF: COMPONENT PROTECTION TIME-OUT	ECM cannot communication with alternator via LIN communication.

POSSIBLE CAUSE

- Alternator
- Harness and connectors

FAIL-SAFE

Not applicable

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-966, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935625

1.CHECK LIN COMMUNICATION CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and alternator harness connector.
3. Disconnect DC/DC conveter harness connector.
4. Check the continuity between ECM harness connector and alternator harness connector.

+		-		Continuity
ECM		Alternator		
Connector	Terminal	Connector	Terminal	
F117	68	F15	2	Existed

5. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK ALTERNATOR

Check alternator. Refer to [CHG-14, "Work Flow"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Replace alternator. Refer to [CHG-26, "R9M : Removal and Installation"](#).

3.CHECK DTC

U0111 LIN COMMUNICATION

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to [EC-966, "DTC Description"](#).

Is DTC detected again?

YES >> Replace ECM.
NO >> INSPECTION END

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U0121 CAN COMMUNICATION

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

U0121 CAN COMMUNICATION

DTC Description

INFOID:0000000010935626

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U0121	MLTIPLXD TRACTION CNTRL CONN [Lost communication with anti-lock brake system (ABS) control Module] • 1.DEF: INVALID SOURCE COMPUTER MULTIPLEX SIGNALS	When ECM is not transmitting or receiving CAN communication signal between ABS actuator and electric unit (control unit).

POSSIBLE CAUSE

ABS actuator and electric unit (control unit)

FAIL-SAFE

ESP is deactivated

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-968, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935627

1.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Check DTC with ABS actuator and electric unit (control unit). Refer to [BRC-70, "CONSULT Function"](#).

Is DTC detected?

- YES >> INSPECTION END
NO >> Perform trouble shooting relevant to DTC indicated.

U0298 DC/DC CONVERTER

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

U0298 DC/DC CONVERTER

DTC Description

INFOID:0000000010935628

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U0298	— (Lost communication with DC to DC converter control module "A")	During the restart, the DC/DC converter status of the engine communication line does not show an decrease in voltage after an ECM transmitted voltage stabilizer signal is changed from battery voltage to 2.0 V or less.

POSSIBLE CAUSE

- Harness and connectors (Voltage stabilizer signal line is open or circuit shorted.)
- DC/DC converter
Harness or connectors (CAN communication line is open or shorted.)

FAIL-SAFE

STOP/START SYSTEM

Stop/start system operating condition in fail safe mode		
Idling or driving the vehicle	Stop/start system operating	
	Stop	During cranking (Restart)
—	—	Prohibit the stop/start system operation from the next time

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If the other DTC Confirmation Procedure is performed right before this procedure, the ignition switch must be turned OFF and wait for 1 minute or more to start this procedure.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start the engine and warm it up to normal operating temperature.
2. Press start/stop OFF switch and check that the switch indicator is ON.
3. Select "AUTO STOP START" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
4. Touch "START" and operate stop/start system. (Stop the engine.)
5. Touch "CANCEL" and restart the engine.
6. Check DTC.

Without CONSULT

1. Activate stop/start system. Refer to [EC-848. "STOP/START SYSTEM : System Description \(M/T models\)"](#) (M/T models), [EC-856. "STOP/START SYSTEM : System Description \(CVT models\)"](#) (CVT models).

CAUTION:

Always drive vehicle at a safe speed.

2. Restart the engine.
3. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-969. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935629

1.CHECK VOLTAGE STABILIZER SIGNAL

U0298 DC/DC CONVERTER

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

Ⓑ With CONSULT

1. Start the engine and warm it up to normal operating temperature.
2. Press start/stop OFF switch and check that the switch indicator is ON.
3. Select "AUTO STOP START" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
4. Touch "START" and operate stop/start system. (engine stop.)
5. Touch "CANCEL" and restart the engine, and then check the voltage between DC/DC converter harness connector and ground as per the following conditions.

+		-	Condition	Voltage (Approx.)
DC/DC converter				
Connector	Terminal			
M98	9	Ground	While cranking with restart	2.0 V or less
			Except above	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK VOLTAGE STABILIZER SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect DC/DC converter harness connector, alternator harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between DC/DC converter harness connector and ECM harness connector.

+		-		Continuity
DC/DC converter		ECM		
Connector	Terminal	Connector	Terminal	
M98	9	F117	37	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

3. CHECK INTERMITTENT INCIDENT

Perform intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to [EC-1229, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

4. CHECK INTERMITTENT INCIDENT

Perform intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace ECM. Refer to [EC-1226, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

U0299 LOST COMMUNICATION (DC/DC CONVERTER)

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

U0299 LOST COMMUNICATION (DC/DC CONVERTER)

DTC Description

INFOID:0000000010935630

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U0299	— (Lost communication with DC to DC converter control module "B")	- ECM receives an abnormality signal sent from DC/DC converter. - ECM is not receiving LIN communication signal sent from DC/DC converter.

POSSIBLE CAUSE

- DC/DC converter
- Harness and connectors (LIN communication line)

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If the other DTC Confirmation Procedure is performed right before this procedure, the ignition switch must be turned OFF and wait for 1 minute or more to start this procedure.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

- Turn ignition switch ON and wait at least 10 seconds.
- Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-971, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

- Start the engine and let it idle for at least 5 minutes.
- Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-971, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935631

1.CHECK ENGINE COMMUNICATION LINE

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Disconnect DC/DC converter harness connector, alternator harness connector.
- Check the continuity between ECM harness connector and DC/DC converter harness connector.

+		-		Continuity
ECM		DC/DC converter		
Connector	Terminal	Connector	Terminal	
F117	68	M98	7	Existed

- Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> GO TO 2.

U0299 LOST COMMUNICATION (DC/DC CONVERTER)

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

2.CHECK INTERMITTENT INCIDENT

Perform intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to [EC-1229, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

U0315 CAN COMMUNICATION [ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)]

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

U0315 CAN COMMUNICATION [ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)]

DTC Description

INFOID:0000000010935632

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U0315	VEHICLE SPEED (Software incompatibility with anti-lock brake system control module) • 1.DEF: INVALID SERIAL DATA RECEIVED • 2.DEF: INVALID SOURCE COMPUTER MULTIPLEX SIGNALS • 3.DEF: ALIVE COUNTER INCORRECT • 4.DEF: CIRCUIT QUANTITY NOT PLAUSIBLE	ECM receives invalid signal of vehicle speed sent from ABS actuator and electric unit (control unit).

POSSIBLE CAUSE

ABS actuator and electric unit (control unit)

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC U0315 can not duplicate.

>> Proceed to [EC-973, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935633

1.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Check DTC with ABS actuator and electric unit (control unit). Refer to [BRC-70, "CONSULT Function"](#).

Is DTC detected?

- YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).
NO >> Perform trouble shooting relevant to DTC indicated.

U0415 CAN COMMUNICATION

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

U0415 CAN COMMUNICATION

DTC Description

INFOID:0000000010935634

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U0415	MLTIPLXD TRACTION CNTRL CONN [Invalid data received from anti-lock brake system (ABS) control module] • 1.DEF: IMPLAUSIBLE SIGNAL • 2.DEF: INVALID SOURCE COMPUTER MULTIPLEX SIGNALS	ECM receives invalid data sent from ABS actuator and electric unit (control unit).

POSSIBLE CAUSE

ABS actuator and electric unit (control unit)

FAIL-SAFE

ESP is deactivated

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC U0415 can not duplicate.

>> Proceed to [EC-974, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935635

1.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Check DTC with ABS actuator and electric unit (control unit). Refer to [BRC-70, "CONSULT Function"](#).

Is DTC detected?

- YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).
NO >> Perform trouble shooting relevant to DTC indicated.

B1900 DC/DC CONVERTER

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

B1900 DC/DC CONVERTER

DTC Description

INFOID:000000010935636

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
B1900	— (—)	DC/DC converter detects power supply input 1 is 5.0 V or less and difference between power supply input 1 and power supply input 2 is 4.0 V or more for 3 seconds.

POSSIBLE CAUSE

ABS actuator and electric unit (control unit)

- Harness and connectors (DC/DC converter power supply input 1 circuit is open or shorted.)
- DC/DC converter

FAIL-SAFE

STOP/START SYSTEM

Stop/start system operating condition in fail safe mode		
Idling or driving the vehicle	Stop/start system operating	
	Stop	During cranking (Restart)
Prohibit the stop/start system operation	Restart the engine	Prohibit the stop/start system operation from the next time

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If the other DTC Confirmation Procedure is performed right before this procedure, the ignition switch must be turned OFF and wait for 10 seconds or more to start this procedure.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to [EC-976, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-2

Ⓔ With CONSULT

1. Start the engine and warm it up to normal operating temperature.
2. Press start/stop OFF switch and check that the switch indicator is ON.
3. Select "AUTO STOP START" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
4. Touch "START" and operate stop/start system. (engine stop.)
5. Touch "CANCEL" and restart the engine.
6. Check DTC.

ⓧ Without CONSULT

1. Activate stop/start system. Refer to [EC-848, "STOP/START SYSTEM : System Description \(M/T models\)"](#) (M/T models), [EC-856, "STOP/START SYSTEM : System Description \(CVT models\)"](#) (CVT models).

CAUTION:

Always drive vehicle at a safe speed.

2. Restart the engine.
3. Check DTC.

Is DTC detected?

B1900 DC/DC CONVERTER

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Proceed to [EC-976, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935637

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that the following fuse is not fusing.

Fuse No.	Capacity
F/L-O	30 A

Is the fuse fusing?

- YES >> Replace the fuse after repairing the applicable circuit.
NO >> GO TO 2.

2.CHECK DC/DC CONVERTER POWER SUPPLY INPUT 1

1. Disconnect DC/DC converter harness connector.
2. Check the voltage between DC/DC converter harness connector and ground.

+		-	Voltage
DC/DC converter			
Connector	Terminal		
M97	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK DC/DC CONVERTER POWER SUPPLY INPUT 1 CIRCUIT

1. Disconnect battery negative terminal.
2. Check the continuity between DC/DC converter harness connector and fuse.

+		-	Continuity
DC/DC converter		Fuse No.	
Connector	Terminal		
M97	1	F/L-O	Existed

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK INTERMITTENT INCIDENT

Perform intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace DC/DC converter. Refer to [EC-1229, "Removal and Installation"](#).
NO >> Repair or replace error-detected parts.

B1901 DC/DC CONVERTER

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

B1901 DC/DC CONVERTER

DTC Description

INFOID:000000010935638

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
B1901	— (—)	DC/DC converter detects power supply input 2 is 5.0 V or less and difference between power supply input 2 and power supply input 1 is 4.0 V or more for 3 seconds.

POSSIBLE CAUSE

- Harness and connectors (DC/DC converter power supply input 2 circuit is open or shorted.)
- DC/DC converter

FAIL-SAFE

STOP/START SYSTEM

Stop/start system operating condition in fail safe mode		
Idling or driving the vehicle	Stop/start system operating	
	Stop	During cranking (Restart)
Prohibit the stop/start system operation	Restart the engine	Prohibit the stop/start system operation from the next time

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If the other DTC Confirmation Procedure is performed right before this procedure, the ignition switch must be turned OFF and wait for 10 seconds or more to start this procedure.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-978, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

1. Start the engine and warm it up to normal operating temperature.
2. Press start/stop OFF switch and check that the switch indicator is ON.
3. Select "AUTO STOP START" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
4. Touch "START" and operate stop/start system. (engine stop.)
5. Touch "CANCEL" and restart the engine.
6. Check DTC.

Without CONSULT

1. Activate stop/start system. Refer to [EC-848, "STOP/START SYSTEM : System Description \(M/T models\)"](#) (M/T models), [EC-856, "STOP/START SYSTEM : System Description \(CVT models\)"](#).

CAUTION:

Always drive vehicle at a safe speed.

2. Restart the engine.
3. Check DTC.

Is DTC detected?

B1901 DC/DC CONVERTER

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Proceed to [EC-978, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935639

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that the following fuse is not fusing.

Fuse No.	Capacity
F/L-N	30 A

Is the fuse fusing?

- YES >> Replace the fuse after repairing the applicable circuit.
NO >> GO TO 2.

2.CHECK DC/DC CONVERTER POWER SUPPLY INPUT 2

1. Disconnect DC/DC converter harness connector.
2. Check the voltage between DC/DC converter harness connector and ground.

+		-	Voltage
DC/DC converter			
Connector	Terminal		
M97	3	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK DC/DC CONVERTER POWER SUPPLY INPUT 2 CIRCUIT

1. Disconnect battery negative terminal.
2. Check the continuity between DC/DC converter harness connector and fuse.

+		-	Continuity
DC/DC converter		Fuse No.	
Connector	Terminal		
M97	3	F/L-N	Existed

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK INTERMITTENT INCIDENT

Perform intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace DC/DC converter. Refer to [EC-1229, "Removal and Installation"](#).
NO >> Repair or replace error-detected parts.

B1902 DC/DC CONVERTER

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

B1902 DC/DC CONVERTER

DTC Description

INFOID:0000000010935640

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
B1902	— (—)	DC/DC converter detects power supply output 1 is 5.0 V or less when re-start the engine.

POSSIBLE CAUSE

- Harness and connectors (DC/DC converter power supply output 1 circuit is open or shorted.)
- DC/DC converter
- Components power-supplied from DC/DC output 1

FAIL-SAFE

STOP/START SYSTEM

Stop/start system operating condition in fail safe mode		
Idling or driving the vehicle	Stop/start system operating	
	Stop	During cranking (Restart)
Prohibit the stop/start system operation	Restart the engine	Prohibit the stop/start system operation from the next time

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If the other DTC Confirmation Procedure is performed right before this procedure, the ignition switch must be turned OFF and wait for 10 seconds or more to start this procedure.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start the engine and warm it up to normal operating temperature.
2. Press start/stop OFF switch and check that the switch indicator is ON.
3. Select "AUTO STOP START" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
4. Touch "START" and operate stop/start system. (Stop the engine.)
5. Touch "CANCEL" and restart the engine.
6. Check DTC.

Without CONSULT

1. Activate stop/start system. Refer to [EC-848. "STOP/START SYSTEM : System Description \(M/T models\)"](#) (M/T models), [EC-856. "STOP/START SYSTEM : System Description \(CVT models\)"](#) (CVT models).

CAUTION:

Always drive vehicle at a safe speed.

2. Restart the engine.
3. Check DTC.

Is DTC detected?

YES >> Proceed to [EC-979. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935641

1.CHECK FUSE

B1902 DC/DC CONVERTER

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Check that the following fuse is not fusing.

Fuse No.	Capacity
#54	10 A
#55	10 A
#56	10 A
#57	10 A

Refer to [PG-12, "Wiring Diagram - BATTERY POWER SUPPLY -"](#).

Is the fuse fusing?

YES >> Replace the fuse after repairing the applicable circuit.

NO >> GO TO 2.

2.CHECK DC/DC CONVERTER POWER SUPPLY OUTPUT 1 CIRCUIT

1. Disconnect the ignition relay.
2. Disconnect DC/DC converter harness connector.
3. Check the continuity between DC/DC converter harness connector ignition relay harness connector.

+		-	Continuity
DC/DC converter		Ignition relay	
Connector	Terminal		
M97	4	Switching circuit (+)	Existed

Refer to [PG-12, "Wiring Diagram - BATTERY POWER SUPPLY -"](#).

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 IGNITION RELAY ROUTING CIRCUIT

Check ignition relay routing circuit.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK INTERMITTENT INCIDENT

Perform intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to [EC-1229, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

B1903 DC/DC CONVERTER

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

B1903 DC/DC CONVERTER

DTC Description

INFOID:0000000010935642

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
B1903	— (—)	DC/DC converter detects power supply output 2 is 5.0 V or less when re-start the engine.

POSSIBLE CAUSE

- Harness and connectors (DC/DC converter power supply output 2 circuit is open or shorted.)
- DC/DC converter
- Components power-supplied from DC/DC output 2

FAIL-SAFE

STOP/START SYSTEM

Stop/start system operating condition in fail safe mode		
Idling or driving the vehicle	Stop/start system operating	
	Stop	During cranking (Restart)
Prohibit the stop/start system operation	Restart the engine	Prohibit the stop/start system operation from the next time

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If the other DTC Confirmation Procedure is performed right before this procedure, the ignition switch must be turned OFF and wait for 10 seconds or more to start this procedure.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start the engine and warm it up to normal operating temperature.
2. Press start/stop OFF switch and check that the switch indicator is ON.
3. Select "AUTO STOP START" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
4. Touch "START" and operate stop/start system. (Stop the engine.)
5. Touch "CANCEL" and restart the engine.
6. Check DTC.

Without CONSULT

1. Activate stop/start system. Refer to [EC-848. "STOP/START SYSTEM : System Description \(M/T models\)"](#) (M/T models), [EC-856. "STOP/START SYSTEM : System Description \(CVT models\)"](#) (CVT models).

CAUTION:

Always drive vehicle at a safe speed.

2. Restart the engine.
3. Check DTC.

Is DTC detected?

YES >> Proceed to [EC-981. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935643

1. CHECK FUSE

B1903 DC/DC CONVERTER

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Check that the following fuse is not fusing.

Fuse No.	Capacity
#59	10 A
#60	10 A

Refer to [PG-12, "Wiring Diagram - BATTERY POWER SUPPLY -"](#).

Is the fuse fusing?

YES >> Replace the fuse after repairing the applicable circuit.

NO >> GO TO 2.

2.CHECK DC/DC CONVERTER POWER SUPPLY OUTPUT 2 CIRCUIT

1. Disconnect the accessory relay.
2. Disconnect DC/DC converter harness connector.
3. Check the continuity between DC/DC converter harness connector accessory relay harness connector.

+		-	Continuity
DC/DC converter		Accessory relay	
Connector	Terminal		
M97	6	Switching circuit (+)	Existed

Refer to [PG-12, "Wiring Diagram - BATTERY POWER SUPPLY -"](#).

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 ACCESSORY RELAY ROUTING CIRCUIT

Check ignition relay routing circuit.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK INTERMITTENT INCIDENT

Perform intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to [EC-1229, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

B1904 DC/DC CONVERTER

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

B1904 DC/DC CONVERTER

DTC Description

INFOID:000000010935644

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
B1904	— (—)	DC/DC converter function is malfunctioning.

POSSIBLE CAUSE

DC/DC converter

FAIL-SAFE

STOP/START SYSTEM

Stop/start system operating condition in fail safe mode		
Idling or driving the vehicle	Stop/start system operating	
	Stop	During cranking (Restart)
—	—	Prohibit the stop/start system operation from the next time

1.CHECK DTC PRIORITY

If DTC B1904 is displayed with DTC B1900 or B1901, first perform the trouble diagnosis for DTC B1900 or B1901.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.PRECONDITIONING

If the other DTC Confirmation Procedure is performed right before this procedure, the ignition switch must be turned OFF and wait for 10 seconds or more to start this procedure.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start the engine and warm it up to normal operating temperature.
2. Press start/stop OFF switch and check that the switch indicator is ON.
3. Select "AUTO STOP START" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
4. Touch "START" and operate stop/start system. (Stop the engine.)
5. Touch "CANCEL" and restart the engine.
6. Check DTC.

Without CONSULT

1. Activate stop/start system. Refer to [EC-848, "STOP/START SYSTEM : System Description \(M/T models\)"](#) (M/T models), [EC-856, "STOP/START SYSTEM : System Description \(CVT models\)"](#) (CVT models).

CAUTION:

Always drive vehicle at a safe speed.

2. Restart the engine.
3. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-984, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

B1904 DC/DC CONVERTER

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

Diagnosis Procedure

INFOID:0000000010935645

1.CHECK DTC PRIORITY

If DTC B1904 is displayed with DTC B1900 or B1901, first perform the trouble diagnosis for DTC B1900 or B1901.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).

NO >> GO TO 2.

2.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC Confirmation Procedure. Refer to [EC-983, "DTC Description"](#).
4. Check DTC.

Is the DTC B1904 displayed again?

YES >> Replace DC/DC converter. Refer to [EC-1229, "Removal and Installation"](#).

NO >> INSPECTION END

P0001 FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0001 FUEL PUMP

DTC Description

INFOID:0000000010935646

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0001	FUEL FLOW REGULATOR CIRCUIT (Fuel volume regulator control circuit/open) 1.DEF: INLET FLAP BLOCKED CLOSED 2.DEF: INLET FLAP BLOCKED OPEN 3.DEF: OPERATION TEMPERATURE TOO HIGH	- ECM detects a short circuit to ground. - ECM detects a short circuit to battery. - ECM detects a open circuit. - ECM detects an over temperature.

POSSIBLE CAUSE

- Harness or connectors (Fuel flow actuator circuit is open or shorted.)
- Fuel flow actuator

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- CSF regeneration forbidden
- CCSL deactivation with dashboard message
- ESP deactivated
- Rail pressure limitation

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 1 second.
- Check DTC.

Is DTC detected?

YES >> Proceed to [EC-985, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935647

1.CHECK FUEL FLOW ACTUATOR POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect fuel flow actuator harness connector.
- Turn ignition switch ON.
- Check the voltage between fuel flow actuator harness connector and ground.

+		-	Voltage
Fuel flow actuator			
Connector	Terminal		
F167	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

P0001 FUEL PUMP

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK FUEL FLOW ACTUATOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel flow actuator harness connector and ECM harness connector.

+		-		Continuity
Fuel flow actuator		ECM		
Connector	Terminal	Connector	Terminal	
F167	2	F117	43	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.FUEL FLOW ACTUATOR

Refer to [EC-986, "Component Inspection \(Fuel Flow Actuator\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace high pressure fuel pump.

Component Inspection (Fuel Flow Actuator)

INFOID:0000000010935648

1.CHECK FUEL FLOW ACTUATOR

1. Disconnect fuel flow actuator harness connector.
2. Check the resistance between fuel flow actuator terminals as follows.

Fuel flow actuator		Condition		Resistance
+	-			
Terminal				
1	2	Temperature °C (°F)	20 (68)	2.60 - 3.15 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace high pressure fuel pump. Refer to [EM-341, "Removal and Installation"](#).

P0002 FUEL PRESSURE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0002 FUEL PRESSURE

DTC Description

INFOID:000000010935649

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0002	FLOW CONTROL ADAPTIVE (Fuel volume regulator control circuit range/ performance) • 1.DEF: PARAMETER AT MAXIMUM STOP • 2.DEF: PARAMETER AT MINIMUM STOP • 3.DEF: ABOVE THE MAX LEVEL • 4.DEF: BELOW THE MIN LEVEL • 5.DEF: OFFSET IMPLAUSIBLE	• Fuel rail pressure is excessively high. • Fuel rail pressure is excessively low. • Fuel pressure of low pressure fuel circuit is excessively low.

POSSIBLE CAUSE

- Fuel flow actuator
- Fuel rail pressure sensor
- Fuel temperature sensor
- Low pressure fuel pump
- Fuel leakage
- Fuel filter clogged
- Injectors clogged
- Fuel leakage on fuel rail pressure limiter
- Fuel flow actuator blocked

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Rail pressure limitation
- Freeshift inhibited
- CCSL deactivation
- CSF regeneration forbidden
- ESP deactivation
- AGB in limp home (if present)
- PLV opening (if present)
- Not limitation of calibrated performance
- Prohibit stop/start system
- ZFC correction inhibited (if strategy is present)
- FMO: Cancellation regulator (if strategy is present)
- FMO: Stop of the adaptation (if strategy is present)
- Strong vehicle speed limitation (30km/h)
- Torque limitation
- Overpressure on rail on 5 time
- Inhibition of regulation mode of fuel pressure regulator

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0002 is displayed with DTC P0001, P0115, P0190, P0200, P0201, P0202, P0203 or P0204, first perform the trouble diagnosis for DTC P0001, P0115, P0190, P0200, P0201, P0202, P0203 or P0204.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.PERFORM DIAGNOSIS PROCEDURE

NOTE:

< DTC/CIRCUIT DIAGNOSIS >

DTC P0002 can not duplicate.

>> Proceed to [EC-988, "Diagnosis Procedure"](#).**Diagnosis Procedure**

INFOID:0000000010935650

1.CHECK DTC PRIORITY

If DTC P0002 is displayed with DTC P0001, P0115, P0190, P0200, P0201, P0202, P0203 or P0204, first perform the trouble diagnosis for DTC P0001, P0115, P0190, P0200, P0201, P0202, P0203 or P0204.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK FUEL LEVEL

Check that the fuel level is enough.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Refuel.

3.CHECK FUEL FILTER

Check the correctness of the fuel filter.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Replace error-detected parts.

4.CHECK FOR FUEL LEAK

Check for fuel leakage at fuel circuit.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace malfunctioning parts.

5.CHECK FUEL TEMPERATURE SENSOR

Check fuel temperature sensor. Refer to [EC-989, "Component Inspection \(Fuel Temperature Sensor\)"](#).

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Replace error-detected parts.

6.CHECK FUEL FLOW ACTUATOR

Check fuel flow actuator. Refer to [EC-989, "Component Inspection \(Fuel Flow Actuator\)"](#).

Is the inspection result normal?

- YES >> GO TO 7.
NO >> Replace error-detected parts.

7.CHECK FUEL INJECTOR

Check fuel injector. Refer to [EC-989, "Component Inspection \(Fuel Injector\)"](#).

Is the inspection result normal?

- YES >> GO TO 8.
NO >> Replace error-detected parts.

8.CHECK FUEL RAIL PRESSURE SENSOR CIRCUIT

Check fuel rail pressure sensor circuit. Refer to [EC-1014, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 9.
NO >> Replace error-detected parts.

9.CHECK FUEL PUMP

P0002 FUEL PRESSURE

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Check low pressure fuel pump system. Refer to [EC-1205. "Component Function Check"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-44. "Intermittent Incident"](#).
NO >> Replace error-detected parts.

Component Inspection (Fuel Flow Actuator)

INFOID:0000000010935651

1.CHECK FUEL FLOW ACTUATOR

1. Disconnect fuel flow actuator harness connector.
2. Check the resistance between fuel flow actuator terminals as follows.

Fuel flow actuator		Condition		Resistance
+	-			
Terminal				
1	2	Temperature °C (°F)	20 (68)	2.60 - 3.15 Ω

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace high pressure fuel pump. Refer to [EM-341. "Removal and Installation"](#).

Component Inspection (Fuel Injector)

INFOID:0000000010935652

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check the resistance between fuel injector terminals.

Fuel injector		Condition	Resistance
+	−		
Terminal			
1	2	Temperature: 20°C (68°F)	13.7 – 15.3 Ω

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace fuel injector. Refer to [EM-339. "Removal and Installation"](#).

Component Inspection (Fuel Temperature Sensor)

INFOID:0000000010935653

1.CHECK FUEL TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect fuel temperature sensor.
3. Check the resistance between fuel temperature sensor terminals.

+	—	Resistance
Fuel temperature sensor		
Terminal		
1	2	77 Ω - 57 kΩ

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace fuel temperature sensor.

P0016 CKP - CMP CORRELATION

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0016 CKP - CMP CORRELATION

DTC Description

INFOID:0000000010935654

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0016	COHER BTWN CSFT SEN/ENG SPD (Crankshaft position - camshaft position correlation bank 1 sensor A) • 1.DEF: SIGNAL INCOHERENCE	The correlation between crankshaft position sensor signal and camshaft position sensor signal is out of the normal range.

POSSIBLE CAUSE

- Harness or connectors
- CKP sensor circuit is open or shorted.
- CMP sensor circuit is open or shorted.
- Crankshaft position sensor
- Camshaft position sensor
- Timing chain
- Signal plate

FAIL-SAFE

Prohibit start/stop system

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0016 is displayed with DTC P0335, P0560, P0657 or P0641, first perform the trouble diagnosis for DTC P0335, P0560, P0657 or P0641.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to [EC-990, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935655

1.CHECK DTC PRIORITY

If DTC P0016 is displayed with DTC P0335, P0560, P0657 or P0641, first perform the trouble diagnosis for DTC P0335, P0560, P0657 or P0641.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK CKP SENSOR

P0016 CKP - CMP CORRELATION

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Check CKP sensor. Refer to [EC-991, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace error-detected parts.

3.CHECK CMP SENSOR

Check CMP sensor. Refer to [EC-991, "Component Inspection \(Camshaft Position Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace error-detected parts.

4.CHECK SIGNAL PLATE OF CAMSHAFT REAR END

Visually check for chipping signal plate of camshaft rear end (bank 2 intake side).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace camshaft. Refer to [EM-357, "Removal and Installation"](#).

5.CHECK SIGNAL PLATE WITH FLYWHEEL

Visually check for chipping signal plate with flywheel.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace signal plate with flywheel. Refer to [EM-376, "Exploded View"](#).

6.CHECK TIMING CHAIN

Check timing chain. Refer to [EM-347, "Removal and Installation"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace timing chain. Refer to [EM-347, "Removal and Installation"](#).

Component Inspection (Crankshaft Position Sensor)

INFOID:0000000010935656

1.CHECK CRANKSHAFT POSITION SENSOR

1. Turn ignition switch OFF.
2. Disconnect crankshaft position (CKP) sensor harness connector.
3. Check the resistance between CKP sensor terminals.

CKP sensor		Resistance
+	–	
Terminal		
1	2	520 - 860 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CKP sensor. Refer to [EC-812, "Component Parts Location"](#).

Component Inspection (Camshaft Position Sensor)

INFOID:0000000010935657

1.CHECK CAMSHAFT POSITION SENSOR

1. Turn ignition switch OFF.
2. Disconnect camshaft position (CMP) sensor harness connector.
3. Check the resistance between CMP sensor terminals.

P0016 CKP - CMP CORRELATION

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

CMP sensor		Resistance
+	−	
Terminal		
1	2	More than 100 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CMP sensor. Refer to [EM-357, "Exploded View"](#).

P0045 TC BOOST CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0045 TC BOOST CONTROL SOLENOID VALVE

DTC Description

INFOID:000000010935658

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0045	TC SOLENOID VALVE CNTRL CIRC (Turbocharger/supercharger boost control "A" circuit/open) 1.DEF: VOLTAGE TOO LOW 2.DEF: VOLTAGE TOO HIGH	- ECM detects turbocharger boost control solenoid valve circuit is open. - ECM detects turbocharger boost control solenoid valve circuit is short to ground. - ECM detects turbocharger boost control solenoid valve circuit is short to power.

POSSIBLE CAUSE

- Harness or connectors (Turbocharger boost control solenoid valve circuit is open or shorted.)
- Turbocharger boost control solenoid valve

FAIL-SAFE

- Torque limitation
- EGR valve is closed position
- Throttle control motor is opened
- Boost regulation cut off
- CSF regeneration forbidden
- Freeshift inhibited
- CCSL deactivation

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-993, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010935659

1.CHECK ECM HARNESS CONNECTOR CONNECTION

1. Turn ignition switch OFF.
2. Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace ECM harness connector connection. Refer to [PG-7, "Harness Connector"](#) (LEVER LOCKING TYPE).

2.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE HARNESS CONNECTOR CONNECTION

Check turbocharger boost control solenoid valve harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace turbocharger boost control solenoid valve harness connector connection.

P0045 TC BOOST CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

3. 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		
F161	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> Perform trouble diagnosis for power supply circuit.

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	
F161	1	F118	149	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Replace turbocharger boost control solenoid valve.

NO >> Repair or replace error-detected parts.

P0095 IAT SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0095 IAT SENSOR 2

DTC Description

INFOID:0000000010935660

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0095	AIR TEMP SEN/CIRC (Intake air temperature sensor 2 circuit bank 1) • 1.DEF: VOLTAGE TOO LOW • 2.DEF: VOLTAGE TOO HIGH • 3.DEF: IMPLAUSIBLE SIGNAL	• Signal voltage from the intake air temperature sensor 2 remains 4.9 V or more for 1 second or more. • An excessively low voltage from the intake air temperature sensor 2 is sent to ECM. • ECM receives an abnormal signal.

POSSIBLE CAUSE

- Harness or connectors (Intake air temperature sensor 2 circuit is open or shorted.)
- Intake air temperature sensor 2

FAIL-SAFE

- EGR volume control valve is closed position
- Throttle control motor is opened
- Inhibition of the correction of ZFC
- Over torque inhibited
- Limitation of temperature at the entry of CSF (TeFAP)
- Oil vapor heater activated when engine is running (if present)
- Engine speed attachment detection inhibited

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC P0095 can not duplicate.

>> Proceed to [EC-995, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935661

1.CHECK ECM HARNESS CONNECTOR CONNECTION

1. Turn ignition switch OFF.
2. Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK INTAKE AIR TEMPERATURE SENSOR 2 HARNESS CONNECTOR CONNECTION

1. Turn ignition switch OFF.
2. Check turbocharger boost sensor (with intake air temperature sensor 2) harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK INTAKE AIR TEMPERATURE SENSOR 2

Refer to [EC-996, "Component Inspection \(Intake Air Temperature Sensor 2\)"](#).

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Replace error-detected parts.

4.CHECK INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT FOR OPEN AND SHORT

P0095 IAT SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

Check intake air temperature sensor 2 circuit for open and short.

+		-		Continuity
ECM		Turbocharger boost sensor (with Intake air temperature sensor 2)		
Connector	Terminal	Connector	Terminal	
F117	59	F146	3	Existed
	81		1	
	86		2	

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE UPSTREAM TEMPERATURE SENSOR

Refer to [EC-996. "Component Inspection \(Low Pressure EGR Volume Control Valve Upstream Temperature Sensor\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-44. "Intermittent Incident"](#).

NO >> Replace error-detected parts.

Component Inspection (Intake Air Temperature Sensor 2)

INFOID:0000000010935662

1.CHECK INTAKE AIR TEMPERATURE SENSOR 2

1. Disconnect turbocharger boost sensor (with intake air temperature sensor 2) harness connector.
2. Check resistance between turbocharger boost sensor (with intake air temperature sensor 2) harness connector terminals under the following conditions.

Turbocharger boost sensor (with intake air temperature sensor 2)		Condition		Resistance
+	-			
Terminals				
2	1	Temperature° C (°F)	20 (68)	

Is the inspection result normal?

YES >> **INSPECTION END**

NO >> Replace turbocharger boost sensor (with intake air temperature sensor 2).

Component Inspection (Low Pressure EGR Volume Control Valve Upstream Temperature Sensor)

INFOID:0000000010935663

1.CHECK LOW PRESSURE EGR TEMPERATURE SENSOR

1. Disconnect low pressure EGR temperature sensor harness connector.
2. Check resistance between low pressure EGR temperature sensor terminals under the following conditions.

Low pressure EGR temperature sensor		Condition		Resistance
+	-			
Terminal				
1	2	Temperature° C (°F)	20 (68)	

Is the inspection result normal?

YES >> **INSPECTION END**

NO >> Replace low pressure EGR temperature sensor.

