SECTION EC9

ENGINE CONTROL SYSTEM (R9M)

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SERVICE DATA AND SPECIFICATIONS (SDS) 411
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PRECAUTION

PRECAUTIONS

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

INFOID:0000000010308911

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:

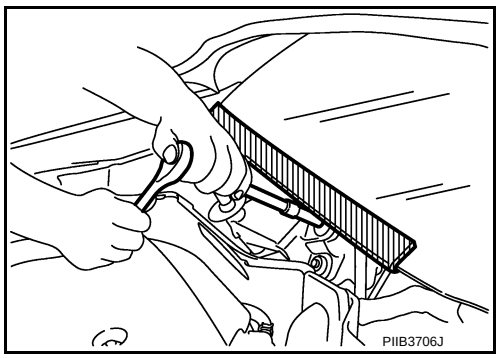
Always observe the following items for preventing accidental activation.

- **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:0000000010308912

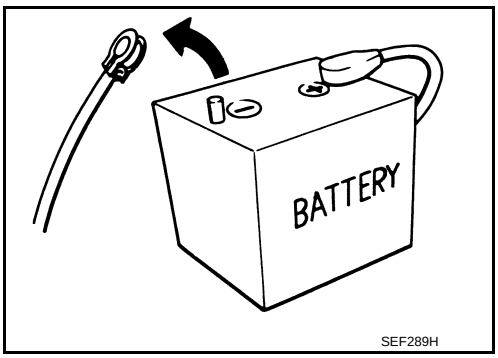
When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



Precautions for Removing Battery Terminal

INFOID:0000000010505549

- 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.



- 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

1. Open the hood.
2. Turn key switch to the OFF position with the driver side door opened.
3. Get out of the vehicle and close the driver side door.
4. 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.

5. 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)

1. Unlock the door with intelligent key or remote keyless entry.
   NOTE:
   At this moment, ACC power is supplied.
2. Open the driver side door.
3. Open the hood.
4. Close the driver side door.
5. 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.
6. 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:0000000010308914

CAUTION:

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:0000000010308915

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-5, "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.**

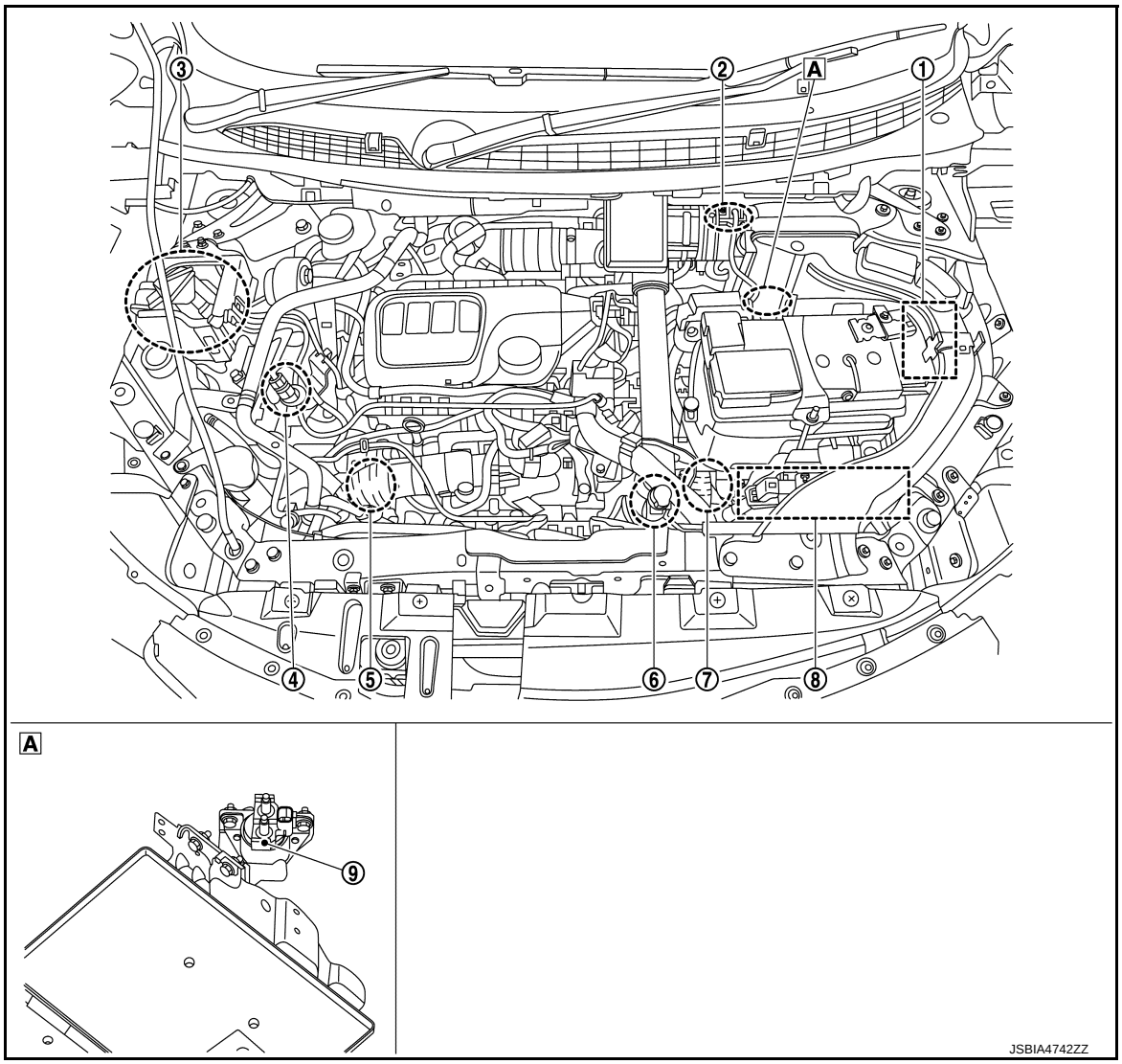
SYSTEM DESCRIPTION

COMPONENT PARTS

Component Parts Location

INFOID:0000000010308916

ENGINE ROOM COMPARTMENT

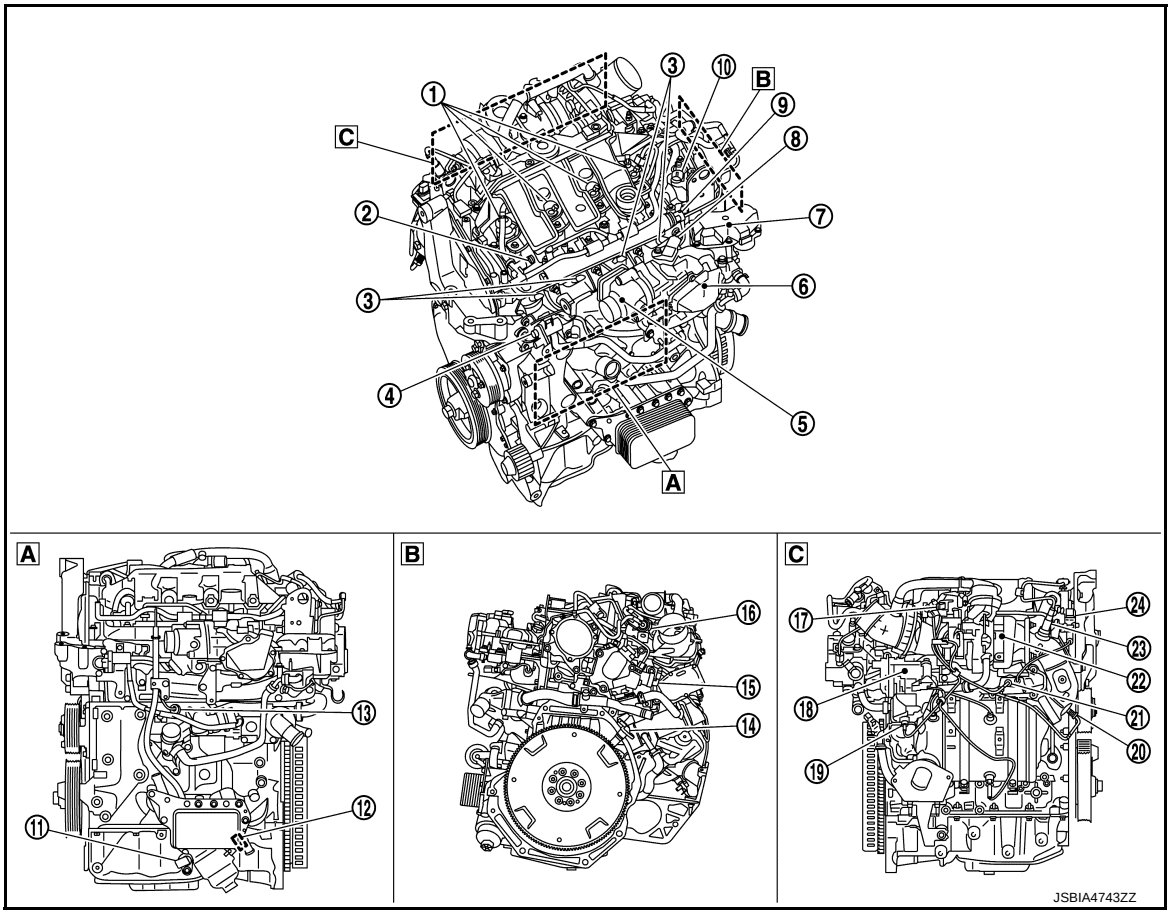


A Battery mounting bracket assembly

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)	• EC9-16, "Mass Air Flow Sensor" • EC9-16, "Intake Air Temperature Sensor 1"
3	Fuel heater and water in fuel level sensor	EC9-18, "Fuel Heater With Water In Fuel Level Sensor"
4	Fuel pressure sensor	EC9-18, "Fuel Pressure Sensor"

No.	Component parts	Function
5	Alternator	CHG-6, "Alternator"
6	Hood switch	EC9-23, "Hood Switch"
7	Reverse / neutral position switch (M/T models)	It detects that the transmission is in reverse and neutral.
8	ECM	EC9-16, "ECM"
9	Engine restart bypass relay	EC9-23, "Engine Restart Bypass Relay"

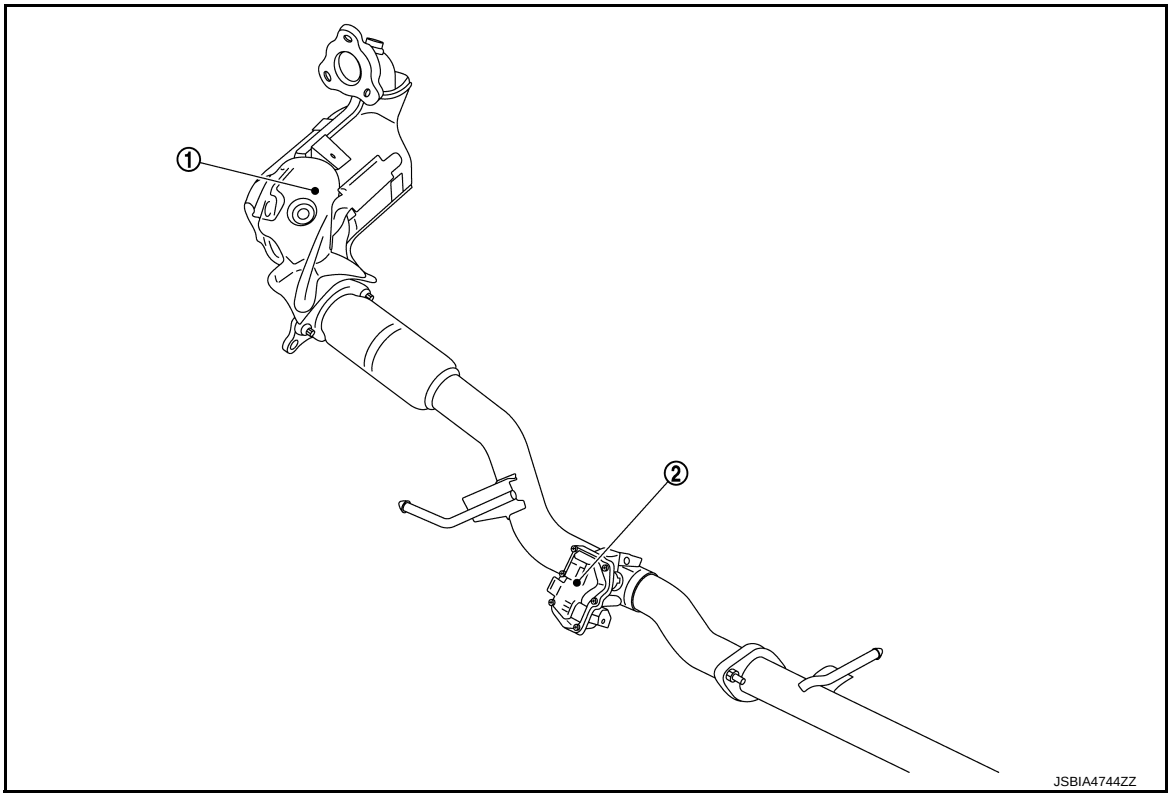
ENGINE COMPARTMENT



No.	Component parts	Function
1	Fuel injector	EC9-18, "Fuel Injector"
2	Fuel temperature sensor	EC9-18, "Fuel Temperature Sensor"
3	Glow plug	EC9-21, "Glow Plug"
4	Engine coolant bypass control solenoid valve	EC9-22, "Engine Coolant Bypass Valve Control Solenoid Valve"
5	Electric throttle control actuator	EC9-19, "Electric Throttle Control Actuator"
6	Intake valve runner control valve	EC9-19, "Intake Manifold Runner Control Valve"
7	High pressure EGR volume control valve	EC9-19, "High Pressure EGR Volume Control Valve"
8	Turbocharger boost sensor (with intake air temperature sensor 2)	• EC9-17, "Turbocharger Boost Sensor" • EC9-17, "Intake Air Temperature Sensor 2"
9	Fuel rail pressure sensor	EC9-18, "Fuel Rail Pressure Sensor"
10	Camshaft position sensor	EC9-16, "Camshaft Position Sensor"
11	Engine oil level sensor	—
12	Engine oil pressure sensor	—
13	Engine coolant temperature sensor	EC9-17, "Engine Coolant Temperature Sensor"

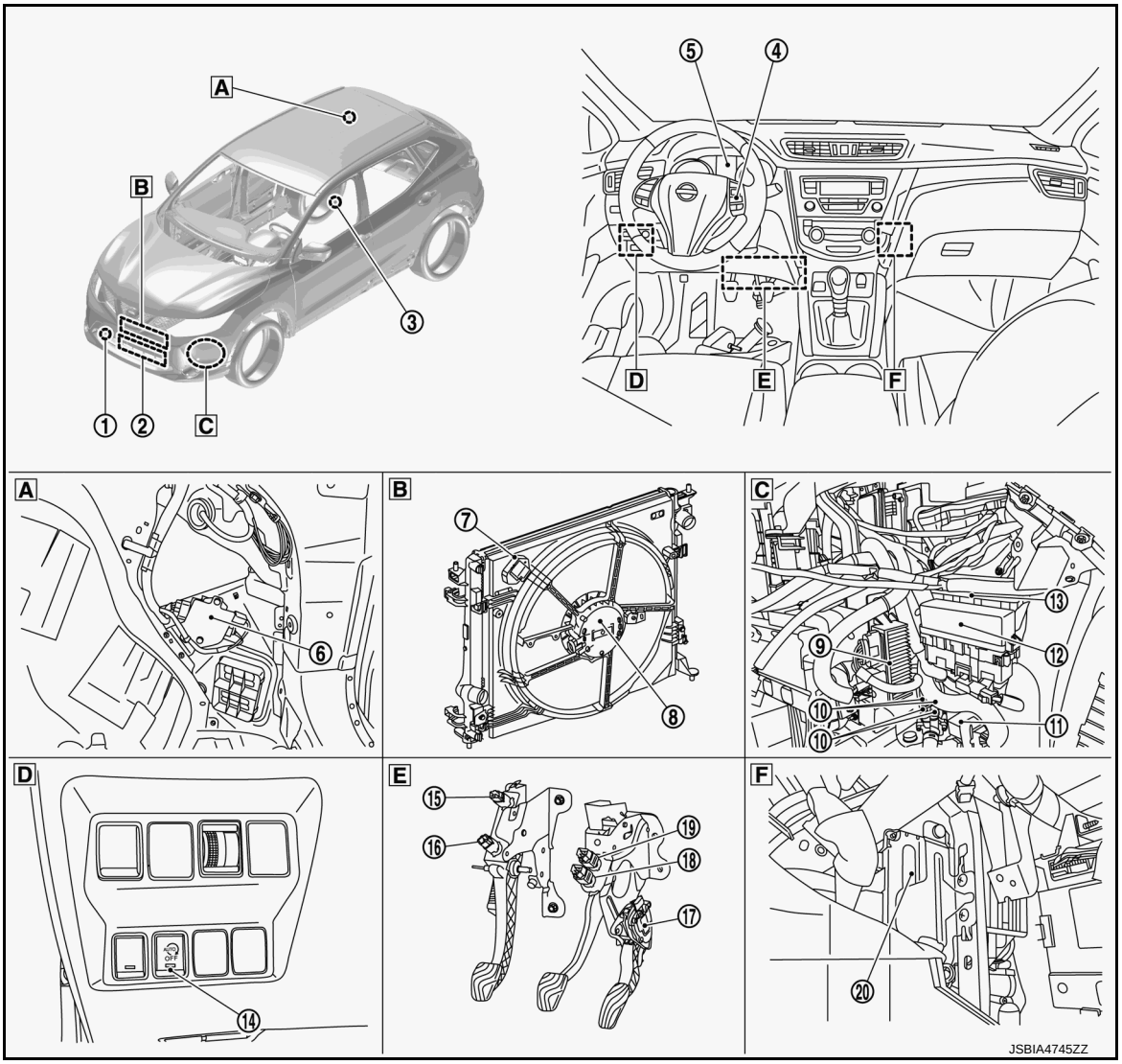
No.	Component parts	Function
14	Crankshaft position sensor	EC9-16, "Crankshaft Position Sensor"
15	Fuel flow actuator	EC9-17, "High Pressure Fuel Pump"
16	Turbocharger boost control solenoid valve	EC9-18, "Turbocharger Boost Control Solenoid Valve"
17	DPF (diesel particulate filter) differential pressure sensor	EC9-20, "DPF Differential Pressure Sensor"
18	Low pressure EGR volume control valve	EC9-19, "Low Pressure EGR Volume Control Valve"
19	Low pressure EGR temperature sensor	EC9-19, "Low Pressure EGR Temperature Sensor"
20	Exhaust gas temperature sensor 2	EC9-21, "Exhaust Gas Temperature Sensor 2"
21	Exhaust gas temperature sensor 1	EC9-20, "Exhaust Gas Temperature Sensor 1"
22	Turbocharger	EC9-28, "TURBOCHARGER BOOST CONTROL : System Description"
23	A/F sensor 1	EC9-17, "Air Fuel Ratio (A/F) Sensor"
24	Exhaust gas pressure sensor	EC9-20, "Exhaust Gas Pressure Sensor"