P0100 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0100 MAF SENSOR

DTC Description

INFOID:000000010935664

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0100	AIR FLOW SENSOR CIRCUIT (Mass or volume air flow "A" circuit) 1.DEF: VOLTAGE TOO LOW 2.DEF: VOLTAGE TOO HIGH	- An excessively low voltage from the sensor is sent to ECM for 2 seconds or more. - An excessively high voltage from the sensor is sent to ECM for 2 seconds or more.

POSSIBLE CAUSE

- Harness or connectors (Mass air flow sensor circuit is open or shorted.)
- Mass air flow sensor

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Prohibit DPF regeneration

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-997. "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-44. "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010935665

1.CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT

Check the power supply of the mass air flow sensor.

+		-	Voltage
Mass air flow sensor			
Connector	Terminal		
F152	3	Ground	5.0 V

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Perform trouble diagnosis for power supply circuit.

2.CHECK MASS AIR FLOW SENSOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check mass air flow sensor circuit for open and short.

P0100 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

+		-		Continuity
ECM		Mass air flow sensor		
Connector	Terminal	Connector	Terminal	
F117	78	F152	4	Existed
	82		2	

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK MASS AIR FLOW SENSOR

Refer to [EC-998, "Component Inspection \(Mass Air Flow Sensor\)"](#).

Is the inspection result normal?

YES >> Replace error-detected parts.

NO >> INSPECTION END

Component Inspection (Mass Air Flow Sensor)

INFOID:0000000010935666

1.CHECK MASS AIR FLOW SENSOR

1. Disconnect mass air flow sensor harness connector.
2. Check resistance between mass air flow sensor terminals under the following conditions.

Mass air flow sensor		Resistance
+	-	
Terminal		
3	4	2 – 10 kΩ

Is the inspection result normal?

YES >> **INSPECTION END**

NO >> Replace mass air flow sensor.

P0101 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0101 MAF SENSOR

DTC Description

INFOID:0000000010935667

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0101	AIR FLOW SENSOR INFORMATION (Mass or volume air flow "A" circuit range/ performance) • 1.DEF: SIGNAL OUTSIDE UPPER LIMIT • 2.DEF: SIGNAL OUTSIDE LOWER LIMIT	ECM receives improper signal voltage sent from MAF sensor for more than 5 seconds during driving condition.

POSSIBLE CAUSE

- Harness or connectors
- Mass air flow sensor
- Turbocharger boost sensor
- Intake air temperature sensor 2
- Intake air leaks

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Prohibit DPF regeneration

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC P0101 can not duplicate.

>> Proceed to [EC-999, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935668

1.CHECK INTAKE SYSTEM

1. Check air cleaner for clogging.
2. Check the following for connection and cracks.
 - Air duct
 - Vacuum hoses
 - Intake air passage between air duct and intake manifold
 - Turbocharger
 - Turbocharger boost sensor

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning part.

2.SOAK THE VEHICLE

1. Soak the vehicle for 8 hours.

NOTE:

When the engine is already cold condition, proceed to next step.

2. Turn ignition switch ON.
3. Check that the detecting value of TC boost sensor is same as the detecting value of barometric pressure sensor using CONSULT.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace TC boost sensor.

P0101 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

3.CHECK COHERENCE

1. Check coherence between intake air temperature, ambient temperature, and engine coolant temperature.
2. Check that intake air temperature is equal to ambient air temperature ($\pm 10^{\circ}\text{C}$).

Is the inspection result normal?

YES >> Replace mass air flow sensor.

NO >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

P0105 TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0105 TC BOOST SENSOR

DTC Description

INFOID:0000000010935669

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0105	INLET MANIF PRS SEN CIRC (Manifold absolute pressure/barometric pressure circuit) 1.DEF: VOLTAGE TOO LOW 2.DEF: VOLTAGE TOO HIGH 3.DEF: SIGNAL INCOHERENCE 4.DEF: IMPROPER SIGNAL SHAPE	- An excessively low voltage from Turbocharger Boost sensor is sent to ECM for 1 second or more. - An excessively high voltage from Turbocharger Boost sensor is sent to ECM for 1 second or more.

POSSIBLE CAUSE

- Harness or connectors (TC boost sensor circuit is open or shorted.)
- TC boost sensor

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Limited upstream turbine pressure regulation if the sensor is present: Otherwise, the boost pressure regulation is cut
- CSF regeneration forbidden
- CCSL deactivation with dashboard message
- Freeshift Inhibited
- Increased idle speed
- After sales routines forbidden (for boost / manifold pressure sensor not equipped engine)
- Wastegate cut off
- Torque limitation

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1001, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935670

1.CHECK TURBOCHARGER BOOST SENSOR

Check turbocharger boost sensor. Refer to [EC-1002, "Component Inspection \(Turbocharger Boost Sensor\)"](#).

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace error-detected parts.

2.CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.

P0105 TC BOOST SENSOR

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

2. Check the power supply of the turbocharger boost sensor.

+		-	Voltage (Approx.)
Turbocharger boost sensor			
Connector	Terminal		
F146	3	Ground	5.0 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform trouble diagnosis for power supply circuit.

3.CHECK TURBOCHARGER BOOST SENSOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check turbocharger boost sensor circuit for open and short.

+		-		Continuity
ECM		Turbocharger boost sensor		
Connector	Terminal	Connector	Terminal	
F117	59	F146	3	Existed
	81		1	
	85		4	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

Component Inspection (Turbocharger Boost Sensor)

INFOID:0000000010935671

1.CHECK TURBOCHARGER BOOST SENSOR

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost sensor harness connector.
3. Check resistance between turbocharger boost sensor terminals under the following conditions.

Turbocharger boost sensor		Resistance
+	-	
Terminal		
4	1	More than 50 kΩ

Is the inspection result normal?

YES >> **INSPECTION END**

NO >> Replace turbocharger boost sensor.

P0106 TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0106 TC BOOST SENSOR

DTC Description

INFOID:0000000010935672

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0106	INLET PRESSURE CONSISTENCY (Manifold absolute pressure/barometric pressure circuit range/performance) • 1.DEF: SIGNAL INCOHERENCE	Difference between intake manifold air pressure and barometric pressure for 2 seconds while engine stopped.

POSSIBLE CAUSE

- Harness or connectors
- TC boost sensor

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Limited upstream turbine pressure regulation if the sensor is present: Otherwise, the boost pressure regulation is cut
- CSF regeneration forbidden
- CCSL deactivation with dashboard message
- Freeshift Inhibited
- Increased idle speed
- After sales routines forbidden (for boost / manifold pressure sensor not equipped engine)
- Wastegate cut off
- Torque limitation

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1003. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935673

1.CHECK TURBOCHARGER BOOST SENSOR FITTING CONDITION

Check turbocharger boost sensor fitting condition.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Adjust parts fitting condition.

2.CHECK FOR CHARGE AIR LEAK

1. Start the engine and let it idle.
2. Listen for an charge air leak.

Is intake air leak detected?

- YES >> Repair or replace error-detected parts.

P0106 TC BOOST SENSOR

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 3.

3.CHECK TURBOCHARGER

Check if foreign matter is caught between the turbocharger. Refer to EM section.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Remove the foreign matter and clean the turbocharger.

4.CHECK TURBOCHARGER BOOST SENSOR HARNESS CONNECTOR CONNECTIONS

Check turbocharger boost sensor harness connector connection.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK TURBOCHARGER BOOST SENSOR

Check turbocharger boost sensor. Refer to [EC-1004, "Component Inspection \(Turbocharger Boost Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace error-detected parts.

6.CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check the power supply of the turbocharger boost sensor.

+		-	Voltage (Approx.)
Turbocharger boost sensor			
Connector	Terminal		
F146	3	Ground	5.0 V

Is the inspection result normal?

YES >> GO TO 7.

NO >> Perform trouble diagnosis for power supply circuit.

7.CHECK TURBOCHARGER BOOST SENSOR CIRCUIT FOR OPEN AND SHORT

Check turbocharger boost sensor circuit for open and short.

+		-		Continuity
ECM		Turbocharger boost sensor		
Connector	Terminal	Connector	Terminal	
F117	59	F146	3	Existed
	81		1	
	85		4	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

Component Inspection (Turbocharger Boost Sensor)

INFOID:000000010935674

1.CHECK TURBOCHARGER BOOST SENSOR

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost sensor harness connector.
3. Check resistance between turbocharger boost sensor terminals under the following conditions.

P0106 TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

Turbocharger boost sensor		Resistance
+	-	
Terminal		
4	1	More than 50 kΩ

Is the inspection result normal?

YES >> **INSPECTION END**

NO >> Replace turbocharger boost sensor.

A

EC

C

D

E

F

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H

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P

P0110 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0110 IAT SENSOR

DTC Description

INFOID:0000000010935675

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0110	AIR TEMP SEN/CIRC (Intake air temperature sensor 1 circuit bank 1) • 1.DEF: VOLTAGE TOO LOW • 2.DEF: VOLTAGE TOO HIGH	• An excessively low voltage from Intake air temperature sensor 1 is sent to ECM for 1 second. • An excessively high voltage from Intake air temperature sensor 1 is sent to ECM for 1 second.

POSSIBLE CAUSE

- Harness or connectors (Intake air temperature sensor 1 circuit is open or shorted.)
- Intake air temperature sensor 1

FAIL-SAFE

- Boost pressure limitation
- EGR valve is closed position
- Throttle control motor is opened

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1006, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935676

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK MASS AIR FLOW SENSOR HARNESS CONNECTOR CONNECTIONS

Check mass air flow sensor (with intake air temperature sensor 1) harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT FOR OPEN AND SHORT

Check intake air temperature sensor 1 sensor circuit for open and short.

P0110 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

+		-		Continuity
ECM		Mass air flow sensor		
Connector	Terminal	Connector	Terminal	
F117	74	F152	1	Existed
	82		2	

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK INTAKE AIR TEMPERATURE SENSOR 1

Refer to [EC-1007. "Component Inspection \(Intake Air Temperature Sensor 1\)".](#)

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace error-detected parts.

Component Inspection (Intake Air Temperature Sensor 1)

INFOID:0000000010935677

1.CHECK INTAKE AIR TEMPERATURE SENSOR 1

1. Disconnect mass air flow sensor harness connector.
2. Check resistance between mass air flow sensor terminals under the following conditions.

Mass air flow sensor		Condition		Resistance
+	-			
Terminal				
1	2	Temperature° C (°F)	20 (68)	2.342 – 2.531 kΩ

Is the inspection result normal?

YES >> **INSPECTION END**

NO >> Replace mass air flow sensor (intake air temperature sensor 1).

P0115 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0115 ECT SENSOR

DTC Description

INFOID:0000000010935678

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0115	WATER TEMPERATURE SENSOR CIRC (Engine coolant temperature sensor 1 circuit) • 1.DEF: VOLTAGE TOO LOW • 2.DEF: VOLTAGE TOO HIGH • 3.DEF: SIGNAL INCOHERENCE • 4.DEF: IMPROPER SIGNAL SHAPE • 5.DEF: CIRCUIT QUANTITY NOT PLAUSIBLE	• An excessively low voltage from Engine Coolant Temperature Sensor is sent to ECM for 1 second. • An excessively high voltage from Engine Coolant Temperature Sensor is sent to ECM for 1 second. • Engine coolant temperature changes rapidly for 8 seconds.

POSSIBLE CAUSE

- Harness or connectors (Engine coolant temperature sensor circuit is open or shorted.)
- Engine coolant temperature sensor

FAIL-SAFE

- Engine cooling fan operates at high speed while engine running when engine stopped and operates at low speed.
- Engine speed limitation
- EGR valve is closed position
- Throttle control motor is opened
- Prohibit DPF regeneration
- EGR cooling valve activated

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1008, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935679

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR HARNESS CONNECTOR CONNECTIONS

Check engine coolant temperature sensor harness connector connection.

Is the inspection result normal?

P0115 ECT SENSOR

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT FOR OPEN AND SHORT

Check engine coolant temperature sensor circuit for open and short.

+		-		Continuity
ECM		Engine coolant temperature sensor		
Connector	Terminal	Connector	Terminal	
F118	129	F149	2	Existed
	133		1	

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-1009. "Component Inspection \(Engine Coolant Temperature Sensor\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace error-detected parts.

Component Inspection (Engine Coolant Temperature Sensor)

INFOID:0000000010935680

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Disconnect engine coolant temperature sensor harness connector.
2. Check resistance between engine coolant temperature sensor terminals under the following conditions.

Engine coolant temperature sensor		Condition		Resistance
+	-			
Terminal				2.140 – 2.364 kΩ
2	1	Temperature°C (°F)	25 (77)	

Is the inspection result normal?

- YES >> **INSPECTION END**
NO >> Replace engine coolant temperature sensor.

P0120 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0120 TP SENSOR

DTC Description

INFOID:0000000010935681

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0120	INLET AIR FLAP POSITION SEN (Throttle/pedal position sensor/switch "A" circuit) 1.DEF: SIGNAL INCOHERENCE	- Throttle position sensor voltage sent to ECM is 4.8 V or more for 0.5 second or more. - Throttle position sensor voltage sent to ECM is 0.2 V or less for 0.5 second or more.

POSSIBLE CAUSE

- Harness or connectors (Throttle position sensor circuit is open or shorted.)
- Throttle position sensor
- Electric throttle control actuator

FAIL-SAFE

ENGINE CONTROL SYSTEM

- EGR valve is closed position
- Throttle control motor is opened
- CSF regeneration forbidden
- Airflow regulation cut off
- Compression test routine forbidden
- CCSL deactivated with dashboard message
- Freeshift inhibited

STOP/START SYSTEM

Stop/start system operating condition in fail safe mode		
Idling or driving the vehicle	Stop/start system operating	
	Stop	During cranking (Restart)
Prohibit the stop/start system operation	Restart the engine	Prohibit the stop/start system operation from the next time

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1010, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935682

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM harness connector connection.

P0120 TP SENSOR

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR HARNESS CONNECTOR CONNECTIONS

Check electric throttle control actuator harness connector connection.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR FITTING CONDITION

Check electric throttle control actuator fitting condition.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Adjust parts fitting condition.

4.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT FOR OPEN AND SHORT

Check electric throttle control actuator circuit for open and short.

+		-		Continuity
ECM		Electric throttle control actuator		
Connector	Terminal	Connector	Terminal	
F118	103	F153	2	Existed
	107		3	
	108		1	

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK THROTTLE POSITION SENSOR

Refer to [EC-1011. "Component Inspection \(Throttle Position Sensor\)".](#)

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace error-detected parts.

Component Inspection (Throttle Position Sensor)

INFOID:0000000010935683

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform [EC-949. "Work Procedure"](#).
4. Turn ignition switch ON.
5. Set selector lever to D position.
6. Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition	Voltage (V)
Connector	+	−		
	Terminal			
F118	107	103	Accelerator pedal: Fully released	More than 0.425
			Accelerator pedal: Fully depressed	Less than 4.760

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning electric throttle control actuator.

P0135 A/F SENSOR HEATER

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0135 A/F SENSOR HEATER

DTC Description

INFOID:0000000010935684

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0135	PROPOR RICH SEN HEAT CIRC (O2 sensor heater circuit bank 1 sensor 1) • CC.0: SHORT CIRCUIT TO EARTH • CC.1: SHORT-CIRCUIT TO +12V • CO: OPEN CIRCUIT	• ECM detects Air Fuel Ratio Sensor Heater circuit is open for 5 seconds. • ECM detects Air Fuel Ratio Sensor Heater circuit is short to ground for 5 seconds. • ECM detects Air Fuel Ratio Sensor Heater circuit is short to power for 5 seconds.

POSSIBLE CAUSE

- Harness or connectors (The air fuel ratio sensor heater circuit is open or shorted.)
- Air fuel ratio sensor heater

FAIL-SAFE

Stop closed-loop control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1012, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935685

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK AIR FUEL RATIO (A/F) SENSOR HARNESS CONNECTOR CONNECTIONS

Check A/F sensor harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR HEATER CIRCUIT FOR OPEN AND SHORT

Check A/F sensor circuit for open and short.

P0135 A/F SENSOR HEATER

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

+		-		Continuity
ECM		A/F sensor		
Connector	Terminal	Connector	Terminal	
F117	89	F166	3	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK A/F SENSOR HEATER

Check A/F sensor heater. Refer to [EC-1013, "Component Inspection \(A/F Sensor Heater\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

5.REPLACE A/F SENSOR

Replace A/F sensor.

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

Component Inspection (A/F Sensor Heater)

INFOID:0000000010935686

CAUTION:

- Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

1.CHECK AIR FUEL RATIO (A/F) SENSOR

1. Turn ignition switch OFF.
2. Disconnect A/F sensor harness connector.
3. Check the resistance between A/F sensor terminals.

+	−	Resistance
A/ F sensor		
Terminal		
3	4	2.4 - 4.0 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning air fuel ratio (A/F) sensor.

P0190 FRP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0190 FRP SENSOR

DTC Description

INFOID:0000000010935687

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0190	RAIL PRESSURE SENSOR CIRCUIT (Fuel rail pressure sensor "A" circuit) 1.DEF: VOLTAGE TOO LOW 2.DEF: VOLTAGE TOO HIGH 3.DEF: ABOVE THE MAX LEVEL	- An excessively low voltage from the sensor is sent to ECM. - An excessively high voltage from the sensor is sent to ECM. - An improper voltage signal from sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (Fuel rail pressure sensor circuit is open or shorted.)
- Fuel rail pressure sensor

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Rail pressure limitation
- CSF regeneration forbidden
- After sale routines forbidden
- CCSL deactivation with dashboard message
- Freeshift inhibited
- ESP deactivated and AGB in limp home mode

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0190 is displayed with DTC P0697, first perform the trouble diagnosis for DTC P0697.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC P0190 can not duplicate.

>> Proceed to [EC-1014, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935688

1.CHECK DTC PRIORITY

If DTC P0190 is displayed with DTC P0697, first perform the trouble diagnosis for DTC P0697.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK ECM HARNESS CONNECTOR CONNECTIONS

- Turn ignition switch OFF.
- Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK FUEL RAIL PRESSURE SENSOR HARNESS CONNECTOR CONNECTIONS

Check fuel rail pressure sensor harness connector connection.

P0190 FRP SENSOR

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK FUEL PIPING

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK FUEL RAIL PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check the power supply of the fuel rail pressure sensor.

+		-	Voltage (Approx.)
Fuel rail pressure sensor			
Connector	Terminal		
F148	91	Ground	5.0 V

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Perform trouble diagnosis for power supply circuit.

6.CHECK FUEL RAIL PRESSURE SENSOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check fuel rail pressure sensor circuit for open and short.

+		-		Continuity
ECM		Fuel rail pressure sensor		
Connector	Terminal	Connector	Terminal	
F117	73	F148	1	Existed
	77		2	
	91		3	

Is the inspection result normal?

- YES >> Replace fuel rail pressure sensor.
NO >> Repair or replace error-detected parts.

P0200 FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0200 FUEL INJECTOR

DTC Description

INFOID:000000010935689

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0200	INJECTOR CONTROL CIRCUIT (Injector circuit/open) 1.DEF: VALUES OUTSIDE TOLERANCES	- ECM detects fuel injectors circuit malfunction. - Injector code is not stored into ECM.

POSSIBLE CAUSE

- Harness or connectors
- Injector code error

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- After sales routines forbidden
- CCSL deactivation with dashboard message
- CSF regeneration forbidden
- Increased idle speed

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1016, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010935690

1.CHECK FUEL INJECTOR HARNESS CONNECTOR STATE

Check fuel injector harness connector state.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK FUEL INJECTOR

Refer to [EC-1017, "Component Inspection \(Fuel Injector\)"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Replace malfunctioning injector(s).

3.CHECK FUEL INJECTOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check fuel injector circuit for open and short.

P0200 FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

Cylinder	+		-		Continuity
	ECM		Fuel injector		
	Connector	Terminal	Connector	Terminal	
No.1	F118	158	F162	1	Existed
		160		2	
No.2		154	F163	1	
		159		2	
No.3		157	F164	1	
		155		2	
No.4		153	F165	1	
		156		2	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

Component Inspection (Fuel Injector)

INFOID:0000000010935691

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check the resistance between fuel injector terminals.

Fuel injector		Condition	Resistance
+	−		
Terminal			
1	2	Temperature: 20°C (68°F)	13.7 – 15.3Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel injector. Refer to [EM-339, "Removal and Installation"](#).

P0201, P0202, P0203, P0204 FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0201, P0202, P0203, P0204 FUEL INJECTOR

DTC Description

INFOID:000000010935692

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0201	CYLINDER 1 INJECTOR CIRC (Injector circuit/open - cylinder 1) • 1.DEF: AT MAXIMUM LIMIT • 2.DEF: SIGNAL INCOHERENCE • 3.DEF: COMPARISON OF CONFORMITY INFORMATION (CHECKSUM) • 4.DEF: ABOVE THE MAX LEVEL • 5.DEF: INCOHERENCE • CO: OPEN CIRCUIT	• Injector code is incorrect. • ECM detects fuel injectors circuit are open or shorted. • ECM error
P0202	CYLINDER 2 INJECTOR CIRC (Injector circuit/open - cylinder 2) • 1.DEF: AT MAXIMUM LIMIT • 2.DEF: SIGNAL INCOHERENCE • 3.DEF: COMPARISON OF CONFORMITY INFORMATION (CHECKSUM) • 4.DEF: ABOVE THE MAX LEVEL • 5.DEF: INCOHERENCE • CO: OPEN CIRCUIT	
P0203	CYLINDER 3 INJECTOR CIRC (Injector circuit/open - cylinder 3) • 1.DEF: AT MAXIMUM LIMIT • 2.DEF: SIGNAL INCOHERENCE • 3.DEF: COMPARISON OF CONFORMITY INFORMATION (CHECKSUM) • 4.DEF: ABOVE THE MAX LEVEL • 5.DEF: INCOHERENCE • CO: OPEN CIRCUIT	
P0204	CYLINDER 4 INJECTOR CIRC (Injector circuit/open - cylinder 4) • 1.DEF: AT MAXIMUM LIMIT • 2.DEF: SIGNAL INCOHERENCE • 3.DEF: COMPARISON OF CONFORMITY INFORMATION (CHECKSUM) • 4.DEF: ABOVE THE MAX LEVEL • 5.DEF: INCOHERENCE • CO: OPEN CIRCUIT	

POSSIBLE CAUSE

- Harness or connectors (The fuel injector circuit is open.)
- Fuel injector
- Injector code error

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- After sales routines forbidden
- CCSL deactivation with dashboard message
- CSF regeneration forbidden
- Increased idle speed

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1019, "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935693

1.PERFORM FUEL INJECTOR ADJUSTMENT VALUE REGISTRATION

1. Perform FUEL INJECTOR ADJUSTMENT VALUE REGISTRATION. Refer to [EC-947, "Work Procedure"](#).
2. Perform DTC confirmation procedure. Refer to [EC-1018, "DTC Description"](#).

Is DTC detected again?

- YES >> GO TO 2.
 NO >> INSPECTION END

2.CHECK FUEL RETURN HOSE

Check Fuel return hose.

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Repair or replace error-detected parts.

3.CHECK COMPRESSION PRESSURE

Check compression pressure.

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

4.CHECK FUEL INJECTOR HARNESS CONNECTOR STATE

Check fuel injector harness connector state.

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Repair or replace error-detected parts.

5.CHECK FUEL INJECTOR

Refer to [EC-1020, "Component Inspection \(Fuel Injector\)"](#).

Is the inspection result normal?

- YES >> GO TO 6.
 NO >> Repair or replace error-detected parts.

6.CHECK FUEL INJECTOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check fuel injector circuit for open and short.

P0201, P0202, P0203, P0204 FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

Cylinder	+		-		Continuity
	ECM		Fuel injector		
	Connector	Terminal	Connector	Terminal	
No.1	F118	158	F162	1	Existed
		160		2	
No.2		154	F163	1	
		159		2	
No.3		157	F164	1	
		155		2	
No.4		153	F165	1	
		156		2	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

Component Inspection (Fuel Injector)

INFOID:0000000010935694

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check the resistance between fuel injector terminals.

Fuel injector		Condition	Resistance
+	–		
Terminal			
1	2	Temperature: 20°C (68°F)	13.7 – 15.3Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel injector. Refer to [EM-339, "Removal and Installation"](#).

P0217 ENGINE OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0217 ENGINE OVER TEMPERATURE

DTC Description

INFOID:000000010935695

DTC DETECTION LOGIC

If the cooling fan or other 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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0217	ENGINE OVERHEATING (Engine coolant over temperature condition) 1.DEF: OPERATION TEMPERATURE TOO HIGH	When engine coolant temperature is 110°C or more.

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Also, replace the engine oil.

1. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio.
2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

POSSIBLE CAUSE

- Cooling fan
- Radiator hose
- Radiator
- Radiator cap
- Water pump
- Thermostat
- Engine coolant bypass valve control solenoid valve
- Engine coolant temperature sensor

FAIL-SAFE

- Cooling FAN Activated
- Controlled shutters opening (if present)
- Warning overheating lamp activated
- Opening of the engine coolant thermostat (request of ineffective opening in that case) (if present)
- Prohibit stop/start system
- EGR control cut off (if present)
- A/C compressor cut-off (if present)

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK-1

WARNING:

Never remove the reservoir tank 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.

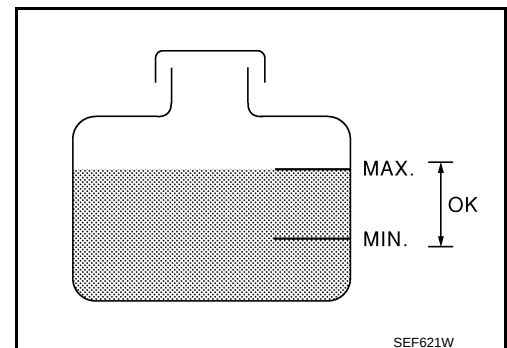
Allow engine to cool before checking coolant level.

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 coolant level in the reservoir tank and/or radiator below the proper range?

- YES >> Proceed to [EC-1022, "Diagnosis Procedure"](#).
NO >> GO TO 2.



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P0217 ENGINE OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

2.PERFORM COMPONENT FUNCTION CHECK-2

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

- YES >> Proceed to [EC-1022, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-3

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 >> Proceed to [EC-1022, "Diagnosis Procedure"](#).

4.PERFORM COMPONENT FUNCTION CHECK-4

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-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
YES-2 >> Confirmation after repair: INSPECTION END
NO >> Proceed to [EC-1022, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935697

1.CHECK COOLING FAN OPERATION

Check cooling fan operation.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace malfunctioning part.

2.CHECK COOLING SYSTEM FOR LEAK-1

Check cooling system for leak.

Is leakage detected?

- YES >> GO TO 3.
NO >> GO TO 4.

3.CHECK COOLING SYSTEM FOR LEAK-2

Check the following for leak.

- Hose
- Radiator
- Radiator cap
- Water pump
- Reservoir tank

>> Repair or replace malfunctioning part.

4.CHECK RADIATOR CAP

Check radiator cap.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Replace radiator cap.

5.CHECK ENGINE COOLANT BYPASS VALVE

P0217 ENGINE OVER TEMPERATURE

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Check engine coolant bypass valve system. Refer to [EC-1200, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK THERMOSTAT

Check thermostat.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace thermostat.

7.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor routing circuit. Refer to [EC-1008, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Perform overheating cause analysis. Refer to [CO-62, "Troubleshooting Chart"](#).

NO >> Replace engine coolant temperature sensor.

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P0225 APP SENSOR

DTC Description

INFOID:000000010935698

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0225	PEDAL POTENTIOMETER CIRCUIT TRACK 1 (Throttle/pedal position sensor/switch "C" circuit) 1.DEF: VOLTAGE TOO HIGH 2.DEF: VOLTAGE TOO LOW	- An excessively low voltage from the sensor is sent to ECM. - An excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (Accelerator pedal position sensor circuit is open or shorted.)
- Accelerator pedal position sensor (APP sensor 1)

FAIL-SAFE

- Torque limitation
- After sales and factory routines inhibited
- Freeshift inhibited
- CCSL deactivation (considered as abnormal with dashboard message)

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0225 is displayed with DTC P0641, first perform the trouble diagnosis for DTC P0641.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
 NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 1 second.
- Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1024, "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010935699

1.CHECK DTC PRIORITY

If DTC P0225 is displayed with DTC P0641, first perform the trouble diagnosis for DTC P0641.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
 NO >> GO TO 2.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

Check the power supply of the accelerator pedal position sensor 1.

P0225 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

+		-	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E110*1 E167*2	4	Ground	5.0 V

*1: CVT models

*2: M/T models

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform trouble diagnosis for power supply circuit.

3.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check accelerator pedal position sensor 1 circuit for open and short.

+		-		Continuity
ECM		APP sensor		
Connector	Terminal	Connector	Terminal	
E79	6	E110* ¹ E167* ²	4	Existed
	3		2	
	2		3	

*1: CVT models

*2: M/T models

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to [EC-1025, "Component Inspection \(Accelerator Pedal Position Sensor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace error-detected parts.

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:0000000010935700

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 terminals as follows.

ECM			Condition		Voltage
Connector	+	-			
	Terminal				
E79	2	3	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	11	12		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.

P0226 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0226 APP SENSOR

DTC Description

INFOID:0000000010935701

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0226	BRAKE/ACCELERATOR PEDAL POSITIONS (Throttle/pedal position sensor/switch "C" circuit) • 1.DEF: JAMMED ACCELERATOR PEDAL DETECTED • 2.DEF: JAMMED ACCELERATOR PEDAL DETECTED • 3.DEF: IMPLAUSIBLE SIGNAL • 4.DEF: FAULT ON GANGS 1 AND 2 OF THE PEDAL POTENTIOMETER	• ECM does not receive a signal sent from APP sensor 1 and 2. • ECM detects a invalid signal sent from APP sensor 1 and 2.

POSSIBLE CAUSE

- Harness or connectors (APP sensor 1 and 2 circuit is open or shorted.)
- Accelerator pedal position sensor

FAIL-SAFE

- Torque limitation
- Pedal limp home activated
- Aftersales and factory routines inhibited
- Freeshift Inhibited
- CCSL deactivation (considered as abnormal with dashboard message)

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC P0226 can not duplicate.

>> Proceed to [EC-1026. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935702

1.CHECK ACCELERATOR PEDAL STATE

Check that the accelerator pedal is not stuck with the driver side floor mat.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair malfunction.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY CIRCUIT

Check the power supply of the accelerator pedal position sensor.

+		-	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E110* ¹	4	Ground	5.0 V
E167* ²	5		

*1: CVT models

*2: M/T models

Is the inspection result normal?

P0226 APP SENSOR

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 3.
NO >> Perform trouble diagnosis for power supply circuit.

3.CHECK ACCELERATOR PEDAL POSITION SENSOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check accelerator pedal position sensor circuit for open and short.

Sensor	+		-		Continuity
	ECM		APP sensor		
	Connector	Terminal	Connector	Terminal	
1	E79	6	E110* ¹ E167* ²	4	Existed
		3		2	
		2		3	
2		12		1	
		11		6	
		10		5	

*1: CVT models

*2: M/T models

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to [EC-1027, "Component Inspection \(Accelerator Pedal Position Sensor\)"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).
NO >> Replace error-detected parts.

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:0000000010935703

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 terminals as follows.

ECM			Condition		Voltage
Connector	+	-			
	Terminal				
E79	2	3	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	11	12		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.

P025A FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P025A FUEL PUMP

DTC Description

INFOID:0000000010935704

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P025A	FUEL PUMP MODULE CONTROL CIRCUIT (Fuel pump module control circuit/open) • CC.0: SHORT CIRCUIT TO EARTH • CC.1: SHORT-CIRCUIT TO +12V • CO: OPEN CIRCUIT	• Fuel pump relay circuit is open • Fuel pump relay circuit is short to ground or power

POSSIBLE CAUSE

- Harness or connectors (Fuel pump relay circuit is open or shorted.)
- Fuel pump relay

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1028, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935705

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection. Refer to Ground Inspection in [GI-46, "Circuit Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK FUEL PUMP RELAY CIRCUIT-I

Check the voltage between ECM harness connector and ground.

ECM				Voltage
+		−		
Connector	Terminal	Connector	Terminal	
F117	38	E79	1	Battery voltage

Is the inspection result normal?

- YES >> INSPECTION END
NO >> GO TO 3.

P025A FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

3.CHECK FUEL PUMP RELAY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F117	38	F72	76	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK 20A FUSE

1. Disconnect 20A fuse (No. 61) from IPDM E/R.
2. Check 20A fuse.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace 20A fuse.

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P025B FUEL PUMP CONTROL MODULE CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P025B FUEL PUMP CONTROL MODULE CONTROL

DTC Description

INFOID:0000000010935706

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P025B	FUEL PUMP MODULE CONTROL CIRCUIT (Fuel pump module control circuit range/performance) • 1.DEF: OPERATION TEMPERATURE TOO HIGH • CC.0: SHORT CIRCUIT TO EARTH • CC.1: SHORT-CIRCUIT TO +12V • CO: OPEN CIRCUIT	• FPCM command circuit is open or shorted. • ECU temperature is too high.

POSSIBLE CAUSE

- Harness or connectors (FPCM command circuit is open or shorted.)
- FPCM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1030, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935707

1.CHECK COMMAND VOLTAGE

Check FPCM command voltage as the following conditions.

ECM			Condition	Voltage
Connector	+	-		
	Terminal			
E79	20	8	Ignition switch: OFF ⇒ ON (fuel pump activated)	0 – 6.74 V
			Ignition switch ON (fuel pump not activated)	0.05 V

Is the inspection result normal?

- YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK FUEL PUMP CONTROL MODULE COMMAND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and FPCM harness connector.

P025B FUEL PUMP CONTROL MODULE CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

3. Check the continuity between ECM harness connector and FPCM harness connector.

+		-		Continuity
ECM		FPCM		
Connector	Terminal	Connector	Terminal	
E79	20	B133	9	Existed

Is the inspection result normal?

- YES >> Replace FPCM. Refer to [EC-1231, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

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P0335 CKP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0335 CKP SENSOR

DTC Description

INFOID:0000000010935708

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0335	ENGINE SPEED SENSOR SIGNAL (Crankshaft position sensor "A" circuit) • 1.DEF: NO SIGNAL • 2.DEF: IMPLAUSIBLE SIGNAL	• Crankshaft position sensor signal is not detected by ECM when engine is running. • Crankshaft position sensor signal is not in the normal pattern when engine is running.

POSSIBLE CAUSE

- Harness or connectors (The sensor circuit is open or shorted.)
- Crankshaft position sensor
- Signal plate

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Prohibit DPF regeneration
- Prohibit start/stop system
- Torque limitation
- Engine speed limitation
- ESP deactivated

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC P0335 can not duplicate.