EXHAUST COMPARTMENT



No.	Component parts	Function
1	DPF (diesel particulate filter)	EC9-20, "DPF (Diesel Particulate Filter)"
2	Exhaust electric throttle control actuator	EC9-19, "Exhaust Electric Throttle Control Actuator"

BODY COMPARTMENT



A Behind luggage side finisher RH
B Radiator assembly
C Behind front fender protector LH
D Instrument lower panel
E Periphery of pedals
F Behind of glove upper box assembly

No.	Component parts	Function
1	Refrigerant pressure sensor	EC9-22, "Refrigerant Pressure Sensor"
2	Active grille shutter	EXT-12, "ACTIVE GRILLE SHUTTER SYSTEM : Active grille shutter"
3	Cooling fan resistor	EC9-21, "Cooling Fan Resistor"
4	ASCD steering switch	EC9-22, "ASCD Steering Switch"
5	Combination meter	MWI-9, "METER SYSTEM : System Description"
6	Fuel pump control module (FPCM)	EC9-18, "FPCM (Fuel Pump Control Module)"
7	Cooling fan resistor	EC9-21, "Cooling Fan Resistor"
8	Cooling fan motor	EC9-21, "Cooling Fan"
9	Thermoplunger control unit	EC9-21, "Thermoplunger Control Unit"
10	Thermoplunger unit	EC9-21, "Thermoplunger"
11	Glow control unit	EC9-21, "Glow Control Unit"
12	Relay box	—
13	Fuse block (J/B)	—

No.	Component parts	Function
14	Stop/start OFF switch	EC9-24, "Stop/Start OFF Switch"
15	Clutch interlock switch (M/T models)	EC9-22, "Clutch Interlock Switch & Clutch Pedal Position Switch"
16	Clutch pedal position switch (M/T models)	
17	Accelerator pedal position sensor	EC9-22, "Accelerator Pedal Position Sensor"
18	Stop lamp switch	EC9-22, "Stop Lamp Switch"
19	Brake pedal position switch (CVT models)	EC9-22, "Stop Lamp Switch"
20	DC/DC converter	EC9-23, "DC/DC Converter"

ECM

INFOID:0000000010308918

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

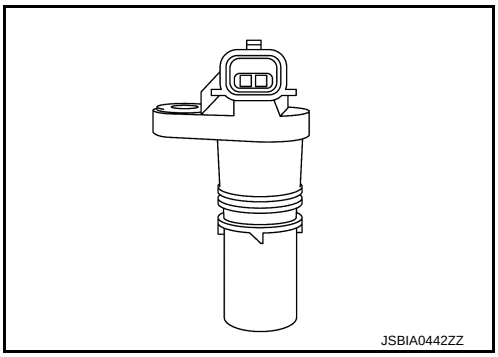
INFOID:0000000010308919

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:0000000010308920

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.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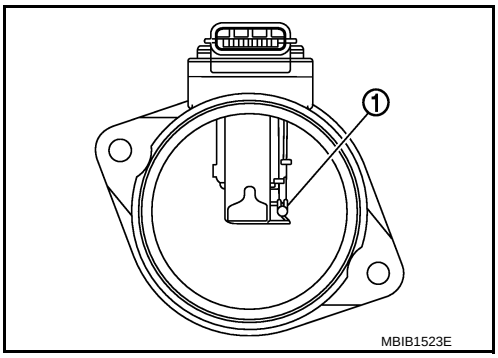
Mass Air Flow Sensor

INFOID:0000000010308921

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.



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Intake Air Temperature Sensor 1

INFOID:0000000010308922

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.

<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:0000000010308923

The turbocharger boost sensor detects pressure in the charge air cooler outlet area. The sensor send to voltage signal to the ECM. As the pressure increases, the voltage rises.

Intake Air Temperature Sensor 2

INFOID:0000000010308924

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:0000000010308925

Air fuel ratio (A/F) sensor is installed on the upstream of the oxidation catalyst. A/F sensor measures the oxygen 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:0000000010308926

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:0000000010308928

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:0000000010456182

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:

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:0000000010308927

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

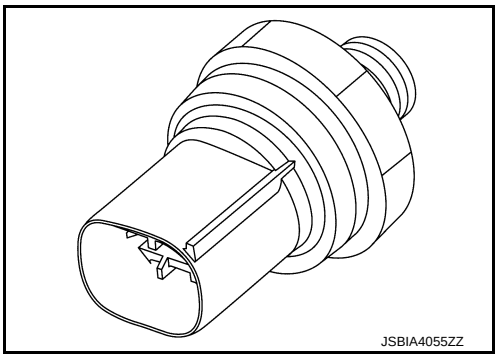
INFOID:0000000010308931

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:0000000010501531

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:0000000010308932

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:0000000010308933

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:0000000010501530

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:0000000010308934

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:0000000010308935

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:0000000010308936

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:0000000010308937

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:0000000010308938

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:0000000010308939

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.

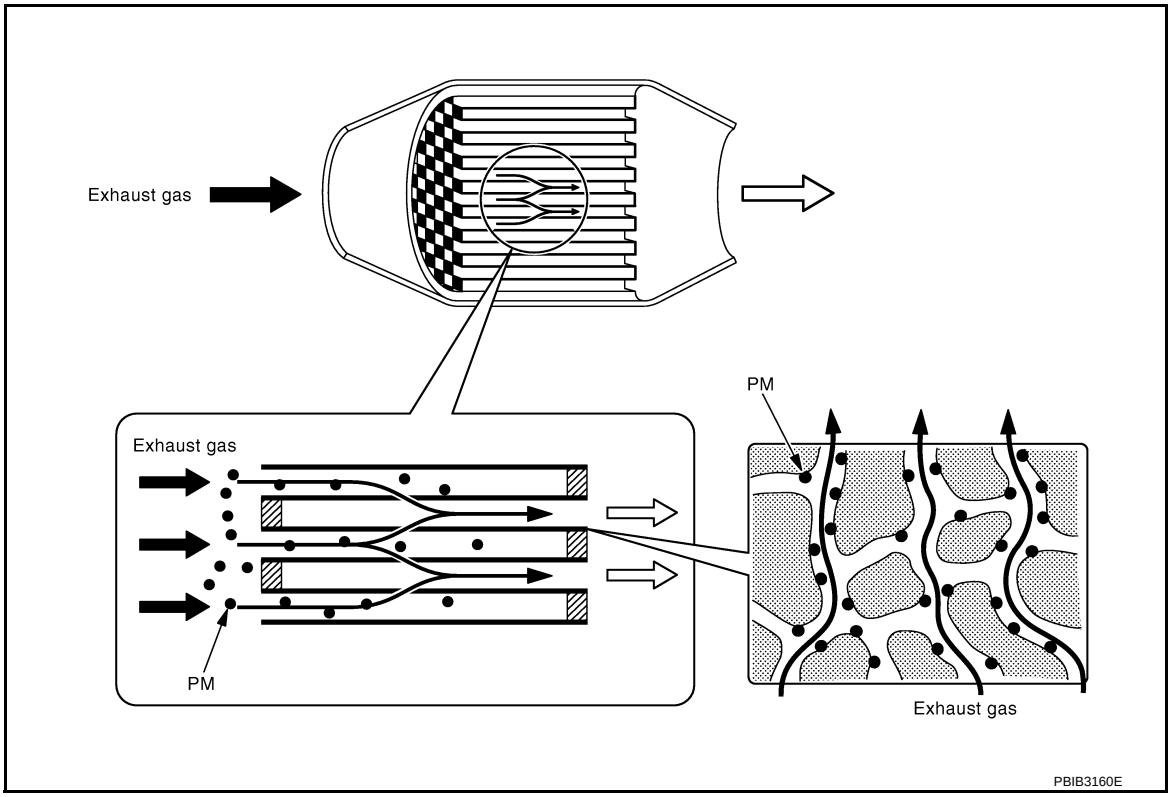
Exhaust Electric Throttle Control Actuator

INFOID:0000000010308940

Exhaust Electric Throttle Control Actuator is installed to the exhaust tube and activated only during low pressure EGR.

DPF (Diesel Particulate Filter)

INFOID:0000000010308941



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

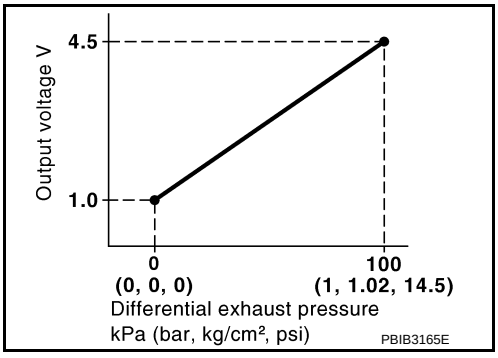
INFOID:0000000010308942

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:0000000010308943

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:0000000010308944

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.

<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:0000000010308945

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:0000000010308946

Glow Control Unit performs PWM (Pulse Width Modulation) communication with ECM. It improves engine starting function by performing glow control.

Glow Plug

INFOID:0000000010308947

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:0000000010308948

Glow indicator lamp illuminates when glow system is activated in order to inform it to the driver.

Cooling Fan

INFOID:0000000010503744

Cooling fan operates at each speed when the current flows in the cooling fan motor as follows.
Refer to EC9-34, "COOLING FAN CONTROL : System Description" for cooling fan operation.

Cooling Fan Resistor

INFOID:0000000010308949

Cooling Fan Resister 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:0000000010308950

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:0000000010308951

Thermoplunger Control Unit passes a current to Thermoplungers according to a signal transmitted from ECM.

Engine Coolant Bypass Valve

INFOID:0000000010308952

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

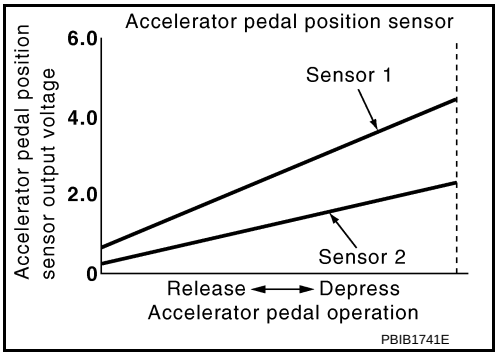
INFOID:0000000010308953

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:0000000010308954

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:0000000010308955

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:0000000010308956

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:0000000010589773

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:0000000010501522

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

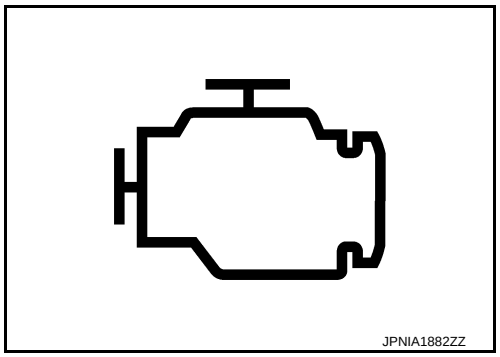
INFOID:0000000010308958

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:0000000010308959

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.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Information Display

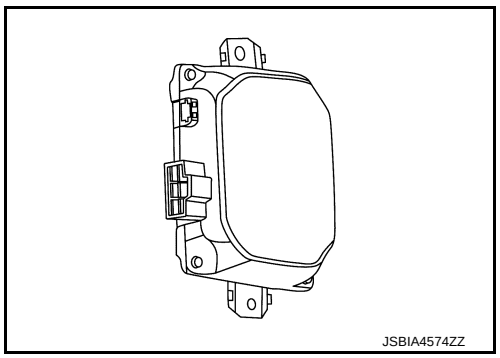
INFOID:0000000010308960

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:0000000010308962

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 EC9-39, "STOP/START SYSTEM : System Description (M/T models)" or EC9-47, "STOP/START SYSTEM : System Description (CVT models)".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Engine Restart Relay

INFOID:0000000010308963

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

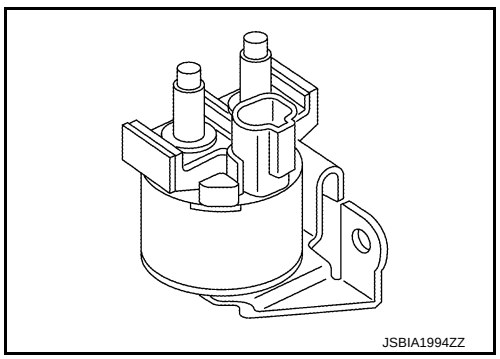
INFOID:0000000010308964

The engine restart bypass control relay is controlled by ECM and controls the engine restart bypass relay.

Engine Restart Bypass Relay

INFOID:0000000010308965

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 EC9-39, "STOP/START SYSTEM : System Description (M/T models)" or EC9-47, "STOP/START SYSTEM : System Description (CVT models)".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Hood Switch

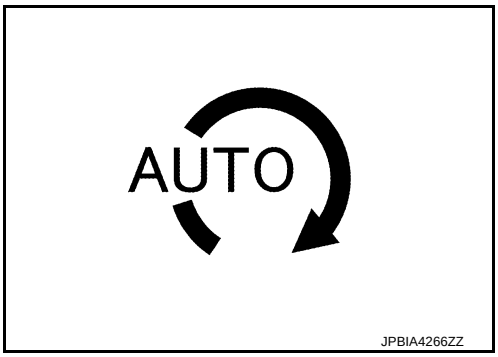
INFOID:0000000010308970

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:0000000010308971

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

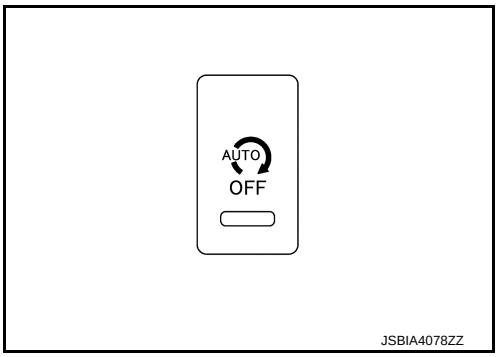
System condition	Condition	Stop/start indicator lamp	Warning chime
Operate	Normal	Illuminate	—
	Door (driver side) open and seat belt released*1	High speed blinking	Sound
	Hood open	High speed blinking*2	Sound*2
Fail-Safe	Starter motor operation counter: too much	Slow speed blinking	—
	Malfunction of 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:0000000010308972

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 lump turns ON and the stop/start system can be deactivated.
For further details, refer to EC9-57, "STOP/START SYSTEM : Switch Name and Function".

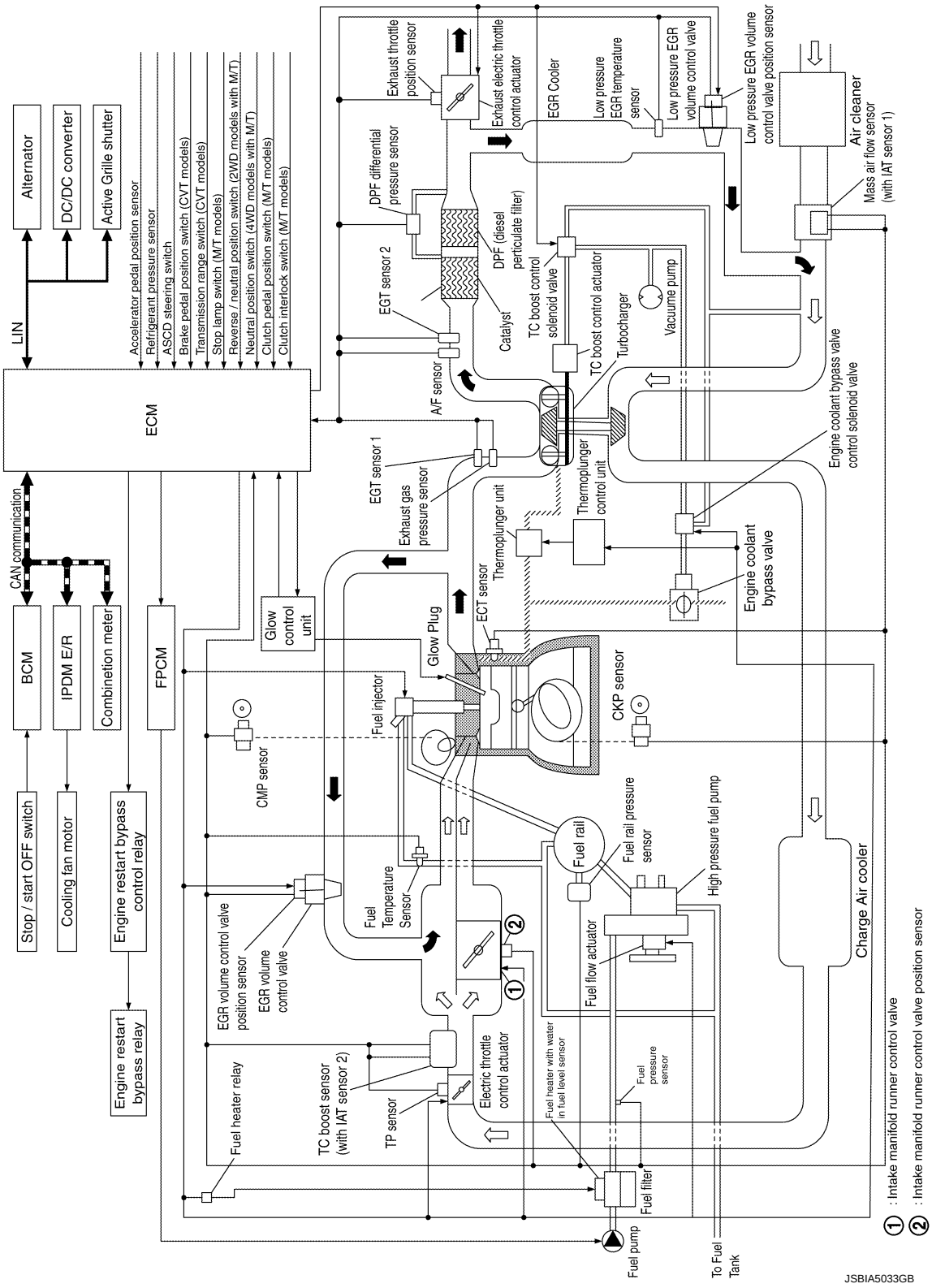


SYSTEM

ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : System Diagram

INFOID:0000000010308973



ENGINE CONTROL SYSTEM : Vacuum Hose Drawing

INFOID:0000000010308974

For vacuum hose drawing, refer to EC9-404, "Vacuum Layout".

ENGINE CONTROL SYSTEM : System Description

INFOID:0000000010308975

ECM controls the engine by various functions.