>> Proceed to [EC-1032, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935709

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM harness connector connection.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK CKP SENSOR HARNESS CONNECTOR CONNECTIONS

Check crankshaft position (CKP) sensor harness connector connection.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK CKP SENSOR

Refer to [EC-1033, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace error-detected parts.

4.CHECK GEAR TOOTH

Visually check for chipping flywheel gear tooth.

P0335 CKP SENSOR

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).
NO >> Replace signal plate.

Component Inspection (Crankshaft Position Sensor)

INFOID:0000000010935710

EC

1.CHECK CRANKSHAFT POSITION (CKP) SENSOR

1. Disconnect CKP sensor harness connector.
2. Check resistance between CKP sensor terminals as follows.

CKP sensor		Resistance
+	-	
Terminal		
1	2	0.52 - 0.86 kΩ

Is the inspection result normal?

- YES >> **INSPECTION END**
NO >> Replace CKP sensor.

P0340 CMP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0340 CMP SENSOR

DTC Description

INFOID:0000000010935711

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0340	CAMSHAFT SENSOR CIRCUIT (Camshaft position sensor "A" circuit bank 1 or single sensor) • 1.DEF: IMPLAUSIBLE SIGNAL • 2.DEF: NO SIGNAL	• Camshaft position sensor signal is not detected by ECM when engine is running. • Camshaft position sensor signal is not in the normal pattern when engine is running.

POSSIBLE CAUSE

- Harness or connectors (The sensor circuit is open or shorted.)
- Camshaft position sensor
- Signal plate

FAIL-SAFE

- Synchronization on the exhaust CAM
- Intake VVT deactivation
- Prohibit stop/start system
- Inhibition of the VVT (setpoint = 0)
- Inhibition of the VVT command (% PWM = 0)
- VVTC angular position set to 0 and inhibition of the VVTC control

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0340 is displayed with DTC P0016, P0335, P0560, P0641, P0651 or P0657, first perform the trouble diagnosis for DTC P0016, P0335, P0560, P0641, P0651 or P0657.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC P0340 can not duplicate.

>> Proceed to [EC-1034, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935712

1.CHECK DTC PRIORITY

If DTC P0340 is displayed with DTC P0016, P0335, P0560, P0641, P0651 or P0657, first perform the trouble diagnosis for DTC P0016, P0335, P0560, P0641, P0651 or P0657.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK CMP SENSOR-1

Visually check camshaft position (CMP) sensor for chipping.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK CMP SENSOR HARNESS CONNECTOR CONNECTIONS

Check CMP sensor harness connector connection.

P0340 CMP SENSOR

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK CMP SENSOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check CMP sensor circuit for open and short.

+		-		Continuity
ECM		CMP sensor		
Connector	Terminal	Connector	Terminal	
F117	55	F151	1	Existed
	70		2	
	71		3	

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK CMP SENSOR-2

Refer to [EC-1035, "Component Inspection \(Camshaft Position Sensor\)"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).
NO >> Replace error-detected parts.

Component Inspection (Camshaft Position Sensor)

INFOID:0000000010935713

1.CHECK CAMSHAFT POSITION (CMP) SENSOR

1. Disconnect CMP sensor harness connector.
2. Check the resistance between CMP sensor terminals as follows.

CMP sensor		Resistance
+	-	
Terminal		
1	2	More than 100 kΩ

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace CMP sensor.

P0380 GLOW CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0380 GLOW CONTROL SYSTEM

DTC Description

INFOID:0000000010935714

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0380	PREHEATING UNIT DIAG CONN (Glow plug/heater circuit "A") • 1.DEF: FAULT ALERTED VIA THE CONTROL UNIT • 2.DEF: OPERATION TEMPERATURE TOO HIGH • CC.0: SHORT CIRCUIT TO EARTH • CC.1: SHORT-CIRCUIT TO +12V • CO: OPEN CIRCUIT	• ECM detects glow plug control unit error. • ECM detects glow plug control circuit is open for 1 second or more. • ECM detects glow plug circuit is short to ground for 1 second or more. • ECM detects glow plug circuit is short to power for 1 second or more. • ECM detects an over temperature on the glow plug control unit for 1 second or more.

POSSIBLE CAUSE

- Harness or connectors
 - Glow plug control circuit is open or shorted.
 - Glow control unit input signal circuit is open or shorted.
- Glow plug
- Glow control unit

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0380 is displayed with DTC P0560 or P0657, first perform the trouble diagnosis for DTC P0560 or P0657.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 4 minutes before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1036, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935715

1.CHECK DTC PRIORITY

If DTC P0380 is displayed with DTC P0560 or P0657, first perform the trouble diagnosis for DTC P0560 or P0657.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

P0380 GLOW CONTROL SYSTEM

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

2.CHECK GLOW CONTROL UNIT POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check the power supply of the glow control unit.

+		-	Voltage
Glow control unit			
Connector	Terminal		
F140	6	Ground	Battery voltage
	10		

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Perform trouble diagnosis for power supply circuit.

3.CHECK GLOW CONTROL UNIT CIRCUIT FOR OPEN AND SHORT-1

1. Turn ignition switch OFF.
2. Check the continuity between glow control unit harness connector and ECM harness connector.

+		-		Continuity
ECM		Glow control unit		
Connector	Terminal	Connector	Terminal	
F117	35	F140	11	Existed
	67		9	

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK GLOW CONTROL UNIT CIRCUIT FOR OPEN AND SHORT-2

Check the continuity between glow control unit harness connector and glow plug harness connector.

+		-		Continuity
Glow control unit		Glow plug		
Connector	Terminal	Connector	Terminal	
F140	1	F95	1	Existed
	2	F96	1	
	3	F97	1	
	4	F98	1	

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK GLOW PLUG

Refer to [EC-1038, "Component Inspection \(Glow Plug\)"](#).

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Replace error-detected parts.

6.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace glow control unit.
NO >> Repair or replace.

P0380 GLOW CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

Component Inspection (Glow Plug)

INFOID:0000000010935716

1.CHECK GLOW PLUG

1. Disconnect glow plug harness connector.
2. Check resistance between glow plug terminals as follows.

+	-	Resistance
Glow plug		
Terminal		
1	Ground	0.2 - 0.8 Ω [at 20°C (68°F)]

Is the inspection result normal?

- YES >> **INSPECTION END**
NO >> Replace malfunctioning glow plug.

P0402 EGR VOLUME CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0402 EGR VOLUME CONTROL VALVE

DTC Description

INFOID:0000000010935717

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0402	EGR VALVE JAMMED OPEN (Exhaust gas recirculation "A" flow excessive detected) • 1.DEF: MECHANICAL FAULT	ECM detects an incorrect closed position of high Pressure EGR volume control valve.

POSSIBLE CAUSE

- Harness or connectors
- High Pressure EGR volume control valve

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- CSF regenerations forbidden
- CCSL deactivation with dashboard message
- Freeshift inhibited

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. Maintain the following conditions for at least 10 consecutive seconds. Hold the steady as possible.

ENGINE SPEED	3,500 rpm

3. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1039, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935718

1.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE

Visually check high pressure EGR volume control valve for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK ECM HARNESS CONNECTOR CONNECTIONS

Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE HARNESS CONNECTOR CONNECTIONS

P0402 EGR VOLUME CONTROL VALVE

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Check high pressure EGR volume control valve harness connector connection.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check high pressure EGR volume control valve circuit for open and short.

+		-		Continuity
ECM		High pressure EGR volume control valve		
Connector	Terminal	Connector	Terminal	
F118	144	F156	1	Existed
	148		2	

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to [EC-1039, "DTC Description"](#).

Is the DTC P0402 displayed again?

YES >> GO TO 6.

NO >> INSPECTION END

6.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to [EC-1040, "Component Inspection \(High Pressure EGR Volume Control Valve Motor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace error-detected parts.

Component Inspection (High Pressure EGR Volume Control Valve Motor) INFOID:0000000010935719

1.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE MOTOR

1. Turn ignition switch OFF.
2. Disconnect high pressure EGR volume control valve harness connector.
3. Check resistance between high pressure EGR volume control valve terminals as follows.

High pressure EGR volume control valve		Resistance (Approx.)
+	-	
Terminal		
1	2	2.35 Ω

Is the inspection result normal?

YES >> **INSPECTION END**

NO >> Replace high pressure EGR volume control valve.

P0403 EGR VOLUME CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0403 EGR VOLUME CONTROL VALVE

DTC Description

INFOID:000000010935720

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0403	EGR VLV CMD CIRC (Exhaust gas recirculation "A" control circuit) • 1.DEF: — • 2.DEF: OPERATION TEMPERATURE TOO HIGH	• ECM detects high Pressure EGR volume control valve command circuit is short to ground. • ECM detects high Pressure EGR volume control valve command circuit is short to power. • ECM detects an over temperature of high Pressure EGR volume control valve.

POSSIBLE CAUSE

- Harness or connectors (High Pressure EGR volume control valve command circuit is open or shorted.)
- High Pressure EGR volume control valve

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- CSF regenerations forbidden
- CCSL deactivation with dashboard message
- Freeshift inhibited

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0403 is displayed with DTC P0641, first perform the trouble diagnosis for DTC P0641.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1041, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010935721

1.CHECK DTC PRIORITY

If DTC P0403 is displayed with DTC P0641, first perform the trouble diagnosis for DTC P0641.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE

Visually check high pressure EGR volume control valve for chipping.

Is the inspection result normal?

P0403 EGR VOLUME CONTROL VALVE

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK ECM HARNESS CONNECTOR CONNECTIONS

Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE HARNESS CONNECTOR CONNECTIONS

Check high pressure EGR volume control valve harness connector connection.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check high pressure EGR volume control valve circuit for open and short.

+		-		Continuity
ECM		High pressure EGR volume control valve		
Connector	Terminal	Connector	Terminal	
F118	144	F156	1	Existed
	148		2	

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to [EC-1041, "DTC Description"](#).

Is the DTC P0403 displayed again?

- YES >> GO TO 7.
NO >> INSPECTION END

7.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to [EC-1042, "Component Inspection \(High Pressure EGR Volume Control Valve Motor\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace error-detected parts.

Component Inspection (High Pressure EGR Volume Control Valve Motor)

INFOID:0000000010935722

1.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE MOTOR

1. Turn ignition switch OFF.
2. Disconnect high pressure EGR volume control valve harness connector.
3. Check resistance between high pressure EGR volume control valve terminals as follows.

High pressure EGR volume control valve		Resistance (Approx.)
+	-	
Terminal		
1	2	
		2.35 Ω

P0403 EGR VOLUME CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

Is the inspection result normal?

- YES >> **INSPECTION END**
- NO >> Replace high pressure EGR volume control valve.

EC

- A
- C
- D
- E
- F
- G
- H
- I
- J
- K
- L
- M
- N
- O
- P

P0409 EGR VOLUME CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0409 EGR VOLUME CONTROL VALVE POSITION SENSOR

DTC Description

INFOID:0000000010935723

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0409	EGR VALVE POSITION SEN CIRC (Exhaust gas recirculation sensor "A" circuit) 1.DEF: SIGNAL INCOHERENCE	- A Voltage of high Pressure EGR volume control valve position sensor remains more than 4.5 V. - A Voltage of high Pressure EGR volume control valve position sensor remains less than 0.5 V.

POSSIBLE CAUSE

- Harness or connectors (High pressure EGR volume control valve control position sensor circuit is open or shorted.)
- High pressure EGR volume control valve control position sensor

FAIL-SAFE

- EGR valve is closed position
- Stop closed-loop control
- CSF regeneration forbidden
- CCSL deactivation with dashboard message
- Freeshift inhibited

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 1 second.
- Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1044, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935724

1.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE

Visually check high pressure EGR volume control valve for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK ECM HARNESS CONNECTOR CONNECTIONS

Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE HARNESS CONNECTOR CONNECTIONS

Check high pressure EGR volume control valve harness connector connection.

Is the inspection result normal?

P0409 EGR VOLUME CONTROL VALVE POSITION SENSOR

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE POSITION SENSOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check high pressure EGR volume control valve position sensor circuit for open and short.

+		-		Continuity
ECM		High pressure EGR volume control valve		
Connector	Terminal	Connector	Terminal	
F118	106	F156	6	Existed
	108		4	
	110		5	

Is the inspection result normal?

- YES >> Replace High pressure EGR volume control valve.
NO >> Repair or replace error-detected parts.

P0470 EXHAUST GAS PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0470 EXHAUST GAS PRESSURE SENSOR

DTC Description

INFOID:0000000010935725

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0470	TBN UPSTR PRS SEN CIRC (Exhaust pressure sensor "A" circuit) • 1.DEF: VOLTAGE TOO LOW • 2.DEF: VOLTAGE TOO HIGH	• An excessively low voltage from the sensor is sent to ECM. • An excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

Exhaust gas pressure sensor

FAIL-SAFE

- Boost pressure limitation
- EGR valve is closed position
- Throttle control motor is opened
- CCSL deactivation (considered as abnormal with dashboard message)
- Freeshift inhibited
- CSF regeneration forbidden

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0470 is displayed with DTC P0651 or P2263, first perform the trouble diagnosis for DTC P0651 or P2263.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1046, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935726

1.CHECK DTC PRIORITY

If DTC P0470 is displayed with DTC P0651 or P2263, first perform the trouble diagnosis for DTC P0651 or P2263.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM harness connector connection.

P0470 EXHAUST GAS PRESSURE SENSOR

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK EXHAUST GAS PRESSURE SENSOR HARNESS CONNECTOR CONNECTIONS

Check exhaust gas pressure sensor harness connector connection.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK EXHAUST GAS PRESSURE SENSOR POWER SUPPLY CIRCUIT

Check the power supply of the exhaust gas pressure sensor.

+		-	Voltage (Approx.)
Exhaust gas pressure sensor			
Connector	Terminal		
F81	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 5.

NO >> Perform trouble diagnosis for power supply circuit.

5.CHECK EXHAUST GAS PRESSURE SENSOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check exhaust gas pressure sensor circuit for open and short.

+		-		Continuity
ECM		Exhaust gas pressure sensor		
Connector	Terminal	Connector	Terminal	
F118	104	F81	3	Existed
	126		1	
	138		2	

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK EXHAUST GAS PRESSURE SENSOR

Refer to [EC-1048, "Component Inspection \(Exhaust Gas Pressure Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace error-detected parts.

7.DTC CONFIRMATION PROCEDURES

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to [EC-1046, "DTC Description"](#).

Is the DTC P0470 displayed again?

YES >> GO TO 8.

NO >> INSPECTION END

8.CHECK TURBOCHARGER

Check turbocharger.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace malfunctioning parts.

P0470 EXHAUST GAS PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

Component Inspection (Exhaust Gas Pressure Sensor)

INFOID:0000000010935727

1. CHECK EXHAUST GAS PRESSURE SENSOR

1. Disconnect exhaust gas pressure sensor harness connector.
2. Check the resistance between exhaust gas pressure sensor terminals as follows.

Exhaust gas pressure sensor		Resistance (Approx.)
+	-	
Terminal		
2	1	100 kΩ

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace exhaust gas pressure sensor.

P0471 EXHAUST PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0471 EXHAUST PRESSURE SENSOR

DTC Description

INFOID:0000000010935728

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0471	PRS UPSTR OF TBN (Exhaust pressure sensor "A" circuit range/ performance) • 1.DEF: INCORRECT SENSOR MOUNT- ING • 2.DEF: SIGNAL INCOHERENCE	• Difference between barometric pressure and exhaust pressure while en- gine stopped. • Exhaust pressure is excessively low while engine is running.

POSSIBLE CAUSE

Exhaust gas pressure sensor

FAIL-SAFE

- Boost pressure limitation
- EGR valve is closed position
- Throttle control motor is opened
- CCSL deactivation (considered as abnormal with dashboard message)
- Freeshift inhibited
- CSF regeneration forbidden
- Torque limitation

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0471 is displayed with DTC P0335, P0470 or P2226, first perform the trouble diagnosis for DTC P0335, P0470 or P2226.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC P0471 can not duplicate.

>> Proceed to [EC-1049, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935729

1.CHECK DTC PRIORITY

If DTC P0471 is displayed with DTC P0335, P0470 or P2226, first perform the trouble diagnosis for DTC P0335, P0470 or P2226.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK EXHAUST GAS PRESSURE SENSOR HARNESS CONNECTOR CONNECTIONS

P0471 EXHAUST PRESSURE SENSOR

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Check exhaust gas pressure sensor harness connector connection.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK EXHAUST GAS PRESSURE SENSOR POWER SUPPLY CIRCUIT

Check the power supply of the exhaust gas pressure sensor.

+		-	Voltage (Approx.)
Exhaust gas pressure sensor			
Connector	Terminal		
F81	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 5.

NO >> Perform trouble diagnosis for power supply circuit.

5.CHECK EXHAUST GAS PRESSURE SENSOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check exhaust gas pressure sensor circuit for open and short.

+		-		Continuity
ECM		Exhaust gas pressure sensor		
Connector	Terminal	Connector	Terminal	
F118	104	F81	3	Existed
	126		1	
	138		2	

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK EXHAUST GAS PRESSURE SENSOR

Refer to [EC-1048, "Component Inspection \(Exhaust Gas Pressure Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace error-detected parts.

7.DTC CONFIRMATION PROCEDURES

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to [EC-1046, "DTC Description"](#).

Is the DTC P0471 displayed again?

YES >> GO TO 8.

NO >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

8.CHECK TURBOCHARGER

Check turbocharger.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

NO >> Repair or replace malfunctioning parts.

Component Inspection (Exhaust Gas Pressure Sensor)

INFOID:0000000010935730

1.CHECK EXHAUST GAS PRESSURE SENSOR

1. Disconnect exhaust gas pressure sensor harness connector.

P0471 EXHAUST PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

2. Check the resistance between exhaust gas pressure sensor terminals as follows.

Exhaust gas pressure sensor		Resistance (Approx.)
+	-	
Terminal		
2	1	100 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust gas pressure sensor.

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

P0487 EGR VOLUME CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0487 EGR VOLUME CONTROL VALVE

DTC Description

INFOID:0000000010935731

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0487	EGR VLV CMD CIRC (Exhaust gas recirculation throttle control circuit "A"/open) 1.DEF: OFFSET IMPLAUSIBLE	ECM detects abnormally closed position of high pressure EGR volume control valve.

POSSIBLE CAUSE

- Harness or connectors
- High pressure EGR volume control valve
- High pressure EGR valve position sensor

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Stop closed-loop control
- Freeshift inhibited
- CSF regeneration forbidden
- CCSL deactivation

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1052, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935732

1.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE

Visually check high pressure EGR volume control valve for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK ECM HARNESS CONNECTOR CONNECTIONS

Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE HARNESS CONNECTOR CONNECTIONS

Check high pressure EGR volume control valve harness connector connection.

P0487 EGR VOLUME CONTROL VALVE

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check high pressure EGR volume control valve circuit for open and short.

+		-		Continuity
ECM		High pressure EGR volume control valve		
Connector	Terminal	Connector	Terminal	
F118	106	F156	6	Existed
	108		4	
	110		5	
	144		1	
	148		2	

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to [EC-1052, "DTC Description"](#).

Is the DTC P0487 displayed again?

- YES >> GO TO 6.
NO >> INSPECTION END

6.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to [EC-1053, "Component Inspection \(High Pressure EGR Volume Control Valve Motor\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace error-detected parts.

Component Inspection (High Pressure EGR Volume Control Valve Motor)

INFOID:0000000010935733

1.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE MOTOR

1. Turn ignition switch OFF.
2. Disconnect high pressure EGR volume control valve harness connector.
3. Check resistance between high pressure EGR volume control valve terminals as follows.

High pressure EGR volume control valve		Resistance (Approx.)
+	-	
Terminal		
1	2	2.35 Ω

Is the inspection result normal?

- YES >> **INSPECTION END**
NO >> Replace high pressure EGR volume control valve.

P0488 EGR SYSTEM

DTC Description

INFOID:0000000010935734

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0488	EGR VALVE POSITION CNTRL (Exhaust gas recirculation throttle control circuit "A" range/performance) 1.DEF: NO RESPONSE FROM THE VALVE MOTOR 2.DEF: VALVE LOCKED	ECM detects high pressure EGR volume control valve regulation error.

POSSIBLE CAUSE

- Harness or connectors
- High pressure EGR volume control valve
- High pressure EGR volume control valve position sensor

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Freeshift inhibited
- CCSL deactivation
- CSF regeneration forbidden

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1054, "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935735

1.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE

Visually check high pressure EGR volume control valve for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Repair or replace error-detected parts.

2.CHECK ECM HARNESS CONNECTOR CONNECTIONS

Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Repair or replace error-detected parts.

3.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE HARNESS CONNECTOR CONNECTIONS

Check high pressure EGR volume control valve harness connector connection.

P0488 EGR SYSTEM

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check high pressure EGR volume control valve circuit for open and short.

+		-		Continuity
ECM		High pressure EGR volume control valve		
Connector	Terminal	Connector	Terminal	
F118	106	F156	6	Existed
	108		4	
	110		5	
	144		1	
	148		2	

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to [EC-1054, "DTC Description"](#).

Is the DTC P0488 displayed again?

YES >> GO TO 6.

NO >> INSPECTION END

6.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to [EC-1055, "Component Inspection \(High Pressure EGR Volume Control Valve Motor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace error-detected parts.

Component Inspection (High Pressure EGR Volume Control Valve Motor)

INFOID:0000000010935736

1.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE MOTOR

1. Turn ignition switch OFF.
2. Disconnect high pressure EGR volume control valve harness connector.
3. Check resistance between high pressure EGR volume control valve terminals as follows.

High pressure EGR volume control valve		Resistance (Approx.)
+	-	
Terminal		
1	2	2.35 Ω

Is the inspection result normal?

YES >> **INSPECTION END**

NO >> Replace high pressure EGR volume control valve.

P0530 REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0530 REFRIGERANT PRESSURE SENSOR

DTC Description

INFOID:0000000010935737

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0530	RFRG TEMP PRESS SEN VOLT (A/C refrigerant pressure sensor "A" circuit) 1.DEF: VOLTAGE TOO LOW 2.DEF: VOLTAGE TOO HIGH	- Refrigerant pressure sensor signal voltage remains more than 4.75 V for 2 seconds or more. - Refrigerant pressure sensor signal voltage remains less than 0.1 V for 2 seconds or more.

POSSIBLE CAUSE

- Harness or connectors (Refrigerant pressure sensor circuit is open or shorted.)
- Refrigerant pressure sensor

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to [EC-1056, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935738

1.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
2. Check the voltage between refrigerant pressure sensor connector and ground.

+		-	Voltage (Approx.)
Refrigerant pressure sensor			
Connector	Terminal		
F42	3	Ground	5.0 V

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

2.CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF and wait at least 1 minute.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

P0530 REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

+		-		Continuity
Refrigerant pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
F42	1	F118	141	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 REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

+		-		Continuity
Refrigerant pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
F42	2	F118	137	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, short to ground or short to power in harness or connectors.

4.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.

NO >> Repair or replace.

P0544 EGT SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0544 EGT SENSOR 1

DTC Description

INFOID:0000000010935739

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0544	TBN UPSTR TEMP SEN CIRC (Exhaust gas temperature sensor circuit bank 1 sensor 1) • 1.DEF: VOLTAGE TOO LOW • 2.DEF: VOLTAGE TOO HIGH	• An excessively low voltage from Exhaust Gas Temperature sensor is sent to ECM for 15 seconds or more. • An excessively high voltage from Exhaust Gas Temperature sensor is sent to ECM for 1 second or more.

POSSIBLE CAUSE

- Harness or connectors (Exhaust gas temperature sensor 1 circuit is open or shorted.)
- Exhaust gas temperature sensor 1

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Prohibit DPF regeneration

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC P0544 can not duplicate.

>> Proceed to [EC-1058. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935740

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

Check ECM harness connector connection.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK EXHAUST GAS TEMPERATURE SENSOR 1 HARNESS CONNECTOR CONNECTIONS

Check exhaust gas temperature sensor 1 control valve harness connector connection.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK EXHAUST GAS TEMPERATURE SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Check exhaust gas temperature sensor 1 circuit for open and short.

+		-		Continuity
ECM		EGT sensor 1		
Connector	Terminal	Connector	Terminal	
F118	134	F142	1	Existed
	150		2	

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

P0544 EGT SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

4.CHECK EXHAUST GAS TEMPERATURE SENSOR 1

Refer to [EC-1059. "Component Inspection \(Exhaust Gas Temperature Sensor 1\)"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-44. "Intermittent Incident"](#).
NO >> Replace error-detected parts.

Component Inspection (Exhaust Gas Temperature Sensor 1)

INFOID:0000000010935741

1.CHECK EXHAUST GAS TEMPERATURE SENSOR 1

1. Reconnect all harness connectors disconnected.
2. Start the engine.
3. Select "TEMP UPSTREAM TURBINE" in "DATA MONITOR" mode of "ENGINE" with CONSULT.
4. Maintain the following conditions for at least 2 minutes and check the monitor status "TEMP UPSTREAM TURBINE".

Engine speed	Approx. 2,500 rpm
Engine coolant temperature	More than 80°C

Does the value of the exhaust gas temperature sensor 1 vary?

- YES >> INSPECTION END
NO >> Replace exhaust gas temperature sensor 1.

P0560 BATTERY VOLTAGE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0560 BATTERY VOLTAGE

DTC Description

INFOID:0000000010935742

DTC DETECTION LOGIC

NOTE:

If this DTC is detected, first confirm self-diagnostic result in IPDM E/R.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0560	COMPUTER SUPPLY VOLTAGE (System voltage) • 1.DEF: VOLTAGE TOO LOW • 2.DEF: VOLTAGE TOO HIGH	• A battery power supply voltage remains more than 17 V or more for 2.5 seconds or more. • A battery power supply voltage remains less than 9 V or more for 10 seconds or more.

POSSIBLE CAUSE

- Harness or connectors (ECM power supply circuit is open or shorted.)
- Battery
- Battery terminal
- Alternator
- IPDM E/R

FAIL-SAFE

- Mechanically activated throttle limp-home
- Torque limitation
- ESP deactivated
- Glow plug circuit deactivated
- Inhibition of idle speed control
- Factory and aftersales routines inhibited
- Freeshift Inhibited
- CCSL deactivation (considered as abnormal with dashboard message)
- Wastegate cut off
- Deactivation of the VVT

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to [EC-1060, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935743

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.

P0560 BATTERY VOLTAGE

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

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-152, "Battery"](#) and [CHG-29, "Alternator"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace with a proper one.

A

EC

C

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P0564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0564 ASCD STEERING SWITCH

DTC Description

INFOID:0000000010935744

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0564	SL LMTR/CC FNC (Cruise control multi-function input "A" circuit) 1.DEF: VALUES OUTSIDE TOLERANCES 2.DEF: SIGNAL INCOHERENCE - CO.1: OPEN CIRCUIT OR SHORT CIRCUIT TO +12 V	- An ASCD steering switch signal voltage is out of the specified range. - ASCD steering switch signal circuit is open. - ASCD steering switch signal circuit is short to battery. - ECM cannot detect the ASCD steering switch signal.

POSSIBLE CAUSE

- Harness or connectors (The switch circuit is open or shorted.)
- ASCD steering switch

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 10 seconds.
- Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Check DTC.

Is DTC detected?

YES >> Proceed to [EC-1062, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935745

1.CHECK ASCD STEERING SWITCH CIRCUIT

- Turn ignition switch ON.
- Check the voltage between ECM harness connector terminals as follows.

ECM			Condition	Voltage (Approx.)
Connector	+	-		
	Terminal			
E79	18	19	CANCEL switch: Pressed	1.0 V
			SET/COAST switch: Pressed	2.0 V
			RESUME/ACCELERATE switch: Pressed	3.0 V
			All ASCD steering switches: Released	4.0 V

P0564 ASCD STEERING SWITCH

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF and wait at least 1 minute.
2. Disconnect combination switch harness connector.
3. Disconnect ECM 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	28	E79	19	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, short to ground or short to power in harness or connectors.

3.CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between combination switch (spiral cable) and ECM harness connector.

+		-		Continuity
Combination switch (spiral cable)		ECM		
Connector	Terminal	Connector	Terminal	
M33	27	E79	18	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, short to ground or short to power in harness or connectors.

4.CHECK ASCD STEERING SWITCH

Refer to [EC-1063, "Component Inspection \(ASCD Steering Switch\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace ASCD steering switch.

Component Inspection (ASCD Steering Switch)

INFOID:0000000010935746

1.CHECK ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector.
2. Check the continuity between combination switch harness connector terminals under following conditions.

Combination switch			Condition	Resistance (Approx.)
Connector	+	-		
	Terminals			
M303	8	9	CANCEL switch: Pressed	250 Ω
			SET/COAST switch: Pressed	660 Ω
			RESUME/ACCELERATE switch: Pressed	1,480 Ω
			All ASCD steering switches: Released	4,000 Ω

Is the inspection result normal?

- YES >> INSPECTION END

P0564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

NO >> Replace ASCD steering switch.

P0575 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0575 ASCD STEERING SWITCH

DTC Description

INFOID:0000000010935747

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0575	CC/SL LMTR BUTTONS (Cruise control input circuit) • 1.DEF: IMPLAUSIBLE SIGNAL	ECM receives ASCD MAIN switch signal and Speed Limiter MAIN switch signal simultaneously.

POSSIBLE CAUSE

ASCD steering switch

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1065, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935748

1.CHECK ASCD STEERING SWITCH SIGNAL-1

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as follows.

+		−	Condition	Voltage (Approx.)
ECM				
Connector	Terminal			
E79	30	Ground	• ASCD MAIN switch: NOT pressed • Speed Limiter MAIN switch: NOT pressed	0 V
	23			
	30		• ASCD MAIN switch: Pressed • Speed Limiter MAIN switch: NOT pressed	Battery Voltage
	23			0 V
	30		• ASCD MAIN switch: NOT pressed • Speed Limiter MAIN switch: Pressed	0 V
	23			Battery Voltage

Is the inspection result normal?

- YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ASCD STEERING SWITCH

1. Turn ignition switch OFF and wait at least 1 minute.
2. Disconnect combination switch harness connector.
3. Check the continuity between combination switch (spiral cable) harness connector terminals.

P0575 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

Combination switch (spiral cable)			Continuity
Connector	+	-	
	Terminal		
M303	1	2	Not existed

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace ASCD steering switch.

3. CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between combination switch (spiral cable) harness connector terminals.

Combination switch (spiral cable)			Continuity
Connector	+	-	
	Terminal		
M33	20	21	Not existed

Is the inspection result normal?

YES >> Replace spiral cable. Refer to [SR-23. "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

P060A ECM

DTC Description

INFOID:0000000010935749

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P060A	— (Internal control module monitoring processor performance)	Internal monitoring processor error.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Reset ECU

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1067, "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935750

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Turn ignition switch OFF and wait for 1 minute.
4. Turn ignition switch ON and wait at least 1 second.
5. Perform the self-diagnosis.

Is the DTC P060A displayed again?

- YES >> GO TO 2.
 NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Perform [EC-944, "Work Procedure"](#).

>> INSPECTION END

P060B ECM

DTC Description

INFOID:0000000010935751

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P060B	— (Internal control module A/D processing performance) • 1.DEF: Internal electronic fault	ECM internal malfunction

POSSIBLE CAUSE

ECM

FAIL-SAFE

- Engine speed limitation
- CCSL deactivation
- Freeshift inhibited

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1068, "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935752

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. Refer to [EC-1226, "Removal and Installation"](#).
2. Go to [EC-937, "Work Procedure"](#).

>> INSPECTION END

P061A ECM

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P061A ECM

DTC Description

INFOID:0000000010935753

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P061A	— (Internal control module torque performance)	ECM detects internal error.

POSSIBLE CAUSE

ECM

FAIL-SAFE

- Medium engine speed limitation
- CCSL deactivation with dashboard message
- Freeshift inhibited (If present)

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC P061A can not duplicate.

>> Proceed to [EC-1069, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935754

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Turn ignition switch OFF and wait for 1 minute.
4. Turn ignition switch ON and wait at least 1 second.
5. Perform the self-diagnosis.

Is the DTC P061A displayed again?

YES >> GO TO 2.

NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Perform [EC-944, "Work Procedure"](#).

>> INSPECTION END

P0627 FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0627 FUEL PUMP

DTC Description

INFOID:0000000010935755

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0627	LOW PRES PMP REL CIRC (Fuel pump "A" control circuit/open) • 1.DEF: FAULT ALERTED VIA THE CONTROL UNIT • 2.DEF: SIGNAL OUTSIDE LOWER LIMIT • 3.DEF: PARAMETER AT MINIMUM STOP • 4.DEF: PARAMETER AT MAXIMUM STOP	• Low fuel pressure is excessively low. • Low fuel pressure is excessively high.

POSSIBLE CAUSE

- Harness or connectors (Fuel pump relay circuit is open or shorted.)
- Fuel pump relay
- Fuel pressure sensor
- FPCM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1070, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935756

1.CHECK FUEL LEAKAGE

Visually check the fuel leakage.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK FUEL PRESSURE SENSOR POWER SUPPLY

1. Disconnect fuel pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between fuel pressure sensor harness connector and ground.

P0627 FUEL PUMP

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

+		-	Voltage (Approx.)
Fuel pressure sensor			
Connector	Terminal		
F150	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK FUEL PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel pressure sensor harness connector and ECM harness connector.

+		-		Continuity
Fuel pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
F150	3	F117	55	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

4.CHECK FUEL PRESSURE SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel pressure sensor harness connector and ECM harness connector.

+		-		Continuity
Fuel pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
F150	1	F117	66	Existed
	2		88	

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.PERFORM DTC CONFIRMATION PROCEDURE

1. Reconnect harness connectors disconnected.
2. Erase DTC.
3. Disconnect fuel injector return pipes.
4. Perform DTC confirmation procedure. Refer to [EC-1070, "DTC Description"](#).

Is DTC detected again?

YES >> Replace fuel pump (in fuel tank).

NO >> Repair or replace fuel return circuit.

P062B ECM

DTC Description

INFOID:0000000010935757

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P062B	COMPUTER (Internal control module fuel injector control performance) • 1.DEF: —	ECM calculation function is malfunctioning.

POSSIBLE CAUSE

ECM

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- CSF regeneration forbidden
- Increased idle speed
- CCSL deactivation with dashboard message
- Freeshift inhibited
- ESP deactivated and AGB in limp home mode
- Compression test routine forbidden

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. Check DTC.

Is DTC detected?

- YES >> [EC-1072, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935758

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Turn ignition switch OFF and wait for 1 minute.
4. Turn ignition switch ON and wait at least 1 second.
5. Perform the self-diagnosis.

Is the DTC P062B displayed again?

- YES >> GO TO 2.
- NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Perform [EC-944, "Work Procedure"](#).

>> INSPECTION END

P0638 ELECTRIC THROTTLE CONTROL ACTUATOR FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0638 ELECTRIC THROTTLE CONTROL ACTUATOR FUNCTION

DTC Description

INFOID:0000000010935759

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0638	INLET AIR FLAP POSITION CTRL (Throttle actuator control range/performance bank 1) 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	- Throttle valve regulation error - ECM detects an incorrect closed position of the throttle valve. - ECM detects an incorrect fully open position of the throttle valve.

POSSIBLE CAUSE

- Electric throttle control actuator
- Throttle valve stuck
- Throttle chamber clogged

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- CSF regeneration forbidden
- Compression test routine inhibited
- Airflow regulation cut off
- CCSL deactivation with dashboard message
- Freeshift inhibited

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0638 is displayed with DTC P0120 or P2100, first perform the trouble diagnosis for DTC P0120 or P2100.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 3 seconds.
- Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1073, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935760

1.CHECK DTC PRIORITY

If DTC P0638 is displayed with DTC P0120 or P2100, first perform the trouble diagnosis for DTC P0120 or P2100.

P0638 ELECTRIC THROTTLE CONTROL ACTUATOR FUNCTION

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR HARNESS CONNECTOR CONNECTIONS

Check electric throttle control actuator harness connector connection.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check electric throttle control actuator circuit for open and short.

+		-		Continuity
ECM		Electric throttle control actuator		
Connector	Terminal	Connector	Terminal	
F118	103	F153	2	Existed
	107		3	
	108		1	
	140		5	
	152		4	

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.DTC CONFIRMATION PROCEDURES

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to [EC-1073, "DTC Description"](#).

Is the DTC P0638 displayed again?

- YES >> GO TO 6.
NO >> INSPECTION END

6.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Perform [EC-1011, "Component Inspection \(Throttle Position Sensor\)"](#) (throttle position sensor), [EC-1177, "Component Inspection"](#) (throttle control motor).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> GO TO 7.

7.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform [EC-949, "Work Procedure"](#).

>> INSPECTION END

P0641 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0641 SENSOR POWER SUPPLY

DTC Description

INFOID:0000000010935761

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0641	SEN SUPPLY N-1 VOL (Sensor reference voltage "A" circuit/open) • 1.DEF: VOLTAGE TOO LOW • 2.DEF: VOLTAGE TOO HIGH	• A voltage of sensor power supply is 5.3 V or more. • A voltage of sensor power supply is 4.7 V or less.

POSSIBLE CAUSE

- Harness or connectors (The sensor power supply 1 circuit is shorted.)
- High pressure EGR volume control valve position sensor
- Throttle position sensor
- Intake manifold runner control valve position sensor
- DPF differential pressure sensor
- TC boost sensor
- Low pressure EGR volume control valve position sensor
- Camshaft position sensor
- APP sensor 1

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- The pressure downstream turbo exists then the limit: Otherwise cut regulation turbo
- Limited upstream turbine pressure regulation if the sensor is present: Otherwise, the boost pressure regulation is cut
- Torque limitation
- Airflow regulation cut off
- CSF regeneration forbidden
- CCSL deactivation with dashboard message
- Freeshift inhibited
- Increased idle speed
- After sales routines forbidden

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1075, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935762

1.CHECK SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

P0641 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

+		−	Voltage (Approx.)
ECM			
Connectors	Terminal		
E79	6	Ground	5 V
F117	55		
	59		
F118	100		
	108		
	112		

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK SENSOR POWER SUPPLY CIRCUITS

1. Turn ignition switch OFF.
2. Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E79	6	Accelerator pedal position sensor (sensor 1)	E110 ^{*1} E167 ^{*2}	4
F117	55	Low pressure EGR volume control valve position sensor	F155	1
		Camshaft position sensor	F151	1
	59	Turbocharger boost sensor	F146	3
		MAF sensor	F152	3
F118	100	DPF differential pressure sensor	F88	1
	108	High pressure EGR volume control valve position sensor	F156	4
		Throttle position sensor	F153	1
	112	Intake manifold runner control valve position sensor	F147	1

*1: CVT models

*2: M/T models

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair short to ground or short to power in harness or connectors.

3. CHECK COMPONENTS

Check the following.

- Accelerator pedal position sensor (sensor 1). Proceed to [EC-1180, "Diagnosis Procedure"](#).
- Low pressure EGR volume control valve position sensor. Proceed to [EC-1108, "Component Inspection \(Low Pressure EGR Volume Control Valve Motor\)"](#).
- Camshaft position sensor. Proceed to [EC-1035, "Component Inspection \(Camshaft Position Sensor\)"](#).
- Turbocharger boost sensor. Proceed to [EC-1002, "Component Inspection \(Turbocharger Boost Sensor\)"](#).
- MAF sensor. Proceed to [EC-998, "Component Inspection \(Mass Air Flow Sensor\)"](#).
- DPF pressure sensor. Proceed to [EC-1193, "Diagnosis Procedure"](#).
- High pressure EGR volume control valve position sensor. Proceed to [EC-1044, "Diagnosis Procedure"](#).
- Throttle position sensor. Proceed to [EC-1011, "Component Inspection \(Throttle Position Sensor\)"](#).
- Intake manifold runner control valve position sensor. Proceed to [EC-1092, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning component.

P0651 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0651 SENSOR POWER SUPPLY

DTC Description

INFOID:0000000010935763

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0651	SEN SUPPLY N-2 VOL (Sensor reference voltage "B" circuit/open) • 1.DEF: VOLTAGE TOO LOW • 2.DEF: VOLTAGE TOO HIGH	• A voltage of sensor power supply is 5.3 V or more. • A voltage of sensor power supply is 4.7 V or less.

POSSIBLE CAUSE

- Harness or connectors (The sensor power supply 2 circuit is shorted.)
- Refrigerant pressure sensor
- Exhaust electric throttle control actuator
- DPF differential pressure sensor
- Exhaust gas pressure sensor
- Accelerator pedal position sensor 2

FAIL-SAFE

- Air conditioner deactivation
- Torque limitation
- CCSL deactivation with dashboard message
- Freeshift inhibited
- After sales routines forbidden
- FAN 2 activation

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1077, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935764

1.CHECK SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

P0651 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

+		-	Voltage (Approx.)
ECM			
Connectors	Terminal		
E79	10	Ground	5.0 V
F118	99		
	100		
	104		

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY CIRCUITS

1. Turn ignition switch OFF.
2. Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E79	10	Accelerator pedal position sensor 2	E110 ^{*1} E167 ^{*2}	5
F118	99	Refrigerant pressure sensor	F42	3
	100	DPF differential pressure sensor	F88	1
	104	Exhaust electric throttle control actuator	F154	1
		Exhaust gas pressure sensor	F81	3

*1: CVT models

*2: M/T models

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair short to ground or short to power in harness or connectors.

3.CHECK COMPONENTS

Check the following.

- Accelerator pedal position sensor. Refer to [EC-1025. "Component Inspection \(Accelerator Pedal Position Sensor\)"](#).
- Refrigerant pressure sensor. Proceed to [EC-1056. "Diagnosis Procedure"](#).
- DPF differential pressure sensor. Proceed to [EC-1095. "Component Inspection \(DPF Differential Pressure Sensor\)"](#).
- Exhaust electric throttle control actuator. Proceed to [EC-1098. "Component Inspection \(Exhaust Throttle Control Motor\)"](#).
- Exhaust gas pressure sensor. Proceed to [EC-1048. "Component Inspection \(Exhaust Gas Pressure Sensor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning component.

P0657 ECM RELAY

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0657 ECM RELAY

DTC Description

INFOID:0000000010935765

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0657	MAIN RELAY CONTROL CIRCUIT (Actuator supply voltage "A" circuit/open) • CC.0: SHORT CIRCUIT TO EARTH	• ECM detects ECM relay control circuit is short to ground. (ECM relay always ON)

POSSIBLE CAUSE

- Harness or connectors (ECM relay control circuit is shorted.)
- ECM relay

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1079, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935766

1.CHECK FUSE

Check that the fuse is not fusing.

#84	10A
#85	15A

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Replace the fuse after repairing the applicable circuit.

2.CHECK ECM POWER SUPPLY

1. Reinsert the fuse pulled out.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

+		-	Voltage
ECM			
Connector	Terminal		
E79	5	Ground	Battery voltage
F117	96		

P0657 ECM RELAY

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> INSPECTION END
NO >> GO TO 3.

3.CHECK ECM RELAY CONTROL SIGNAL

1. Turn ignition switch OFF.
2. Check the voltage between ECM harness connector and ground.

+		-	Voltage
ECM			
Connector	Terminal		
F117	41	Ground	Battery voltage

3. Turn ignition switch ON.
4. Check the voltage between ECM harness connector and ground.

+		-	Voltage (Approx.)
ECM			
Connector	Terminal		
F117	41	Ground	0 V

Is the inspection result normal?

- YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK ECM RELAY CONTROL 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	
F117	41	F74	93	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Check IPDM E/R.
NO >> Repair or replace error-detected parts.

5.CHECK ECM 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	
E79	5	F72	75	Existed
F117	96	F72	78	

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Replace IPDM E/R (ECM relay malfunction).
NO >> Repair or replace error-detected parts.

P0697 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0697 SENSOR POWER SUPPLY

DTC Description

INFOID:0000000010935767

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0697	SEN SUPPLY N-3 VOL (Sensor reference voltage "C" circuit/open) 1.DEF: VOLTAGE TOO LOW 2.DEF: VOLTAGE TOO HIGH	- A voltage of sensor power supply is more than 5.3 V. - A voltage of sensor power supply is less than 4.7 V.

POSSIBLE CAUSE

- Harness or connectors (Fuel rail pressure sensor circuit is shorted.)
- Fuel rail pressure sensor
- Crankshaft position sensor

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Rail pressure limitation
- CSF regeneration forbidden
- After sales routines forbidden
- CCSL deactivation with dashboard message
- Freeshift inhibited
- ESP deactivated and AGB in limp home mode

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1081. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935768

1.CHECK SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

+		-	Voltage (Approx.)
ECM			
Connectors	Terminal		
F117	60	Ground	5 V
	91		

Is the inspection result normal?

- YES >> INSPECTION END

P0697 SENSOR POWER SUPPLY

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY CIRCUITS

1. Turn ignition switch OFF.
2. Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F117	60	Crankshaft position sensor	F145	1
	91	Fuel rail pressure sensor	F148	3

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair short to ground or short to power in harness or connectors.

3.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor. Proceed to [EC-1033, "Component Inspection \(Crankshaft Position Sensor\)"](#).
- Fuel rail pressure sensor. Proceed to [EC-1014, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning component.

P0833 CPP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P0833 CPP SWITCH

DTC Description

INFOID:0000000010935769

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0833	CLUTCH SWITCH SIGNAL CONSISTENCY (Clutch pedal switch "B" circuit) • 1.DEF: SIGNAL INCOHERENCE • 2.DEF: —	Correlation of two clutch pedal position switch signal is inconsistency.

POSSIBLE CAUSE

- Harness or connectors
- Clutch pedal position switch

FAIL-SAFE

ENGINE CONTROL SYSTEM

CC/SL not available

STOP/START SYSTEM

Stop/start system operating condition in fail safe mode		
Idling or driving the vehicle	Stop/start system operating	
	Stop	During cranking (Restart)
Prohibit the stop/start system operation	—	—

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Fully depress clutch pedal.
3. Fully release clutch pedal.
4. Repeat steps 2 and 3 for five times.
5. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1084, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals under the following conditions.

NOTE:

Use component function check to check the overall function of the clutch switch circuit. During this check, a DTC might not be confirmed.

P0833 CPP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

ECM			Condition		Voltage
Connector	+	−			
	Terminal				
E79	24	8	Clutch pedal	Fully released	Approx. 0 V
				Fully depressed	Battery voltage

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC-1084, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935771

1.CHECK CLUTCH PEDAL POSITION SWITCH GROUND CIRCUIT

1. Disconnect clutch pedal position switch harness connector.
2. Check the continuity between clutch pedal position switch harness connector and ground.

+		-	Continuity
Clutch pedal position switch			
Connector	Terminal		
E111	2	Ground	Existed

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 connectors.
2. Check the continuity between clutch pedal position switch harness connector and ECM harness connector.

+		-		Continuity
Clutch pedal position switch		ECM		
Connector	Terminal	Connector	Terminal	
E111	1	E79	24	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-1084, "Component Inspection \(Clutch Pedal Position Switch\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace clutch pedal position switch.

Component Inspection (Clutch Pedal Position Switch)

INFOID:0000000010935772

1.CHECK CLUTCH PEDAL POSITION SWITCH-1

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.

P0833 CPP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

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-2

1. Adjust clutch pedal position switch installation. Refer to [CL-16, "LHD : Inspection and Adjustment"](#) (LHD models) or [CL-20, "RHD : Inspection and Adjustment"](#) (RHD models).
2. Check the continuity between clutch pedal position switch terminals under the following conditions.

Clutch pedal position switch		Condition		Continuity
+	-			
Terminal				
1	2	Clutch pedal	Fully released	Existed
			Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace clutch pedal position switch.

P1010 SWIRL CONTROL VALVE ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1010 SWIRL CONTROL VALVE ACTUATOR

DTC Description

INFOID:0000000010935773

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1010	SWIRL FLAP (Swirl flap) 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	- Intake manifold runner control valve regulation error - ECM detects an incorrect closed position of the intake manifold runner control valve. - ECM detects an incorrect fully open position of the intake manifold runner control valve.

POSSIBLE CAUSE

- Intake manifold runner control valve
- Intake manifold runner control valve stuck
- Intake manifold clogged

FAIL-SAFE

Stop intake manifold runner control valve control (Fully open position)

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1010 is displayed with DTC P1011 or P1013, first perform the trouble diagnosis for DTC P1011 or P1013.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 1 second.
- Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1086, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935774

1.CHECK DTC PRIORITY

If DTC P1010 is displayed with DTC P1011 or P1013, first perform the trouble diagnosis for DTC P1011 or P1013.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK ECM HARNESS CONNECTOR CONNECTIONS

- Turn ignition switch OFF.

P1010 SWIRL CONTROL VALVE ACTUATOR

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

2. Check ECM harness connector connection.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE HARNESS CONNECTOR CONNECTIONS

Check intake manifold runner control valve harness connector connection.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE POWER SUPPLY CIRCUIT

1. Disconnect intake manifold runner control valve.
2. Turn ignition switch ON.
3. Check the power supply of the intake manifold runner control valve.

+		-	Voltage
Intake manifold runner control valve			
Connector	Terminal		
F147	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> Perform trouble diagnosis for power supply circuit.

5.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and intake manifold runner control valve harness connector.

+		-		Continuity
ECM		Intake manifold runner control valve		
Connector	Terminal	Connector	Terminal	
F117	49	F147	4	Existed
F118	112		1	
	121		3	
	125		2	

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.DTC CONFIRMATION PROCEDURES

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to [EC-1086, "DTC Description"](#).

Is the DTC P1010 displayed again?

YES >> Replace intake manifold runner control valve.

NO >> INSPECTION END

P1011 SWIRL CONTROL VALVE ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1011 SWIRL CONTROL VALVE ACTUATOR

DTC Description

INFOID:0000000010935775

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1011	SWIRL FLAP CONTROL CIRCUIT (Swirl flap control circuit) 1.DEF: —	- ECM detects the intake manifold runner control valve control circuit is short to ground for 5 seconds. - ECM detects the intake manifold runner control valve control circuit is short to power for 5 seconds.

POSSIBLE CAUSE

- Harness or connectors (Intake manifold runner control valve control circuit is open or shorted.)
- Intake manifold runner control valve

FAIL-SAFE

- Stop intake manifold runner control valve control (Fully open position)
- CCSL deactivation
- Freeshift inhibition

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to [EC-1088, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935776

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM harness connector connection.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE HARNESS CONNECTOR CONNECTIONS

Check intake manifold runner control valve harness connector connection.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and intake manifold runner control valve harness connector.

P1011 SWIRL CONTROL VALVE ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

+		-		Continuity
ECM		Intake manifold runner control valve		
Connector	Terminal	Connector	Terminal	
F117	49	F147	4	Existed
F118	112		1	
	121		3	
	125		2	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Replace intake manifold runner control valve.

NO >> Repair or replace error-detected parts.

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P

P1012 SWIRL CONTROL VALVE ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1012 SWIRL CONTROL VALVE ACTUATOR

DTC Description

INFOID:0000000010935777

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1012	SWIRL FLAP (Swirl flap) • 1.DEF: OFFSET IMPLAUSIBLE	ECM detects the intake manifold runner control valve regulation error.

POSSIBLE CAUSE

- Harness or connectors (Intake manifold runner control valve position sensor circuit is open or shorted.)
- Intake manifold runner control valve stuck
- Intake manifold runner control valve actuator
- Intake manifold runner control valve position sensor

FAIL-SAFE

Stop intake manifold runner control valve control (Fully open position)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Perform "Intake Manifold Runner Control Valve Position Learning". Refer to [EC-953, "Work Procedure"](#).
2. Check DTC.

Is DTC detected?

YES >> Proceed to [EC-1090, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935778

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM harness connector connection F406 and F407.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE HARNESS CONNECTOR CONNECTIONS

Check intake manifold runner control valve harness connector connection F427.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and intake manifold runner control valve harness connector.

P1012 SWIRL CONTROL VALVE ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

+		-		Continuity
ECM		Intake manifold runner control valve		
Connector	Terminal	Connector	Terminal	
F117	49	F147	4	Existed
F118	112		1	
	121		3	
	125		2	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.PERFORM INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION LEARNING

1. Perform "Intake Manifold Runner Control Valve Position Learning".

2. Check DTC.

Is the DTC P1012 displayed again?

YES >> GO TO 5.

NO >> INSPECTION END

5.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE FITTING CONDITION

Check intake manifold runner control valve fitting condition.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

P1013 SWIRL CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1013 SWIRL CONTROL VALVE POSITION SENSOR

DTC Description

INFOID:0000000010935779

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1013	SWIRL FLAP POSITION SENSOR (Swirl flap position sensor) 1.DEF: SIGNAL INCOHERENCE	- A voltage of intake manifold runner control valve position sensor is more than 4.8 V for 1 second. - A voltage of intake manifold runner control valve position sensor is less than 0.2 V for 1 second.

POSSIBLE CAUSE

- Harness or connectors (Intake manifold runner control valve position sensor circuit is open or shorted.)
- Intake manifold runner control valve position sensor

FAIL-SAFE

Stop intake manifold runner control valve control (Fully open position)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to [EC-1092, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935780

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM harness connector connection.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE HARNESS CONNECTOR CONNECTIONS

Check intake manifold runner control valve harness connector connection.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE POWER SUPPLY CIRCUIT

1. Disconnect intake manifold runner control valve.
2. Turn ignition switch ON.
3. Check the power supply of the intake manifold runner control valve.

P1013 SWIRL CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

+		-	Voltage
Intake manifold runner control valve			
Connector	Terminal		
F147	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> Perform trouble diagnosis for power supply circuit.

4. CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and intake manifold runner control valve harness connector.

+		-		Continuity
ECM		Intake manifold runner control valve		
Connector	Terminal	Connector	Terminal	
F117	49	F147	4	Existed
F118	112		1	
	121		3	
	125		2	

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

P1453 DIESEL PARTICULATE FILTER PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1453 DIESEL PARTICULATE FILTER PRESSURE SENSOR

DTC Description

INFOID:0000000010935781

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1453	DIFF. PRESSURE SENSOR CIRCUIT, PARTICLE FILTER (Differential pressure sensor circuit, particle filter) • 1.DEF: IMPLAUSIBLE SIGNAL • 2.DEF: CLOGGED	ECM detects an abnormal pressure of DPF.

POSSIBLE CAUSE

- Harness or connectors
- DPF differential pressure sensor

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Prohibit DPF regeneration

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC P1453 can not duplicate.

>> Proceed to [EC-1094, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935782

1.VISUALLY CHECK

Visually check for chipping DPF (Diesel Particulate Filter) differential pressure sensor and turbocharger.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning parts.

2.CHECK DPF DIFFERENTIAL PRESSURE SENSOR HARNESS CONNECTOR CONNECTIONS

Check DPF differential pressure sensor harness connector connection.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK DPF DIFFERENTIAL PRESSURE SENSOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Check DPF differential pressure sensor circuit for open and short.

+		-		Continuity
ECM		DPF differential pressure sensor		
Connector	Terminal	Connector	Terminal	
F118	100	F88	1	Existed
	117		2	
	122		3	

P1453 DIESEL PARTICULATE FILTER PRESSURE SENSOR

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK DPF DIFFERENTIAL PRESSURE SENSOR

Refer to [EC-1095, "Component Inspection \(DPF Differential Pressure Sensor\)"](#).

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Replace error-detected parts.

5.CHECK DPF DIFFERENTIAL PRESSURE SENSOR TUBE

1. Remove DPF differential pressure sensor tube.
2. Check DPF differential pressure sensor tube for clogging.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Repair DPF differential pressure sensor tube.

Component Inspection (DPF Differential Pressure Sensor)

INFOID:0000000010935783

1.CHECK DPF PRESSURE SENSOR

1. Disconnect DPF differential pressure sensor harness connector.
2. Check the resistance between DPF differential pressure sensor terminals as follows.

DPF differential pressure sensor		Resistance
+	-	
Terminals		
3	2	330 kΩ

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace DPF differential pressure sensor.

P1480 EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1480 EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Description

INFOID:0000000010935784

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1480	EXHAUST AIR FLAP FUNCTION (Exhaust air flap function) 1.DEF: NO RESPONSE FROM THE VALVE MOTOR 2.DEF: INLET FLAP BLOCKED CLOSED 3.DEF: CLOSING OF AIR INLET FLAP	- Exhaust throttle valve regulation error. - ECM detects an incorrect closed position of the exhaust throttle valve.

POSSIBLE CAUSE

- Exhaust throttle valve stuck
- Exhaust electric throttle control actuator

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Airflow regulation cut off
- CSF regeneration forbidden
- Compression test routine forbidden
- CCSL deactivation with dashboard message
- Freeshift inhibited

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1480 is displayed with DTC P1481 or P1482, first perform the trouble diagnosis for DTC P1481 or P1482.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).

NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 5 seconds.
- Check DTC.

Is DTC detected?

YES >> Proceed to [EC-1096, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935785

1.CHECK DTC PRIORITY

If DTC P1480 is displayed with DTC P1481 or P1482, first perform the trouble diagnosis for DTC P1481 or P1482.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).

P1480 EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM harness connector connection.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR HARNESS CONNECTOR CONNECTIONS

Check exhaust electric throttle control actuator harness connector connection.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR POWER SUPPLY CIRCUIT

Check the power supply of the exhaust electric throttle control actuator.

+		-	Voltage
Exhaust electric throttle control actuator			
Connector	Terminal		
F154	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> Perform trouble diagnosis for power supply circuit.

5.CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check exhaust electric throttle control actuator circuit for open and short.

+		+		Continuity
ECM		Exhaust electric throttle control actuator		
Connector	Terminal	Connector	Terminal	
F118	104	F154	1	Existed
	113		3	
	117		2	
	132		5	
	147		6	

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.DTC CONFIRMATION PROCEDURES

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to [EC-1096, "DTC Description"](#).

Is the DTC P1480 displayed again?

YES >> GO TO 7.

NO >> INSPECTION END

7.CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

P1480 EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Perform [EC-1098. "Component Inspection \(Exhaust Throttle Position Sensor\)"](#), [EC-1098. "Component Inspection \(Exhaust Throttle Control Motor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust electric throttle control actuator.

Component Inspection (Exhaust Throttle Control Motor)

INFOID:0000000010935786

1.CHECK EXHAUST THROTTLE CONTROL MOTOR

1. Disconnect exhaust electric throttle control actuator harness connector.
2. Check the resistance between exhaust throttle control motor terminals as follows.

Exhaust throttle control actuator		Resistance
+	-	
Terminal		
5	6	2.65 - 3.25 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust electric throttle control actuator.

Component Inspection (Exhaust Throttle Position Sensor)

INFOID:0000000010935787

1.CHECK EXHAUST THROTTLE POSITION SENSOR

1. Turn ignition switch ON.
2. Check the voltage between ECM terminals as follows.

ECM		Voltage
+	-	
Terminal		
113	117	0.2 – 4.8 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust electric throttle control actuator.

P1481 EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1481 EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Description

INFOID:000000010935788

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1481	EXHAUST E/THROTTLE CONT ACTUA- TOR (Exhaust electric/throttle control actuator) • 1.DEF: — • 2.DEF: OPERATION TEMPERATURE TOO HIGH	• ECM detects the exhaust electric throttle control valve command circuit is short to ground. • ECM detects the exhaust electric throttle control valve command circuit is short to power. • ECM detects an over temperature of the exhaust electric throttle control actuator.

POSSIBLE CAUSE

- Harness or connectors (Exhaust electric throttle control actuator command circuit is open or shorted.)
- Exhaust electric throttle control actuator
- Exhaust throttle valve stuck

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Airflow regulation cut off
- CSF regeneration forbidden
- Compression test routine forbidden
- CCSL deactivation with dashboard message
- Freeshift inhibited

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1481 is displayed with DTC P0651, first perform the trouble diagnosis for DTC P0651.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 1 second.
2. Check DTC.

Is DTC detected?

- YES >> [EC-1099, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010935789

1.CHECK DTC PRIORITY

If DTC P1481 is displayed with DTC P0651, first perform the trouble diagnosis for DTC P0651.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

P1481 EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

2. CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM harness connector connection.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3. CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR HARNESS CONNECTOR CONNECTIONS

Check exhaust electric throttle control actuator harness connector connection.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4. CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR POWER SUPPLY CIRCUIT

Check the power supply of the exhaust electric throttle control actuator.

+		-	Voltage
Exhaust electric throttle control actuator			
Connector	Terminal		
F154	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> Perform trouble diagnosis for power supply circuit.

5. CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check exhaust electric throttle control actuator circuit for open and short.

+		+		Continuity
ECM		Exhaust electric throttle control actuator		
Connector	Terminal	Connector	Terminal	
F118	104	F154	1	Existed
	113		3	
	117		2	
	132		5	
	147		6	

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. DTC CONFIRMATION PROCEDURES

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to [EC-1096, "DTC Description"](#).

Is the DTC P1481 displayed again?

YES >> GO TO 7.

NO >> INSPECTION END

7. CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

Perform [EC-1101, "Component Inspection \(Exhaust Throttle Position Sensor\)"](#), [EC-1101, "Component Inspection \(Exhaust Throttle Control Motor\)"](#).

P1481 EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust electric throttle control actuator.

Component Inspection (Exhaust Throttle Control Motor)

INFOID:0000000010935790

EC

1.CHECK EXHAUST THROTTLE CONTROL MOTOR

1. Disconnect exhaust electric throttle control actuator harness connector.
2. Check the resistance between exhaust throttle control motor terminals as follows.

Exhaust throttle control actuator		Resistance
+	-	
Terminal		
5	6	2.65 - 3.25 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust electric throttle control actuator.

Component Inspection (Exhaust Throttle Position Sensor)

INFOID:0000000010935791

1.CHECK EXHAUST THROTTLE POSITION SENSOR

1. Turn ignition switch ON.
2. Check the voltage between ECM terminals as follows.

ECM		Voltage
+	-	
Terminal		
113	117	0.2 – 4.8 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust electric throttle control actuator.

P1482 EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1482 EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Description

INFOID:0000000010935792

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1482	EXHAUST THROTTLE POSITION SENSOR (Exhaust throttle position sensor) 1.DEF: SIGNAL INCOHERENCE	- An exhaust throttle valve position sensor voltage is more than 4.8 V. - An exhaust throttle valve position sensor voltage is less than 0.2 V.

POSSIBLE CAUSE

- Harness or connectors (Exhaust throttle valve position sensor circuit is open or shorted.)
- Exhaust throttle valve position sensor

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Airflow regulation cut off
- CSF regeneration forbidden
- Compression test routine forbidden
- CCSL deactivation with dashboard message
- Freeshift inhibited

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 1 second.
- Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1102, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935793

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

- Turn ignition switch OFF.
- Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR HARNESS CONNECTOR CONNECTIONS

Check exhaust electric throttle control actuator harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR POWER SUPPLY CIRCUIT

P1482 EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

Check the power supply of the exhaust electric throttle control actuator.

+		-	Voltage
Exhaust electric throttle control actuator			
Connector	Terminal		
F154	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> Perform trouble diagnosis for power supply circuit.

4.CHECK EXHAUST THROTTLE POSITION SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Check exhaust electric throttle control actuator circuit for open and short.

+		+		Continuity
ECM		Exhaust electric throttle control actuator		
Connector	Terminal	Connector	Terminal	
F118	113	F154	3	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK EXHAUST THROTTLE POSITION SENSOR

Refer to [EC-1103. "Component Inspection \(Exhaust Throttle Position Sensor\)".](#)

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust electric throttle control actuator.

Component Inspection (Exhaust Throttle Position Sensor)

INFOID:0000000010935794

1.CHECK EXHAUST THROTTLE POSITION SENSOR

1. Turn ignition switch ON.
2. Check the voltage between ECM terminals as follows.

ECM		Voltage
+	-	
Terminal		
113	117	
		0.2 – 4.8 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust electric throttle control actuator.

P1483 EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1483 EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Description

INFOID:0000000010935795

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1483	EXHAUST AIR FLAP OFFSET (Exhaust air flap offset) 1.DEF: OFFSET IMPLAUSIBLE	ECM detects the exhaust throttle valve regulation error.

POSSIBLE CAUSE

- Harness or connectors (Exhaust throttle valve position sensor circuit is open or shorted.)
- Exhaust throttle valve stuck
- Exhaust electric throttle control actuator
- Exhaust throttle valve position sensor

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Airflow regulation cut off
- CSF regeneration forbidden
- Compression test routine forbidden
- CCSL deactivation with dashboard message
- Freeshift inhibited

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1104, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935796

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR HARNESS CONNECTOR CONNECTIONS

Check exhaust electric throttle control actuator harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

P1483 EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

3.CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR POWER SUPPLY CIRCUIT

Check the power supply of the exhaust electric throttle control actuator.

+		-	Voltage
Exhaust electric throttle control actuator			
Connector	Terminal		
F154	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> Perform trouble diagnosis for power supply circuit.

4.CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check exhaust electric throttle control actuator circuit for open and short.

+		+		Continuity
ECM		Exhaust electric throttle control actuator		
Connector	Terminal	Connector	Terminal	
F118	104	F154	1	Existed
	113		3	
	117		2	
	132		5	
	147		6	

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.DTC CONFIRMATION PROCEDURES

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to [EC-1096, "DTC Description"](#).

Is the DTC P1483 displayed again?

YES >> GO TO 6.

NO >> INSPECTION END

6.CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

Perform [EC-1106, "Component Inspection \(Exhaust Throttle Position Sensor\)"](#), [EC-1105, "Component Inspection \(Exhaust Throttle Control Motor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust electric throttle control actuator.

Component Inspection (Exhaust Throttle Control Motor)

INFOID:0000000010935797

1.CHECK EXHAUST THROTTLE CONTROL MOTOR

1. Disconnect exhaust electric throttle control actuator harness connector.
2. Check the resistance between exhaust throttle control motor terminals as follows.

P1483 EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

Exhaust throttle control actuator		Resistance
+	-	
Terminal		
5	6	2.65 - 3.25 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust electric throttle control actuator.

Component Inspection (Exhaust Throttle Position Sensor)

INFOID:0000000010935798

1. CHECK EXHAUST THROTTLE POSITION SENSOR

1. Turn ignition switch ON.
2. Check the voltage between ECM terminals as follows.

ECM		Voltage
+	-	
Terminal		
113	117	0.2 – 4.8 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust electric throttle control actuator.

P1484 LOW PRESSURE EGR VOLUME CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1484 LOW PRESSURE EGR VOLUME CONTROL VALVE

DTC Description

INFOID:0000000010935799

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1484	LOW PRESSURE EGR VALVE (Low pressure EGR valve) 1.DEF: MECHANICAL FAULT	ECM detects an incorrect closed position of the low pressure EGR volume control valve.

POSSIBLE CAUSE

- Low pressure EGR volume control valve clogged
- Low pressure EGR volume control valve stuck
- Low pressure EGR volume control valve

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- CSF regenerations forbidden
- CSF regeneration forbidden
- CCSL deactivation with dashboard message
- Freeshift inhibited

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. Maintain the following conditions for at least 10 consecutive seconds. Hold the steady as possible.

ENGINE SPEED	3,500 rpm

3. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1107, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935800

1.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE

Visually check low pressure EGR volume control valve for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace error-detected parts.

2.CHECK DIESEL PARTICULATE FILTER

Refer to [EC-1173, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Replace diesel particulate filter.

P1484 LOW PRESSURE EGR VOLUME CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

3.CHECK ECM HARNESS CONNECTOR CONNECTIONS

Check ECM harness connector connection.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE HARNESS CONNECTOR CONNECTIONS

Check low pressure EGR volume control valve harness connector connection.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Check low pressure EGR volume control valve circuit for open and short.

+		-		Continuity
ECM		Low pressure EGR volume control valve		
Connector	Terminal	Connector	Terminal	
F117	55	F155	1	Existed
	65		2	
	69		3	
F118	136		6	
	143		5	

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.DTC CONFIRMATION PROCEDURE

1. Erase DTC.

2. Perform DTC confirmation procedure again. Refer to [EC-1107, "DTC Description"](#).

Is the DTC P1484 displayed again?

YES >> GO TO 7.

NO >> INSPECTION END

7.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to [EC-1108, "Component Inspection \(Low Pressure EGR Volume Control Valve Motor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace error-detected parts.

Component Inspection (Low Pressure EGR Volume Control Valve Motor)

INFOID:0000000010935801

1.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE MOTOR

1. Turn ignition switch OFF.

2. Disconnect low pressure EGR volume control valve harness connector.

3. Check resistance between low pressure EGR volume control valve terminals as follows.

Low pressure EGR volume control valve		Condition		Resistance
+	-			
Terminal				
5	6	Temperature° C (°F)	20 (68)	1.41 Ω

P1484 LOW PRESSURE EGR VOLUME CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

Is the inspection result normal?

YES >> **INSPECTION END**

NO >> Replace low pressure EGR volume control valve.

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P1485 LOW PRESSURE EGR VOLUME CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1485 LOW PRESSURE EGR VOLUME CONTROL VALVE

DTC Description

INFOID:0000000010935802

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1485	LOW PRESSURE EGR VALVE CIRCUIT (Low pressure EGR valve circuit) 1.DEF: — 2.DEF: OPERATION TEMPERATURE TOO HIGH	- ECM detects low pressure EGR volume control valve circuit is short circuit to ground. - ECM detects low pressure EGR volume control valve circuit is short circuit to battery. - Low pressure EGR volume control valve circuit temperature is too high.