Function	Reference
Engine speed control	EC9-26, "ENGINE SPEED CONTROL : System Description"
Powertrain coordination control	EC9-27, "POWERTRAIN COORDINATION CONTROL : System Description"
Turbocharger boost control	EC9-28, "TURBOCHARGER BOOST CONTROL : System Description"
EGR system	EC9-28, "EGR SYSTEM : System Description"
Throttle control	EC9-29, "THROTTLE CONTROL : System Description"
Swirl control system	EC9-29, "SWIRL CONTROL SYSTEM : System Description"
Engine torque control	EC9-30, "ENGINE TORQUE CONTROL : System Description"
Combustion control	EC9-32, "COMBUSTION CONTROL : System Description"
After treatment system	EC9-34, "AFTER TREATMENT SYSTEM : System Description"
Cooling fan control	EC9-34, "COOLING FAN CONTROL : System Description"
Thermostat control	EC9-35, "THERMOSTAT CONTROL : System Description"
Glow control	EC9-35, "GLOW CONTROL : System Description"
ASCD (Automatic Speed Control Device)	EC9-36, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description"
Speed limiter	EC9-36, "SPEED LIMITER : System Description"
Gear shift indicator system	EC9-38, "GEAR SHIFT INDICATOR SYSTEM : System Description"
Stop/start system	EC9-39, "STOP/START SYSTEM : System Description (M/T models)", EC9-47, "STOP/START SYSTEM : System Description (CVT models)"
Energy management system	EC9-54, "ENERGY MANAGEMENT SYSTEM : System Description"
CAN communication	EC9-54, "CAN COMMUNICATION : System Description"

ENGINE SPEED CONTROL

ENGINE SPEED CONTROL : System Description

INFOID:0000000010308976

SYSTEM DESCRIPTION

The engine speed control consists of the following functions:
- Curative anti-jerk
- Idle speed control
- Engine speed limitation
- Engine state

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.

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:
- 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

The final engine idle speed set point is computed from each comsumer'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.

ENGINE SPEED LIMITATION

ECM calculates the maximum engine speed set point and controls the maximum engine speed in order to follow the set point.

• Fail-safe mode
• Maximum available engine speed

ENGINE STATE

ECM calculates the engine state from detected engine speed:

• Engine running
- Driving state
- Idling state
• Engine stalled
- Initial state
- Stalled state

POWERTRAIN COORDINATION CONTROL

POWERTRAIN COORDINATION CONTROL : System Description

INFOID:0000000010437573

SYSTEM DESCRIPTION

The powertrain coordination can be explained by following:

• Powertrain coordination inputs
• Preventive anti-jerk
• Gear shift indicator (for details, refer to EC9-38, "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:0000000010308979

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.

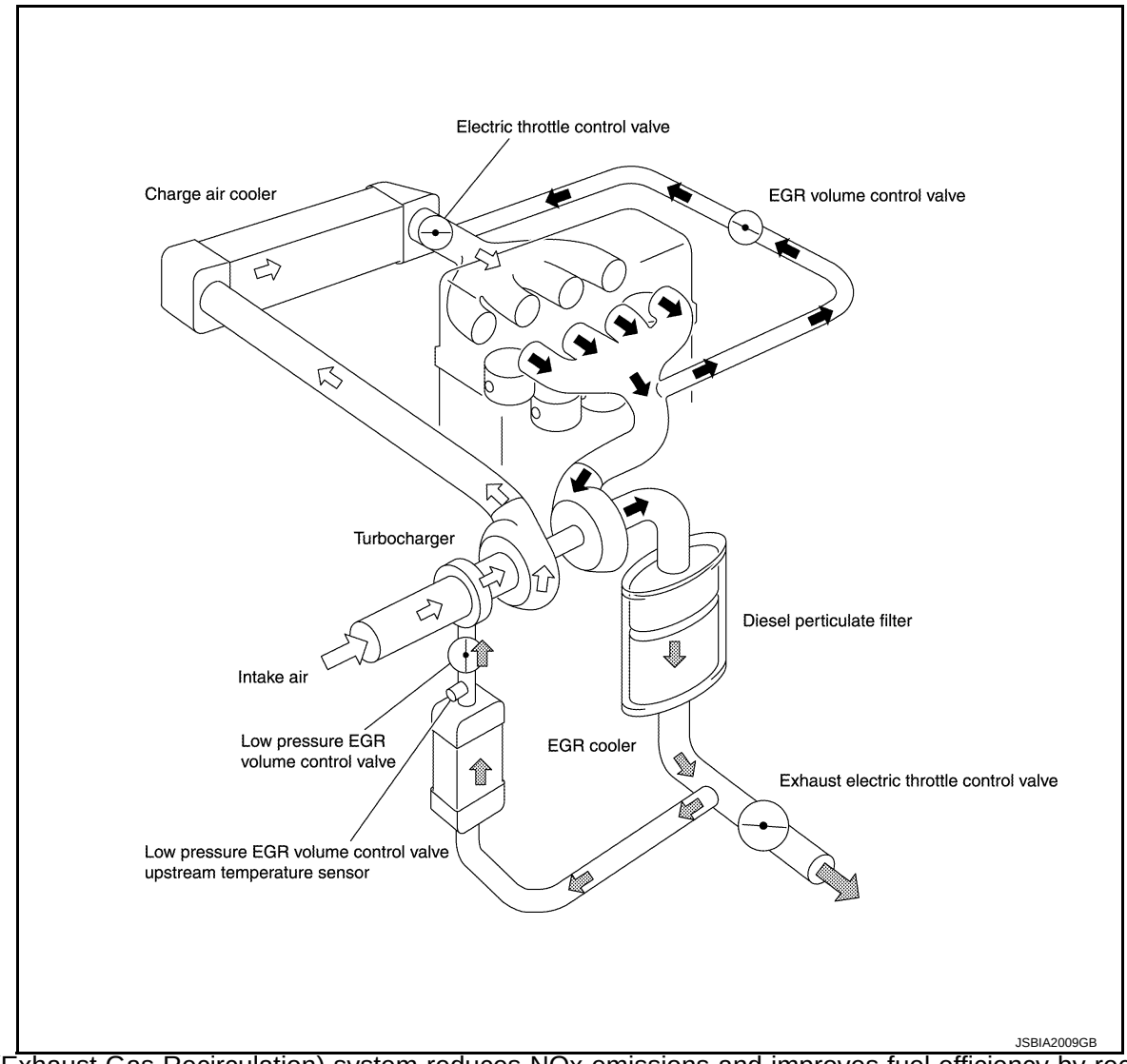
The boost pressure control is able to increase the manifold pressure with respect to the engine operating point. The system has an electric solenoid valve connected on the vacuum circuit to control the flow of exhaust gases through the turbine in order to generate high pressure in the boost circuit.

EGR SYSTEM

EGR SYSTEM : System Description

INFOID:0000000010308980

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:0000000010308981

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.

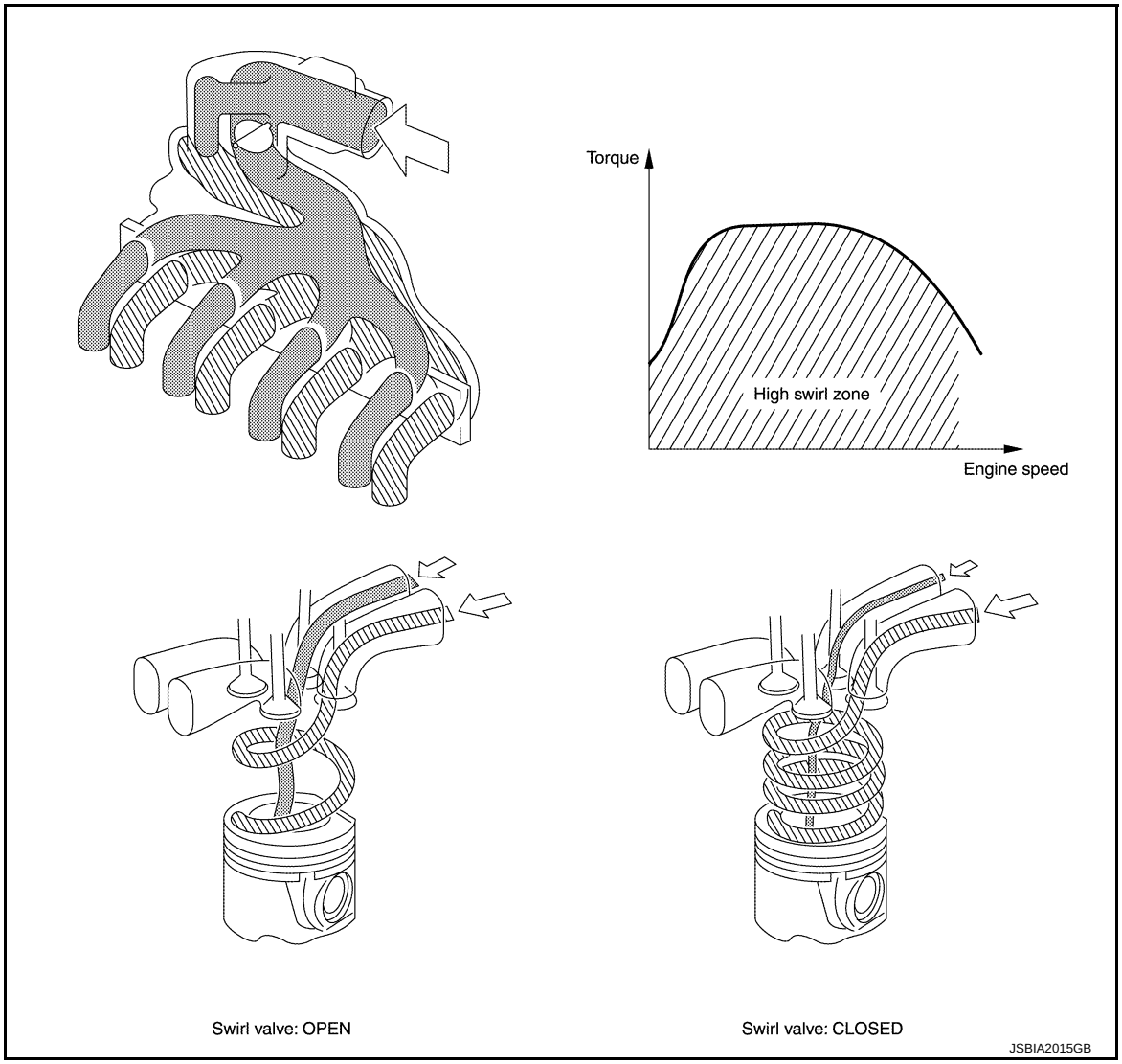
SWIRL CONTROL SYSTEM

SWIRL CONTROL SYSTEM : System Description

INFOID:0000000010308982

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:0000000010308977

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.

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 atmospeeric 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

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:0000000010438173

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 drivers 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:0000000010308986

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 NOx produced by the engine by inserting a NOx-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:
- NOx purge
- SOx 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 NOx 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:0000000010308983

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:0000000010308984

SYSTEM DRAWING
For system drawing of the thermostat control, Refer to CO-85, "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:0000000010308985

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:0000000010308988

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).
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.
NOTE:
Always drive vehicle in a safe manner according to traffic conditions and obey all traffic laws.

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)

ACCELERATE OPERATION

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

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.
- CANCEL switch is pressed
- More than 2 switches 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.

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.
  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.

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 ASCD MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.
- Brake pedal is released
- Clutch pedal is released
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 170 km/h (105 MPH)

SPEED LIMITER

SPEED LIMITER : System Description

INFOID:0000000010308989

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.

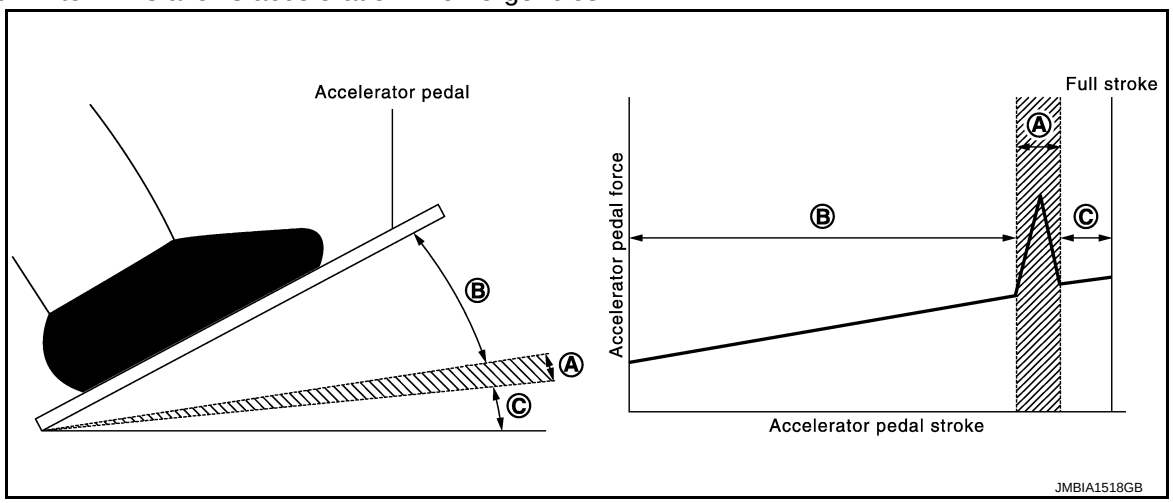
SET OPERATION

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 (A) below, the accelerator pedal reaction force strengthens. Further depressing the accelerator pedal within the (C) range cancels the speed limiter. This allows acceleration in emergencies.



RESUME OPERATION

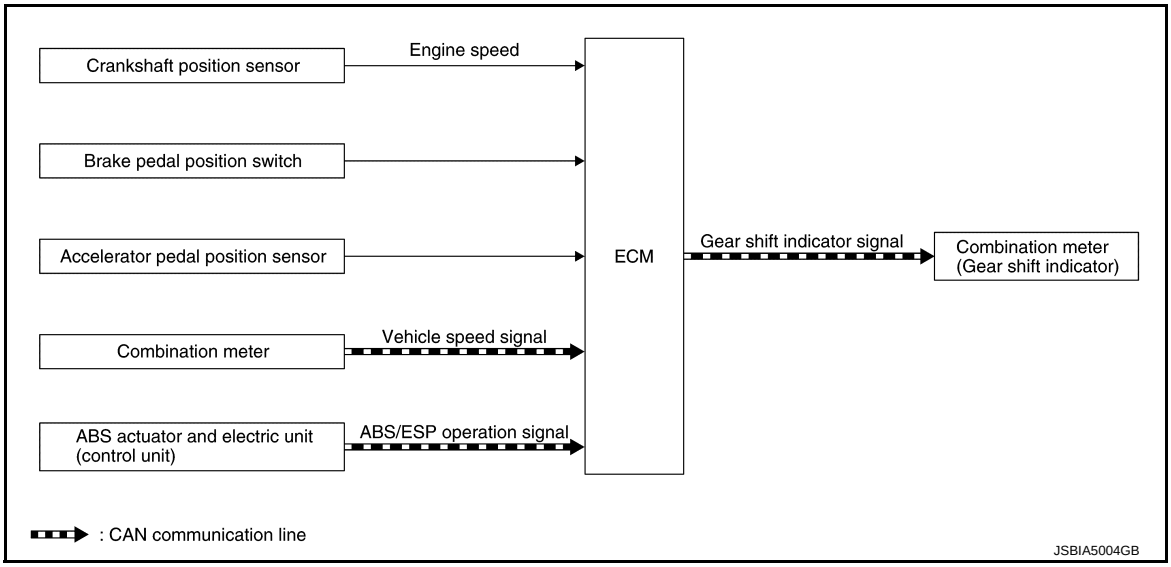
After the speed limiter is released by other method than the MAIN switch, the RESUME/ACCELERATE switch allows to set the vehicle speed again to the one that is previously set before releasing the speed limiter.

GEAR SHIFT INDICATOR SYSTEM

GEAR SHIFT INDICATOR SYSTEM : System Description

INFOID:0000000010438161

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;

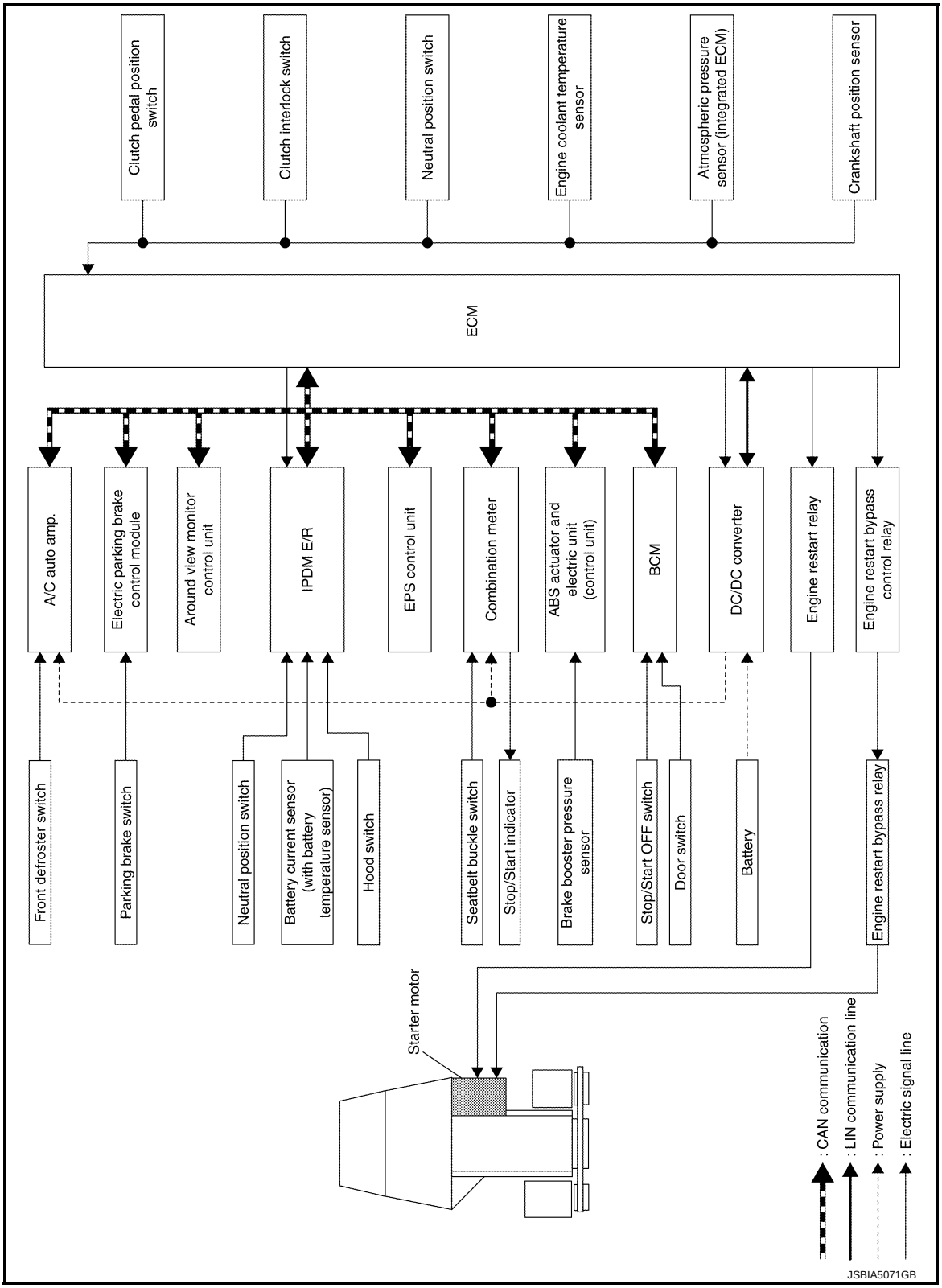
- Shift lever is in neutral position.
- Vehicle is under cruise control (ASCD function) or speed limit (speed limiter function).
- MIL (Malfunction Indicator Lamp) is indicated.
- ABS system or ESP system is operating.

STOP/START SYSTEM

STOP/START SYSTEM : System Description (M/T models)

INFOID:0000000010308990

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL CHART

Input/ Output	Transmits/Receives component	Signal name		Description
Input	Crankshaft position sensor	Crankshaft position sensor signal		Detects an engine speed.
	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).
	Clutch pedal interlock switch	Clutch pedal interlock switch signal		Detects the clutch pedal is depressed (fully depressed).
	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.
	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".
			Battery current signal	Detects battery current.
			Neutral position switch signal	Detects the neutral position.
			Hood switch signal	Detects engine hood status.
			Battery current sensor malfunction signal	Detects the battery current sensor is normal.
	BCM	CAN communication	Ignition switch status signal	Detects ignition switch status.
			Door switch signal	Detects the status of driver side door.
			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.
			Brake booster pressure sensor signal	Detects a pressure in brake booster.
			ABS operation signal	Detects ABS operation.
			ESP operation signal	Detects ESP operation.
	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.
	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-32, "STOP/START SYSTEM : System Description".
	Combination meter	CAN communication	Seat belt buckle switch signal	Detects driver is sitting on the driver seat.
	DC/DC converter	LIN communication	Operation status signal	Detects an operational state of DC/DC converter.
			Diagnosis signal	Detects DC/DC converter malfunction.

Input/ Output	Transmits/Receives component	Signal name		Description
Output	Around view monitor control unit	CAN communication	Stop/Start status signal	Transmits a stop/start status signal
	BCM	CAN communication	Stop/Start status signal	Transmits a stop/start status signal
	ABS actuator and electric unit (control unit)	CAN communication	Stop/Start status signal	Transmits a stop/start status signal
	EPS control unit	CAN communication	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 communication	Stop/Start status signal	Transmits a stop/start status signal
	Combination meter	CAN communication	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.

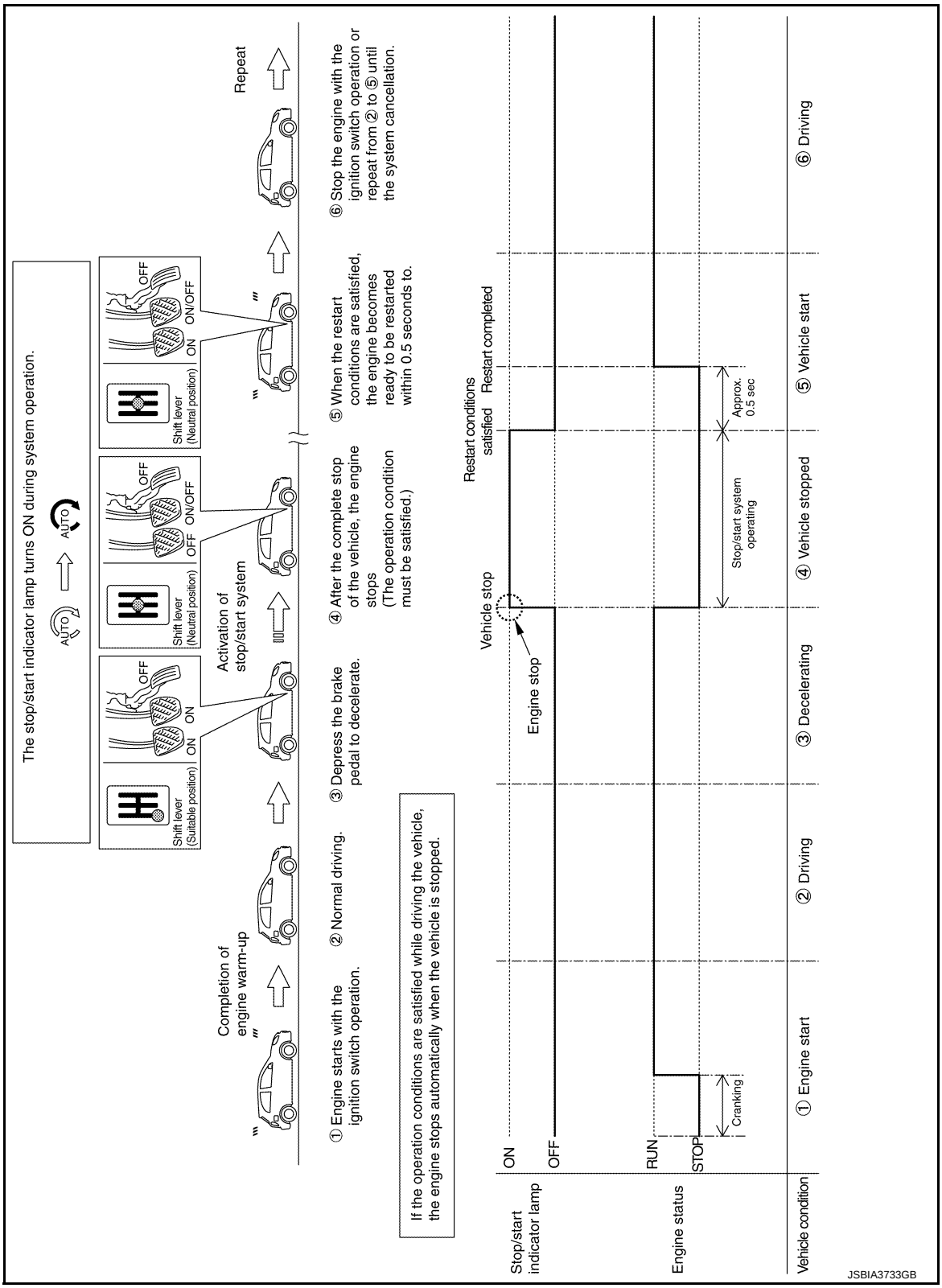
ECM detects a vehicle condition, engine condition and driver′s operation condition based on signals sent from each unit and the sensors to comprehensively control the stop/start system.

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 EC9-24, "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”.

BASIC OPERATION



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 CO_2 saved information are indicated on the combination meter. (With dot matrix information display. Refer to MWI-17, "INFORMATION DISPLAY : System Description".)

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
			Receives Stop/start permit signal (for details, refer to HAC-32, "STOP/START 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.

*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 EC9-10, "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-36, "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					
		Fully depressed		Half depressed		Released	
Vehicle speed	Gear position	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.

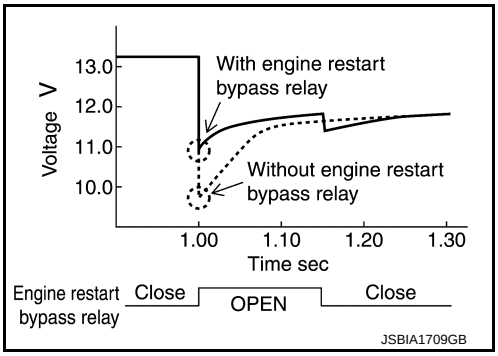
VOLTAGE STABILIZER FUNCTION

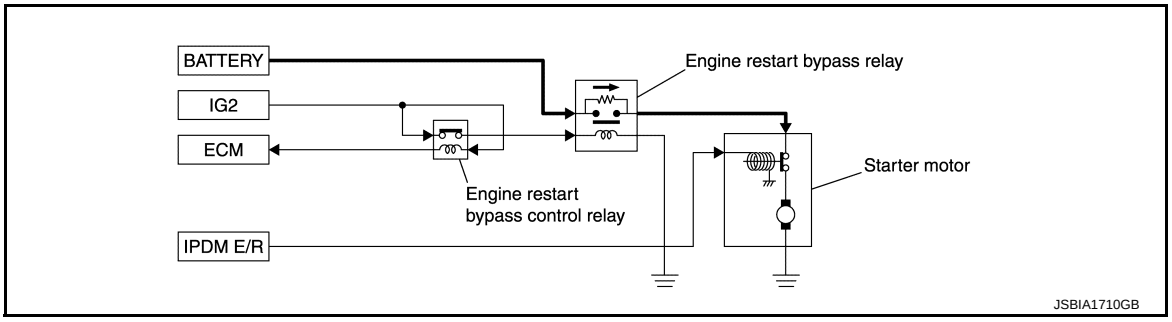
ECM transmits a voltage stabilizer signal to the DC/DC converter during cranking at an engine restart. The DC/DC converter temporarily increases the voltage to prevent the electric equipment from reset due to low voltage. The adoption of the DC/DC converter enables a stable power supply to the electric 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.

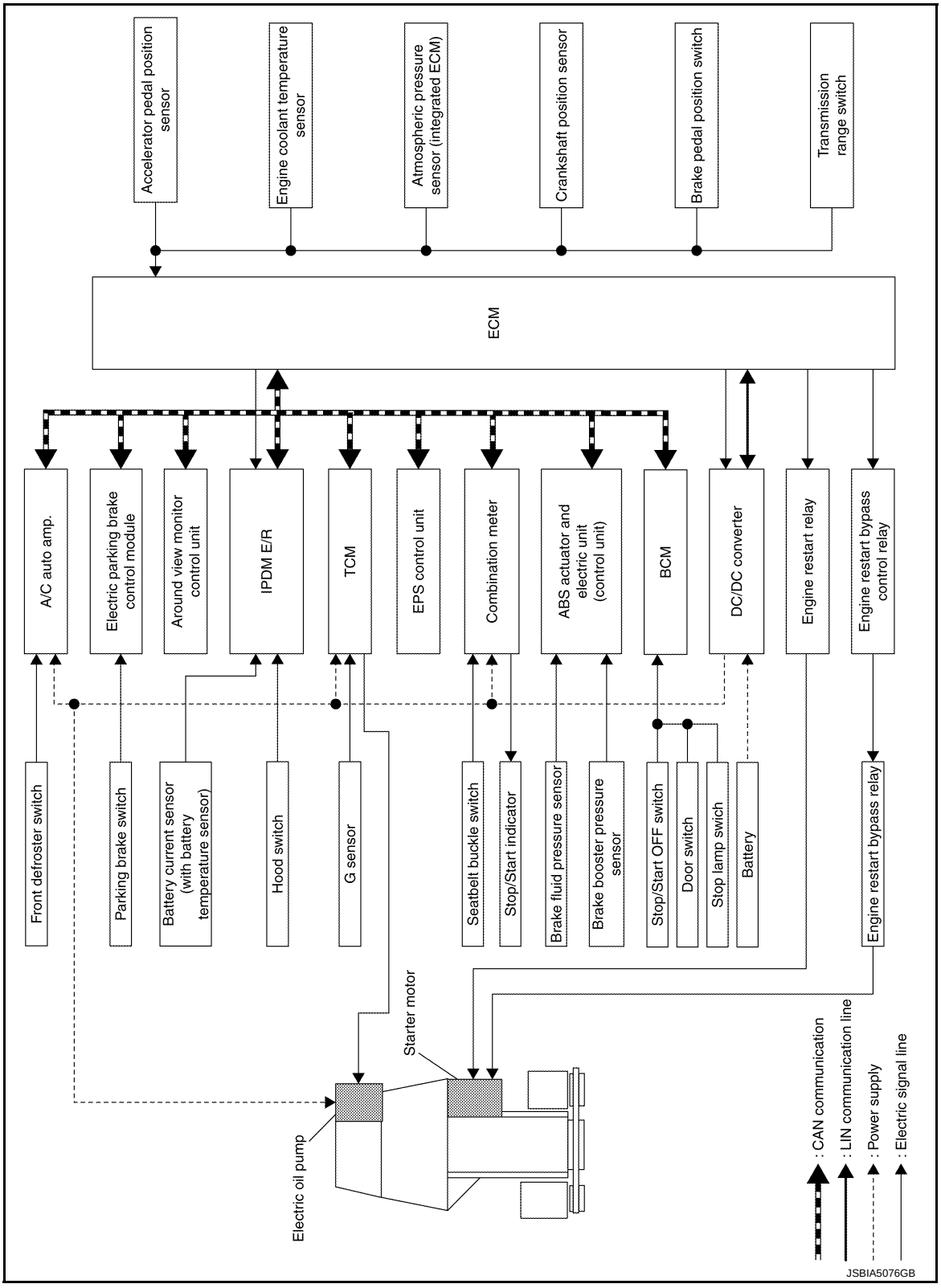




STOP/START SYSTEM : System Description (CVT models)

INFOID:0000000010479132

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL CHART

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.
	Brake pedal position switch	Brake pedal position switch signal		Detects the brake pedal is depressed.
	Crankshaft position sensor	Crankshaft position sensor signal		Detects an engine speed.
	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.
	IPDM E/R	CAN communication	Stop/Start permit signal	Detects the transmission is ready to operate the stop/start system.
			Battery current signal	Detects battery current.
			Hood switch signal	Detects engine hood status.
			Battery current sensor malfunction signal	Detects the battery current sensor is normal.
	BCM	CAN communication	Ignition switch status signal	Detects ignition switch status.
			Stop lamp switch signal	Detects an accelerator pedal position.
			Door switch signal	Detects the status of driver side door.
			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.
			Brake fluid pressure sensor signal	Detects brake fluid pressure.
			Brake booster pressure sensor signal	Detects a pressure in brake booster.
			ABS operation signal	Detects ABS operation.
			ESP operation signal	Detects ESP operation.
			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.
			Stop/Start inhibit signal	Receives the intelligent parking assist status signal sent from the around view monitor control unit through the EPS control unit.
	A/C auto amp.	CAN communication	Stop/Start permit signal	Detects the air conditioning system is ready to operate the stop/start system.
	Combination meter	CAN communication	Seat belt buckle switch signal	Detects driver is sitting on the driver seat.
	TCM	CAN communication	Stop/Start permit signal	Detects the transmission is ready to operate the stop/start system.
			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.

Input/ Output	Transmits/Receives component	Signal name		Description
Output	Around view monitor control unit	CAN communication	Stop/Start status signal	Transmits a stop/start status signal
	BCM	CAN communication	Stop/Start status signal	Transmits a stop/start status signal
	ABS actuator and electric unit (control unit)	CAN communication	Stop/Start status signal	Transmits a stop/start status signal
			Brake hold request signal	Transmits the brake hold/release request according to the stop/start system.
	EPS control unit	CAN communication	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 communication	Stop/Start status signal	Transmits a stop/start status signal
	TCM	CAN communication	Stop/Start status signal	Transmits a stop/start status signal
	Combination meter	CAN communication	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 communication	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.

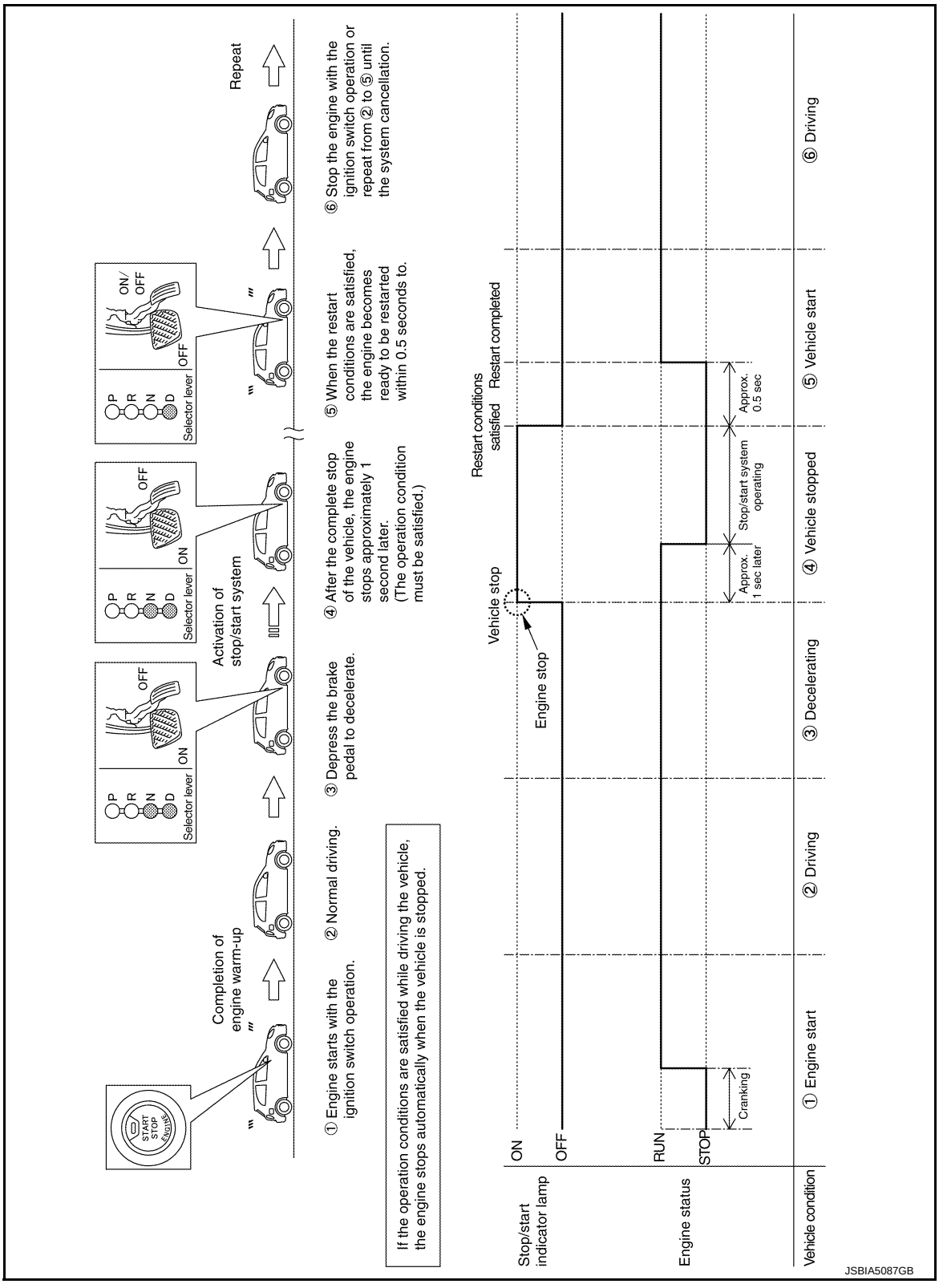
ECM detects a vehicle condition, engine condition, and driver′s operation condition based on signals sent from each unit and the sensors to comprehensively control the stop/start system.

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 EC9-24, "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”.

BASIC OPERATION



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.

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
			Receives Stop/start permit signal (for details, refer to HAC-32, "STOP/START SYSTEM : System Description".)
		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.