POSSIBLE CAUSE

- Harness or connectors (Low pressure EGR volume control valve circuit is shorted.)
- Low pressure EGR volume control valve

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- CSF regenerations forbidden
- CSF regeneration forbidden
- CCSL deactivation with dashboard message
- Freeshift inhibited

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 1 second.
- Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1110, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935803

1.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE

Visually check low pressure EGR volume control valve for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK DIESEL PARTICULATE FILTER

Refer to [EC-1173, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Replace diesel particulate filter.

3.CHECK ECM HARNESS CONNECTOR CONNECTIONS

Check ECM harness connector connection.

P1485 LOW PRESSURE EGR VOLUME CONTROL VALVE

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE HARNESS CONNECTOR CONNECTIONS

Check low pressure EGR volume control valve harness connector connection.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check low pressure EGR volume control valve circuit for open and short.

+		-		Continuity
ECM		Low pressure EGR volume control valve		
Connector	Terminal	Connector	Terminal	
F117	55	F155	1	Existed
	65		2	
	69		3	
F118	136		6	
	143		5	

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to [EC-1107, "DTC Description"](#).

Is the DTC P1485 displayed again?

- YES >> GO TO 7.
NO >> INSPECTION END

7.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to [EC-1120, "Component Inspection \(Low Pressure EGR Volume Control Valve Motor\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace error-detected parts.

Component Inspection (Low Pressure EGR Volume Control Valve Motor)

INFOID:0000000010935804

1.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE MOTOR

1. Turn ignition switch OFF.
2. Disconnect low pressure EGR volume control valve harness connector.
3. Check resistance between low pressure EGR volume control valve terminals as follows.

Low pressure EGR volume control valve		Condition		Resistance
+	-			
Terminal				
5	6	Temperature° C (°F)	20 (68)	1.41 Ω

Is the inspection result normal?

- YES >> **INSPECTION END**

P1485 LOW PRESSURE EGR VOLUME CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

NO >> Replace low pressure EGR volume control valve.

P1486 LOW PRESSURE EGR VOLUME CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1486 LOW PRESSURE EGR VOLUME CONTROL VALVE POSITION SENSOR

DTC Description

INFOID:0000000010935805

EC

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1486	LOW PRESSURE EGR VALVE POSITION SENSOR (Low pressure EGR valve position sensor) 1.DEF: SIGNAL INCOHERENCE	- An excessively high voltage (more than 4.7 V) from low pressure EGR volume control valve position sensor is sent to ECM. - An excessively low voltage (less than 0.3 V) from low pressure EGR volume control valve position sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (Low pressure EGR volume control valve position sensor circuit is open or shorted.)
- Low pressure EGR volume control valve position sensor

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- CSF regenerations forbidden
- CSF regeneration forbidden
- CCSL deactivation with dashboard message
- Freeshift inhibited

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 1 second.
- Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1113, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935806

1.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE

Visually check low pressure EGR volume control valve for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK DIESEL PARTICULATE FILTER

Refer to [EC-1173, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Replace diesel particulate filter.

3.CHECK ECM HARNESS CONNECTOR CONNECTIONS

Check ECM harness connector connection.

P1486 LOW PRESSURE EGR VOLUME CONTROL VALVE POSITION SENSOR

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4. CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE HARNESS CONNECTOR CONNECTIONS

Check low pressure EGR volume control valve harness connector connection.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Check low pressure EGR volume control valve circuit for open and short.

+		-		Continuity
ECM		Low pressure EGR volume control valve		
Connector	Terminal	Connector	Terminal	
F117	55	F155	1	Existed
	65		2	
	69		3	
F118	136		6	
	143		5	

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. DTC CONFIRMATION PROCEDURE

1. Erase DTC.

2. Perform DTC confirmation procedure again. Refer to [EC-1107, "DTC Description"](#).

Is the DTC P1486 displayed again?

YES >> GO TO 7.

NO >> INSPECTION END

7. CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to [EC-1120, "Component Inspection \(Low Pressure EGR Volume Control Valve Motor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace error-detected parts.

Component Inspection (Low Pressure EGR Volume Control Valve Motor)

INFOID:0000000010935807

1. CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE MOTOR

1. Turn ignition switch OFF.

2. Disconnect low pressure EGR volume control valve harness connector.

3. Check resistance between low pressure EGR volume control valve terminals as follows.

Low pressure EGR volume control valve		Condition		Resistance
+	-			
Terminal				
5	6	Temperature° C (°F)	20 (68)	1.41 Ω

Is the inspection result normal?

YES >> **INSPECTION END**

NO >> Replace low pressure EGR volume control valve.

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P1487 LOW PRESSURE EGR VOLUME CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1487 LOW PRESSURE EGR VOLUME CONTROL VALVE

DTC Description

INFOID:0000000010935808

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1487	LOW PRESSURE EGR VALVE (Low pressure EGR valve) • 1.DEF: OFFSET IMPLAUSIBLE	ECM detects the low pressure EGR volume control valve regulation error.

POSSIBLE CAUSE

- Harness or connectors (Low pressure EGR volume control valve circuit is open or shorted.)
- Low pressure EGR volume control valve stuck
- Low pressure EGR volume control valve
- Low pressure EGR volume control valve position sensor

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- CSF regenerations forbidden
- CSF regeneration forbidden
- CCSL deactivation with dashboard message
- Freeshift inhibited

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1116, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935809

1.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE

Visually check low pressure EGR volume control valve for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK DIESEL PARTICULATE FILTER

Refer to [EC-1173, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Replace diesel particulate filter.

3.CHECK ECM HARNESS CONNECTOR CONNECTIONS

Check ECM harness connector connection.

P1487 LOW PRESSURE EGR VOLUME CONTROL VALVE

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE HARNESS CONNECTOR CONNECTIONS

Check low pressure EGR volume control valve harness connector connection.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check low pressure EGR volume control valve circuit for open and short.

+		-		Continuity
ECM		Low pressure EGR volume control valve		
Connector	Terminal	Connector	Terminal	
F117	55	F155	1	Existed
	65		2	
	69		3	
F118	136		6	
	143		5	

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to [EC-1107, "DTC Description"](#).

Is the DTC P1486 displayed again?

- YES >> GO TO 7.
NO >> INSPECTION END

7.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to [EC-1120, "Component Inspection \(Low Pressure EGR Volume Control Valve Motor\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace error-detected parts.

Component Inspection (Low Pressure EGR Volume Control Valve Motor)

INFOID:0000000010935810

1.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE MOTOR

1. Turn ignition switch OFF.
2. Disconnect low pressure EGR volume control valve harness connector.
3. Check resistance between low pressure EGR volume control valve terminals as follows.

Low pressure EGR volume control valve		Condition		Resistance
+	-			
Terminal				
5	6	Temperature° C (°F)	20 (68)	1.41 Ω

Is the inspection result normal?

- YES >> **INSPECTION END**

P1487 LOW PRESSURE EGR VOLUME CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

NO >> Replace low pressure EGR volume control valve.

P1488 LOW PRESSURE EGR VOLUME CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1488 LOW PRESSURE EGR VOLUME CONTROL VALVE

DTC Description

INFOID:0000000010935811

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1488	LOW PRESSURE EGR VALVE (Low pressure EGR valve) 1.DEF: NO RESPONSE FROM THE VALVE MOTOR 2.DEF: CLOSING OF AIR INLET FLAP	Low pressure EGR volume control valve does not operate.

POSSIBLE CAUSE

- Harness or connectors (Low pressure EGR volume control valve circuit is open or shorted.)
- Low pressure EGR volume control valve
- Low pressure EGR volume control valve position sensor

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- CSF regenerations forbidden
- CSF regeneration forbidden
- CCSL deactivation with dashboard message
- Freeshift inhibited

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1119, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935812

1.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE

Visually check low pressure EGR volume control valve for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK DIESEL PARTICULATE FILTER

Refer to [EC-1173, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Replace diesel particulate filter.

3.CHECK ECM HARNESS CONNECTOR CONNECTIONS

Check ECM harness connector connection.

P1488 LOW PRESSURE EGR VOLUME CONTROL VALVE

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE HARNESS CONNECTOR CONNECTIONS

Check low pressure EGR volume control valve harness connector connection.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Check low pressure EGR volume control valve circuit for open and short.

+		-		Continuity
ECM		Low pressure EGR volume control valve		
Connector	Terminal	Connector	Terminal	
F117	55	F155	1	Existed
	65		2	
	69		3	
F118	136		6	
	143		5	

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.DTC CONFIRMATION PROCEDURE

1. Erase DTC.

2. Perform DTC confirmation procedure again. Refer to [EC-1107, "DTC Description"](#).

Is the DTC P1488 displayed again?

YES >> GO TO 7.

NO >> INSPECTION END

7.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to [EC-1120, "Component Inspection \(Low Pressure EGR Volume Control Valve Motor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace error-detected parts.

Component Inspection (Low Pressure EGR Volume Control Valve Motor)

INFOID:0000000010935813

1.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE MOTOR

1. Turn ignition switch OFF.

2. Disconnect low pressure EGR volume control valve harness connector.

3. Check resistance between low pressure EGR volume control valve terminals as follows.

Low pressure EGR volume control valve		Condition		Resistance
+	-			
Terminal				
5	6	Temperature° C (°F)	20 (68)	1.41 Ω

Is the inspection result normal?

YES >> **INSPECTION END**

P1488 LOW PRESSURE EGR VOLUME CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

NO >> Replace low pressure EGR volume control valve.

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P1489 LOW PRESSURE EGR VOLUME CONTROL VALVE UPSTREAM TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1489 LOW PRESSURE EGR VOLUME CONTROL VALVE UPSTREAM TEMPERATURE SENSOR

DTC Description

INFOID:0000000010935814

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1489	LOW PRESSURE EGR VALVE TEMPERATURE SENSOR (Low pressure EGR valve temperature sensor) 1.DEF: VOLTAGE TOO LOW 2.DEF: VOLTAGE TOO HIGH 3.DEF: OPERATION TEMPERATURE TOO HIGH	- ECM detects a short circuit to battery. - ECM detects a short circuit to ground. - EGR cooler (low pressure) temperature is 180 °C (356°F) or more.

POSSIBLE CAUSE

- Harness or connectors (Low pressure EGR volume control valve upstream temperature sensor circuit is shorted.)
- Low pressure EGR volume control valve upstream temperature sensor

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Temperature sensor after EGR cooler overheat signal diagnostic set of data to call the failure manag.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1489 is displayed with DTC P1480, P1481, P1482, P1483, P1484, P1485, P1486, P1487 or P1488, first perform the trouble diagnosis for DTC P1480, P1481, P1482, P1483, P1484, P1485, P1486, P1487 or P1488.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 10 seconds.
- Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1122, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935815

1.CHECK DTC PRIORITY

If DTC P1489 is displayed with DTC P1480, P1481, P1482, P1483, P1484, P1485, P1486, P1487 or P1488, first perform the trouble diagnosis for DTC P1480, P1481, P1482, P1483, P1484, P1485, P1486, P1487 or P1488.

Is applicable DTC detected?

P1489 LOW PRESSURE EGR VOLUME CONTROL VALVE UPSTREAM TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK ECM HARNESS CONNECTOR CONNECTIONS

Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE HARNESS CONNECTOR CONNECTIONS

Check low pressure EGR volume control valve harness connector connection.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check low pressure EGR volume control valve circuit for open and short.

+		-		Continuity
ECM		Low pressure EGR volume control valve		
Connector	Terminal	Connector	Terminal	
F117	55	F155	1	Existed
	65		2	
	69		3	
F118	136		6	
	143		5	

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK DIESEL PARTICULATE FILTER

Refer to [EC-1173, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Replace diesel particulate filter.

6.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE UPSTREAM TEMPERATURE SENSOR

Refer to [EC-1123, "Component Inspection \(Low Pressure EGR Temperature Sensor\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace error-detected parts.

Component Inspection (Low Pressure EGR Temperature Sensor)

INFOID:000000010935816

1.CHECK LOW PRESSURE EGR TEMPERATURE SENSOR

1. Disconnect low pressure EGR volume control valve upstream temperature sensor harness connector.
2. Check resistance between low pressure EGR temperature sensor terminals under the following conditions.

P1489 LOW PRESSURE EGR VOLUME CONTROL VALVE UPSTREAM TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

Low pressure EGR temperature sensor		Condition		Resistance
+	-			
Terminal				
2	1	Temperature° C (°F)	20 (68)	57.094 – 65.836 kΩ

Is the inspection result normal?

YES >> **INSPECTION END**

NO >> Replace low pressure EGR temperature sensor.

P148A HIGH PRESSURE EGR VOLUME CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P148A HIGH PRESSURE EGR VOLUME CONTROL VALVE

DTC Description

INFOID:0000000010935817

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P148A	HIGH PRESSURE EGR VALVE FUNCTION (High pressure EGR valve function) • 1.DEF: NO RESPONSE FROM THE VALVE MOTOR	ECM detects an incorrect position of high Pressure EGR volume control valve.

POSSIBLE CAUSE

- Harness or connectors
- High pressure EGR volume control valve
- High pressure EGR volume control valve volume control valve position sensor

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operation temperature.
2. Turn ignition switch OFF and wait at least 60 seconds.
3. Turn ignition switch ON.
4. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1125, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935818

1.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE

Visually check high pressure EGR volume control valve for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK ECM HARNESS CONNECTOR CONNECTIONS

Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK EGR VOLUME CONTROL VALVE HARNESS CONNECTOR CONNECTIONS

Check low pressure EGR valve and high pressure EGR valve harness connector connection.

Is the inspection result normal?

- YES >> GO TO 4.

P148A HIGH PRESSURE EGR VOLUME CONTROL VALVE

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

4.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE CIRCUIT

1. Turn ignition switch OFF.
2. Check EGR valve circuit for open and short.

+		-		Continuity
ECM		High pressure EGR volume control valve		
Connector	Terminal	Connector	Terminal	
F118	144	F156	1	Existed
	148		2	

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to [EC-1125, "DTC Description"](#).

Is the DTC P148A displayed again?

YES >> GO TO 6.

NO >> INSPECTION END

6.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to [EC-1126, "Component Inspection \(High Pressure EGR Volume Control Valve Motor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace high pressure EGR volume control valve.

Component Inspection (High Pressure EGR Volume Control Valve Motor)

INFOID:0000000010935819

1.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect high pressure EGR volume control valve harness connector.
3. Check resistance between high pressure EGR volume control valve terminals as follows.

High pressure EGR volume control valve		Condition		Resistance (Approx.)
+	-			
Terminal				2.4 Ω
1	2	Temperature °C (°F)	23 (73)	

Is the inspection result normal?

YES >> **INSPECTION END**

NO >> Replace high pressure EGR volume control valve.

P148B LOW PRESSURE EGR VOLUME CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P148B LOW PRESSURE EGR VOLUME CONTROL VALVE

DTC Description

INFOID:0000000010935820

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P148B	LOW PRESSURE EGR VALVE FUNCTION (Low pressure EGR valve function) 1.DEF: NO RESPONSE FROM THE VALVE MOTOR	ECM detects an incorrect position of the low pressure EGR volume control valve.

POSSIBLE CAUSE

- Low pressure EGR volume control valve clogged
- Low pressure EGR volume control valve stuck
- Low pressure EGR volume control valve

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operation temperature.
2. Turn ignition switch OFF and wait at least 60 seconds.
3. Turn ignition switch ON.
4. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1127, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935821

1.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE

Visually check low pressure EGR volume control valve for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK DIESEL PARTICULATE FILTER

Refer to [EC-1173, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Replace diesel particulate filter.

3.CHECK ECM HARNESS CONNECTOR CONNECTIONS

Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

P148B LOW PRESSURE EGR VOLUME CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

4. CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE HARNESS CONNECTOR CONNECTIONS

Check low pressure EGR volume control valve harness connector connection.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Check low pressure EGR volume control valve circuit for open and short.

+		-		Continuity
ECM		Low pressure EGR volume control valve		
Connector	Terminal	Connector	Terminal	
F118	136	F155	6	Existed
	143		5	

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. DTC CONFIRMATION PROCEDURE

1. Erase DTC.

2. Perform DTC confirmation procedure again. Refer to [EC-1127, "DTC Description"](#).

Is the DTC P148B displayed again?

YES >> GO TO 7.

NO >> INSPECTION END

7. CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to [EC-1128, "Component Inspection \(Low Pressure EGR Volume Control Valve Motor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace error-detected parts.

Component Inspection (Low Pressure EGR Volume Control Valve Motor)

INFOID:0000000010935822

1. CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE MOTOR

1. Turn ignition switch OFF.

2. Disconnect low pressure EGR volume control valve harness connector.

3. Check resistance between low pressure EGR volume control valve terminals as follows.

Low pressure EGR volume control valve		Condition		Resistance
+	-			
Terminal				
5	6	Temperature° C (°F)	20 (68)	1.69 Ω

Is the inspection result normal?

YES >> **INSPECTION END**

NO >> Replace low pressure EGR volume control valve.

P148C EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P148C EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Description

INFOID:0000000010935823

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P148C	EXHAUST AIR FLAP FUNCTION (Exhaust air flap function) 1.DEF: NO RESPONSE FROM THE VALVE MOTOR	- Exhaust throttle valve regulation error. - ECM detects an incorrect position of the exhaust throttle valve.

POSSIBLE CAUSE

- Exhaust throttle valve stuck
- Exhaust electric throttle control actuator

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P148C is displayed with DTC P1481 or P1482, first perform the trouble diagnosis for DTC P1481 or P1482.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 3 seconds.
- Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1129, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935824

1.CHECK DTC PRIORITY

If DTC P148C is displayed with DTC P1481 or P1482, first perform the trouble diagnosis for DTC P1481 or P1482.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK ECM HARNESS CONNECTOR CONNECTIONS

- Turn ignition switch OFF.
- Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

P148C EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

3.CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR HARNESS CONNECTOR CONNECTIONS

Check exhaust electric throttle control actuator harness connector connection.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR POWER SUPPLY CIRCUIT

Check the power supply of the exhaust electric throttle control actuator.

+		-	Voltage
Exhaust electric throttle control actuator			
Connector	Terminal		
F154	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> Perform trouble diagnosis for power supply circuit.

5.CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check exhaust electric throttle control actuator circuit for open and short.

+		+		Continuity
ECM		Exhaust electric throttle control actuator		
Connector	Terminal	Connector	Terminal	
F118	104	F154	1	Existed
	113		3	
	117		2	
	132		5	
	147		6	

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.DTC CONFIRMATION PROCEDURES

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to [EC-1129, "DTC Description"](#).

Is the DTC P148C displayed again?

YES >> GO TO 7.

NO >> INSPECTION END

7.CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

Perform [EC-1131, "Component Inspection \(Exhaust Throttle Position Sensor\)"](#), [EC-1131, "Component Inspection \(Exhaust Throttle Control Motor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 8.

8.REPLACE EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace exhaust electric throttle control actuator.
2. Perform [EC-949, "Work Procedure"](#).

P148C EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

>> INSPECTION END

Component Inspection (Exhaust Throttle Control Motor)

INFOID:0000000010935825

1.CHECK EXHAUST THROTTLE CONTROL MOTOR

1. Disconnect exhaust electric throttle control actuator harness connector.
2. Check the resistance between exhaust throttle control motor terminals as follows.

Exhaust electric throttle control actuator		Resistance
+	-	
Terminal		
5	6	2.65 - 3.25 Ω

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace exhaust electric throttle control actuator.

Component Inspection (Exhaust Throttle Position Sensor)

INFOID:0000000010935826

1.CHECK EXHAUST THROTTLE POSITION SENSOR

1. Turn ignition switch ON.
2. Check the voltage between ECM terminals as follows.

ECM		Voltage
+	-	
Terminal		
113	117	0.2 – 4.8 V

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace exhaust electric throttle control actuator.

P1512 STARTER MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1512 STARTER MOTOR

Description

INFOID:0000000010935829

ECM multiplies operation counter of starter motor which operated in operation with key switch and operation with restart and memorizes it.

DTC Description

INFOID:0000000010935830

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1512	STARTER (Starter) • 1.DEF: NO OPERATION • 2.DEF: INCORRECT OPERATION	When starter motor operating counter which ECM memorized is 250,000 times or more.

POSSIBLE CAUSE

Starter motor

FAIL-SAFE

STOP/START SYSTEM

Stop/start system operating condition in fail safe mode		
Idling or driving the vehicle	Stop/start system operating	
	Stop	During cranking (Restart)
Prohibit the stop/start system operation	—	Prohibit the stop/start system operation from the next time

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If the other DTC Confirmation Procedure is performed right before this procedure, the ignition switch must be turned OFF and wait for 10 seconds or more to start this procedure.

>> GO TO 2.

2.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-1132, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935831

1.REPLACE STARTER MOTOR

Replace starter motor. Refer to [STR-39, "R9M : Removal and Installation"](#).

>> INSPECTION END

P1525 ASCD SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1525 ASCD SYSTEM

DTC Description

INFOID:0000000010935832

DTC DETECTION LOGIC

NOTE:

DTC P1525 is displayed with another DTC.

Perform the trouble diagnosis for the corresponding DTC.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1525	CONSISTENT MULTIPLEX SIGNALS FOR CC/SL (Consistent multiplex signals for cruise control/speed limiter) 1.DEF: THE DATA SUPPLIED TO THE CRUISE CONTROL OR SPEED LIMITER ARE NOT CORRECT	Other DTC that illuminates MIL is detected while ASCD is operating.

POSSIBLE CAUSE

- Harness or connectors
- Others systems
- ECM

FAIL-SAFE

Not applicable

Diagnosis Procedure

INFOID:0000000010935833

DTC P1525 is displayed with another DTC.

Perform trouble diagnosis for the corresponding DTC. Refer to [EC-908, "DTC Index"](#).

P1544 EGT SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1544 EGT SENSOR 2

DTC Description

INFOID:0000000010935834

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1544	TEMP SEN UPSTREAM OF PF (Temperature sensor upstream of particle filter) • 1.DEF: SIGNAL OUTSIDE LOWER LIMIT • 2.DEF: SIGNAL OUTSIDE UPPER LIMIT • 3.DEF: OPERATION TEMPERATURE TOO HIGH	• Diesel particulate filter temperature is more than 890 °C (1,634 °F). • Diesel particulate filter temperature is extremely low.

POSSIBLE CAUSE

- Harness or connectors (Exhaust gas temperature sensor 2)
- Exhaust gas temperature sensor 2
- TC boost sensor
- A/F sensor
- Exhaust electric throttle control actuator
- Injector(s)
- Exhaust leakage
- Catalytic converter and DPF (Diesel Particulate Filter)

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Prohibit DPF regeneration

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1544 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC P1544 can not duplicate.

>> Proceed to [EC-1134, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935835

1.CHECK DTC PRIORITY

If DTC P1544 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK EXHAUST LEAKAGE

Check exhaust leakage. Refer to [EX-16, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts. And then GO TO 11.

P1544 EGT SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

3.CHECK HARNESS CONNECTOR CONNECTIONS

Check harness connector connection of the following items.

- ECM
- Exhaust gas temperature sensor 2
- TC boost sensor
- A/F sensor
- Exhaust electric throttle control actuator
- Injectors

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts. And then GO TO 11.

4.CHECK EXHAUST GAS TEMPERATURE (EGT) SENSOR 2 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EGT sensor 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EGT sensor 2 harness connector and ground.

+		-	Voltage (Approx.)
EGT sensor 2			
Connector	Terminal		
F143	2	Ground	5 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK EXHAUST GAS TEMPERATURE (EGT) SENSOR 2 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EGT sensor 2 harness connector.

+		-		Continuity
ECM		EGT sensor 2		
Connector	Terminal	Connector	Terminal	
F118	105	F143	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts. And then GO TO 11.

6.CHECK EXHAUST GAS TEMPERATURE (EGT) SENSOR 2 SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EGT sensor 2 harness connector.

+		-		Continuity
ECM		EGT sensor 2		
Connector	Terminal	Connector	Terminal	
F118	109	F143	1	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts. And then GO TO 11.

P1544 EGT SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

7. CHECK EXHAUST GAS TEMPERATURE SENSOR 2

Refer to [EC-1136, "Component Inspection \(DPF Upstream Temperature Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace error-detected parts. And then GO TO 11.

8. CHECK TC BOOST SENSOR ROUTING CIRCUIT

Refer to [EC-1001, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace error-detected parts. And then GO TO 11.

9. CHECK AIR FUEL RATIO (A/F) SENSOR ROUTING CIRCUIT

Refer to [EC-1184, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace error-detected parts. And then GO TO 11.

10. CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR ROUTING CIRCUIT

Refer to [EC-1096, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace error-detected parts. And then GO TO 11.

11. CHECK FUEL INJECTOR ROUTING CIRCUIT

Refer to [EC-1019, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace error-detected parts. And then GO TO 12.

12. CHECK DIESEL PARTICULATE FILTER

Refer to [EC-1173, "Component Inspection"](#).

Is the inspection result normal?

YES-1 (Every inspection result are normal)>>Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

YES-2 (After repairing any malfunctioning part)>>INSPECTION END

NO >> Replace diesel particulate filter.

Component Inspection (DPF Upstream Temperature Sensor)

INFOID:0000000010935836

1. CHECK EXHAUST GAS TEMPERATURE (EGT) SENSOR 2

1. Disconnect EGT sensor 2 harness connector.

2. Check resistance between EGT sensor 2 terminals under the following conditions.

EGT sensor 2		Condition		Resistance
+	-			
Terminal				
2	1	Temperature° C (°F)	20 (68)	89.309 – 159.795 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EGT sensor 2.

P1546 EXHAUST GAS TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1546 EXHAUST GAS TEMPERATURE

DTC Description

INFOID:0000000010935837

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1546	TEMP. UPSTREAM OF PF (Temperature upstream of particle filter) • 1.DEF: EXCESSIVE TEMPERATURE	Diesel particulate filter temperature is more than 1,200 °C (2,192 °F).

POSSIBLE CAUSE

Diesel particulate filter

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1546 is displayed with following DTC, first perform the trouble diagnosis for following DTC.

- DTC P0001, P0002, P0101, P0190, P0200, P0201, P0202, P0203, P0204, P0627, P1453, P1544 and P2002

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC P1546 can not duplicate.

>> Proceed to [EC-1137, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935838

1.CHECK OTHER DTC

If DTC P1546 is displayed with other DTC, perform trouble diagnosis for other DTC.

>> INSPECTION END.

P1589 NEUTRAL SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1589 NEUTRAL SWITCH

DTC Description

INFOID:0000000010935839

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1589	GEAR BOX NEUTRAL CONTACTOR (Gear box neutral contactor) • 1.DEF: IMPLAUSIBLE SIGNAL	Neutral position switch signal remains ON for a long driving distance.

POSSIBLE CAUSE

- Harness or connectors (Neutral position switch circuit is shorted.)
- Neutral position switch

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

NOTE:

Use Component Function Check the overall function of the neutral position switch circuit. During this check, the DTC might not be confirmed.

With CONSULT

1. Turn ignition switch ON.
2. Select "MANUAL GEARBOX LEVER IN NEUTRAL" in "DATA MONITOR" mode of "ECM" using CONSULT.
3. Check the "MANUAL GEARBOX LEVER IN NEUTRAL" indication as per the following conditions.

Selector lever position	Indication
Neutral position	DETECTED
Except above position	NOT DETECTED

Without CONSULT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connectors as per the following conditions.

+		-	Condition		Voltage (Approx.)
ECM					
Connector	Terminal				
F117	80	Ground	Shift lever	Neutral	Battery voltage
				Except above	0 V

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC-1138, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935842

1.CHECK FUSE

Check that the following fuse is not fusing.

Fuse No.	Capacity
#97	10 A

P1589 NEUTRAL SWITCH

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Is the fuse fusing?

- YES >> Replace the fuse after repairing the applicable circuit.
NO >> GO TO 2.

2.CHECK NEUTRAL POSITION SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect neutral position switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between neutral position switch harness connector and ground.

+		-	Voltage (Approx.)
Neutral position switch			
Connector	Terminal		
F48	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK NEUTRAL POSITION SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between neutral position switch harness connector and IPDM E/R harness connector.

+		-		Continuity
Neutral position switch		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F48	2	F72	71	Existed

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK NEUTRAL POSITION INPUT SIGNAL CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between neutral position switch harness connector and ECM harness connector.

+		-		Continuity
Neutral position switch		ECM		
Connector	Terminal	Connector	Terminal	
F48	1	F117	80	Existed

4. 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 NEUTRAL POSITION INPUT SIGNAL CIRCUIT-2

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between neutral position switch harness connector and IPDM E/R harness connector.

P1589 NEUTRAL SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

+		-		Continuity
Neutral position switch		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F48	2	F74	94	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace neutral position switch.

NO >> Repair or replace error-detected parts.

P158A CLUTCH SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P158A CLUTCH SWITCH

DTC Description

INFOID:000000010935843

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P158A	END STROKE CLUTCH CONTACTOR (End stroke clutch contactor) 1.DEF: IMPLAUSIBLE SIGNAL	ECM detects clutch interlock switch malfunction.

POSSIBLE CAUSE

- Harness or connectors
- Clutch interlock switch

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals under the following conditions.

NOTE:

Use component function check to check the overall function of the clutch switch circuit. During this check, a DTC might not be confirmed.

+		-	Condition		Voltage
ECM					
Connector	Terminal				
E79	27	Ground	Clutch pedal	Fully released	Battery voltage
				Fully depressed	Approx. 0 V

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC-1141, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000010935845

1.CHECK CLUTCH INTERLOCK SWITCH POWER SUPPLY

1. Disconnect clutch interlock switch harness connector.
2. Check the voltage between clutch interlock switch harness connector and ground.

+		-	Voltage
Clutch interlock switch			
Connector	Terminal		
E109	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair open circuit or short to power in harness or connectors.

2.CHECK CLUTCH INTERLOCK SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connectors.
2. Check the continuity between clutch interlock switch harness connector and ECM harness connector.

P158A CLUTCH SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

+		-		Continuity
Clutch interlock switch		ECM		
Connector	Terminal	Connector	Terminal	
E109	2	E79	27	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 INTERLOCK SWITCH

Refer to [EC-1142, "Component Inspection \(Clutch Pedal Position Switch\)"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace clutch interlock switch.

4.CHECK CLUTCH PEDAL POSITION SWITCH

Check clutch pedal position switch. Refer to [EC-1084, "Component Inspection \(Clutch Pedal Position Switch\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

Component Inspection (Clutch Pedal Position Switch)

INFOID:0000000010935846

1.CHECK CLUTCH INTERLOCK SWITCH-1

1. Turn ignition switch OFF.
2. Disconnect clutch interlock switch harness connector.
3. Check the continuity between clutch interlock switch terminals under the following conditions.

Clutch interlock 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 INTERLOCK SWITCH-2

1. Adjust clutch interlock switch installation.
2. Check the continuity between clutch interlock switch terminals under the following conditions.

Clutch interlock 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 interlock switch.

P160C ECM

DTC Description

INFOID:0000000010935847

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P160C	COMPUTER (Computer) • 1.DEF: —	ECM function is malfunctioning.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1143, "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935848

1.CHECK BATTERY TERMINALS

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 1 minute.
3. Check the battery terminals for damage and looseness.

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Repair malfunction(s) and GO TO 2.

2.CHECK OTHER DTC-1

1. Turn ignition switch ON.
2. Check DTC.

Is DTC P160C displayed with U0415, P0101, P0135, P0190, P0201, P0202, P0203, P0204, P0217, P0226, P0471, P0544, P1544, P1620, P1650, P2002, P2080, P2243, P2244, P2263, P2626 or P2A06 displayed?

- YES >> Perform the trouble diagnosis for DTC U0415, P0101, P0135, P0190, P0201, P0202, P0203, P0204, P0217, P0226, P0471, P0544, P1544, P1620, P1650, P2002, P2080, P2243, P2244, P2263, P2626 or P2A06, and GO TO 3. Refer to [EC-908, "DTC Index"](#).
 NO >> GO TO 3.

3.CHECK DTC

1. Turn ignition switch OFF and wait at least 1 minute.
2. Turn ignition switch ON.
3. Check DTC.

< DTC/CIRCUIT DIAGNOSIS >

Is the DTC P160C displayed again?

- YES >> GO TO 4.
- NO >> GO TO 5.

4.REPLACE ECM

- 1. Replace ECM.
- 2. Go to [EC-944, "Work Procedure"](#).

>> INSPECTION END

5.CHECK OTHER DTC-2

- 1. Start engine and let it idle for at least 1 minutes.
- 2. Check DTC.

Is the DTC U0415, P0101, P0135, P0190, P0201, P0202, P0203, P0204, P0217, P0226, P0471, P0544, P1544, P1620, P1650, P2002, P2080, P2243, P2244, P2263, P2626 or P2A06 displayed?

- YES >> Perform the trouble diagnosis for DTC U0415, P0101, P0135, P0190, P0201, P0202, P0203, P0204, P0217, P0226, P0471, P0544, P1544, P1620, P1650, P2002, P2080, P2243, P2244, P2263, P2626 or P2A06, and GO TO 3. Refer to [EC-908, "DTC Index"](#).
- NO >> GO TO 6.

6.CHECK RESULT OF PROCEDURE 2

Check result of procedure 2.

Is result of procedure 2 "YES"?

- YES >> GO TO 7.
- NO >> INSPECTION END

7.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Select "DATA MONITOR" mode with CONSULT.
- 2. Drive the vehicle for at least 15 minutes at 0 - 50 km/h (0 - 31 MPH).

CAUTION:

Always drive vehicle at a safe speed.

- 3. Check DTC.

Is DTC detected?

- YES >> Perform the trouble diagnosis for DTC U0415, P0101, P0135, P0190, P0201, P0202, P0203, P0204, P0217, P0226, P0471, P0544, P1544, P1620, P1650, P2002, P2080, P2243, P2244, P2263, P2626 or P2A06, and GO TO 3. Refer to [EC-908, "DTC Index"](#).
- NO >> INSPECTION END

P160D ECM

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P160D ECM

DTC Description

INFOID:0000000010935849

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P160D	COMPUTER (Computer) 1.DEF: VALUES OUTSIDE TOLERANCES	ECM internal power supply malfunction.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to [EC-1145, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935850

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Turn ignition switch OFF and wait for 1 minute.
4. Turn ignition switch ON and wait at least 1 second.
5. Perform the self-diagnosis.

Is the DTC P160D displayed again?

YES >> GO TO 2.

NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Perform [EC-944, "Work Procedure"](#).