*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 EC9-10, "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-32, "STOP/START 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

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

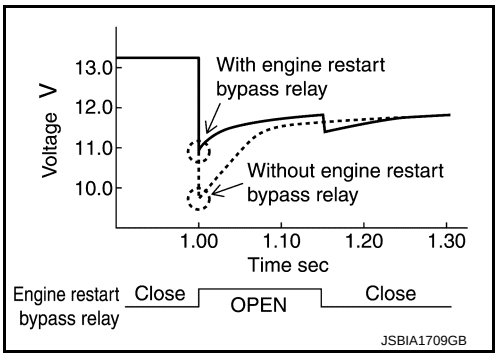
voltage. The adoption of the DC/DC converter enables a stable power supply to the electric equipment connected to the DC/DC converter and permits a substantial lowering of the voltage. For the electrical equipment connected to the DC/DC converter, see “SYSTEM DIAGRAM”.

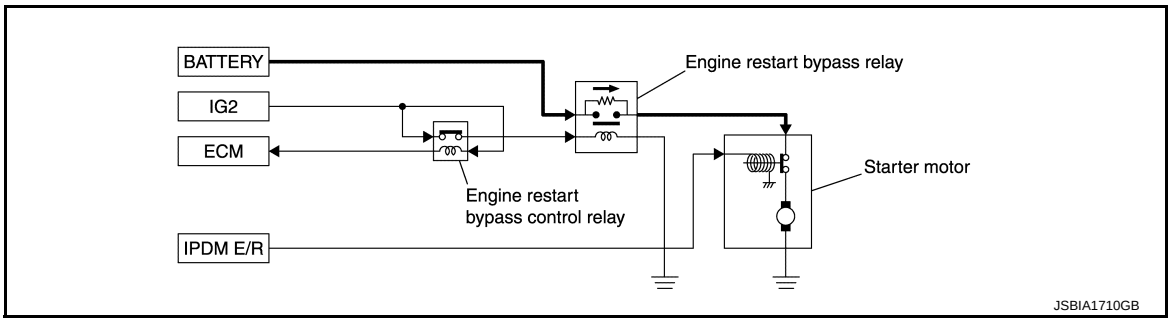
NOTE:

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:0000000010308991

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".

CAN COMMUNICATION

CAN COMMUNICATION : System Description

INFOID:0000000010308992

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-51, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart", about CAN communication for detail.

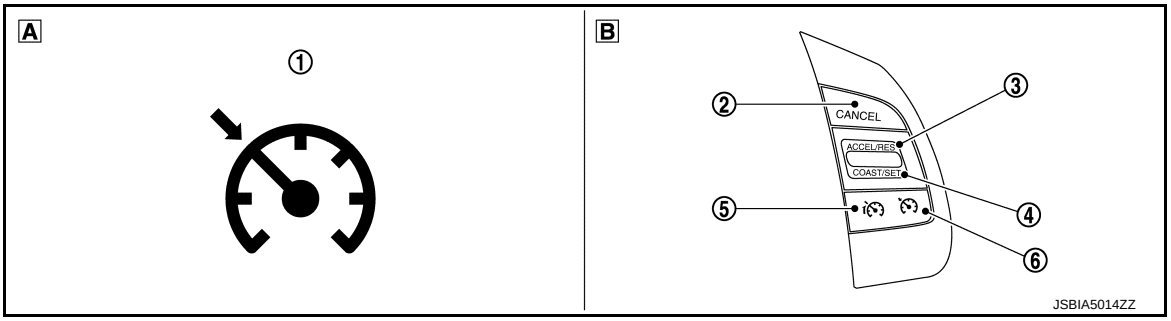
OPERATION

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

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

INFOID:0000000010308993

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

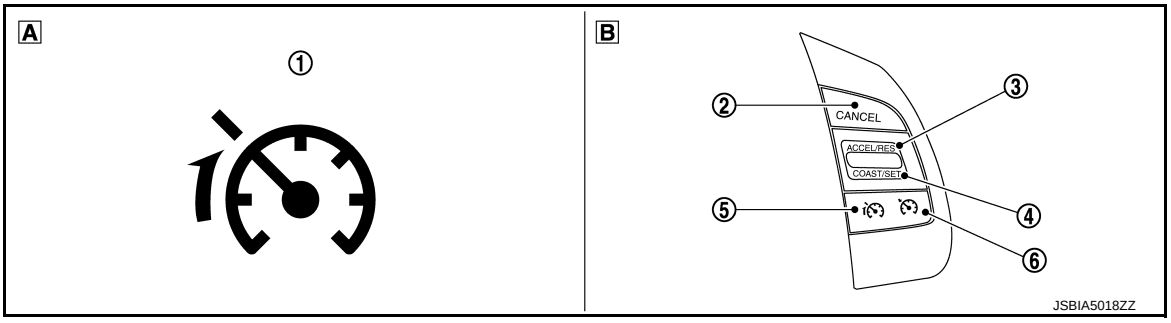
SPEED LIMITER : Switch Name and Function

INFOID:0000000010308994

SWITCHES AND INDICATORS

NOTE:

Shared with ASCD switch.



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

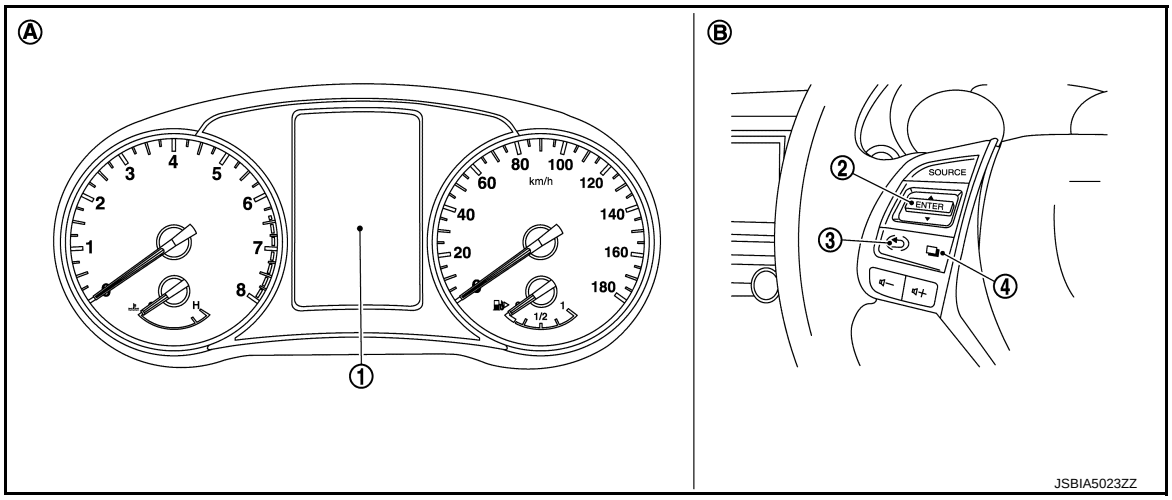
Item	Function
CANCEL switch	Cancels the speed limiter control.
ACCL/RES switch	• Resumes the set speed. • Increases the set speed incrementally.
COAST/SET switch	• Sets desired speed. • Decreases the set speed incrementally.
Speed limiter MAIN switch	Master switch to activate the speed limiter system.

OIL CONTROL SYSTEM

OIL CONTROL SYSTEM : Switch Name and Function

INFOID:0000000010308995

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-26, "Switch Name and Function".

RESET OPERATION

CAUTION:

When an alert was displayed, change the engine oil, and reset the engine oil data.

1. Turn ignition switch ON.
2. On information display, select “Settings” >> “Maintenance” >> “Service”.
3. Press “ENTER” switch until “YES/NO” is appeared.

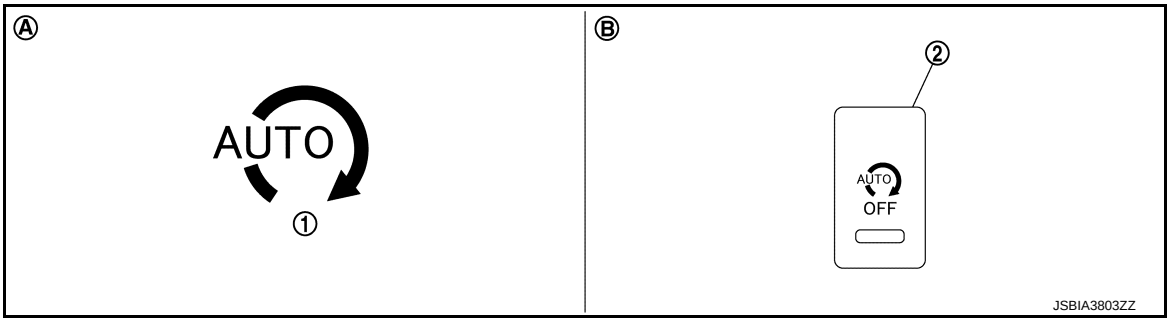
4. Select “YES”.
5. Check that “– – –” is displayed.

STOP/START SYSTEM

STOP/START SYSTEM : Switch Name and Function

INFOID:0000000010308996

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:0000000010308997

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 EC9-39, "STOP/START SYSTEM : System Description (M/T models)" (M/T models), EC9-47, "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:0000000010308998

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 raw.

MALFUNCTION INDICATOR LAMP (MIL) (RED)

ECM may turn ON MIL (red) when a malfunction occurs in the engine.

DIAGNOSIS SYSTEM (ECM)

CONSULT Function

INFOID:0000000010308999

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 — EC9-108, "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 VOLTAGE	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 REGULATOR CURRENT REFERENCE VALUE	Flow regulator current reference value	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 SOLENOID VALVE OCR	Turbocharging solenoid valve OCR	%	

Item*		Unit	Remarks
CONSULT screen terms	Full spell		
DAMPER VALVE UPSTREAM TEMPERATURE	Estimated inlet flap upstream temperature	°C or °F	
MANIFOLD PRESSURE	Manifold pressure	mbar	
INLET AIR TEMPERATURE	Inlet air temperature	°C or °F	
CHARGED AIR TEMPERATURE DOWN STREAM	Charged air temperature down stream	°C or °F	
EGR POSITION	EGR position	%	
EST. AIR FLOW	Estimated air flow	mg/cp	
INLET AIR FLOW	Inlet air flow	mg/cp	
ATMOSPHERIC PRESSURE	Atmospheric pressure	mbar	
TBN UPSTR PRS SEN VOLT	Turbine upstream pressure sensor voltage	mV	
ROUGH TC PRESS	Rough turbocharging pressure	mbar	
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	
IN FLAP ABSO POSI	Air inlet flap absolute position	%	
INLET/F SEN SUPPLY VOLT	Inlet flap sensor supply voltage	mV	
DAMPER VALVE SEN VOLT	Damper valve sensor voltage	mV	
DMPR VLV SET POS	Damper valve setpoint position	%	
IN/FLAP CTRL	Inlet flap control	%	
SEN 1 FEED V	Sensors No. 1 feed voltage	mV	
ADDITIONAL INFO FDE7	Additional information FDE7	—	
ADDITIONAL INFO FDE8	Additional information FDE8	mV	
ADDITIONAL INFO FD47	Additional information FD47	mV	
OXYGEN RATE	Oxygen rate	—	
ADDITIONAL INFORMATION FDE5	Additional information FDE5	—	
ADDITIONAL INFO FD9C	Additional information FD9C	°C or °F	
ADDITIONAL INFO FDF0	Additional information FDF0	hPa	
ADDITIONAL INFO FD9D	Additional information FD9D	—	
ADDITIONAL INFO FDE6	Additional information FDE6	hPa	
ALTERNATOR LOAD	Alternator load	%	
AIR REGULATION CUT-OFF CONDITIONS	Air regulation cut-off conditions	—	
ADDITIONAL INFO 2069	Additional information 2069	Nm	
SEN 2 FEED V	Sensors No. 2 feed voltage	mV	
PL PTNMR T2 V	Pedal potentiometer track 2 voltage	mV	
PL PTNMR T1 V	Pedal potentiometer track 1 voltage	mV	
RAW FUEL PRESSURE FROM SENSOR	Raw fuel pressure from sensor	bar	
PWM OF FUEL PUMP ACTUATOR	PWM of fuel pump actuator	%	
HEATER PLUG CONTROL	Heater plug control	%	
EGR VALVE OPENING REFERENCE	EGR valve opening reference	%	

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 SENSOR SUPPLY VOLTAGE	EGR sensor supply voltage	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	
OIL TEMPERATURE SENSOR VOLTAGE - ENGINE	Oil temperature sensor voltage - Engine	—	
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	
SWIRL FLAP - SWIRL POSITION RELATIVE TO THE CLOSED THRUST	Swirl flap - Swirl position relative to the closed thrust	%	
SWIRL THROTTLE POSITION SETPOINT USED BY THE MONITORING SYSTEM	Swirl throttle postion setpoint used by the monitoring system	%	
SWIRL FLAP - PWM COMMAND ASKED TO THE H - BRIDGE	Swirl flap - PWM command asked to the H - bridge	%	
SWIRL FLAP - CURRENT VALUE OF THE ‘LAST CLOSED THRUST POSITION’ LEARNT	Swirl flap - Current value of the 'last closed thrust position' learnt	%	
SWIRL FLAP - CURRENT VALUE OF THE FIRST CLOSED THRUST POSITION LEARNT	Swirl flap - Current value of the first closed thrust position learnt	%	

Item*		Unit	Remarks
CONSULT screen terms	Full spell		
SWIRL FLAP - CURRENT VALUE OF THE 'FIRST OPENED THRUST POSITION' LEARNT	Swirl flap - Current value of the 'first opened thrust position' learnt	%	
SWIRL FLAP - ABSOLUTE POSITION IN PERCENT OF THE SENSOR SUPPLY VOLTAGE	Swirl flap - Absolute position in percent of the sensor supply voltage	%	
SWIRL FLAP VOLTAGE	Swirl flap voltage	mV	
ADDITIONAL INFO FD2D	Additional information FD2D	—	
ADDITIONAL INFO FD2F	Additional information FD2F	°C or °F	
ADDITIONAL INFO FD96	Additional information FD96	mg/Hub	
ADDITIONAL INFO FD2E	Additional information FD2E	—	
SOOT IN P/FLT	Soot in the particle filter	G	
EXH THROTTLE POSITION	Exhaust throttle position	%	
EXHAUST FLAP POSITION SETPOINT	Exhaust flap position setpoint	%	
EXHAUST AIR FLAP OCR	Exhaust air flap OCR	%	
EXHAUST AIR FLAP OFFSET	Exhaust air flap offset	%	
FIRST OFFSET OF THE EXHAUST AIR FLAP OPEN	First offset of the exhaust air flap open	%	
EXHAUST FLAP ABSOLUTE POSITION	Exhaust flap absolute position	%	
SUPPLY VOLTAGE EXHAUST AIR FLAP SENSOR	Supply voltage exhaust air flap sensor	mV	
FIRST OFFSET OF THE CLOSED EXHAUST FLAP	First offset of the closed exhaust flap	%	
EGR LOW PRESSURE POSITION	EGR low pressure position	%	
LAST OFFSET OF CLOSED LOW PRESSURE EGR	Last offset of closed low pressure EGR	%	
EGR LOW PRESSURE OCR	EGR low pressure OCR	%	
LOW PRESSURE EGR POSITION REFERENCE VALUE	Low pressure EGR position reference value	%	
EGR LOW PRESSURE POSITION	EGR low pressure position	%	
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	%	
POSITION SETPOINT SENT BY THE MONITORING SYSTEM	Position setpoint sent by the monitoring system	%	
LOW PRESSURE EMTV - EGR BP VALVE CONTROL SETPOINT USED BY THE MONITORING SYSTEM	Low pressure EMTV - EGR BP valve control setpoint used by the monitoring system	%	
PART.FILTER UPSTREAM TEMP SENSOR VOLTAGE	Part. filter upstream temperature sensor voltage	mV	

Item*		Unit	Remarks
CONSULT screen terms	Full spell		
ADDITIONAL INFO 2813	Additional information 2813	°Crk	
POST INJECTION FLOW	Post injection flow	mg/cp	
POST INJECTION FLOW 1	Post injection flow 1	mg/cp	
FLOW GAS IN DPF	Flow of gas inside the particle filter	m3/h	
P/FLT DIFF. PRS	Particle filter pressure DIFF.	hPa	
REGEN MALFNC	Number of regeneration failure	—	
CSF - DISTANCE SINCE LAST REGENERATION SUCCESS PARTIAL OR TOTAL TO ALLOW REGENERATION	CSF - Distance since last regeneration success partial or total to allow regeneration	km or mile	
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	
ADDITIONAL INFO FD45	Additional information FD45	—	
OIL DILUTION INFORMATION	Oil dilution information	%	
COMPRESSOR BYPASS COMMAND	Compressor bypass command	—	• NO COMMAND • COMMAND ACTIVATED • INACTIVE
TURBO REGULATION	Turbo regulation	—	• MAX • PROTECTED • DIAG MODE • INACTIVE • REG • INTRME
MOTOR-DRIVEN FAN UNIT REQUEST	Motor-driven fan unit request	—	• ACTIVE • INACTIVE
MOTOR	Motor	—	• Off • RUNNING • STALLED • CRANKING • INACTIVE
LOW FUEL LEVEL INFORMATION	Low fuel level information	—	• OK • LOW • INACTIVE
GEARBOX RATIO	Gearbox ratio	—	• REVERSE • DCLTCH • INACTIVE
COMBUSTION MODE SET	Combustion mode setting	—	• NORMAL • STATUS1 • STAT2 • STAT3 • STAT4 • INACTIVE

Item*		Unit	Remarks
CONSULT screen terms	Full spell		
ACC. PDL DETECT BLOCK	ACC. pedal detection blocked	—	• NO • YES
PREHEATING REL CNT	Preheating relay control	—	• ACTIVE • DEACTIVAT • INACTIVE
CRUISE CONTROL/SPEED LIMITER OPERATION	Cruise control/speed limiter operation	—	• Off • SL ON • SL SUS • SL INHI • CC ON • CC SUS • CC INHI • CC/SL A • INACTIVE
CC OPERATING RELIABLY	Cruise control operating reliably	—	• STAT0 • STAT3 • STAT2 • STATUS1 • INACTIVE
CC/SL LMTR BUTTONS	Cruise control/speed limiter buttons	—	• INACTIVE • INVALID • CO.1 • SUSPD • MINUS • PLUS • RESTART • INACTIVE
CLUTCH START OF TRAVEL SWITCH	Clutch start of travel switch	—	• NO PRS • PRESSED • INVALID • INACTIVE
BRAKING DETECTED MULTIPLEX SIGNAL	Braking detected multiplex signal	—	• MISSING • INTRME • PRESENT • INACTIVE
FUEL PUMP RELAY	Fuel pump relay	—	• DEACTIVAT • ACTIVE • INACTIVE
COMP + AFTER IGNITION	Computer + After ignition	—	• MISSING • PRESENT • INACTIVE
CLUTCH END OF TRAVEL SWITCH	Clutch end of travel switch	—	• NO PRS • PRESSED • RESERVED • INVALID • INACTIVE

Item*		Unit	Remarks
CONSULT screen terms	Full spell		
CLUTCH SWITCH INFORMATION	Clutch switch information	—	• CONTACTOR NOT USED • CONTACTOR USED • NO CONTACTOR • INACTIVE
SWIRL/F CLOSED POS LEARN	Swirl flap closed position learning	—	• NOT DONE • DONE • INACTIVE
EXHAUST FLAP HIGH SETTING	Exhaust flap high setting	—	• NOT LEARNED • LEARNED • INACTIVE
CC/SL SPEED SIGNAL MONITORING	Cruise control/speed limiter signal monitoring	—	• STAT0 • STAT6 • STAT5 • STAT4 • STAT3 • STAT2 • STATUS1 • INACTIVE
CRUISE CONTROL INFO MONITORING	Cruise control information monitoring	—	• STAT0 • STAT8 • STAT7 • STAT6 • STAT5 • STAT4 • STAT3 • STAT2 • STATUS1 • INACTIVE
COMBUSTION MODE	Combustion mode	—	• NORMAL • STATUS1 • STAT2 • STAT3 • STAT4 • INACTIVE
COMBUSTION MODE - PARTICULATE FILTER REGENERATION AUTHORIZATION STATE	Combustion mode - particulate filter regeneration authorization state	—	• PRBT • AUTH • INACTIVE
THERMOPLUNGER1 RELAY	Thermoplunger No. 1 relay control	—	• DEACTIVAT • ACTIVE • INACTIVE
THERMOPLUNGER2 RELAY	Thermoplunger No. 2 relay control	—	• DEACTIVAT • ACTIVE • INACTIVE
THERMOPLUNGER3 RELAY	Thermoplunger No. 3 relay control	—	• DEACTIVAT • ACTIVE • INACTIVE

Item*		Unit	Remarks
CONSULT screen terms	Full spell		
WATER IN DIESEL DETECTOR	Water in diesel detector	—	• NOT DETECTED • DETECTED • INACTIVE
WATER PUMP RELAY COMMAND	Water pump relay command	—	• DEACTIVAT • ACTIVE • INACTIVE
CONFIRMED FAILURE CORRESPONDING TO THE CHECKS ON ACC	Confirmed failure corresponding to the checks on ACC	—	• FRAME ABSENT • CLOCK ERROR • FRAME COHERENCE ERROR • INVALID

*: 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
INLET AIR TEMPERATURE	°C or °F	Intake air temperature is displayed.	
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.	
ATOMOS PRESS	mbar	Atmospheric pressure is displayed.	
WATER TEMP	°C or °F	Engine coolant temperature is displayed.	
COMP SUP VOLT	V	The power supply voltage of ECM 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 signalsent from combination meter is displayed.	
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.	
UPS PRTCL FLTR TMP	°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	
REGENERATION FAIL	—	Indicates the number of DPF regeneration failures since the last success.	
FLOW GAS IN DPF	m3/h	Flow of gas inside the DPF is displayed.	
DPF INJEC RC COM	%	5th injector PWM command	
POST INJEC FLOW 1	mg/cp	Post injection quantity is displayed.	

Monitor item	Unit	Description	Remarks
SOOT IN P/FLT	g	Soot mass in the DPF is displayed.	
EX SYSTEM FLW	g/s	Exhaust gas air mass flow for estimation of downstream pressure and temperature models	
DIFF EXH PRES.	hPa	Differential exhaust gas pressure before/after DPF is displayed.	
PART.FILTER UPSTREAM TEMP SENSOR VOLTAGE	mV	Upstream DPF Temperature Sensor signal voltage is displayed.	
EGR VALVE FIRST OFFSET	%	EGR valve offset - first learning	
LAST EGR VALVE OFFSET	%	EGR valve offset - last learning	
PTNMR EGR VLV CL	%	Absolute position in percent of the sensor supply voltage	
EXH GAS PRESS SEN 1	mbar	Exhaust gas pressure before turbine computed from the exhaust gas pressure sensor 1is displayed.	
FUEL TEMP	°C or °F	Fuel temperature computed from the fuel temperature sensor is displayed.	
RAIL PRESSURE	mV	Fuel rail pressure computed from the fuel rail pressure sensor is displayed.	
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.	
ACCEL/PDL POS	—	Accelerator pedal position is displayed.	
EGR VALVE POSITION SEN	mV	High pressure EGR volume control valve position sensor signal voltage is displayed.	
RV/LV BUTTON VOLTAGE	mV	ASCD/Speed limiter steering switch voltage	
RFRGERNT PRSS	bar	Refrigerant pressure is displayed.	
FUEL FLOW	mg/cp	Total fuel flow is displayed.	
TOTAL DRIVE DISTANCE	km or mile	Total drive distance is displayed.	
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.	
VEHICLE SPEED DISPLAYED	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BOOST PRESSUR	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 INL TMP SEN VO	mV	Intake air temperature sensor 1 signal voltage is displayed.	
ATMOSPHERIC P	mV	Atmospheric pressure sensor voltage	
HEATER PLUG CONTROL	%	Glow plug control PWM command is displayed.	
AIR INL FLAP REL PO	%	Throttle opening angle is displayed.	
EGR/V OPN REF	%	High pressure EGR volume control valve opening reference is displayed.	
EGR VLV CONT	%	High pressure EGR volume control valve PWM command is displayed.	
DMP V SET POS	%	Throttle opening angle is displayed.	
EST. AIR FLOW	mg/cp	Estimated air flow is displayed	
TURB PRE SEN VOL	mV	Exhaust gas pressure sensor 1 signal voltage is displayed.	
ALTERNATOR LO	%	Alternator load is displayed.	

Monitor item	Unit	Description	Remarks
INLET AIR/FLW	mg/cp	The inlet air flow (determined by the signal voltage of the mass air flow sensor) is displayed.	
REFRGRT PRESS SEN	V	Refrigerant signal voltage is displayed.	
IN/FLAP CTRL	%	Inlet throttle PWM command is displayed.	
DMPR VLV SEN VO	mV	Inlet throttle position sensor voltage	
EST INL FLP TMP	°C or °F	Inlet throttle upstream temperature	
INL FLP SEN SUP VO	mV	Inlet throttle position sensor signal voltage is displayed.	
EGR POSITION	%	EGR position is displayed.	
TURB TMP SET	°C or °F	Exhaust gas temperature set point is displayed.	
MANIFOLD PRESSURE	mbar	Intake manifold pressure computed from the TC boost sensor is displayed.	
EXH GAS TEMP (UPSTM CAT)	°C or °F	This item is indicated, but not used.	
SWIRL FLAP VOLTAGE	mV	Intake manifold runner control valve - Voltage supplied to the sensor	
EXH THRTL VALVE OFFSET	%	Exhaust Air Flap - Current value of the "'last closed thrust position" learnt.	
OIL DILUTION INFORMATION	%	Oil dilution rate	
L/ PRES EGR/V FIRST OFFSET	%	Low Pressure EGR valve - Current value of the first closed thrust position learnt	
L/PRES EGR VALVE POSITION	%	Low pressure EGR volume control valve position is displayed.	
EXH THROTTLE POSITION	%	Exhaust throttle opening rate is displayed.	
ALTERNATOR POWER	W	Alternator power	
L/PRES EGR VALVE POS SEN	mV	Low pressure EGR volume control valve position sensor signal voltage is displayed.	
ENGINE REV COUNT	—	Number of engine revolutions since the last oil drain	
ENG OIL DILU RATIO	%	Current oil dilution rate for oil wear estimation	
ENG TORQUE	Nm	Engine output torque calculated by ECM is displayed.	
EXH THROTTLE POS SEN	mV	Exhaust throttle position sensor signal voltage is displayed.	
DPF PRESSURE	hPa	Memorized difference pressure to apply on the CSF differential pressure for adaptation	
Cruise control setting	km or mile	The preset ASCD vehicle speed is displayed.	
DURATION OF RESUME BUTTON PRESS	s	Duration of resume button press is displayed.	
DURATION OF + BUTTON PRESS	s	Duration of SET/+ button press is displayed.	
DURATION OF - BUTTON PRESS	s	Duration of SET/- button press is displayed.	
DURATION OF SUSPEND BUTTON PRESS	s	Duration of suspend button press is displayed.	
NUMBER OF ABNORMAL CC/SL TRANSITIONS	—	Maximum value of blocked button detection counter	
MOTOR	RUNNING/ OFF/ STALLED/ CRANKING	Engine status is displayed.	
1ST IN VAL OPEN PR	YES/NO	Inlet throttle valve offset - first opened learning running	
1ST IN VAL CLOS PR	YES/NO	Inlet throttle valve offset - first closed learning running	
THERMOPLUNGER	DETCT/ACTIVE	Thermoplunger No.1 status is displayed.	

Monitor item	Unit	Description	Remarks
THERMOPLNGR 2	DETCT/ACTIVE	Thermoplunger No.2 status is displayed.	
THERMOPLNGR 3	DETCT/ACTIVE	Thermoplunger No.3 status is displayed.	
EGR FUN PROG	YES/NO	High pressure EGR volume control valve offset - first learning running	
CAM TDC SYNC	NOT DONE/DONE	Camshaft/crankshaft synchronization status is displayed.	
C/U+AFTR IGN	MISSING/PRESENT	Ignition switch status is displayed.	
CLUTCH PEDAL SWITCH	INACTIVE/ACTIVE/BLOCKED	Clutch pedal position switch status is displayed.	
CCS LMT BTN	INACTIVE/INVALID/CO.1/SUSPD/MINUS/PLUS/RSTRT	ASCD steering switch status is displayed. • INACTIVE: unpressed • INVALID: invalid voltage • CO.1: open circuit • SUSPD: suspend switch pressed • MINUS: SET/– switch pressed • PLUS: SET/+ switch pressed • RSTRT: RES switch pressed	
CRS CN/SPD LMT OP	OFF/SL ON/SL SUS/SL INHI/CC ON/CC SUS/CC INHI/NONE	ASCD and speed limiter status is displayed. • OFF: ASCD and speed limiter is no activated. • SL ON: speed limiter is activated. (active or over speed) • SL SUS: speed limiter is activated. (awaiting or suspended) • SL INHI: speed limiter requested and in failure • CC ON: ASCD is activated. (active) • CC SUS: ASCD is activated. (awaiting or suspended) • /CC INH: ASCD requested and in failure • NONE: ASCD and speed limiter not present	
CC/SL CONNECTION AFTER CC BUTTON PRESSED	Not detected/DETCT	When ASCD MAIN switch is pressed, it displays actual ASCD operating condition detected by ECM.	
CC/SL CONNECTION AFTER SL BUTTON PRESSED	Not detected/DETCT	When speed limiter MAIN switch is pressed, it displays actual speed limiter operating condition detected by ECM.	
CRS C/SPD LIM	Inactive/REGUL/LIMIT/Incoherence	Speed limiter MAIN switch status is displayed.	
CC/SL ACT DR	STAT1/STAT2/STAT3/STAT4/STAT5	Cancellation condition of ASCD/speed limiter is displayed. • STAT1: ASCD/speed limiter main switch changed. • STAT2: Suspend button is pressed. • STAT3: ASCD brake switch is ON. • STAT4: Clutch pedal position switch is ON. • STAT5: Shift the selector lever to “N” position. • NONE: Deactivation	
TRC/ANTI-YAW CNT	No/Yes	Anti skid regulation or anti yaw control in regulation.	
CRUISE CONTROL	COR/Incoherence	Speed/set point ratio too small.	
PARKING BRAKE	RELES/APPLIED	Parking brake status is displayed.	
CC CONT INHI INJ	No/Yes	ASCD system engine control inhibition	
SL INHI INJECTION	No/Yes	Speed limiter system engine control inhibition	
CLUTCH INFO UNAV	Not detected/DETCT	Clutch information unavailable is detected.	
BRAKE INFO UNAVAI	Not detected/DETCT	Brake information unavailable is detected.	

Monitor item	Unit	Description	Remarks
BRAKE INFO ABSENT	Not detected/ DETCT	Brake information absent is detected.	
DECELE W/O BRAKE	Not detected/ DETCT	Sudden braking detected without brake information	
SHA DEC W/O BRAK	Not detected/ DETCT	Braking detected without brake information	
CC INHI INJECTION	Not detected/ DETCT	ASCD inhibition is detected.	
DISP VEHI SP UNAV	Not detected/ DETCT	Displayed vehicle speed unavailable is detected.	
ACT SP INFO ABSE	Not detected/ DETCT	Real vehicle speed unavailable is detected.	
DISP SP INFO ABSE	Not detected/ DETCT	Display vehicle speed absence is detected.	
CHANGE SP UNIT	Not detected/ DETCT	Change of the displayed speed unit is detected.	
SL INHI INJECTION	Not detected/ DETCT	Speed limiter inhibition is detected.	
VEHICLE SPEED UNIT	km/h/mph	Vehicle speed is displayed.	
WIRED BRAK CONTA	OFF/ PRESSED/ INTM	ASCD brake switch state is displayed.	
CC OPERATING RELIABLY	STAT1/STAT2/ STAT3	State of the failures which cause irreversible ASCD safety failure is displayed. • STAT1: Presence of ASCD force request despite the ASCD deactivation • STAT2: Activation of the open brake switch without ASCD deactivation • STAT3: Activation of the minimum travel clutch switch without ASCD deactivation	
TURBO REGULATION	Inactive/REGUL/INTM/DIAG MODE/ PRTCT/MAX	Boost regulation state is displayed.	
CC/SL CONN AUTH	Inactive/ACTIVE	Authorization to connect ASCD and speed limiter options status is displayed.	
LOW FUEL LEVEL INFORMATION	OK/Low	LOW FUEL LEVEL INFORMATION is displayed.	
WTR DIESEL DETECTR	Not detected/ DETCT	This item is not used.	
COOLING FAN ACTIV REQ	INACTIVE/ACTIVE	Cooling fan request status is displayed.	
CC/SL SPEED SIGNAL MONITORING	STAT1/STAT2/ STAT3/STAT4/ STAT5/STAT6	State of the reversible failures not due to ASCD/speed limiter which cause ASCD/speed limiter failure • STAT1: Real vehicle speed unavailable is detected. • STAT2: Displayed vehicle speed unavailable is detected. • STAT3: Real vehicle speed absence is detected. • STAT4: Display vehicle speed absence is detected. • STAT5: Change of the displayed speed unit is detected. • STAT6: Speed limiter inhibition is detected.	
COMBU MODE SET	NORMAL/ 1.DEF/2.DEF/ 3.DEF/STAT4/ RESERV/ STAT5/STAT6/ 4.DEF	REQUIREMENT VALUE OF COMBUSTION MODE isdisplayed.	

Monitor item	Unit	Description	Remarks
COMBUSTION MODE	NORMAL/ 2.DEF/3.DEF/ STAT4/RE-SERVED/ 1.DEF/STAT5/ STAT6/4.DEF	REQUIREMENT VALUE OF COMBUSTION MODE isdis-played.	
SWIRL/F OPEN POS LEARN	NOT DONE/ DONE	Indicates Intake Manifold Runner Control Valve Open Po-sition Learning status.	
SWIRL/F CLOSED POS LEARN	NOT DONE/ DONE	Indicates Intake Manifold Runner Control Valve Closed Po-sition Learning status.	
EXH THRTL/ V CLSD POS LRN	NOT DONE/ DONE	Indicates Exhaust Throttle Valve Closed Position Learning status.	
ETAT PRIVE 5	1.DEF/2.DEF	Combustion mode - particulate filter regeneration authori-zation state	
CONTROLLED CL THERMOS	DEACT/AC-TIVE	Flow water valve command of water system	
INJ ERROR FIND PROCEDRE	1.DEF/2.DEF	Error detected by the monitoring of supplier injections (val-ue after reset)	
L/PRES EGR/V CLSD POS LRN	NOT DONE/ DONE	Indicates Low Pressure EGR Volume Control Valve Closed Position Learning status.	
LOW PRESSURE EGR VALVE PROGRAMMING	UNAVAIL-ABLE/AVAILBL	Low Pressure EGR Volume Control Valve Offset - first learning running	
STARTER BUTTON	PRESSED/ RELSD	Ignition switch status is displayed.	
ENGAGE REVERSE GEAR	No/Yes	Selector lever “R” position status is displayed.	
AUTOMATIC GEARBOX IN DE-FECT MODE	Not detected/ DETCT	Transaxle in limp home mode is detected.	
ACT SP INFO UNAV	Not detected/ DETCT	Real vehicle speed unavailable is detected.	
VEHICLE SPEED DISPLAYED	UNAVAIL-ABLE/AVAILBL	Displayed vehicle speed received on the CAN network not available after a filtering time	
VEHICLE SPEED MULTI-PLEXED INFORMATION	UNAVAIL-ABLE/AVAILBL	Vehicle speed received on the CAN network not available after a filtering time	
GEARBOX RATIO	DECLTC/1/2/3/ 4/5/6/RVRS	Current gear engaged • DECLTC: Declutched at rest • 1: 1st gear • 2: 2nd gear • 3: 3rd gear • 4: 4th gear • 5: 5th gear • 6: 6th gear • RVRS: Reverse	
FIRST START	NOT DONE/ DONE	First start status is displayed.	
CLUTCH CONTACT MULTI-PLEX SIGNAL	UNAVAIL-ABLE/AVAILBL	Filtered unavailable clutch pedal status information	
CLUTCH CONTACT WIRING - START OF TRAVEL	UNAVAIL-ABLE/AVAILBL	Begin stroke clutch pedal switch for cruise control safety	
EGR LOW PRESSURE POTEN-TIOMETER	mV	—	
ATMOSPHERIC PRESSURE	mbar	—	
COMPUTER SUPPLY VOLTAGE	V	—	
NUMBER OF ROT ENG	—	—	
ENGINE OIL DILUTION RATIO	%	—	

Monitor item	Unit	Description	Remarks
TEMP. UPSTREAM OF PF	°C or °F	—	
REGEN MALFNC	—	—	
TEMP. UPSTRM OF CAT CNV	°C or °F	—	
AIR FLOW REFERENCE	mg/cp	—	
OIL TEMPERATURE SENSOR VOLTAGE - ENGINE	—	—	
ROUGH TC PRESS	mbar	—	
EGR LOW PRESSURE POSITION	%	—	
ENGINE TORQUE	Nm	—	
POST INJECTION FLOW 1	mg/cp	—	
EXHAUST SYSTEM FLOW	g/s	—	
P/FLT DIFF. PRS	hpa	—	
EXHAUST AIR FLAP OFFSET	%	—	
EXHAUST AIR VALVE POSITION SENSOR VOLTAGE	mV	—	
POTN VAL EGR VALVE CLSD	%	—	
POSITION SETPOINT SENT BY THE MONITORING SYSTEM	%	—	
FUEL TEMPERATURE	°C or °F	—	
PARTICLE FILTER DIFF. PRESSURE CORRECTION	hpa	—	
RAIL PRESS SEN VOLT	mV	—	
LOW PRESSURE EGR AIR TEMPERATURE	°C or °F	—	
LOW PRESSURE EGR VALVE FIRST OFFSET	%	—	
ACCELERATOR PEDAL POSITION	—	—	
EGR LOW PRESSURE POSITION	%	—	
RAIL PRESS LOOP VAR	bar	—	
EGR POTENTIOMETER VOLTAGE	mV	—	
PF PRS SEN VOLT	mV	—	
CHARGED AIR TEMPERATURE DOWN STREAM	°C or °F	—	
DAMPER VALVE SEN VOLT	mV	—	
SUPPLY VOLTAGE EXHAUST AIR FLAP SENSOR	mV	—	
REFRIGERANT PRESSURE	bar	—	
DAMPER VALVE UPSTREAM TEMPERATURE	°C or °F	—	
MILEAGE	km or mile	—	
ADDITIONAL INFO FD23	—	—	
LOW PRESSURE EMTV - EGR BP VALVE CONTROL SETPOINT USED BY THE MONITORING SYSTEM	%	—	