>> INSPECTION END

P1620 ECM

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1620 ECM

DTC Description

INFOID:0000000010935851

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1620	PROPOR RICH SEN FNC (Proportional richness sensor function) • 1.DEF: VALUES OUTSIDE TOLERANCES	ECM function is malfunctioning.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Stop closed-loop control

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC P1620 can not duplicate.

>> Proceed to [EC-1146, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935852

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK AIR FUEL RATIO (A/F) SENSOR HARNESS CONNECTOR CONNECTIONS

Check A/F sensor harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR CIRCUIT FOR OPEN AND SHORT

Check A/F sensor circuit for open and short.

+		-		Continuity
ECM		A/F sensor		
Connector	Terminal	Connector	Terminal	
F117	89	F166	3	Existed
F118	115		6	
	116		2	
	119		1	

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK INTERMITTENT INCIDENT

Perform [GI-44. "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.REPLACE A/F SENSOR

Replace A/F sensor.

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

A

EC

C

D

E

F

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O

P

P1641 THERMOPLUNGER CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1641 THERMOPLUNGER CONTROL UNIT

DTC Description

INFOID:0000000010935853

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1641	THMPR 1 RLY C/CIR (Thermoplunger 1 relay control circuit) • 1.DEF: IMPLAUSIBLE SIGNAL • CC.0: SHORT CIRCUIT TO EARTH • CC.1: SHORT-CIRCUIT TO +12V • CO: OPEN CIRCUIT	• ECM detects thermoplunger control unit circuit is open circuit. • ECM detects thermoplunger control unit circuit is short circuit to ground. • ECM detects thermoplunger control unit circuit is short circuit to battery.

POSSIBLE CAUSE

- Harness or connectors (Thermoplunger control unit circuit is open or shorted.)
- Thermoplunger control unit

FAIL-SAFE

Stop thermoplunger control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON at least 2 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1148, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935854

1.CHECK ECM HARNESS CONNECTOR CONNECTION

1. Turn ignition switch OFF.
2. Check the ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK THERMOPLUNGER CONTROL UNIT HARNESS CONNECTOR CONNECTION

Check the thermoplunger control unit harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK THERMOPLUNGER CONTROL UNIT POWER SUPPLY

Check the thermoplunger control unit power supply.

P1641 THERMOPLUNGER CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

+		-	Voltage
Thermoplunger control unit			
Connector	Terminal		
F141	4	Ground	Battery voltage
	5		

Is the inspection result normal?

YES >> GO TO 4.

NO >> Perform trouble diagnosis for battery power supply circuit.

4.CHECK THERMOPLUNGER CONTROL UNIT REFERENCE VALUE-1

Check the thermoplunger control unit reference value (thermoplunger control unit side). Refer to [EC-889, "Reference Value"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK THERMOPLUNGER CONTROL UNIT CIRCUIT-1

Check the thermoplunger control unit circuit for open and short.

+		-		Continuity
ECM		Thermoplunger control unit		
Connector	Terminal	Connector	Terminal	
F117	46	F141	8	Existed
	50		1	
	57		2	
	63		7	
	76		3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK THERMOPLUNGER CONTROL UNIT REFERENCE VALUE-2

Check the thermoplunger control unit reference value (ECM side). Refer to [EC-889, "Reference Value"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7.CHECK THERMOPLUNGER CONTROL UNIT CIRCUIT-2

Check the thermoplunger control unit circuit for open and short.

+		-		Continuity
ECM		Thermoplunger control unit		
Connector	Terminal	Connector	Terminal	
F117	46	F141	8	Existed
	50		1	
	57		2	
	63		7	
	76		3	

Is the inspection result normal?

YES >> Replace thermoplunger control unit.

P1641 THERMOPLUNGER CONTROL UNIT

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

8.CHECK THERMOPLUNGER

Check thermoplunger. Refer to [EC-1150, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning thermoplunger.

Component Inspection

INFOID:0000000010935855

1.CHECK THERMOPLUNGER

1. Turn ignition switch OFF.
2. Disconnect thermoplunger harness connector.
3. Check the resistance between thermoplunger terminal and ground.

+	-	Resistance
Thermoplunger		
Terminal		
1	Ground	$608 \pm 61 \text{ m}\Omega$

is the inspection result normal?

YES >> INSPECTION END

NO >> Replace thermoplunger.

P1642 THERMOPLUNGER CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1642 THERMOPLUNGER CONTROL UNIT

DTC Description

INFOID:0000000010935856

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1642	THMPR 2 RLY C/CIR (Thermoplunger 2 relay control circuit) 1.DEF: IMPLAUSIBLE SIGNAL - CC.0:SHORT CIRCUIT TO EARTH - CC.1: SHORT-CIRCUIT TO +12V - CO: OPEN CIRCUIT	- ECM detects thermoplunger control unit circuit is open circuit. - ECM detects thermoplunger control unit circuit is short circuit to ground. - ECM detects thermoplunger control unit circuit is short circuit to battery.

POSSIBLE CAUSE

- Harness or connectors (Thermoplunger control unit circuit is open or shorted.)
- Thermoplunger control unit

FAIL-SAFE

Stop thermoplunger control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON at least 2 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1151, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935857

1.CHECK ECM HARNESS CONNECTOR CONNECTION

1. Turn ignition switch OFF.
2. Check the ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK THERMOPLUNGER CONTROL UNIT HARNESS CONNECTOR CONNECTION

Check the thermoplunger control unit harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK THERMOPLUNGER CONTROL UNIT POWER SUPPLY

Check the thermoplunger control unit power supply.

P1642 THERMOPLUNGER CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

+		-	Voltage
Thermoplunger control unit			
Connector	Terminal		
F141	4	Ground	Battery voltage
	5		

Is the inspection result normal?

YES >> GO TO 4.

NO >> Perform trouble diagnosis for battery power supply circuit.

4.CHECK THERMOPLUNGER CONTROL UNIT REFERENCE VALUE-1

Check the thermoplunger control unit reference value (thermoplunger control unit side). Refer to [EC-889. "Reference Value"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK THERMOPLUNGER CONTROL UNIT CIRCUIT-1

Check the thermoplunger control unit circuit for open and short.

+		-		Continuity
ECM		Thermoplunger control unit		
Connector	Terminal	Connector	Terminal	
F117	46	F141	8	Existed
	50		1	
	57		2	
	63		7	
	76		3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK THERMOPLUNGER CONTROL UNIT REFERENCE VALUE-2

Check the thermoplunger control unit reference value (ECM side). Refer to [EC-889. "Reference Value"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7.CHECK THERMOPLUNGER CONTROL UNIT CIRCUIT-2

Check the thermoplunger control unit circuit for open and short.

+		-		Continuity
ECM		Thermoplunger control unit		
Connector	Terminal	Connector	Terminal	
F117	46	F141	8	Existed
	50		1	
	57		2	
	63		7	
	76		3	

Is the inspection result normal?

YES >> Replace thermoplunger control unit.

P1642 THERMOPLUNGER CONTROL UNIT

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

8.CHECK THERMOPLUNGER

Check thermoplunger. Refer to [EC-1153, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning thermoplunger.

Component Inspection

INFOID:0000000010935858

1.CHECK THERMOPLUNGER

1. Turn ignition switch OFF.
2. Disconnect thermoplunger harness connector.
3. Check the resistance between thermoplunger terminal and ground.

+	-	Resistance
Thermoplunger		
Terminal		
1	Ground	$608 \pm 61 \text{ m}\Omega$

is the inspection result normal?

YES >> INSPECTION END

NO >> Replace thermoplunger.

P1643 THERMOPLUNGER CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1643 THERMOPLUNGER CONTROL UNIT

DTC Description

INFOID:0000000010935859

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1643	THMPR 3 RLY C/CIR (Thermoplunger 3 relay control circuit) • 1.DEF: IMPLAUSIBLE SIGNAL • CC.0: SHORT CIRCUIT TO EARTH • CC.1: SHORT-CIRCUIT TO +12V • CO: OPEN CIRCUIT	• ECM detects thermoplunger control unit circuit is open circuit. • ECM detects thermoplunger control unit circuit is short circuit to ground. • ECM detects thermoplunger control unit circuit is short circuit to battery.

POSSIBLE CAUSE

- Harness or connectors (Thermoplunger control unit circuit is open or shorted.)
- Thermoplunger control unit

FAIL-SAFE

Stop thermoplunger control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON at least 2 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1154, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935860

1.CHECK ECM HARNESS CONNECTOR CONNECTION

1. Turn ignition switch OFF.
2. Check the ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK THERMOPLUNGER CONTROL UNIT HARNESS CONNECTOR CONNECTION

Check the thermoplunger control unit harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK THERMOPLUNGER CONTROL UNIT POWER SUPPLY

Check the thermoplunger control unit power supply.

P1643 THERMOPLUNGER CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

+		-	Voltage
Thermoplunger control unit			
Connector	Terminal		
F141	4	Ground	Battery voltage
	5		

Is the inspection result normal?

YES >> GO TO 4.

NO >> Perform trouble diagnosis for battery power supply circuit.

4.CHECK THERMOPLUNGER CONTROL UNIT REFERENCE VALUE-1

Check the thermoplunger control unit reference value (thermoplunger control unit side). Refer to [EC-889, "Reference Value"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK THERMOPLUNGER CONTROL UNIT CIRCUIT-1

Check the thermoplunger control unit circuit for open and short.

+		-		Continuity
ECM		Thermoplunger control unit		
Connector	Terminal	Connector	Terminal	
F117	46	F141	8	Existed
	50		1	
	57		2	
	63		7	
	76		3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK THERMOPLUNGER CONTROL UNIT REFERENCE VALUE-2

Check the thermoplunger control unit reference value (ECM side). Refer to [EC-889, "Reference Value"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7.CHECK THERMOPLUNGER CONTROL UNIT CIRCUIT-2

Check the thermoplunger control unit circuit for open and short.

+		-		Continuity
ECM		Thermoplunger control unit		
Connector	Terminal	Connector	Terminal	
F117	46	F141	8	Existed
	50		1	
	57		2	
	63		7	
	76		3	

Is the inspection result normal?

YES >> Replace thermoplunger control unit.

P1643 THERMOPLUNGER CONTROL UNIT

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

8.CHECK THERMOPLUNGER

Check thermoplunger. Refer to [EC-1156, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning thermoplunger.

Component Inspection

INFOID:0000000010935861

1.CHECK THERMOPLUNGER

1. Turn ignition switch OFF.
2. Disconnect thermoplunger harness connector.
3. Check the resistance between thermoplunger terminal and ground.

+	-	Resistance
Thermoplunger		
Terminal		
1	Ground	$608 \pm 61 \text{ m}\Omega$

is the inspection result normal?

YES >> INSPECTION END

NO >> Replace thermoplunger.

P1650 STARTER MOTOR RELAY 2

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1650 STARTER MOTOR RELAY 2

DTC Description

INFOID:000000010935862

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P1650	STR MTR RELAY 2 (Starter motor relay 2)	A	Engine restart relay is stuck ON.
		B	Engine restart relay is stuck OFF.

POSSIBLE CAUSE

- Harness or connectors
 - Between engine restart relay and starter motor harness is shorted to ground.
 - Between battery and engine restart relay harness is open or shorted to ground.
- IPDM E/R
- Engine restart relay

FAIL-SAFE

STOP/START SYSTEM

Stop/start system operating condition in fail safe mode		
Idling or driving the vehicle	Stop/start system operating	
	Stop	During cranking (Restart)
Prohibit the stop/start system operation	Restart the engine or stall the engine	Prohibit the stop/start system operation from the next time

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If the other DTC Confirmation Procedure is performed right before this procedure, the ignition switch must be turned OFF and wait for 10 seconds or more to start this procedure.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON and wait at least 30 seconds
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1158, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

1. Start the engine and warm it up to normal operating temperature.
2. Press start/stop OFF switch and check that the switch indicator is ON.
3. Select "AUTO STOP START" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
4. Touch "START" and operate stop/start system. (engine stop.)
5. Touch "CANCEL" and restart the engine.

Without CONSULT

Activate stop/start system. Refer to [EC-848, "STOP/START SYSTEM : System Description \(M/T models\)"](#) (M/T models), [EC-856, "STOP/START SYSTEM : System Description \(CVT models\)"](#) (CVT models).

CAUTION:

Always drive vehicle at a safe speed.

P1650 STARTER MOTOR RELAY 2

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Is stop/start system activated normal?

- YES-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
YES-2 >> Confirmation after repair: INSPECTION END
NO >> Proceed to [EC-1158, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935863

1.CHECK ENGINE RESTART RELAY POWER SUPPLY

1. Turn ignition switch OFF.
2. Remove engine restart relay.
3. Check the voltage between engine restart relay harness connector and ground.

+		-	Voltage
Engine restart relay			
Connector	terminal		
F135	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK ENGINE RESTART RELAY POWER SUPPLY CIRCUIT

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between engine restart relay harness connector and IPDM E/R harness connector.

+		-		Continuity
Engine restart relay		IPDM E/R		
Connector	terminal	Connector	terminal	
F135	2	E11	20	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Check IPDM E/R.
NO >> Repair or replace error-detected parts.

3.CHECK ENGINE RESTART RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect starter control relay.
3. Check the continuity between engine restart relay harness connector and starter control relay harness connector.

+		−		Continuity
Starter control relay		Engine restart relay		
Connector	terminal	Connector	terminal	
F69	5	F135	5	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Perform the trouble diagnosis for starter control relay routing circuit.

4.CHECK ENGINE RESTART RELAY CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine restart relay harness connector and ECM harness connector.

P1650 STARTER MOTOR RELAY 2

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

+		-		Continuity
Engine restart relay		ECM		
Connector	terminal	Connector	terminal	
F135	1	F117	42	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ENGINE RESTART RELAY OUTPUT SIGNAL CIRCUIT

1. Check the continuity between engine restart relay harness connector and IPDM E/R harness connector.

+		-		Continuity
Engine restart relay		IPDM E/R		
Connector	terminal	Connector	terminal	
F135	3	F73	81	Existed

2. Disconnect starter motor terminal.

3. Check the continuity between engine restart relay and starter motor.

+		-		Continuity
Engine restart relay		Starter motor		
Connector	terminal	Connector	terminal	
F135	3	F130	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK ENGINE RESTART RELAY

Check engine restart relay. Refer to [EC-1159. "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine restart relay.

Component Inspection

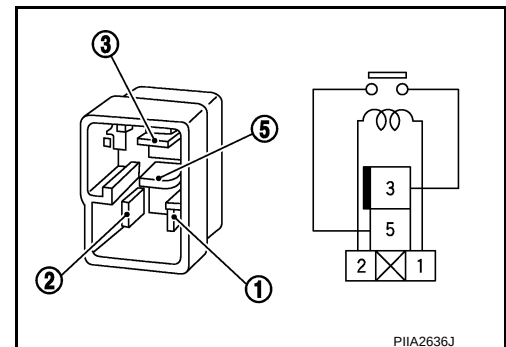
INFOID:000000010935864

1.CHECK ENGINE RESTART RELAY

1. Turn ignition switch OFF.
2. Remove engine restart relay.
3. Check the continuity between engine restart relay terminals as per the following conditions.

Engine restart relay		Condition	Continuity
+	—		
terminal			
3	5	12V direct current supply between terminals 1 and 2	Existed
		No supply	Not existed

Is the inspection result normal?



P1650 STARTER MOTOR RELAY 2

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

YES >> INSPECTION END
NO >> Replace engine restart relay.

P1655 ENGINE RESTART BYPASS RELAY

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1655 ENGINE RESTART BYPASS RELAY

DTC Description

INFOID:000000010935865

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1655	ENGINE RESTART BYPASS RELAY (Engine restart bypass relay)	At an engine restart by stop/start system, the voltage drop allowance is less than Approx. 0.1 V when the engine restart bypass relay becomes closed from the open status, and this condition is repeated three times in a row.

POSSIBLE CAUSE

- Harness or connectors
- Engine restart bypass relay circuit is open or shorted.
- Engine restart bypass control relay circuit is open or shorted.
- Engine restart bypass relay
- Engine restart bypass control relay

FAIL-SAFE

STOP/START SYSTEM

Stop/start system operating condition in fail safe mode		
Idling or driving the vehicle	Stop/start system operating	
	Stop	During cranking (Restart)
—	—	Prohibit the stop/start system operation from the next time

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If the other DTC Confirmation Procedure is performed right before this procedure, the ignition switch must be turned OFF and wait for 10 seconds or more to start this procedure.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start the engine and warm it up to normal operating temperature.
2. Press start/stop OFF switch and check that the switch indicator is ON.
3. Select "AUTO STOP START" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
4. Touch "START" and operate stop/start system. (engine stop.)
5. Touch "CANCEL" and restart the engine.
6. Repeat Step 3 and Step 4 twice.

Without CONSULT

1. Activate the stop/start system. Stop the engine. Restart the engine. Refer to [EC-848, "STOP/START SYSTEM : System Description \(M/T models\)"](#) (M/T models), [EC-856, "STOP/START SYSTEM : System Description \(CVT models\)"](#) (CVT models).
2. Repeat Step 1 four times.

CAUTION:

Always drive vehicle at a safe speed.

Is DTC detected?

- YES >> Proceed to [EC-1162, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

P1655 ENGINE RESTART BYPASS RELAY

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

Diagnosis Procedure

INFOID:000000010935866

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that the following fuse is not fusing.

Location	Fuse No.	Capacity
Fuse block (J/B)	27	15 A

Is the fuse fusing?

- YES >> Replace the fuse after repairing the applicable circuit.
NO >> GO TO 2.

2.CHECK ENGINE RESTART BYPASS CONTROL RELAY POWER SUPPLY

1. Turn ignition switch OFF.
2. Remove engine restart bypass control relay.
3. Turn ignition switch ON.
4. Check the voltage between engine restart bypass control relay harness connector and ground.

+		-	Voltage
Engine restart bypass control relay			
Connector	Terminal	Ground	Battery voltage
F134	2		
	3		

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Perform the trouble diagnosis for power supply circuit.

3.CHECK ENGINE RESTART BYPASS CONTROL RELAY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine restart bypass control relay harness connector and ECM harness connector.

+		−		Continuity
Engine restart bypass control relay		ECM		
Connector	Terminal	Connector	Terminal	
F134	1	F118	151	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 ENGINE RESTART BYPASS CONTROL RELAY CIRCUIT-2

1. Disconnect engine restart bypass relay harness connector.
2. Check the continuity between engine restart bypass control relay harness connector and engine restart bypass relay harness connector.

P1655 ENGINE RESTART BYPASS RELAY

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

+		-		Continuity
Engine restart bypass control relay		Engine restart bypass relay		
Connector	Terminal	Connector	Terminal	
F134	5	F139	1	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 ENGINE RESTART BYPASS CONTROL RELAY

Check the engine restart bypass control relay. Refer to [EC-1163, "Component Inspection \(Engine Restart Bypass Control Relay\)"](#)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace error-detected parts.

6.CHECK ENGINE RESTART BYPASS RELAY

Check the engine restart bypass relay. Refer to [EC-1163, "Component Inspection \(Engine Restart Bypass Relay\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace error-detected parts.

Component Inspection (Engine Restart Bypass Control Relay)

INFOID:0000000010935867

1.CHECK ENGINE RESTART BYPASS CONTROL RELAY

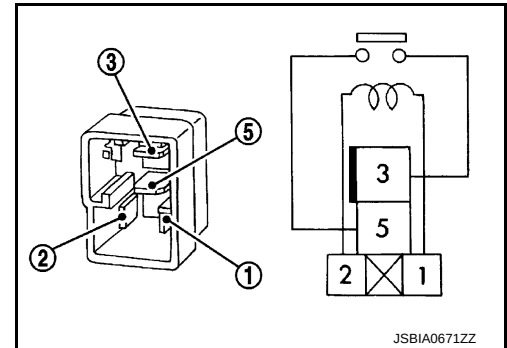
1. Turn ignition switch OFF.
2. Remove engine restart bypass control relay.
3. Check continuity between engine restart bypass control relay terminals as per the following condition.

Engine restart bypass control relay		Condition	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 engine restart bypass control relay.



Component Inspection (Engine Restart Bypass Relay)

INFOID:0000000010935868

1.CHECK ENGINE RESTART BYPASS RELAY-1

1. Turn ignition switch OFF.
2. Disconnect battery cable from negative terminal.
3. Remove engine restart bypass relay. Refer to [EC-1230, "Exploded View"](#).

P1655 ENGINE RESTART BYPASS RELAY

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

4. Check the continuity between engine restart bypass relay terminal and engine restart bypass relay body.

+		
Engine restart bypass relay	–	Continuity
Terminal		
1	Engine restart bypass relay body	Existed

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace engine restart bypass relay. Refer to [EC-1230, "Removal and Installation"](#).

2.CHECK ENGINE RESTART BYPASS RELAY-2

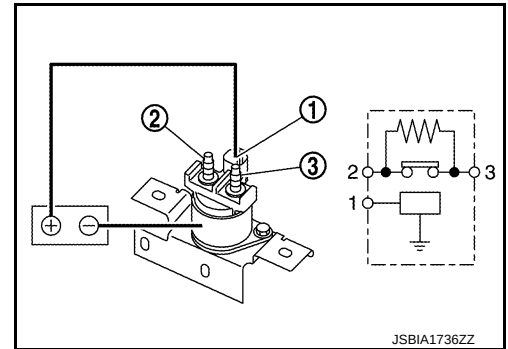
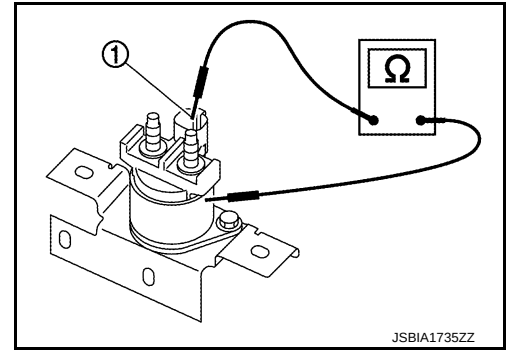
Check the resistance between engine restart bypass relay terminals as per the following conditions.

Engine restart bypass relay		Condition	Resistance (Approx.)
+	–		
Terminal			
2	3	12 V direct current supply between terminal 1 and body	10 mΩ
		No current supply	0 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine restart bypass relay. Refer to [EC-1230, "Removal and Installation"](#).



P1656 ENGINE RESTART BYPASS RELAY

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1656 ENGINE RESTART BYPASS RELAY

DTC Description

INFOID:000000010935869

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1656	ENGINE RESTART BYPASS RELAY (Engine restart bypass relay)	At an engine restart by stop/start system, the voltage right after the starter motor activation is less than Approx. 8 V.

POSSIBLE CAUSE

- Harness or connectors
- Engine restart bypass relay circuit is open or shorted.
- Engine restart bypass control relay circuit is open or shorted.
- Engine restart bypass relay
- Engine restart bypass control relay

FAIL-SAFE

STOP/START SYSTEM

Stop/start system operating condition in fail safe mode		
Idling or driving the vehicle	Stop/start system operating	
	Stop	During cranking (Restart)
—	—	Prohibit the stop/start system operation from the next time

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If the other DTC Confirmation Procedure is performed right before this procedure, the ignition switch must be turned OFF and wait for 10 seconds or more to start this procedure.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

④ With CONSULT

1. Start the engine and warm it up to normal operating temperature.
2. Press start/stop OFF switch and check that the switch indicator is ON.
3. Select "AUTO STOP START" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
4. Touch "START" and operate stop/start system. (engine stop.)
5. Touch "CANCEL" and restart the engine.
6. Repeat Step 3 and Step 4 twice.

④ Without CONSULT

1. Activate the stop/start system. Stop the engine. Restart the engine. Refer to [EC-848, "STOP/START SYSTEM : System Description \(M/T models\)"](#) (M/T models), [EC-856, "STOP/START SYSTEM : System Description \(CVT models\)"](#) (CVT models).
2. Repeat Step 1 four times.

CAUTION:

Always drive vehicle at a safe speed.

Is DTC detected?

- YES >> Proceed to [EC-1166, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

P1656 ENGINE RESTART BYPASS RELAY

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

Diagnosis Procedure

INFOID:000000010935870

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that the following fuse is not fusing.

Location	Fuse No.	Capacity
Fuse block (J/B)	27	15 A

Is the fuse fusing?

- YES >> Replace the fuse after repairing the applicable circuit.
NO >> GO TO 2.

2.CHECK ENGINE RESTART BYPASS CONTROL RELAY POWER SUPPLY

1. Turn ignition switch OFF.
2. Remove engine restart bypass control relay.
3. Turn ignition switch ON.
4. Check the voltage between engine restart bypass control relay harness connector and ground.

+		-	Voltage
Engine restart bypass control relay			
Connector	Terminal	Ground	Battery voltage
F134	2		
	3		

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Perform the trouble diagnosis for power supply circuit.

3.CHECK ENGINE RESTART BYPASS CONTROL RELAY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine restart bypass control relay harness connector and ECM harness connector.

+		-		Continuity
Engine restart bypass control relay		ECM		
Connector	Terminal	Connector	Terminal	
F134	1	F118	151	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 ENGINE RESTART BYPASS CONTROL RELAY CIRCUIT-2

1. Disconnect engine restart bypass relay harness connector.
2. Check the continuity between engine restart bypass control relay harness connector and engine restart bypass relay harness connector.

P1656 ENGINE RESTART BYPASS RELAY

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

+		-		Continuity
Engine restart bypass control relay		Engine restart bypass relay		
Connector	Terminal	Connector	Terminal	
F134	5	F139	1	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 ENGINE RESTART BYPASS CONTROL RELAY

Check the engine restart bypass control relay. Refer to [EC-1167, "Component Inspection \(Engine Restart Bypass Control Relay\)"](#)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace error-detected parts.

6.CHECK ENGINE RESTART BYPASS RELAY

Check the engine restart bypass relay. Refer to [EC-1167, "Component Inspection \(Engine Restart Bypass Relay\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace error-detected parts.

Component Inspection (Engine Restart Bypass Control Relay)

INFOID:0000000010935871

1.CHECK ENGINE RESTART BYPASS CONTROL RELAY

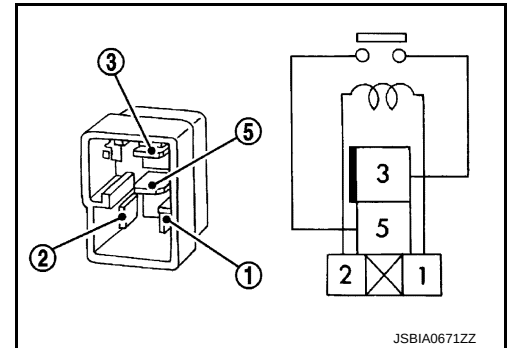
1. Turn ignition switch OFF.
2. Remove engine restart bypass control relay.
3. Check continuity between engine restart bypass control relay terminals as per the following condition.

Engine restart bypass control relay		Condition	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 engine restart bypass control relay.



Component Inspection (Engine Restart Bypass Relay)

INFOID:0000000010935872

1.CHECK ENGINE RESTART BYPASS RELAY-1

1. Turn ignition switch OFF.
2. Disconnect battery cable from negative terminal.
3. Remove engine restart bypass relay. Refer to [EC-1230, "Exploded View"](#).

P1656 ENGINE RESTART BYPASS RELAY

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

4. Check the continuity between engine restart bypass relay terminal and engine restart bypass relay body.

+	-	Continuity
Engine restart bypass relay		
Terminal		
1	Engine restart bypass relay body	Existed

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace engine restart bypass relay. Refer to [EC-1230, "Removal and Installation"](#).

2.CHECK ENGINE RESTART BYPASS RELAY-2

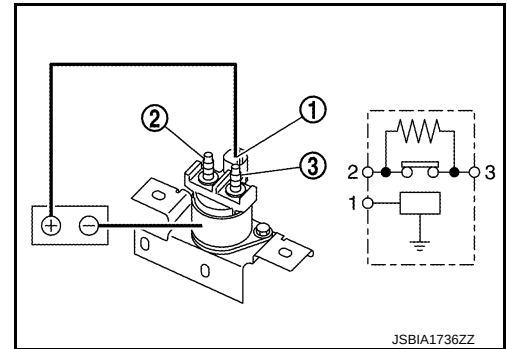
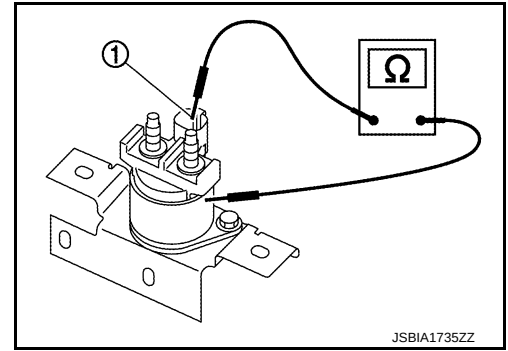
Check the resistance between engine restart bypass relay terminals as per the following conditions.

Engine restart bypass relay		Condition	Resistance (Approx.)
+	–		
Terminal			
2	3	12 V direct current supply between terminal 1 and body	10 mΩ
		No current supply	0 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine restart bypass relay. Refer to [EC-1230, "Removal and Installation"](#).



P1675 ENGINE COOLANT TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P1675 ENGINE COOLANT TEMPERATURE

DTC Description

INFOID:000000010935873

DTC DETECTION LOGIC

If the cooling fan or other 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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1675	— (—)	When engine coolant temperature is too high.

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Also, replace the engine oil.

1. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio.
2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

POSSIBLE CAUSE

- Cooling fan
- Radiator hose
- Radiator
- Radiator cap
- Water pump
- Thermostat
- Engine coolant bypass valve control solenoid valve
- Engine coolant temperature sensor

FAIL-SAFE

Stop closed-loop control

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK-1

WARNING:

Never remove the reservoir tank 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.

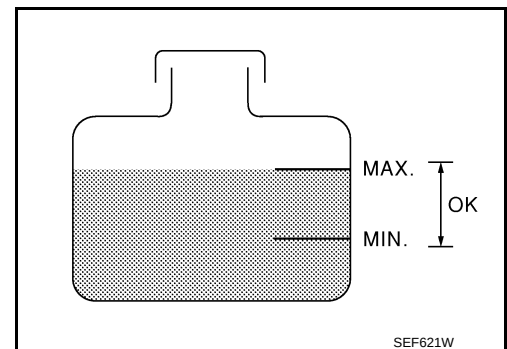
Allow engine to cool before checking coolant level.

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 coolant level in the reservoir tank and/or radiator below the proper range?

- YES >> Proceed to [EC-1170, "Diagnosis Procedure"](#).
NO >> GO TO 2.



2.PERFORM COMPONENT FUNCTION CHECK-2

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

- YES >> Proceed to [EC-1170, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-3

1. Start engine and let it idle.

P1675 ENGINE COOLANT TEMPERATURE

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

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 >> Proceed to [EC-1170, "Diagnosis Procedure"](#).

4.PERFORM COMPONENT FUNCTION CHECK-4

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-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
YES-2 >> Confirmation after repair: INSPECTION END
NO >> Proceed to [EC-1170, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935875

1.CHECK COOLING FAN OPERATION

Check cooling fan operation.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace malfunctioning part.

2.CHECK COOLING SYSTEM FOR LEAK-1

Check cooling system for leak.

Is leakage detected?

- YES >> GO TO 3.
NO >> GO TO 4.

3.CHECK COOLING SYSTEM FOR LEAK-2

Check the following for leak.

- Hose
- Radiator
- Radiator cap
- Water pump
- Reservoir tank

>> Repair or replace malfunctioning part.

4.CHECK RADIATOR CAP

Check radiator cap.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Replace radiator cap.

5.CHECK ENGINE COOLANT BYPASS VALVE

Check engine coolant bypass valve system. Refer to [EC-1200, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK THERMOSTAT

Check thermostat.

Is the inspection result normal?

- YES >> GO TO 7.

P1675 ENGINE COOLANT TEMPERATURE

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace thermostat.

7. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor routing circuit. Refer to [EC-1008, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Perform overheating cause analysis. Refer to [CO-62, "Troubleshooting Chart"](#).

NO >> Replace engine coolant temperature sensor.

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P2002 DIESEL PARTICULATE FILTER

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P2002 DIESEL PARTICULATE FILTER

DTC Description

INFOID:0000000010935876

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2002	PARTICLE FILTER (Diesel particulate filter efficiency below threshold bank 1) • 1.DEF:CLOGGED • 2.DEF: COMPONENT IN POOR CONDITION • 3.DEF: OFFSET IMPLAUSIBLE	Diesel particulate filter function does not operate properly.

POSSIBLE CAUSE

Diesel particulate filter

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Prohibit DPF regeneration

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2002 is displayed with following DTC, first perform the trouble diagnosis for following DTC.

- DTC U0101, U0121, U0415, P0001, P0002, P0045, P0100, P0101, P0102, P0105, P0106, P0115, P0190, P0200, P0201, P0202, P0203, P0204, P0225, P0226, P0335, P0402, P0470, P0471, P0487, P0488, P0544, P0560, P060A, P061A, P062B, P0638, P0641, P0651, P0697, P1544, P160C, P160D, P1641, P1642, P1643, P1650, P2080, P2100, P2119, P2120, P2226, P2263 and P253F.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC P2002 can not duplicate.

>> Proceed to [EC-1172, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935877

1.CHECK DTC PRIORITY

If DTC P2002 is displayed with following DTC, first perform the trouble diagnosis for following DTC.

- DTC U0101, U0121, U0415, P0001, P0002, P0045, P0100, P0101, P0102, P0105, P0106, P0115, P0190, P0200, P0201, P0202, P0203, P0204, P0225, P0226, P0335, P0402, P0470, P0471, P0487, P0488, P0544, P0560, P060A, P061A, P062B, P0638, P0641, P0651, P0697, P1544, P160C, P160D, P1641, P1642, P1643, P1650, P2080, P2100, P2119, P2120, P2226, P2263 and P253F.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK DIESEL PARTICULATE FILTER

Refer to [EC-1173, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Replace diesel particulate filter.

P2002 DIESEL PARTICULATE FILTER

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

3.CHECK INTAKE AIR SYSTEM

Check the intake air system for leakage.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts and then GO TO 4.

4.PERFORM SELF-DIAGNOSIS

Perform "Self-diagnostic results" of "ENGINE" using CONSULT.

Is any DTC detected?

YES >> Replace diesel particulate filter.

NO >> Perform "SERVICE REGENERATION". Refer to [EC-954, "Work Procedure"](#).

Component Inspection

INFOID:0000000010935878

1.CHECK DIESEL PARTICULATE FILTER

Check diesel particulate filter for damage.

Is the inspection result normal?

YES >> Perform "SERVICE REGENERATION". Refer to [EC-954, "Work Procedure"](#).