Monitor item	Unit	Description	Remarks
BOOST PRESS REF VALUE	hpa	—	
AIR INLET TEMP SEN VOLT	mV	—	
FAULT APPEARANCE COUNTER	—	—	
AIR INLET/F REL POS	%	—	
EGR VALVE OPENING REFERENCE	%	—	
EGR VALVE CONTROL	%	—	
RFRG TEMP PRESS SEN VOLT	V	—	
DMPR VLV SET POS	%	—	
ADDITIONAL INFO 2069	Nm	—	
TBN UPSTR PRS SEN VOLT	mV	—	
MAX PERMISSIBLE SPEED	km/h or mph	—	
ALTERNATOR LOAD	%	—	
INLET AIR FLOW	mg/cp	—	
ADDITIONAL INFO FD2E	—	—	
INLET/F SEN SUPPLY VOLT	mV	—	
EGR LOW PRESSURE OCR	%	—	
ALTERNATOR POWER	W	—	
EGR SENSOR SUPPLY VOLTAGE	mV	—	
ADDITIONAL INFO FD24	—	—	
BRAKE/ACCELERATOR PEDAL INCONSISTENCY	—	—	
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	—	—	
ADDITIONAL INFO FD96	mg/Hub	—	
AIR REGULATION CUT-OFF CONDITIONS	—	—	
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	—	

Monitor item	Unit	Description	Remarks
FLOW REGULATOR CURRENT REFERENCE VALUE	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	—	
EXHAUST FLAP POSITION SETPOINT	%	—	
EXHAUST AIR FLAP OCR	%	—	
FIRST OFFSET OF THE EXHAUST AIR FLAP OPEN	%	—	
EXHAUST FLAP ABSOLUTE POSITION	%	—	
LOW PRESSURE EGR VALVE SUPPLY VOLTAGE	mV	—	
LOW PRESSURE EGR POSITION REFERENCE VALUE	%	—	
DURATION OF - BUTTON PRESS	S	—	
NUMBER OF ABNORMAL CC/SL TRANSITIONS	—	—	
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	—	—	
PRESSURE UPSTREAM OF PARTICLE FILTER	mbar	—	
BRAKE CNT 1 DURATION	S	—	
BRAKE CNT 2 DURATION	S	—	
ADDITIONAL INFORMATION FD68	%	—	
VEHICLE SPEED SENSOR	km/h or mph	—	
PARTICLE FILTER PRESSURE SENSOR OFFSET	mbar	—	

Monitor item	Unit	Description	Remarks
ADDITIONAL INFORMATION FDE5	—	—	
ADDITIONAL INFO FD9C	°C or °F	—	
ADDITIONAL INFO FD9D	—	—	
ADDITIONAL INFO FDE6	hpa	—	
ALTERNATOR LOAD	%	—	
PRS UPSTR OF TBN	mbar	—	
TBN UPSTR TMP SEN VOLT	V	—	
SWIRL FLAP - SWIRL POSITION RELATIVE TO THE CLOSED THRUST	%	—	
SWIRL THROTTLE POSTION SETPOINT USED BY THE MONITORING SYSTEM	%	—	
SWIRL FLAP - PWM COMMAND ASKED TO THE H - BRIDGE	%	—	
SWIRL FLAP - CURRENT VALUE OF THE ‘LAST CLOSED THRUST POSITION’ LEARNT	%	—	
SWIRL FLAP - CURRENT VALUE OF THE FIRST CLOSED THRUST POSITION LEARNT	%	—	
SWIRL FLAP - CURRENT VALUE OF THE ‘FIRST OPENED THRUST POSITION’ LEARNT	%	—	
SWIRL FLAP - ABSOLUTE POSITION IN PERCENT OF THE SENSOR SUPPLY VOLTAGE	%	—	
ATMOS PRESS SEN VOLT	mV	—	
EGR LOW PRESSURE POTENTIOMETER	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	—	—	

Monitor item	Unit	Description	Remarks
CARBON MATERIAL RATE	%	—	
ADDITIONAL INFO FD45	—	—	
ADDITIONAL INFO FD96	mg/Hub	—	
ADDITIONAL INFORMATION FE22	—	—	
ADDITIONAL INFORMATION FE23	—	—	
ADDITIONAL INFORMATION FE24	—	—	
ADDITIONAL INFORMATION FE25	—	—	
DAMPER VALVE SEN VOLT	mV	—	
PREHEATING MODE	%	—	
COMP + AFTER IGNITION	PRESENT/IN-ACTIVE	—	
A/C ATHRSTION	NOT DONE/ DONE/INAC-TIVE	—	
THERMOPLUNGER1 RELAY	DEACTIVAT/ ACTIVE/INAC-TIVE	—	
THERMOPLUNGER2 RELAY	PRESENT/IN-ACTIVE	—	
THERMOPLUNGER3 RELAY	PRESENT/IN-ACTIVE	—	
MOTOR	OFF/RUN-NING/ STALLED/ CRANKING/ INACTIVE	—	
BRAKE PEDAL	NO PRS/RE-SERVED/ PRESSED/IN-ACTIVE	—	
GEARBOX RATIO	REVERSE/ DCLTCH/IN-ACTIVE	—	
CC/SL LMTR	DEACTIVAT/ ACTIVE/INAC-TIVE	—	
CC/SL LMTR	DEACTIVAT/ ACTIVE/INAC-TIVE	—	
CRUISE CONTROL	INCOHER-ENCE/COR-RECT/ INACTIVE	—	
COMBUSTION MODE - PAR-TICULATE FILTER REGENERA-TION AUTHORIZATION STATE	1.DEF/2.DEF/ INACTIVE	—	
PREHEATING REL CNT	ACTIVE/DE-ACTIVAT/IN-ACTIVE	—	
EGR FUN PROG	NO/YES/INAC-TIVE	—	

Monitor item	Unit	Description	Remarks
CLUTCH PEDAL SWITCH	INACTIVE/ACTIVE/BLOCKED	—	
CRUISE CONTROL/SPEED LIMITER OPERATION	OFF/SL ON/SL SUS/SL INHI/CC ON/CC SUS/CC INHI/CC/SL A/INACTIVE	—	
LOW FUEL LEVEL INFORMATION	OK/LOW/INACTIVE	—	
CC/SL DEACT BY DR ACTIN	—	—	
WATER PUMP RELAY COMMAND	DEACTIVAT/ACTIVE/INACTIVE	—	
BRAKE SWITCH	WITHOUT/WITH//INACTIVE	—	
FUEL PUMP RELAY	DEACTIVAT/ACTIVE/INACTIVE	—	
WATER IN DIESEL DETECTOR	NOT DETECTED/DETECTED/INACTIVE	—	
STARTER BUTTON	PRESSED/RELSD/INACTIVE	—	
STATIC REGEN (IWRKSHOP)	STATUS1/STAT2/STAT3/STAT4/STAT5/STAT6/INACTIVE	—	
CC/SL LMTR BUTTONS	INACTIVE/INVALID/CO.1/SUSPD/MINUS/PLUS/RESTART	—	
GEARBOX RATIO TARGET	NOT DONE/DONE/INACTIVE	—	
VEHICLE SPEED DISPLAYED	UNAVAILABLE/AVAIL/INACTIVE	—	
VEHICLE SPEED MULTIPLEXED INFORMATION	AVAIL/UNAVAILABLE/INACTIVE	—	
ENGAGE REVERSE GEAR	NO/YES//INACTIVE	—	
CC/SL CONNECTION AFTER CC BUTTON PRESSED	WITHOUT/WITH/INACTIVE	—	
CC/SL CONNECTION AFTER SL BUTTON PRESSED	NOT DETECTED/DETECTED/INACTIVE	—	
CL CONTACT WIRE SIGNAL	RELSD/PRESSED/INACTIVE	—	

Monitor item	Unit	Description	Remarks
MANUAL OR ASSISTED PARKING BRAKE	RELSD/APPLIED/INACTIVE	—	
CRUISE CONTROL INFO MONITORING	STAT0/STAT6/STAT5/STAT4/STAT3/STAT2/STATUS1/INACTIVE	—	
CC/SL SPEED SIGNAL MONITORING	STAT0/STAT8/STAT7/STAT6/STAT5/STAT4/STAT3/STAT2/STATUS1/INACTIVE	—	
MANUAL GEARBOX LEVER IN NEUTRAL	NOT DETECTED/DETECTED/INACTIVE	—	
AUTOMATIC GEARBOX IN DEFECT MODE	NOT DETECTED/DETECTED/INACTIVE	—	
CLUTCH CONTACT MULTIPLEX SIGNAL	UNAVAILABLE/AVAIL/INACTIVE	—	
BRAKING DETECTED MULTIPLEX SIGNAL	MISSING/INTRME/PRESENT/INACTIVE	—	
FIRST START	DONE/NOT DONE/INACTIVE	—	
CC OPERATING RELIABLY	STAT0/STAT3/STAT2/STATUS1/INACTIVE	—	
CLUTCH CONTACT WIRING - START OF TRAVEL	INACTIVE/ACTIVE	—	
VEHICLE SPEED UNIT	km/h/MPH/INACTIVE	—	
TURBO REGULATION	MAX/PROTECTED/DIAG MODE/INACTIVE/REG/INTRME	—	
CAM TDC SYNC	NOT DONE/DONE/INACTIVE	—	
CLUTCH INFO UNAVAILABLE	NOT DETECTED/DETECTED/INACTIVE	—	
CLUTCH INFO ABSENT	NOT DETECTED/DETECTED/INACTIVE	—	
BRAKE INFO UNAVAILABLE	NOT DETECTED/DETECTED/INACTIVE	—	
BRAKE INFO ABSENT	NOT DETECTED/DETECTED/INACTIVE	—	

Monitor item	Unit	Description	Remarks
DECEL W/O BRK DEPR	NOT DETECTED/DETECTED/INACTIVE	—	
S/DECEL W/O BRK DEPR	NOT DETECTED/DETECTED/INACTIVE	—	
CC INHIBITED BY INJECTION	NOT DETECTED/DETECTED/INACTIVE	—	
SL INHIBITED BY INJECTION	NOT DETECTED/DETECTED/INACTIVE	—	
ACTL VHCL SPD INFO UNAVL	NOT DETECTED/DETECTED/INACTIVE	—	
DISP VHCL SPD UNAVL	NOT DETECTED/DETECTED/INACTIVE	—	
ACTL VHCL SPD INFO ABSNT	NOT DETECTED/DETECTED/INACTIVE	—	
DISP VHCL SPD INFO ABSNT	NOT DETECTED/DETECTED/INACTIVE	—	
CHANGE OF VHCL SPD UNIT	NOT DETECTED/DETECTED/INACTIVE	—	
WIRED BRAKE CONTACT	NO PRS/INTRME/PRESSED/INACTIVE	—	
FAST IDLE SPD FUNCTION	INACTIVE/ACTIVE	—	
CLUTCH START OF TRAVEL SWITCH	CONNECTED/N CON/INACTIVE	—	
TRC/ANTI-YAW CNT	NO/YES//INACTIVE	—	
PARKING BRAKE	RELSD/APPLIED/INACTIVE	—	
MOTOR-DRIVEN FAN UNIT REQUEST	ACTIVE/INACTIVE	—	
REGENERATION COMMAND	STATUS1/STAT2/STAT3/STAT4/STAT5/STAT6/STAT7/STAT8/STAT9/STAT10/INACTIVE	—	
(TBD)REGENERATION AUTHORISATION	YES/NO/INACTIVE	—	
1ST IN VAL OPEN PR	NOT DONE/DONE/INACTIVE	—	

Monitor item	Unit	Description	Remarks
1ST IN VAL CLOS PR	NOT DONE/ DONE/INAC-TIVE	—	
CC/SL CONN AUTHR	INACTIVE/AC-TIVE	—	
CC CONT INHI INJ	NO/YES/INAC-TIVE	—	
SL INHI SYS INJ	NO/YES/INAC-TIVE	—	
COMBUSTION MODE SET	NORMAL/ STATUS1/ STAT2/STAT3/ STAT4/INAC-TIVE	—	
COMBUSTION MODE	NORMAL/ STATUS1/ STAT2/STAT3/ STAT4/INAC-TIVE	—	
LOW PRESSURE EGR VALVE PROGRAMMING	NOT DONE/ DONE//INAC-TIVE	—	
EXHAUST FLAP HIGH SET-TING	NOT LEARNED/ LEARNED/IN-ACTIVE	—	
EXHAUST AIR FLAP PRO-GRAMMING	NOT DONE/ DONE/INAC-TIVE	—	
SPEED LIMITER	LIMIT/INAC-TIVE	—	
STOP WARNING LIGHT	YES/NO/INAC-TIVE	—	
CL START OF TRAVEL SW	RELSD/ PRESSED/IN-ACTIVE	—	
SPEED LIMITER FUNCTION	NOT DETECT-ED/DETECT-ED/NOT DEFINED	—	
CRUISE CONTROL FUNCTION	WITHOUT/ WITH/INAC-TIVE	—	
CC/SL LMTR BUTTONS	WITHOUT/ WITH/INAC-TIVE	—	
ACC. PDL DETECT BLOCK	NO/YES	—	
CLUTCH START OF TRAVEL SWITCH	NO PRS/ PRESSED/IN-VALID/INAC-TIVE	—	
CLUTCH END OF TRAVEL SWITCH	NO PRS/ PRESSED/RE-SERVED/IN-VALID/ INACTIVE	—	

Monitor item	Unit	Description	Remarks
SWIRL/F CLOSED POS LEARN	NOT DONE/ DONE//INAC-TIVE	—	
INJECTION PROTECTION	NOT PRO-TECTED/ STAT2/STAT3/ INACTIVE/ STATUS1/ STAT4/INDE-TERMINATE	—	
A/C COMMAND	NOT DETECT-ED/DETECT-ED/INACTIVE	—	
ACCELERATED IDLE RE-QUEST	INACTIVE/ac-tive/	—	
PREHEATER LIGHT	EXTING/IL-LUM/INAC-TIVE	—	
RECYC EXGAS COOLING	INACTIVE/AC-TIVE	—	
TURB ELEC WTR PMP CMND	ACTIVE/INAC-TIVE	—	
EXHAUST INJ S/V COMMAND	INACTIVE/AC-TIVE	—	
SWIRL/F OPEN POS LEARN	NOT DONE/ DONE/INAC-TIVE	—	
INJ ERROR FIND PROCEDRE	1.DEF/2.DEF/ INACTIVE	—	
COMP + AFTER IGNITION	PRESENT/IN-ACTIVE	—	
COMP + AFTER IGNITION	PRESENT/IN-ACTIVE	—	
COMP + AFTER IGNITION	PRESENT/IN-ACTIVE	—	
COMP + AFTER IGNITION	PRESENT/IN-ACTIVE	—	
COMP + AFTER IGNITION	PRESENT/IN-ACTIVE	—	
COMP + AFTER IGNITION	PRESENT/IN-ACTIVE	—	
COMP + AFTER IGNITION	PRESENT/IN-ACTIVE	—	
COMP + AFTER IGNITION	PRESENT/IN-ACTIVE	—	
COMP + AFTER IGNITION	PRESENT/IN-ACTIVE	—	
COMP + AFTER IGNITION	PRESENT/IN-ACTIVE	—	
COMP + AFTER IGNITION	PRESENT/IN-ACTIVE	—	
COMP + AFTER IGNITION	PRESENT/IN-ACTIVE	—	
COMP + AFTER IGNITION	PRESENT/IN-ACTIVE	—	

Monitor item	Unit	Description	Remarks
COMP + AFTER IGNITION	PRESENT/INACTIVE	—	
STRT OPRTN CNTR	count	Starter motor operation counter is displayed.	Indicated multiplication value of thestarter motor operation of key switch operationand the restart.

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 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.*
PARTICLE FILTER REGENERATION	In this mode, service regeneration is performed.	• When ECM is replaced.* • ECM enter fail-safe mode because the amount of particulate matter in DPF reaches the specified level. • Component inspection for DPF is performed.
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.
AFTER DPF REPLACEMENT	In this mode, estimated PM amount in DPF is cleared.	When DPF is replaced.
AFTER DPF REGENERATION	In this mode, estimated PM amount in DPF is cleared.	When DPF is regenerated.
ENGINE OIL OXIDATION DATA RESET	In this mode, engine oil oxidation data is cleared.	• When engine oil is changed. • When engine assembly is replaced.
ENGINE OIL DILUTION DATA RESET	In this mode, engine oil dilution data is cleared.	• When engine oil is changed. • When engine assembly is replaced.
VIN REGISTRATION	In this mode, VIN is registered in ECM.	When registering VIN in ECM.
EGR VALVE PROGRAMMING	—	—
FLYWHL TGT PG	—	—
PRPR RICH SEN PROG	—	—
EXHAUST THROTTLE VALVE PROGRAMMING	—	—
SWIRL FLAP PROGRAMMING	—	—
TURBOCHARGER PROGRAMMING	—	—
ADAPTIVES ON ETC ACTUATOR MALFUNCTION	—	—

Work item	Description	Usage
AIR FLOW METER PROGRAMMING	—	—
MANIFOLD PRESSURE SENSOR PROGRAMMING	—	—
DIFF EXH PRES. SEN	—	—
LOW PRESSURE EGR VALVE PROGRAMMING	—	—
ENGINE ADAPTIVES	—	—
SWIRL FLAP	—	—
RAIL PRS SEN ADAPTIVES	—	—
NUMBER OF STARTING CYCLES	—	—
INJECTION PUMP ADAPTIVES	—	—
FUEL SPLY PREV	—	—
H/P FUEL PUMP INITIAL STARTS COUNTER RESET	In this mode, high pressure fuel pump initial starts counter is cleared.	When high pressure fuel pump is replaced.
H/P FUEL PUMP TOTAL STARTS COUNTER RESET	In this mode, high pressure fuel pump total starts counter is cleared.	When high pressure fuel pump is replaced.
WRITE V.I.N.	—	—
(TBD)CYLINDER NO. 1 INJECTOR CODE	—	—
(TBD)CYLINDER NO. 2 INJECTOR CODE	—	—
(TBD)CYLINDER NO. 3 INJECTOR CODE	—	—
(TBD)CYLINDER NO. 4 INJECTOR CODE	—	—
NUMBER OF STARTING 1	—	—
NUMBER OF STARTING 2	—	—
NUMBER OF STARTING 3	—	—
NUMBER OF STARTING 4	—	—
FUEL PUMP PROGRAMMING	—	—
ADAPTIVES ON AIR INTAKE FLAP MALFUNCTION	—	—
AIR DAMPER VALVE PROGRAMMING(R088)	—	—
EXHAUST FLAP LOW SETTING	—	—
INJECTION PUMP ADAPTATIVES	—	—
RAIL PRESSURE SENSOR ADAPTIVES	—	—
DPF RELATIVE PRESSURE SENSOR	—	—
P/FLT DIFF PRS SEN	—	—
BYPASS SOLENOID VALVE FOR HP TURBINE COMPONENT	—	—

Work item	Description	Usage
AIR DAMPER VALVE PROGRAMMING(R044)	—	—
CABIN FILTER REGENERATION	—	—
SPEED LIMITER	—	—
FAST IDLE SPEED MODIFICATION	—	—
ADAPTIVES AFTER REPLACING CABIN FILTER	—	—
ADAPTIVES AFTER REGENERATING PF	—	—
INTERVAL OF OIL CHANGE (OCS) OXIDATION	—	—
OIL CHANGE INTERVAL (OCS): DILUTION	—	—
TEST ROUTINE FOR UDS IMPLEMENTATION VALIDATION	—	—
DAIMLER COMPRESSION TEST	—	—
VVT AFTER SALES	—	—
IDLE SPEED TARGET TUNING FUNCTION (INCREASING)	—	—
IDLE SPEED TARGET TUNING FUNCTION (DECREASING)	—	—
FAP REGENERATION	—	—
EXHAUST FUEL INJECTOR LEAKAGE	—	—
UPSTREAM LAMBDA SENSOR	—	—
RAIL PRESSURE TEST	—	—
RUN-UP TEST	—	—
STATIC TEST	—	—
FUEL FEED INHIBITION	—	—
DAIMLERIMMOBILIZER FBS3 END OF LINE	—	—
IMMOBILIZER FBS3 AFTER SALES	—	—
STARTER OPERATION COUNTER CLEAR	Cumulative number of engine starts, for starter reliability is cleared.	When Starter Motor 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 EC9-144, "Description".