NO >> Replace diesel particulate filter.

< DTC/CIRCUIT DIAGNOSIS >

P2080 EGT SENSOR 1

DTC Description

INFOID:0000000010935879

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2080	TBN DOWNS TEMP REG (Exhaust gas temperature sensor circuit range/performance bank 1 sensor 1) • 1.DEF: SIGNAL OUTSIDE UPPER LIMIT	- An excessively high voltage from exhaust gas temperature sensor 1 is sent to ECM. - Temperature before the turbine is more than 810 °C (1,490 °F)

POSSIBLE CAUSE

- Intake air leaks
- Electric throttle actuator
- Fuel injector
- Exhaust gas leaks

FAIL-SAFE

Stop closed-loop control

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2080 is displayed with DTC P0544, first perform the trouble diagnosis for DTC P0544.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
 NO >> GO TO 2.

2.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC P2080 can not be duplicate.

>> Proceed to [EC-1174, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935880

1.CHECK DTC PRIORITY

If DTC P2080 is displayed with DTC P0544, first perform the trouble diagnosis for DTC P0544.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
 NO >> GO TO 2.

2.CHECK INTAKE AIR SYSTEM

1. Check the air cleaner for clogging.
2. Check the air duct for connection and cracks.

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Repair or replace error-detected parts.

3.CHECK ELECTRIC THROTTLE ACTUATOR

Check the electric throttle actuator. Refer to [EC-1177, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> Replace electric throttle actuator.

4.CHECK FUEL INJECTOR

P2080 EGT SENSOR 1

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Check the fuel injector. Refer to [EC-1017, "Component Inspection \(Fuel Injector\)"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning fuel injector.

5.CHECK EXHAUST SYSTEM

Check the exhaust gas leakage.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

NO >> Repair or replace error-detected parts.

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P2100 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P2100 THROTTLE CONTROL MOTOR RELAY

DTC Description

INFOID:000000010935881

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2100	INLET AIR FLAP CIRCUIT (Throttle actuator "A" control motor circuit/ open) • 1.DEF: — • 2.DEF: OPERATION TEMPERATURE TOO HIGH	• ECM detects throttle control motor circuit is open circuit. • ECM detects throttle control motor circuit is short circuit to ground. • ECM detects throttle control motor circuit is short circuit to battery. • Overheating of electric throttle control actuator.

POSSIBLE CAUSE

- Harness or connectors (Throttle control motor circuit is open or shorted.)
- Electric throttle control actuator

FAIL-SAFE

ENGINE CONTROL SYSTEM

- EGR valve is closed position
- Throttle control motor is opened
- CSF regeneration forbidden
- Compression test routine inhibited
- Airflow regulation cut off
- CCSL deactivation with dashboard message
- Freeshift inhibited

STOP/START SYSTEM

Stop/start system operating condition in fail safe mode		
Idling or driving the vehicle	Stop/start system operating	
	Stop	During cranking (Restart)
Prohibit the stop/start system operation	—	Prohibit the stop/start system operation from the next time

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Turn ignition ON at least 2 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1177, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Start engine and let it idle for at least 2 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1177, "Diagnosis Procedure"](#).

P2100 THROTTLE CONTROL MOTOR RELAY

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-1 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935882

1.CHECK ECM HARNESS CONNECTOR CONNECTION

1. Turn ignition switch OFF.
2. Check the ECM harness connector connection.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR HARNESS CONNECTOR CONNECTION

1. Turn ignition switch OFF.
2. Check the electric throttle control actuator harness connector connection.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT

Check the electric throttle control actuator circuit for open and short.

+		-		Continuity
ECM		Electric throttle control actuator		
Connector	Terminal	Connector	Terminal	
F118	103	F153	2	Existed
	107		3	
	108		1	
	140		5	
	152		4	

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE CONTROL MOTOR

Perform [EC-1177, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator.

Component Inspection

INFOID:0000000010935883

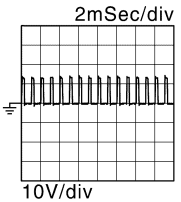
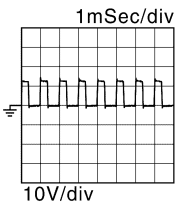
1.CHECK THROTTLE CONTROL MOTOR

1. Reconnect all harness connectors disconnected.
2. Check the voltage between ECM harness connectors terminals as per the following conditions.

P2100 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

ECM				Condition	Voltage
+		-			
Connector	Terminal	Connector	Terminal		
F118	140	E79	8	[Ignition switch: OFF] For 20 seconds after turning ignition switch OFF NOTE: Repeat several times opening and shutting after turning ignition switch OFF.	
				[Ignition switch: OFF] More than 20 seconds after turning ignition switch OFF	0.08 V
	152			[Ignition switch: OFF] For 20 seconds after turning ignition switch OFF NOTE: Repeat several times opening and shutting after turning ignition switch OFF.	
				[Ignition switch: OFF] More than 20 seconds after turning ignition switch OFF	1.23 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator.

P2119 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P2119 ELECTRIC THROTTLE CONTROL FUNCTION

DTC Description

INFOID:000000010935884

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2119	AIR INLET FLAP (Throttle actuator control throttle body range/performance) • 1.DEF: OFFSET IMPLAUSIBLE	ECM detects abnormally closed position of throttle control valve.

POSSIBLE CAUSE

- Harness or connectors (Throttle control motor circuit is open or shorted.)
- Electric throttle control actuator

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- CSF regeneration forbidden
- Compression test routine inhibited
- Airflow regulation cut off
- CCSL deactivation with dashboard message
- Freeshift inhibited

Diagnosis Procedure

INFOID:000000010935885

1.CHECK INTERMITTENT INCIDENT

Refer to [GI-44, "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-949, "Work Procedure"](#).

>> INSPECTION END

P2120 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P2120 APP SENSOR

DTC Description

INFOID:0000000010935886

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2120	PEDAL POTENTIOMETER CIRCUIT TRACK 2 (Throttle/pedal position sensor/switch "D" circuit) 1.DEF: VOLTAGE TOO LOW 2.DEF: VOLTAGE TOO HIGH	- An excessively low voltage from the accelerator pedal position (APP) sensor 2 is sent to ECM. - An excessively high voltage from the accelerator pedal position (APP) sensor 2 is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (APP sensor 2 circuit is open or shorted.)
- APP sensor 2

FAIL-SAFE

- Torque limitation
- Freeshift inhibited
- CCSL deactivation (considered as abnormal with dashboard message)
- Aftersales and factory routines inhibited

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 1 second.
- Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1180, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
- NO-1 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935887

1.CHECK ACCELERATOR PEDAL POSITION (APP) SENSOR POWER SUPPLY

Check the power supply of the APP sensor.

+		-	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E110* ¹	4	Ground	5.0 V
E167* ²	5		

*1: CVT models

*2: M/T models

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> GO TO 2.

P2120 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

2.CHECK APP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check APP sensor circuit for open and short.

+		-		Continuity
ECM		APP sensor		
Connector	Terminal	Connector	Terminal	
E79	10	E110* ¹ E167* ²	5	Existed
	6		4	

*1: CVT models

*2: M/T models

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to [EC-963, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

3.CHECK APP CIRCUIT

1. Turn ignition switch OFF.
2. Check APP sensor circuit for open and short.

+		-		Continuity
ECM		APP sensor		
Connector	Terminal	Connector	Terminal	
E79	12	E110*1 E167*2	1	Existed
	11		6	
	3		2	
	2		3	

*1: CVT models

*2: M/T models

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK APP SENSOR

Refer to [EC-1181, "Component Inspection \(Accelerator Pedal Position Sensor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace error-detected parts.

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:0000000010935888

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 terminals as follows.

P2120 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

ECM			Condition		Voltage
Connector	+	-			
	Terminal				
E79	2	3	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	11	12		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.

P2226 BARO SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P2226 BARO SENSOR

DTC Description

INFOID:0000000010935889

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2226	ATMOS PRESS SEN (Barometric pressure sensor "A" circuit) 1.DEF: VOLTAGE TOO HIGH 2.DEF: VOLTAGE TOO LOW 3.DEF: IMPROPER SIGNAL SHAPE	- An excessively low voltage from the atmospheric pressure sensor (built-into ECM) is sent to ECM. - An excessively high voltage from the atmospheric pressure sensor (built-into ECM) is sent to ECM.

POSSIBLE CAUSE

ECM

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Prohibit DPF regeneration

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON.
- Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1183, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
- NO-1 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935890

1.CHECK ECM AIR INLET VISUALLY

Check if foreign matter is blocking the air inlet for ECM.

Is the inspection result normal?

- YES >> Replace ECM. Refer to [EC-1226, "Removal and Installation"](#).
- NO >> Remove foreign matter.

P2243 A/F SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P2243 A/F SENSOR

DTC Description

INFOID:0000000010935891

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2243	PROPOR RICH SEN CIRC (O2 sensor reference voltage circuit/open bank 1 sensor 1) • CO: OPEN CIRCUIT	ECM detects air fuel ratio (A/F) sensor circuit is open circuit.

POSSIBLE CAUSE

- Harness or connectors (A/F sensor circuit is open.)
- A/F sensor

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC P2243 can not duplicate.

>> Proceed to [EC-1184, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935892

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK AIR FUEL RATIO (A/F) SENSOR HARNESS CONNECTOR CONNECTIONS

Check A/F sensor harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR CIRCUIT FOR OPEN AND SHORT

Check A/F sensor circuit for open and short.

+		-		Continuity
ECM		A/F sensor		
Connector	Terminal	Connector	Terminal	
F117	89	F166	3	Existed
F118	115		6	
	116		2	
	119		1	

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

P2243 A/F SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

4.CHECK INTERMITTENT INCIDENT

Perform [GI-44. "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.REPLACE A/F SENSOR

Replace A/F sensor.

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

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P2244 A/F SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P2244 A/F SENSOR

DTC Description

INFOID:0000000010935893

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2244	PROPOR RICH SEN CIRC (O2 sensor reference voltage performance bank 1 sensor 1) • CC.0: SHORT CIRCUIT TO EARTH • CC.1: SHORT-CIRCUIT TO +12V	• ECM detects air fuel ratio (A/F) sensor circuit is short circuit to ground. • ECM detects air fuel ratio (A/F) sensor circuit is short circuit to battery.

POSSIBLE CAUSE

- Harness or connectors (A/F sensor circuit is shorted.)
- A/F sensor

FAIL-SAFE

Stop closed-loop control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 2 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1186, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-1 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935894

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM harness connector connection.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK AIR FUEL RATIO (A/F) SENSOR HARNESS CONNECTOR CONNECTIONS

Check A/F sensor harness connector connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR CIRCUIT FOR OPEN AND SHORT

Check A/F sensor circuit for open and short.

P2244 A/F SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

+		-		Continuity
ECM		A/F sensor		
Connector	Terminal	Connector	Terminal	
F117	89	F166	3	Existed
F118	115		6	
	116		2	
	119		1	

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.REPLACE A/F SENSOR

Replace A/F sensor.

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

P2263 TC SYSTEM

DTC Description

INFOID:0000000010935895

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2263	BOOST PRESSURE CIRCUIT (Turbocharger/supercharger boost system performance) • 1.DEF: SIGNAL OUTSIDE LOWER LIMIT • 2.DEF: SIGNAL OUTSIDE UPPER LIMIT	• Differences between boost pressure and target value are less than -150 hPa. (Boost pressure is too high) • Differences between boost pressure and target value are more than 150 hPa. (Boost pressure is too low)

POSSIBLE CAUSE

- Harness or connectors (Turbocharger boost sensor circuit is open or shorted.)
- Turbocharger boost sensor (with intake air temperature sensor 2)
- Vacuum air circuit
- Air filter
- Turbocharger
- Intake air leaks
- Exhaust gas leaks
- EGR circuit
- Fuel flow actuator
- Turbocharger boost control solenoid valve

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Torque limitation
- CCSL deactivation (considered as abnormal with dashboard message)
- Freeshift is inhibited
- Wastegate activation is inhibited
- ESP deactivation
- CSF regeneration forbidden

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2263 is displayed with following DTC, first perform the trouble diagnosis for following DTC.

- P0001, P0002, P0045, P0105, P0106, P0115, P0190, P0200, P0201, P0202, P0203, P0204, P0217, P0402, P0409, P0487, P0488, P0627, P0641 and P0651

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
 NO >> GO TO 2.

2.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC P2263 can not be duplicate.

>> Proceed to [EC-1188, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935896

1.CHECK DTC PRIORITY

If DTC P2263 is displayed with following DTC, first perform the trouble diagnosis for following DTC.

- P0001, P0002, P0045, P0105, P0106, P0115, P0190, P0200, P0201, P0202, P0203, P0204, P0217, P0402, P0409, P0487, P0488, P0627, P0641 and P0651

Is applicable DTC detected?

P2263 TC SYSTEM

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK AIR FILTER

Check that air filter is not obstructed.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK INTAKE AIR DUCT

Check that intake air duct is not obstructed.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK EXHAUST GAS LEAK

Check exhaust gas leak.

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-1002, "Component Inspection \(Turbocharger Boost Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace turbocharger boost sensor.

6.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Check the turbocharger boost control solenoid valve. Refer to [EC-993, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK TURBOCHARGER

Check the turbocharger.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8.CHECK EGR CIRCUIT

Check the EGR circuit.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9.CHECK FUEL FLOW ACTUATOR CIRCUIT

Check fuel flow actuator circuit.

+		-		Continuity
ECM		Fuel flow actuator		
Connector	Terminal	Connector	Terminal	
F117	43	F167	2	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

P2263 TC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

NO >> Repair or replace error-detected parts.

P2264 WATER IN FUEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P2264 WATER IN FUEL SENSOR

DTC Description

INFOID:0000000010935897

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2264	WATER IN DIESEL DETECTOR (Water in fuel sensor circuit) 1.DEF: OPEN CIRCUIT ON THE LINE OR PRESENCE OF WATER IN THE DIESEL	- A signal from the detection sensor is sent to ECM - ECM detects detection sensor circuit is open circuit.

POSSIBLE CAUSE

- Harness or connectors (Detection sensor circuit is open.)
- Water in fuel level sensor
- Fuel filter

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. Drive the vehicle at least 15 seconds at 5 km/h (3.11 MPH) or more.

CAUTION:

Always drive the vehicle at safe speed.

3. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1191, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-1 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935898

1.PERFORM DIESEL FUEL FILTER WATER DRAINING

Perform diesel fuel filter water draining. Refer to [FL-38, "Draining Water from Fuel Filter"](#).

Water has been detected in the fuel filter?

- YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK FUEL CONFORMITY

Check fuel conformity.

Is fuel normal?

- YES >> Replace fuel filter.
NO >> Drain the fuel circuit and replace the fuel filter.

3.CHECK HARNESS CONNECTOR CONNECTIONS

Check fuel heater and water level sensor harness connector connections.

Is the inspection result normal?

P2264 WATER IN FUEL SENSOR

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK WATER LEVEL SENSOR POWER SUPPLY AND GROUND CIRCUIT

Check water level sensor power supply and ground circuit for open and short.

+		-	Voltage
Fuel heater and water in fuel level sensor			
Connector	Terminal		
F190	2	Ground	Battery voltage
	5		

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK WATER LEVEL SENSOR CIRCUIT

Check water level sensor circuit for open and short.

+		-		Continuity
ECM		Fuel heater and water level sensor		
Connector	Terminal	Connector	Terminal	
E79	9	F190	1	Existed

+		-	Continuity
Fuel heater and water level sensor			
Connector	Terminal		
F190	3	Ground	Existed
	4		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

P2452 DIESEL PARTICULATE FILTER PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P2452 DIESEL PARTICULATE FILTER PRESSURE SENSOR

DTC Description

INFOID:0000000010935899

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2452	P/FLT DIFF PRS SEN (Diesel particulate filter pressure sensor "A" circuit) • 1.DEF: VOLTAGE TOO LOW • 2.DEF: VOLTAGE TOO HIGH	• An excessively high voltage (more than 4.9 V) from diesel particulate filter pressure sensor is sent to ECM. • An excessively low voltage (less than 0.18 V) from diesel particulate filter pressure sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (Diesel particulate filter differential pressure sensor circuit is open or shorted.)
- Diesel particulate filter differential pressure sensor

FAIL-SAFE

- EGR valve is closed position
- Throttle control motor is opened
- Prohibit DPF regeneration

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2452 is displayed with DTC P0641, P0651 or P0697, first perform the trouble diagnosis for DTC P0641, P0651 or P0697.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1193, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-1 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935900

1.CHECK DTC PRIORITY

If DTC P2452 is displayed with DTC P0641, P0651 or P0697, first perform the trouble diagnosis for DTC P0641, P0651 or P0697.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC-908, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check the ECM harness connector connection.

P2452 DIESEL PARTICULATE FILTER PRESSURE SENSOR

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK DPF (DIESEL PARTICULATE FILTER) DIFFERENTIAL PRESSURE SENSOR HARNESS CONNECTOR CONNECTIONS

Check the DPF differential pressure sensor harness connector connection.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK DPF DIFFERENTIAL PRESSURE SENSOR POWER SUPPLY

Check the DPF differential pressure sensor power supply.

+		-	Voltage (Approx.)
DPF differential pressure sensor			
Connector	Terminal		
F88	1	Ground	5.0 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK DPF DIFFERENTIAL PRESSURE SENSOR POWER SUPPLY AND GROUND CIRCUIT

Check the DPF differential pressure sensor power supply and ground circuit for open and short.

+		+		Continuity
ECM		DPF differential pressure sensor		
Connector	Terminal	Connector	Terminal	
F118	100	F88	1	Existed
	117		2	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK DPF DIFFERENTIAL PRESSURE SENSOR SIGNAL CIRCUIT

Check the DPF differential pressure sensor signal circuit for open and short.

+		+		Continuity
ECM		DPF differential pressure sensor		
Connector	Terminal	Connector	Terminal	
F118	122	F88	3	Existed

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.REPLACE DPF DIFFERENTIAL PRESSURE SENSOR

Replace DPF differential pressure sensor.

>> GO TO 8.

8.PERFORM DTC CONFIRMATION PROCEDURE

P2452 DIESEL PARTICULATE FILTER PRESSURE SENSOR

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Perform DTC Confirmation Procedure.

See [EC-1193, "DTC Description"](#).

Is the DTC P2452 detected again?

YES >> Replace ECM. Refer to [EC-1226, "Removal and Installation"](#).

NO >> INSPECTION END

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P2504 CHARGING SYSTEM VOLTAGE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P2504 CHARGING SYSTEM VOLTAGE

DTC Description

INFOID:0000000010935901

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2504	CHARGING SYSTEM VOLTAGE (Charging system voltage high) • 1.DEF: SIGNAL OUTSIDE UPPER LIMIT • 2.DEF: SIGNAL OUTSIDE LOWER LIMIT • 3.DEF: — • 4.DEF: MECHANICAL LINKAGE FAILURE • 5.DEF: OPERATION TEMPERATURE TOO HIGH	ECM detects poor performance of alternator.

POSSIBLE CAUSE

- Harness or connectors
- Alternator

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.

Is the DTC detected?

- YES >> Proceed to [EC-1196, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-1 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935902

1.CHECK DRIVE BELT

Check drive belt. Refer to [EM-301, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Adjust or replace drive belt.

2.CHECK CHARGING SYSTEM

Check charging system. Refer to [CHG-14, "Work Flow"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Repair or replace error-detected part.

P253F ENGINE OIL DETERIORATED

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P253F ENGINE OIL DETERIORATED

DTC Description

INFOID:000000010935903

DTC DETECTION LOGIC

NOTE:

If DTC P253F is displayed with DTC P0115, first perform the trouble diagnosis for DTC P0115. Refer to [EC-1008, "DTC Description"](#).

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P253F	ENG OIL DILUTION (Engine oil deteriorated) • 1.DEF: SIGNAL INCOHERENCE	When engine oil is too much quantity.

POSSIBLE CAUSE

Too much engine oil

FAIL-SAFE

- CSF regeneration is forbidden
- Torque limitation
- EGR valve is closed position
- Throttle control motor is opened

DTC CONFIRMATION PROCEDURE

1..PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Check DTC.

Is DTC detected?

YES >> Proceed to [EC-1197, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-1 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010935904

1.CHECK ENGINE OIL LEVEL

Check the engine oil level. Refer to [LU-38, "Inspection"](#).

CAUTION:

If after performed service regeneration, exchange the engine oil and engine oil filter.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Drain or refill engine oil. Refer to [LU-39, "Draining"](#) or [LU-39, "Refilling"](#).

2.CHECK OIL LEVEL SENSOR

Check oil level sensor. Refer to [MWI-126, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil level sensor. Refer to [EC-812, "Component Parts Location"](#).

P2626 A/F SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P2626 A/F SENSOR

DTC Description

INFOID:0000000010935905

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2626	PROPOR RICH SEN CIRC (O2 sensor pumping current trim circuit/ open bank 1 sensor 1) • CO: OPEN CIRCUIT	ECM detects air fuel ratio (A/F) sensor circuit is open circuit.

POSSIBLE CAUSE

- Harness or connectors (A/F sensor circuit is open.)
- A/F sensor

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC P2626 can not duplicate.

>> Proceed to [EC-1198. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935906

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM harness connector connection.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK AIR FUEL RATIO (A/F) SENSOR HARNESS CONNECTOR CONNECTIONS

Check A/F sensor harness connector connection.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR CIRCUIT FOR OPEN AND SHORT

Check A/F sensor circuit for open and short.

+		-		Continuity
ECM		A/F sensor		
Connector	Terminal	Connector	Terminal	
F117	89	F166	3	Existed
F118	115		6	
	116		2	
	119		1	

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

P2626 A/F SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

4.CHECK INTERMITTENT INCIDENT

Perform [GI-44. "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.REPLACE A/F SENSOR

Replace A/F sensor.

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

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P

P2681 ENGINE COOLANT BYPASS VALVE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P2681 ENGINE COOLANT BYPASS VALVE

DTC Description

INFOID:0000000010935907

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2681	COOLANT CIRC SWITCHING S/V (Engine coolant bypass valve control circuit/open) • CC.0: SHORT CIRCUIT TO EARTH • CC.1: SHORT-CIRCUIT TO +12V • CO: OPEN CIRCUIT	• ECM detects engine coolant bypass valve circuit is short circuit to ground. • ECM detects engine coolant bypass valve circuit is short circuit to battery. • ECM detects engine coolant bypass valve circuit is open circuit.

POSSIBLE CAUSE

- Harness or connectors (Engine coolant bypass valve control solenoid valve circuit is open or shorted.)
- Engine coolant bypass valve control solenoid valve

FAIL-SAFE

- Engine cooling fan activation
- Throttle control motor is opened
- Prohibit start/stop system
- Stop EGR control
- Stop thermoplunger control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1200, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).
NO-1 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010935908

1.CHECK BATTERY VOLTAGE

Check the battery voltage.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Perform trouble diagnosis for battery. Refer to [PG-118, "R9M : How to Handle Battery"](#).

2.CHECK ENGINE COOLANT BYPASS VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect engine coolant bypass valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between engine coolant bypass valve harness connector and ground.

P2681 ENGINE COOLANT BYPASS VALVE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

+		-	Voltage
Engine coolant bypass valve			
Connector	Terminal		
F160	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK ENGINE COOLANT BYPASS VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between engine coolant bypass valve harness connector and IPDM E/R harness connector.

+		-		Continuity
Engine coolant bypass valve		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F160	2	F72	73	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Check IPDM E/R.
NO >> Repair or replace error-detected parts.

4.CHECK ENGINE COOLANT BYPASS VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine coolant bypass valve harness connector and ECM harness connector.

+		-		Continuity
Engine coolant bypass valve		ECM		
Connector	Terminal	Connector	Terminal	
F160	1	F117	53	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ENGINE COOLANT BYPASS VALVE

Check the engine coolant bypass valve. Refer to [EC-1201, "Component Inspection"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace engine coolant bypass valve.

Component Inspection

INFOID:0000000010935909

1.CHECK ENGINE COOLANT BYPASS VALVE

1. Turn ignition switch OFF.
2. Disconnect engine coolant bypass valve harness connector.
3. Check the resistance between engine coolant bypass valve as per the following conditions.

P2681 ENGINE COOLANT BYPASS VALVE

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

Engine coolant bypass valve		Condition		Resistance (Ω)
+	-			
Terminal				
1	2	Temperature [°C (°F)]	-40 °C (-40 °F)	32 - 37
			23 °C (73 °F)	43 - 49

Is the inspection result normal?

YES >> **INSPECTION END**

NO >> Replace engine coolant bypass valve.

P2A06 A/F SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

P2A06 A/F SENSOR

DTC Description

INFOID:0000000010935910

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2A06	PROPOR RICH SEN CIRC (O2 sensor negative voltage bank 1 sensor 1) • CO: OPEN CIRCUIT	ECM detects air fuel ratio (A/F) sensor ground circuit is open circuit.

POSSIBLE CAUSE

- Harness or connectors (A/F sensor circuit is open.)
- A/F sensor

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC P2A06 can not duplicate.

>> Proceed to [EC-1203. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935911

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM harness connector connection.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK AIR FUEL RATIO (A/F) SENSOR HARNESS CONNECTOR CONNECTIONS

Check A/F sensor harness connector connection.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR CIRCUIT FOR OPEN AND SHORT

Check A/F sensor circuit for open and short.

+		-		Continuity
ECM		A/F sensor		
Connector	Terminal	Connector	Terminal	
F117	89	F166	3	Existed
F118	115		6	
	116		2	
	119		1	

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

P2A06 A/F SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

4.CHECK INTERMITTENT INCIDENT

Perform [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.REPLACE A/F SENSOR

Replace A/F sensor.

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

LOW PRESSURE FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

LOW PRESSURE FUEL PUMP

Component Function Check

INFOID:0000000010935912

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 >> [EC-1205, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935913

1.CHECK FPCM POWER SUPPLY CIRCUIT

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		
B132	8	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Perform the trouble diagnosis for power supply circuit. Refer to [EC-963, "ECM : Diagnosis Procedure"](#).

2.CHECK FPCM GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between FPCM harness connector and ground.

+		-	Continuity
FPCM			
Connector	Terminal		
B132	7	Ground	Existed

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair open circuit or short to power in harness or connectors.

3.CHECK FPCM INPUT AND OUTPUT CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between FPCM harness connector and ECM harness connector.

+		-		Continuity
FPCM		ECM		
Connector	Terminal	Connector	Terminal	
B133	9	E79	20	Existed
	10		22	

3. Also check harness for short to ground and to power.

LOW PRESSURE FUEL PUMP

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK FUEL PUMP CONTROL CIRCUIT

1. Disconnect fuel level sensor unit and fuel pump (main) harness connector.
2. Check the continuity between FPCM harness connector and fuel level sensor unit and fuel pump (main) harness connector.

+		-		Continuity
FPCM		Fuel level sensor unit and fuel pump (main)		
Connector	Terminal	Connector	Terminal	
B131	3	B130	1	Existed
	4		4	
	5		3	
	6		2	

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 LOW PRESSURE FUEL PUMP

Refer to [EC-1206, "Component Inspection \(Low Pressure Fuel Pump\)"](#).

Is the inspection result normal?

YES >> Replace FPCM.

NO >> Replace low pressure fuel pump.

Component Inspection (Low Pressure Fuel Pump)

INFOID:0000000010935914

1.CHECK FUEL PRESSURE REGULATOR

1. Turn ignition switch OFF.
2. Check low fuel pressure.

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 and fuel pump (main).
3. Check resistance between fuel level sensor unit and fuel pump (main) terminals as follows.

+	—	Continuity
Fuel level sensor unit and fuel pump (main)		
Terminals		
2	3	Existed
	4	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel level sensor unit and fuel pump (main).

BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

BRAKE SWITCH

Component Function Check

INFOID:0000000010935915

1.CHECK BRAKE SWITCH FUNCTION

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as per the following.

ECM			Condition		Voltage (Approx.)
Connector	+	-			
	Terminal				
E79	16	1	Brake pedal	Slightly depressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-1207, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935916

1.CHECK BRAKE 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.

M/T models

+		-	Voltage
Stop lamp switch			
Connector	Terminal		
E121	3	Ground	Battery voltage

CVT models

+		−	Voltage
Brake pedal position switch			
Connector	Terminal		
E112	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK BRAKE SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between stop lamp switch harness connector and ECM harness connector.

M/T models

+		-		Continuity
Stop lamp switch		ECM		
Connector	Terminal	Connector	Terminal	
E121	4	E79	16	Existed

BRAKE SWITCH

[R9M]

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CVT models

+		-		Continuity
Brake pedal position switch		ECM		
Connector	Terminal	Connector	Terminal	
E112	2	E79	16	Existed

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 BRAKE SWITCH

Check the brake switch. Refer to [EC-1208, "Component Inspection \(Stop Lamp Switch\)"](#) (M/T models), [EC-1208, "Component Inspection \(Brake Pedal Position Switch\)"](#) (CVT models).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

NO >> Replace stop lamp switch.

Component Inspection (Stop Lamp Switch)

INFOID:0000000010935917

1.CHECK STOP LAMP SWITCH-1

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				
3	4	Brake pedal	Fully released	Existed
			Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-2

1. Adjust stop lamp switch installation. Refer to [BR-11, "Inspection and Adjustment"](#) (LHD models) or [BR-75, "Inspection and Adjustment"](#) (RHD models).
2. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch		Condition		Continuity
+	-			
Terminals				
3	4	Brake pedal	Fully released	Existed
			Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch.

Component Inspection (Brake Pedal Position Switch)

INFOID:0000000010935918

1.CHECK BRAKE PEDAL POSITION SWITCH-1

1. Turn ignition switch OFF.

BRAKE SWITCH

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

- Disconnect brake pedal position switch harness connector.
- 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 depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK BRAKE PEDAL POSITION SWITCH-2

- Adjust brake pedal position switch installation. Refer to [BR-11, "Inspection and Adjustment"](#) (LHD models) or [BR-75, "Inspection and Adjustment"](#) (RHD models).
- 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 depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace brake pedal position switch.

HOOD SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

HOOD SWITCH

Component Function Check

INFOID:0000000010935919

1.CHECK HOOD SWITCH FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Select "HOOD SW" in "DATA MONITOR" mode of "IPDM E/R" using CONSULT.
3. Check indication as per the following conditions.

Monitor item	Condition		Indication
HOOD SW	Engine hood	Close	OPEN
		Open	CLOSE

Without CONSULT

1. Turn ignition switch ON.
2. Check the voltage between hood switch harness connector and ground as per the following conditions.

+		–	Condition		Voltage (Approx.)
Hood switch					
Connector	Terminal				
E164	2	Ground	Engine hood	Close	Battery voltage
				Open	0 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-1210, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935920

1.CHECK IPDM E/R OUTPUT

1. Turn ignition switch OFF.
2. Open the engine hood.
3. Disconnect hood switch harness connector.
4. Turn ignition switch ON.
5. Check the voltage between hood switch harness connector and ground.

+		-	Voltage (Approx.)
Hood switch			
Connector	Terminal		
E164	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK HOOD SWITCH SIGNAL CIRCUIT

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between hood switch harness connector and IPDM E/R harness connector.

+		-		Continuity
Hood switch		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E164	2	E148	52	Existed

HOOD SWITCH

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace error-detected parts.

3.CHECK HOOD SWITCH GROUND CIRCUIT

Check the continuity between hood switch harness connector and ground.

+		-	Continuity
Hood switch			
Connector	Terminal		
E164	1	Ground	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK HOOD SWITCH

Check the hood switch. Refer to [EC-1211, "Component Inspection"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-44, "Intermittent Incident"](#).

NO >> Replace hood switch.

Component Inspection

INFOID:0000000010935921

1.CHECK HOOD SWITCH

1. Turn ignition switch OFF.
2. Disconnect hood switch harness connector.
3. Check the continuity between hood switch terminals as per the following conditions.

Hood switch		Condition		Continuity
+	–			
Terminal				
2	1	Hood switch	Released	Existed
			Depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace hood switch.

STOP/START OFF SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

STOP/START OFF SWITCH

Component Function Check

INFOID:0000000010935922

1.CHECK STOP/START OFF SWITCH FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Select "AT STOP START SW" in "DATA MONITOR" mode of "BCM" using CONSULT.
3. Check "AT STOP START SW" indication as per the following condition.

Monitor item	Condition		Indication
AT STOP START SW	Stop/start OFF switch	ON	On
		OFF	Off

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-1212, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010935923

1.CHECK STOP/START OFF SWITCH POWER SUPPLY (INDICATOR)

1. Turn ignition switch OFF.
2. Disconnect stop/start OFF switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between stop/start OFF switch harness connector and ground.

+		-	Voltage (Approx.)
Stop/start OFF switch			
Connector	Terminal		
M49	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Check power supply circuit.

2.CHECK STOP/START OFF SWITCH GROUND CIRCUIT (INDICATOR)

1. Turn ignition switch OFF.
2. Disconnect combination meter harness connector.
3. Check the continuity between stop/start OFF switch harness connector and ground.

+		-	Continuity
Stop/start OFF switch			
Connector	Terminal		
M49	6	Ground	Existed

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK STOP/START OFF SWITCH POWER SUPPLY (SWITCH)

Check the voltage between stop/start OFF switch harness connector and ground.

STOP/START OFF SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

+		-	Voltage (Approx.)
Stop/start OFF switch			
Connector	Terminal		
M49	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.CHECK STOP/START OFF SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect BCM harness connector.
2. Check the continuity between BCM harness connector and stop/start OFF switch harness connector.

+		-		Continuity
BCM		Stop/start OFF switch		
Connector	Terminal	Connector	Terminal	
B47	99	M49	1	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Check BCM power supply and ground circuit.

NO >> Repair or replace error-detected parts.

5.CHECK STOP/START OFF SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between stop/start OFF switch harness connector and ground.

-		-	Continuity
Stop/start OFF switch			
Connector	Terminal		
M49	2	Ground	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 STOP/START OFF SWITCH

Check the stop/start OFF switch. Refer to [EC-1213, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop/start OFF switch.

Component Inspection

INFOID:0000000010935924

1.CHECK STOP/START OFF SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop/start OFF switch harness connector.
3. Check the continuity between stop/start OFF switch harness connectors as per the following condition.

STOP/START OFF SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

Stop/start OFF switch		Condition		Continuity
+	–			
Terminal				
1	2	Stop/start OFF switch	Pressed	Existed
			Released	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop/start OFF switch.

COOLING FAN

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

COOLING FAN

Component Function Check

INFOID:0000000011058653

1.CHECK COOLING FAN FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Perform "COOLING FAN" in "ACTIVE TEST" mode of "IPDM E/R" using CONSULT.
3. Touch "LOW", "HI" on the CONSULT screen.
4. Check that cooling fan operates.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-1215, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000011058654

1.CHECK COOLING FAN RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-2.
3. Turn ignition switch ON.
4. Check the voltage between cooling fan relay-2 harness connectors and ground.

+		-	Voltage
Cooling fan relay-2			
Connector	Terminal		
F168	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble diagnosis for power supply circuit.

2.CHECK COOLING FAN MOTOR CIRCUIT-1

Check the voltage between cooling fan relay-2 harness connectors and ground.

+		-	Voltage
Cooling fan relay-2			
Connector	Terminal		
F168	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK COOLING FAN RELAY OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connectors.
3. Check the continuity between cooling fan relay-2 harness connectors and IPDM E/R harness connector.

+		-		Continuity
Cooling fan relay-2		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F168	2	F74	106	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

COOLING FAN

[R9M]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK COOLING FAN MOTOR CIRCUIT-2

1. Check the continuity between cooling fan relay-2 harness connectors and cooling fan motor harness connectors.

+		-		Continuity
Cooling fan relay-2		Cooling fan motor		
Connector	Terminal	Connector	Terminal	
F168	2	F169	1	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 COOLING FAN MOTOR CIRCUIT-3

1. Check the continuity between IPDM E/R harness connector and resister harness connector.

+		-		Continuity
IPDM E/R		Resister		
Connector	Terminal	Connector	Terminal	
F73	85	F170	1	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK COOLING FAN MOTOR CIRCUIT-4

1. Check the continuity between resister harness connector and cooling fan motor harness connector.

+		-		Continuity
Cooling fan motor		Resister		
Connector	Terminal	Connector	Terminal	
F169	1	F170	2	Existed

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 COOLING FAN MOTOR CIRCUIT-5

1. Check the continuity between cooling fan motor harness connector and ground.

+		-	Continuity
Cooling fan motor			
Connector	Terminal		
F169	2	Ground	Existed

2. 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.

COOLING FAN

< DTC/CIRCUIT DIAGNOSIS >

[R9M]

8.CHECK COOLING FAN RELAY-2

Refer to [EC-1217, "Component Inspection \(Cooling Fan Relay\)"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace malfunctioning cooling fan relay.

9.CHECK COOLING FAN MOTOR

Refer to [EC-1217, "Component Inspection \(Cooling Fan Motor\)"](#).

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace malfunctioning cooling fan motor. Refer to [CO-76, "Removal and Installation"](#).

10.CHECK INTERMITTENT INCIDENT

Perform [GI-44, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to [PCS-60, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

Component Inspection (Cooling Fan Motor)

INFOID:0000000011058655

1.CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector.
3. Supply cooling fan motor terminals with battery voltage and check operation.

Cooling fan motor		Condition
Terminal		
+	—	
1	2	Cooling fan motor operats

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace cooling fan motor. Refer to [CO-76, "Removal and Installation"](#).

Component Inspection (Cooling Fan Relay)

INFOID:0000000011058656

1.CHECK COOLING FAN RELAY

1. Turn ignition switch OFF.
2. Remove cooling fan relay-2.
3. Check the continuity between cooling fan relay-2 terminals as per the following conditions.

Cooling fan relay-2		Conditions	Continuity
+	–		
Terminal			
1	2	12V direct current supply between terminals 3 and 4	Existed
		No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace cooling fan relay.

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[R9M]

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:000000010935925

SYSTEM — Basic engine control system	SYMPTOM														Reference page
	HARD/NO START/RESTART (EXCP. HA)				ENGINE STALL										
	NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING	HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE		
	AA				AB			AC	AD	AE		AF			
	x	x	x	x	x	x	x		x	x	x		x	EM-365	
										x	x			EM-308	
	x	x	x	x	x	x	x	x	x	x	x	x	x	EC-1067 , EC-1069 , EC-1072	
			x	x										EC-1034	
		x	x	x	x	x	x	x	x	x	x			EC-1032	
								x		x	x			EC-997 , EC-999	
													EC-1006 , EC-1006		
									x	x			EC-1001 , EC-1003		
													EC-995		
													EC-1184 , EC-1186		
			x		x		x						x	EC-1008	
	x	x	x	x	x	x	x	x	x	x	x	x	x	EC-1016	

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[R9M]

SYSTEM — Basic engine control system	SYMPTOM												Reference page	
	HARD/NO START/RESTART (EXCP. HA)				ENGINE STALL			HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE		LOW IDLE
	NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING							
Warranty symptom code	AA				AB			AC	AD	AE		AF		
High pressure fuel pump	x	x	x	x	x	x	x	x		x	x		x	—
Fuel pressure sensor circuit														
Fuel rail pressure sensor circuit		x												EC-1014
Fuel temperature sensor circuit														EC-989
Fuel heater circuit														—
Turbocharger boost control solenoid valve circuit								x		x	x			EC-993
High pressure EGR volume control valve circuit								x		x	x			EC-1039 , EC-1041
Low pressure EGR volume control valve circuit														EC-1107 , EC-1110 , EC-1116 , EC-1119
Low pressure EGR volume control valve Up-stream temperature sensor circuit														EC-1122
Electric throttle control actuator circuit	x	x	x	x	x	x	x			x	x			EC-1073 , EC-1179
Intake manifold runner control valve										x				EC-1086 , EC-1088 , EC-1090
Exhaust electric throttle control actuator circuit										x				EC-1096 , EC-1099 , EC-1102 , EC-1104
DPF (Diesel Particulate Filter)														EC-1172

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ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[R9M]

SYSTEM — Basic engine control system	SYMPTOM												Reference page	
	HARD/NO START/RESTART (EXCP. HA)				ENGINE STALL			HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE		LOW IDLE
	NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING							
Warranty symptom code	AA				AB			AC	AD	AE		AF		
Exhaust gas pressure sensor 1 circuit														EC-1046 , EC-1049
DPF pressure sensor circuit														EC-1094 , EC-1193
Exhaust gas temperature sensor 1 circuit														EC-1058 , EC-1174
Exhaust gas temperature sensor 2 circuit														EC-1134
Glow control unit circuit	x	x	x						x					EC-1036
Glow plug circuit	x	x	x						x					EC-1036
Cooling fan resister circuit					x					x				—
Thermoplunger unit circuit														—
Thermoplunger control unit circuit														EC-1148 , EC-1151 , EC-1154
Engine coolant bypass valve circuit														—
Engine coolant bypass valve control solenoid valve circuit														EC-1200
Accelerator pedal position sensor circuit								x		x	x			EC-1024 , EC-1026 , EC-1180
Refrigerant pressure sensor circuit					x	x	x							EC-1056
NATS (Nissan Anti-theft System)		x												SEC-97 , SEC-259

STOP/START SYSTEM

< SYMPTOM DIAGNOSIS >

[R9M]

STOP/START SYSTEM

Diagnosis Procedure

INFOID:000000010935926

1.CHECK STOP/START SYSTEM FUNCTION-1

Activate stop/start system. Refer to [EC-848, "STOP/START SYSTEM : System Description \(M/T models\)"](#).

Is the stop/start system activated?

YES >> GO TO 2.

NO >> Proceed to [EC-1222, "Diagnosis Procedure"](#).

2.CHECK STOP/START INDICATOR LAMP

Check the stop/start indicator lamp during stop/start system operation.

Is stop/start indicator lamp turned ON?

YES >> GO TO 3.

NO >> Check the combination meter. Refer to [MWI-118, "Work flow"](#).

3.CHECK STOP/START SYSTEM FUNCTION-2

Check the engine status during stop/start system operation.

Is the engine stalled during stop/start system operation?

YES >> Perform "All DTC Reading" with CONSULT and perform trouble diagnosis for DTC indicated.

NO >> GO TO 4.

4.CHECK STOP/START SYSTEM FUNCTION-3

Check the engine restart operation during stop/start system operation. Refer to [EC-848, "STOP/START SYSTEM : System Description \(M/T models\)"](#).

Is the engine restarted?

YES >> INSPECTION END

NO >> GO TO 5.

5.CHECK STARTER MOTOR OPERATION

Check the starter motor operation (cranking) when engine restart during stop/start system operation.

Is the starter motor operated (cranking)?

YES >> Refer to "HARD/NO START/RESTART" in [EC-1218, "Symptom Table"](#).

NO >> Perform the trouble diagnosis for starting system. Refer to [STR-19, "Work Flow"](#).

STOP/START SYSTEM NOT ACTIVATED

< SYMPTOM DIAGNOSIS >

[R9M]

STOP/START SYSTEM NOT ACTIVATED

Diagnosis Procedure

INFOID:000000010935927

NOTE:

To use the stop/start system, the vehicle needs to recognize the status of battery. For this reason, the stop/start system may not be activated immediately after battery change.

1.CHECK DTC

④With CONSULT

Perform "All DTC Reading" with CONSULT.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC.

NO >> GO TO 2.

2.CHECK STOP/START INDICATOR LAMP

Check stop/start indicator lamp.

Is stop/start indicator lamp blinks slowly?

YES >> Perform "All DTC Reading" with CONSULT and perform trouble diagnosis for detected DTC.

NO >> GO TO 3.

3.PERFORM ACTIVE TEST

④With CONSULT

1. Start the engine and warm it up to normal operating temperature.
2. Press start/stop OFF switch and check that the switch indicator is ON.
3. Select "AUTO STOP START" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
4. Touch "START" and operate stop/start system. (engine stop.)
5. Touch "CANCEL" and restart the engine.

Is stop/ start system activated normal?

YES >> GO TO 9.

NO >> GO TO 4.

4.CHECK HIGH PRESSURE FUEL PUMP OPERATION COUNTER

④With CONSULT

1. Select "ENGINE REV COUNT" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
2. Check that the "ENGINE REV COUNT" indication.

Monitor item	Indication
ENGINE REV COUNT	Less than 280,000

Is the indication less than 280.000?

YES >> GO TO 5.

NO >> Replace high pressure fuel pump. Refer to [EM-341, "Removal and Installation"](#).

5.CHECK STARTER MOTOR OPERATION COUNTER

④With CONSULT

1. Select "STRT OPRTN CNTR" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
2. Check that the "STRT OPRTN CNTR" indication.

Monitor item	Indication
STRT OPRTN CNTR	Less than 250,000

Is the indication less than 250.000?

YES >> GO TO 6.

NO >> Replace starter motor. Refer to [STR-39, "R9M : Removal and Installation"](#).

6.CHECK IPDM E/R STATUS

④With CONSULT

STOP/START SYSTEM NOT ACTIVATED

[R9M]

< SYMPTOM DIAGNOSIS >

1. On CONSULT screen, select "IPDM E/R" >> "DATA MONITOR" >> "STOP/START STATUS".
2. Check that "STOP/START STATUS" indicates "PERMIT".

Is "PERMIT" indicated?

- YES >> GO TO 10.
NO >> GO TO 7.

7.CHECK CUMULATIVE BATTERY DISCHARGE CURRENT

Ⓜ WITH CONSULT

1. Select "DATA MONITOR" mode of "IPDM E/R" using CONSULT.
2. Check that the "BAT DISCHARGE COUNT" indication.

Monitor item	Indication
BAT DISCHARGE COUNT	Less than 65,000

Is the indication less than 65,000?

- YES >> GO TO 8.
NO >> Replace battery designed for the stop/start system. Refer to [PG-139, "R9M : Removal and Installation"](#).

8.CHARGE BATTERY

Charge battery. Refer to [PG-118, "R9M : How to Handle Battery"](#).

>> GO TO 9.

9.CHECK BATTERY STATUS

Ⓜ WITH CONSULT

1. Start the engine and warm up the engine coolant temperature to 45°C (113°F) or more.
2. Check the temperature of battery fluid is 0°C (32°F) or more.
3. Select "BATTERY STATUS" in "DATA MONITOR" mode of "IPDM E/R" using CONSULT.
4. Check the "BATTERY STATUS" indication.

Is "OK" displayed on CONSULT screen?

- YES >> GO TO 10.
NO >> Check battery. Refer to [PG-118, "R9M : How to Handle Battery"](#).

10.CHECK STOP/START OFF SWITCH

Check the stop/start OFF switch. Refer to [EC-1212, "Component Function Check"](#).

Is the inspection normal?

- YES >> GO TO 11.
NO >> Repair or replace error-detected parts.

11.CHECK HOOD SWITCH

Check the hood switch. Refer to [EC-1210, "Component Function Check"](#).

Is the inspection normal?

- YES >> GO TO 12.
NO >> Repair or replace error-detected parts.

12.CHECK STOP/START SYSTEM OPERATION CONDITION

Check the stop/start system operation condition. Refer to [EC-848, "STOP/START SYSTEM : System Description \(M/T models\)"](#) (M/T models), [EC-856, "STOP/START SYSTEM : System Description \(CVT models\)"](#) (CVT models).

>> INSPECTION END

PERIODIC MAINTENANCE

IDLE SPEED

Inspection

INFOID:0000000010935928

1. CHECK IDLE SPEED

With CONSULT

Check "ENGINE SPEED" in "DATA MONITOR" mode with CONSULT.

Idle speed: Refer to [EC-1232, "Idle Speed"](#).

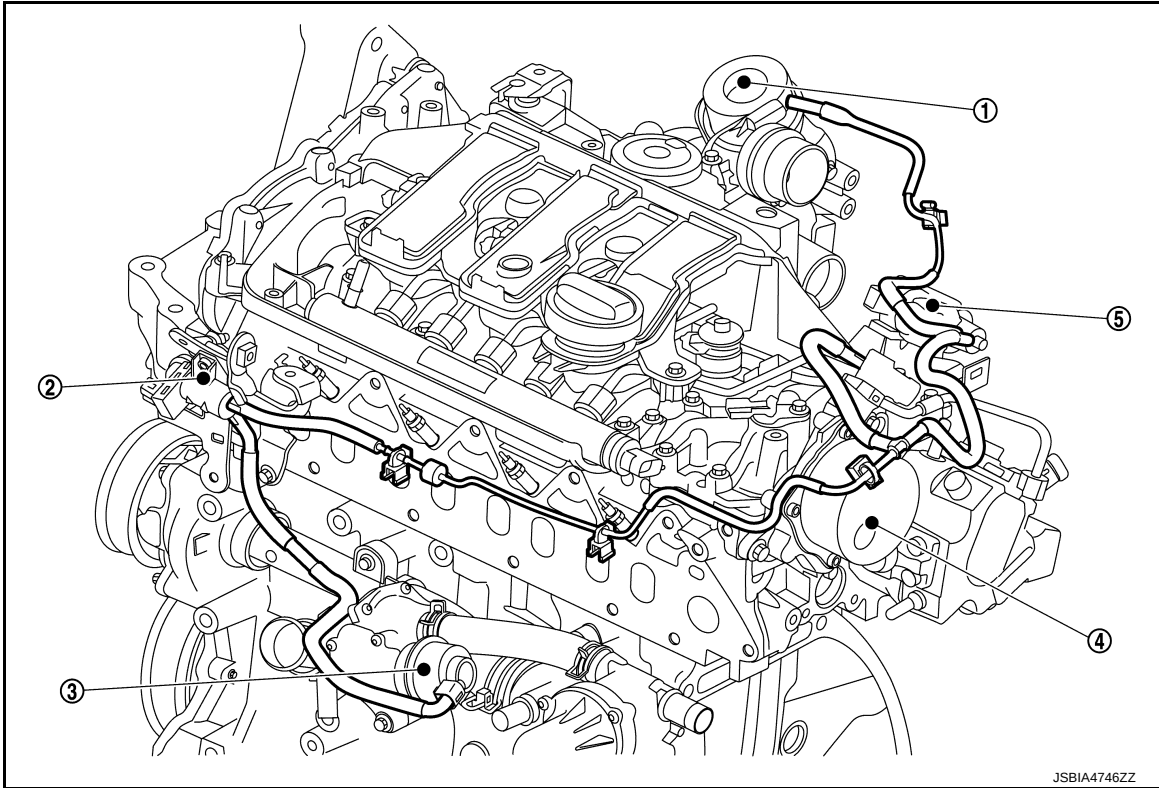
>> INSPECTION END

REMOVAL AND INSTALLATION

VACUUM LINES

Vacuum Layout

INFOID:0000000010935929



- ① TC boost control actuator
- ② Engine coolant bypass valve control solenoid valve
- ③ Engine coolant bypass valve control actuator
- ④ Vacuum pump
- ⑤ TC boost control solenoid valve

CAUTION:

Do not use soapy water or any type of solvent while installing vacuum hose.

ECM

Removal and Installation

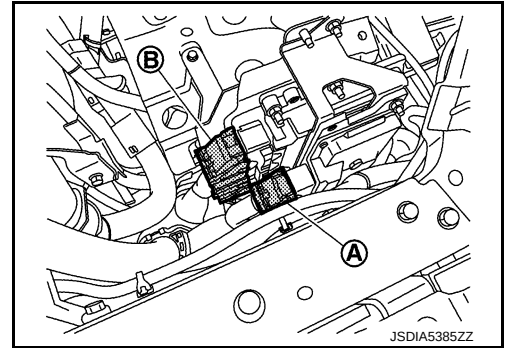
INFOID:000000010935931

CAUTION:

Perform **ADDITIONAL SERVICE WHEN REPLACING ECM**. Refer to [EC-944, "Work Procedure"](#).

REMOVAL (CVT MODELS)

1. Remove the battery. Refer to [PG-139, "R9M : Removal and Installation"](#)
2. Remove the air duct (inlet). Refer to [EM-308, "Exploded View"](#).
3. Disconnect the TCM harness connector (A) and the ECM harness connector (B). Refer to [PG-7, "Harness Connector"](#) (lever locking type).



4. Remove the battery tray with ECM and TCM. Refer to [PG-143, "R9M : Removal and Installation"](#).
5. Remove TCM bracket with TCM. Refer to [PG-148, "EXCEPT FOR R9M : Removal and Installation"](#).
6. Remove ECM from the battery tray.

REMOVAL (M/T MODELS)

1. Remove the battery. Refer to [PG-139, "R9M : Removal and Installation"](#)
2. Remove the air duct (inlet). Refer to [EM-308, "Exploded View"](#).
3. Disconnect the ECM harness connector. Refer to [PG-7, "Harness Connector"](#) (lever locking type).
4. Remove the battery tray with ECM. Refer to [PG-143, "R9M : Removal and Installation"](#).
5. Remove ECM from the battery tray.

INSTALLATION

Install in the reverse order of removal.

GLOW CONTROL UNIT

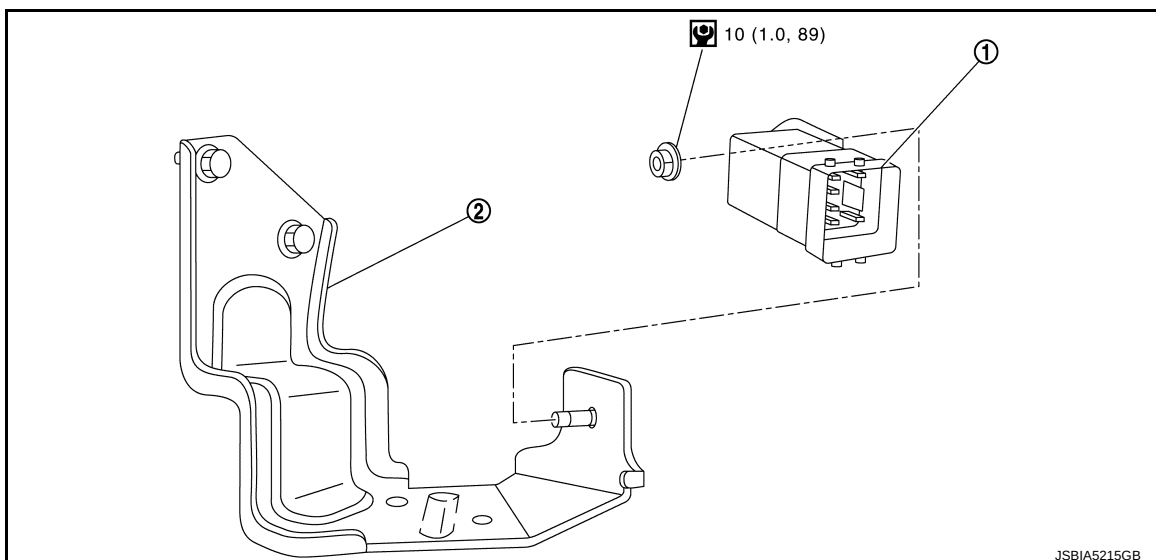
< REMOVAL AND INSTALLATION >

[R9M]

GLOW CONTROL UNIT

Exploded View

INFOID:000000010935932



① Glow control unit

② Bracket

 : N·m (kg-m, in-lb)

Removal and Installation

INFOID:000000010935933

REMOVAL

1. Remove front fender protector (LH). Refer to [EXT-35, "FENDER PROTECTOR : Removal and Installation"](#).
2. Disconnect glow control unit harness connector.
3. Remove glow control unit from bracket.

INSTALLATION

Install in the reverse order of removal.

THERMOPLUNGER CONTROL UNIT

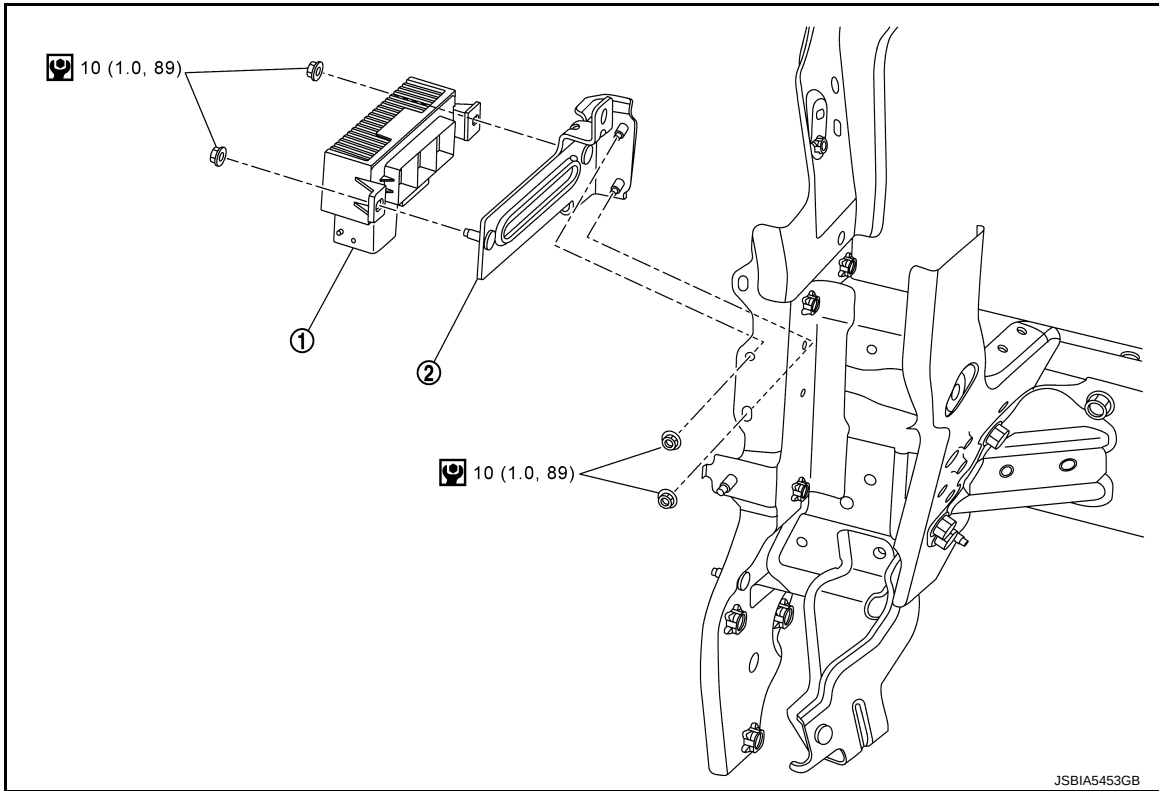
< REMOVAL AND INSTALLATION >

[R9M]

THERMOPLUNGER CONTROL UNIT

Exploded View

INFOID:0000000010935934



① Thermoplunger control unit

② Bracket

 : N·m (kg·m, in-lb)

Removal and Installation

INFOID:0000000010935935

REMOVAL

1. Remove front fender protector (LH). Refer to [EXT-35, "FENDER PROTECTOR : Removal and Installation"](#).
2. Disconnect thermoplunger control unit harness connector.
3. Remove thermoplunger control unit from bracket.

INSTALLATION

Install in the reverse order of removal.

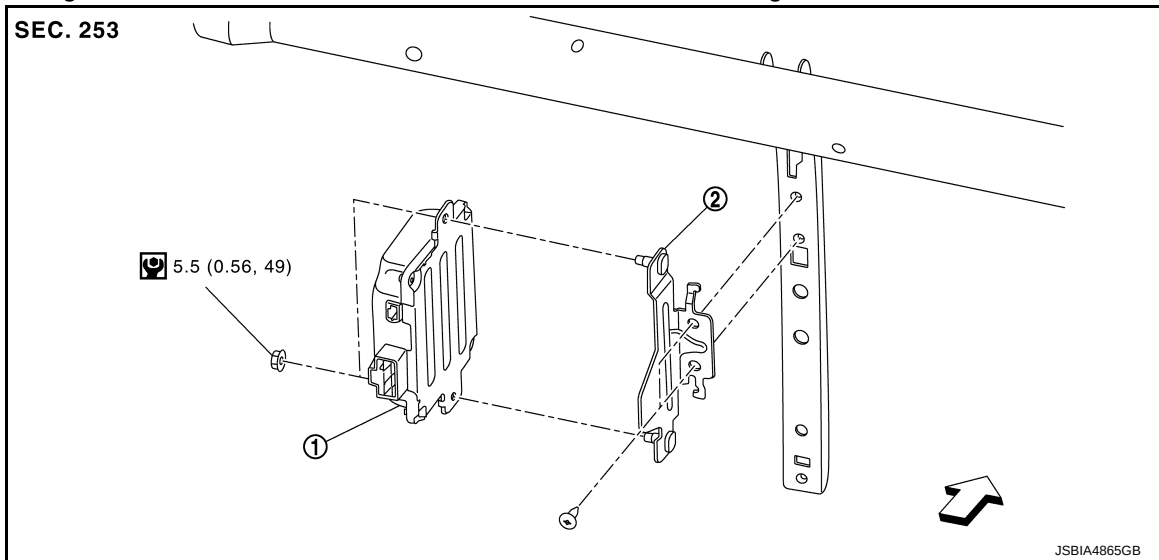
DC/DC CONVERTER

Exploded View

INFOID:0000000010935936

NOTE:

The below figure shows LHD models. RHD models are the mirror image.



① DC/DC converter

② Bracket

: N·m (kg-m, in-lb)

: Vehicle front

Removal and Installation

INFOID:0000000010935937

REMOVAL

1. Disconnect battery negative terminal. Refer to [EC-809, "Precautions for Removing Battery Terminal"](#).
2. Remove glove box cover. Refer to [IP-13, "Exploded View"](#) (LHD models) or [IP-40, "Exploded View"](#) (RHD models).
3. Disconnect DC/DC converter harness connectors.
4. Remove DC/DC converter bracket mounting screws.
5. Remove bracket with DC/DC converter.
6. Remove DC/DC converter mounting nuts.
7. Remove DC/DC converter.

INSTALLATION

Install in the reverse order of removal.

ENGINE RESTART BYPASS RELAY

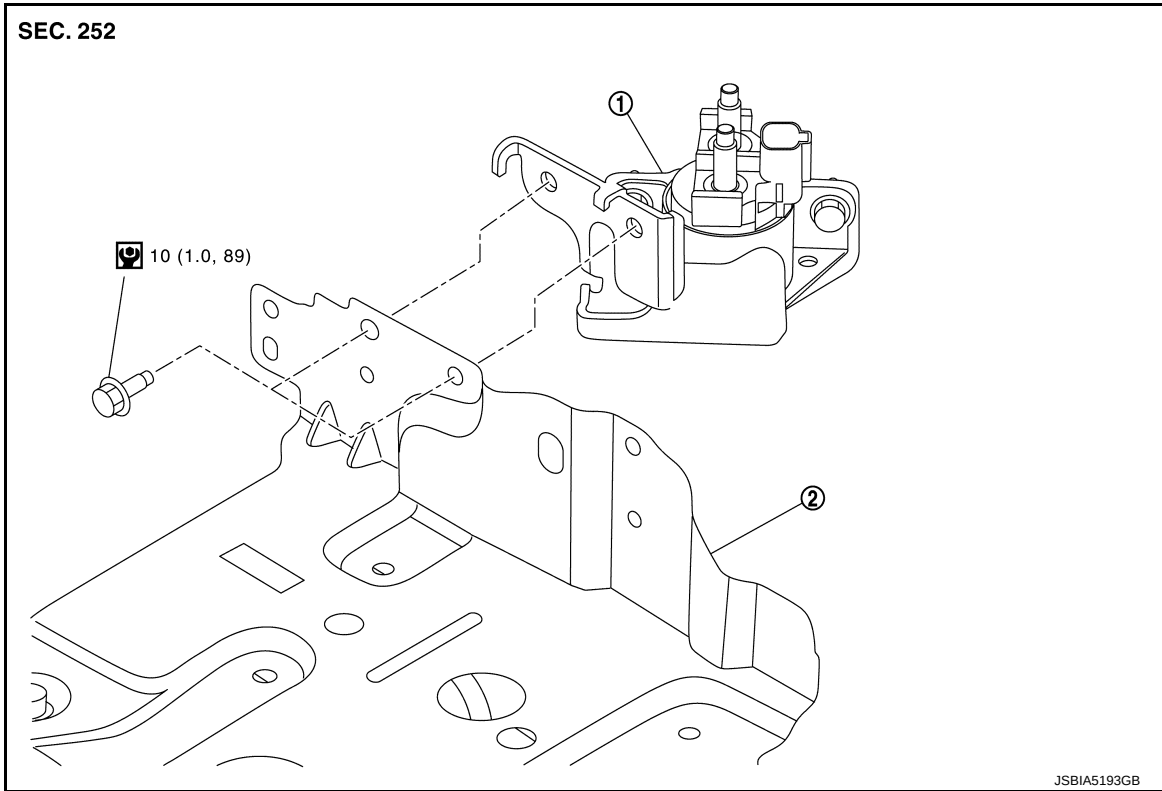
< REMOVAL AND INSTALLATION >

[R9M]

ENGINE RESTART BYPASS RELAY

Exploded View

INFOID:0000000010935938



① Engine restart bypass relay

② Battery mounting bracket

: N·m (kg-m, in-lb)

Removal and Installation

INFOID:0000000010935939

REMOVAL

1. Remove battery, battery cover and battery tray. Refer to [PG-139, "R9M : Removal and Installation"](#).
2. Disconnect engine restart bypass relay harness connectors.
3. Remove bracket with engine restart bypass relay.

INSTALLATION

Install in the reverse order of removal.

FUEL PUMP CONTROL MODULE (FPCM)

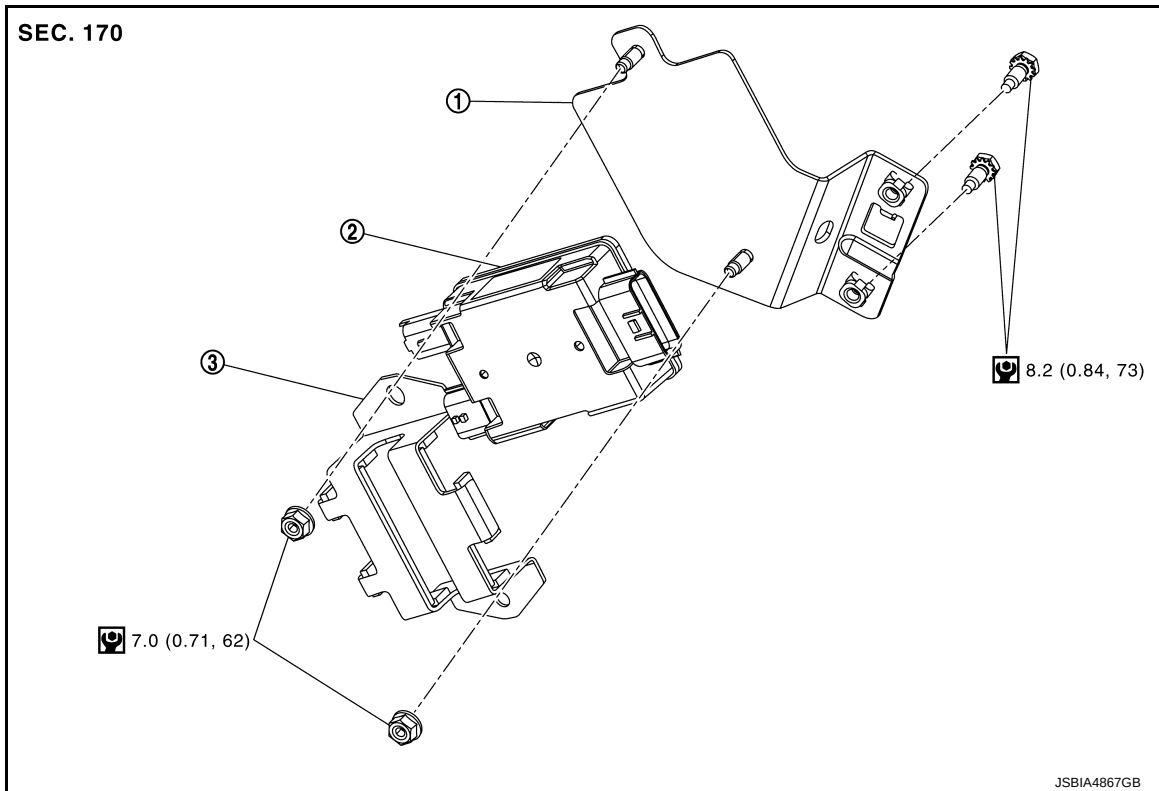
< REMOVAL AND INSTALLATION >

[R9M]

FUEL PUMP CONTROL MODULE (FPCM)

Exploded View

INFOID:000000010935940



① Bracket

② Fuel pump control module (FPCM)

③ Cover

: N·m (kg·m, in-lb)

Removal and Installation

INFOID:000000010935941

REMOVAL

1. Remove luggage side finisher (RH). Refer to [INT-40, "Exploded View"](#).
2. Remove bracket with fuel pump control module (FPCM).
3. Disconnect fuel pump control module (FPCM) harness connectors.
4. Remove cover and fuel pump control module (FPCM) from bracket.

INSTALLATION

Install in the reverse order of removal.

SERVICE DATA AND SPECIFICATIONS (SDS)**SERVICE DATA AND SPECIFICATIONS (SDS)****Idle Speed**

INFOID:0000000010935942

Condition	Specification
No load* (in Neutral position)	850 ± 100 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