ACTIVE TEST MODE

Test item	Condition	Judgment	Check item (Remedy)
TURBOCHARGING SOLENOID VALVE	• Ignition switch: ON • Turn turbocharger boost control solenoid valve ON and OFF with the CONSULT and listen to operation sound.	Turbocharger boost control solenoid valve makes an operating sound.	• Harness and connector • Turbocharger boost control solenoid valve
AIR INLET FLAP	• Ignition switch: ON • Turn throttle control motor ON and OFF with the CONSULT and confirm the operation.	Throttle valve is operated.	• Harness and connector • Electric throttle control actuator
THERMOPLNGR RLY N1	—	—	—
THERMOPLNGR RLY N2	—	—	—
THERMOPLNGER 3 RLY	—	—	—
PREHEATER RLY	—	—	—
EGR 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
PUMP PRESSURE REGULATOR	—	—	—
SWIRL FLAP	• Ignition switch: ON • Turn swirl control motor ON and OFF with the CONSULT and confirm the operation.	Intake manifold runner control valve is operated.	• Harness and connector • Intake manifold runner control valve
CONTROLLED CL THERMOS	—	—	—
FUEL PUMP	• Ignition switch: ON • Turn fuel flow actuator ON and OFF with the CONSULT and listen to operation sound.	Fuel flow actuator makes an operating sound.	• Harness and connector • Fuel pump
EXHAUST E/ THROTTLE CONTROL ACTUATOR	• 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
LOW PRESSURE EGR VALVE	• Ignition switch: ON • Turn low pressure EGR volume control valve ON and OFF with the CONSULT and confirm the operation.	Low pressure EGR volume control valve is operated.	• Harness and connector • Low pressure EGR volume control valve
HEATER DRIVER PWM DUTY CYCLE	—	—	—
VOLUME FLOW ACTUATOR PWM COMMAND	—	—	—
FAN 2 ACTIVATION	—	—	—
FAN 1 ACTIVATION	—	—	—
5TH INJECTOR PWM COMMAND	—	—	—
RAIL PRESSURE SETPOINT	—	—	—

Test item	Condition	Judgment	Check item (Remedy)
SWIRL THROTTLE POSITION SET-POINT USED BY THE MONITORING SYSTEM	—	—	—
EGR BP VALVE CONTROL SET-POINT USED BY THE MONITORING SYSTEM	—	—	—
ET THROTTLE POSITION USED BY THE MONITORING SYSTEM	—	—	—
TURBO WATER COOLING PUMP COMMAND	—	—	—
EGR COOLING BYPASS PWM COMMAND	—	—	—
EGR VALVE POSITION SETPOINT	—	—	—
INLET THROTTLE POSITION SET-POINT	—	—	—
BOOST PRESURE PWM COMMAND	—	—	—
FLOW WATER VALVE COMMAND OF WATER SYSTEM	—	—	—
WIRE PTC3 ORDER	—	—	—
WIRE PTC2 ORDER	—	—	—
WIRE PTC1 ORDER	—	—	—
HEATING GLOW PLUGS PWM COMMAND	—	—	—
IDLE ENGINE SPEED SETPOINT	—	—	—
AIR CONDITIONING STATE	—	—	—
THERMOPLUNGERS COMMAND STATE	—	—	—

Test item	Condition	Judgment	Check item (Remedy)
FUEL INJECTORS	—	—	—
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.

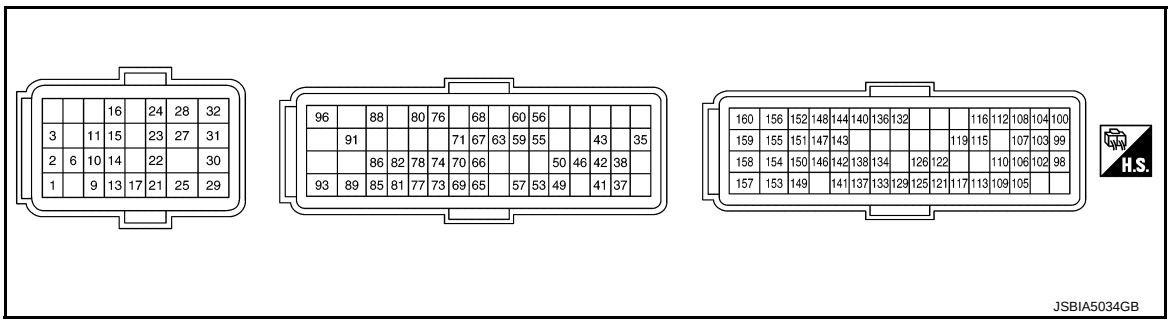
ECU DIAGNOSIS INFORMATION

ECM

Reference Value

INFOID:0000000010309002

TERMINAL LAYOUT



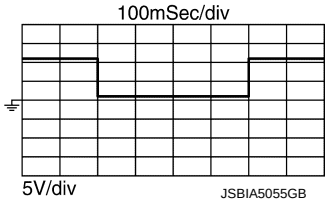
PHYSICAL VALUES

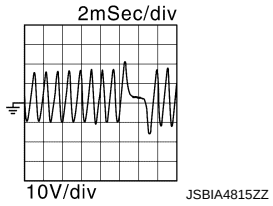
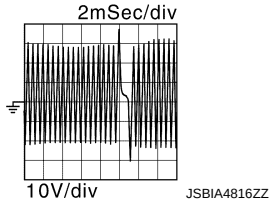
NOTE:

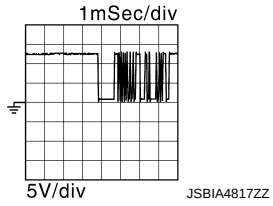
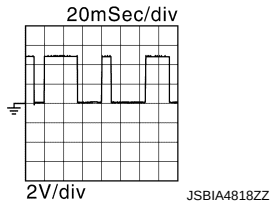
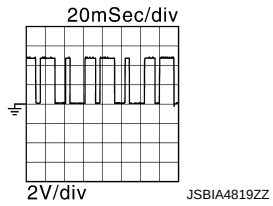
- ECM is located near the battery in the engine room.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT.

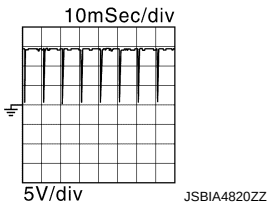
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
1 (L)	—	CAN communication line (CAN-H)	Input/ Output	—	—
2 (P)	—	CAN communication line (CAN-L)	Input/ Output	—	—
3 (SB)	29 (B)	ASCD MAIN switch	Input	[Ignition switch: ON] ASCD MAIN switch: OFF	0 V
				[Ignition switch: ON] ASCD MAIN switch: ON	Battery voltage (11 - 14 V)
6 (V)	29 (B)	Clutch interlock switch	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)
9 (R)	29 (B)	Clutch pedal position switch	Input	[Ignition switch: ON] • Clutch pedal: Fully released	0 V
				[Ignition switch: ON] • Clutch pedal: Fully depressed	11.25 V
10 (V)	29 (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)
11 (G)	29 (B)	Fuel pump control module (diagnosis)	Input	[Ignition switch: ON]	11.0 V
13 (BR)	29 (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%)

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	−	Signal name	Input/ Output		
14 (BR)	—	Sensor ground (ASCD steering switch)	—	—	—
15 (G)	14 (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
16 (LG)	29 (B)	Ignition switch	Input	[Ignition switch: ON]	11.87 V
17 (R)*1 (BG)*2	29 (B)	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0 V
				[Ignition switch: OFF] • Brake pedal: Slightly depressed	11.83 V
21 (P)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
22 (V)	21 (P)	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.38 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	0.27 V
23 (L)	21 (P)	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5 V
24 (L)	29 (B)	Fuel heater and water in fuel sensor	Input	[Ignition switch: ON]	11.69 V
				[Engine is running] • Warm-up condition • Idle speed	14.0 V
25 (B)	—	ECM ground	—	—	—
27 (G)	30 (Y)	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5 V
28 (G)	29 (B)	Power supply for ECM	Input	[Ignition switch: OFF]	0 V
				[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
29 (B)	—	ECM ground	—	—	—
30 (Y)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—

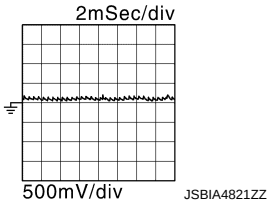
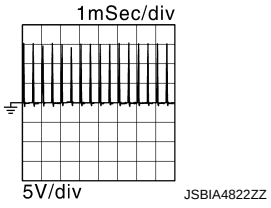
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
31 (W)	30 (Y)	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.74 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	4.54 V
32 (B)	—	ECM ground	—	—	—
35 (R)	29 (B)	Glow plug control (command)	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)	29 (B)	Voltage stabilizer signal	Output	[Stop/start system operates] • While cranking of restart	(While operating the starter motor) 
				[Engine is running] • Warm-up condition • Idle speed	Battery voltage
				[Ignition switch: ON]	12.39 V
38 (GR)	29 (B)	Fuel pump relay control	Output	[Ignition switch: ON] • Fuel Pump relay always is on	0 – 5.17 V
41 (G)	29 (B)	ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] • A few seconds after turning ignition switch OFF	0.78 V
				[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	12.42 V
42 (Y)	29 (B)	Restart relay	Output	[Stop/start system operate] • While cranking of restart	0 V (While operating the starter motor)
				[Engine is running] • Warm-up condition • Idle speed	11.38 V
43 (R)	29 (B)	Fuel flow actuator	Output	[Engine is running] • Warm-up condition • Idle speed	9.6 V
46 (P)	29 (B)	Thermoplunger relay 2	Output	[Engine is running] During diesel particulate filter regeneration mode	0 V
				[Engine is running] Except above	13.20 V

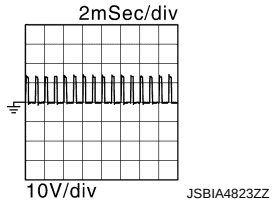
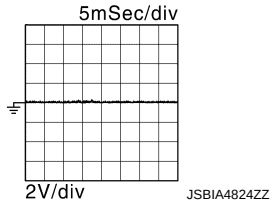
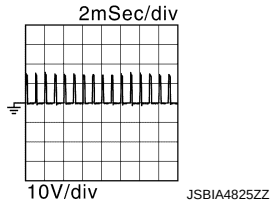
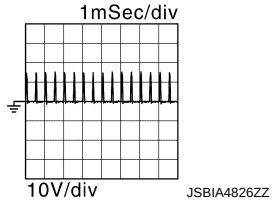
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
49 (G)	29 (B)	Intake manifold runner control valve motor (-)	Output	[Engine is running] • Warm-up condition • Idle speed	14.43 V
50 (BG)	29 (B)	Thermoplunger relay 1	Output	[Engine is running] During diesel particulate filter regeneration mode	0 V
				[Engine is running] Except above	13.68 V
53 (Y)	29 (B)	Engine coolant bypass control 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 (V)	29 (B)	Sensor power supply (Camshaft position sensor, Low pressure EGR volume control valve position sensor, Fuel pressure sensor)	—	[Ignition switch: ON]	5 V
56 (B)	29 (B)	Crankshaft 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: 2,000 rpm	
57 (SB)	29 (B)	Thermoplunger relay 3	Output	[Engine is running] During diesel particulate filter regeneration mode	0 V
				[Engine is running] Except above	13.67 V
59 (Y)	29 (B)	Sensor power supply (Turbocharger boost sensor, mass air flow sensor)	—	[Ignition switch: ON]	5.0 V
60 (R)	29 (B)	Sensor power supply (Crankshaft position sensor)	—	[Ignition switch: ON]	5.0 V
63 (LG)	29 (B)	Thermoplunger diagnosis 1	Input	[Engine is running] • Idle speed • No malfunction in thermoplunger system.	13.97 V
65 (SB)	—	Sensor ground (Low pressure EGR volume control valve position sensor)	—	—	—

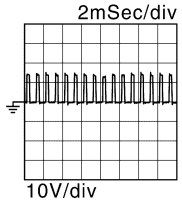
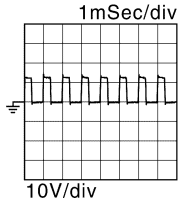
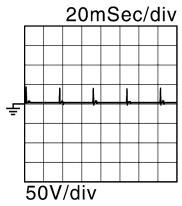
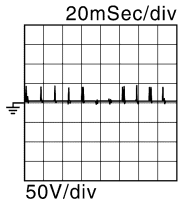
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
66 (SB)	—	Sensor ground (Fuel pressure sensor)	—	—	—
67 (W)	—	Glow plug control unit (diagnosis)	Input	[Engine is running] • Idle speed • No malfunction in glow control system.	1.50 V
68 (G)	29 (B)	Engine communication line	Input/ Output	[Ignition switch: ON]	
69 (L)	29 (B)	Low pressure EGR 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 (GR)	—	Sensor ground (Fuel rail pressure sensor)	—	—	—
74 (R)	82 (G)	Intake air temperature sensor 1	Input	[Engine is running] • Warm-up condition	2.38 V Output voltage varies with intake air temperature.
76 (Y)	29 (B)	Thermoplunger diagnosis 2	Input	[Engine is running] • Idle speed • No malfunction in thermoplunger system.	13.9 V
77 (BR)	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

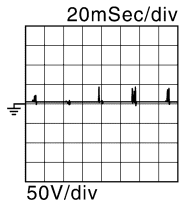
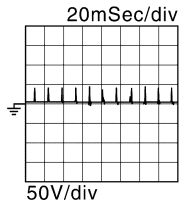
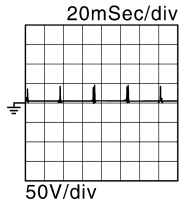
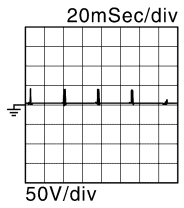
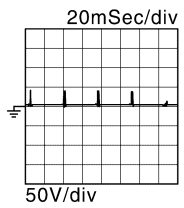
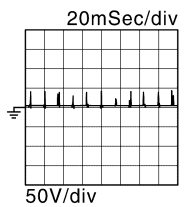
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
78 (P)	82 (G)	Mass air flow sensor	Input	[Engine is running] • Warm-up condition • Idle speed	4.49 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	4.58 V
80 (W)	29 (B)	Reverse/Neutral position switch (M/T) Transmission range switch (CVT)	Input	[Ignition switch: ON] • Selector lever: N or P (CVT) • Shift lever: Neutral (M/T)	Battery voltage
				[Ignition switch: ON] • Selector lever or shift lever: Except above	0 V
81 (L)	—	Sensor ground (Turbocharger boost sensor, Intake air temperature sensor 2)	—	—	—
82 (G)	—	Sensor ground (Mass air flow sensor)	—	—	—
85 (V)	81 (L)	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 (L)	Intake air temperature sensor 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)	29 (B)	A/F sensor heater	Input	[Engine is running] After the vehicles is driven for 6 minutes under the following conditions • Warm-up condition • Vehicle speed: 80 km/h (50 MPH) or more • Shift lever: Suitable gear position	 JSBIA4820ZZ
91 (G)	73 (GR)	Sensor power supply (Fuel rail pressure sensor)	—	[Ignition switch: ON]	5.0 V
93 (B)	29 (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

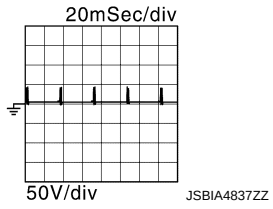
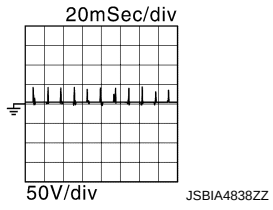
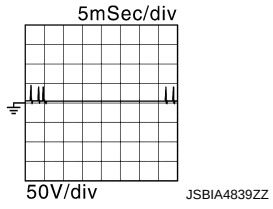
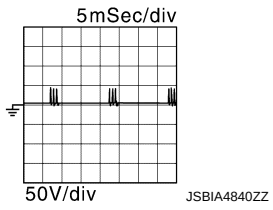
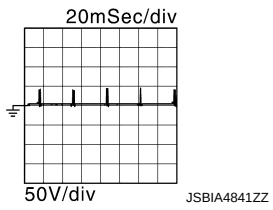
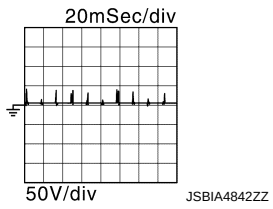
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
96 (R)	29 (B)	Power supply for ECM (back-up)	Input	[Ignition switch: OFF]	0 V
				[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
98 (P)	24 (L)	Fuel pump temperature sensor	Input	[Engine is running] • 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 pump temperature sensor)	—	—	—
103 (GR)	—	Sensor ground (Electric throttle control valve position sensor)	—	—	—
104 (LG)	117 (Y)	Sensor power supply (Exhaust throttle valve 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 (V)	116 (SB)	A/F sensor voltage nernst 1	Input	[Engine is running] • Warm-up condition	0.01 - 0.28 V
116 (SB)	—	Sensor ground [Air fuel ratio (A/F) sensor 1]	—	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	−	Signal name	Input/ Output		
117 (Y)	—	Sensor ground (Exhaust throttle position sensor)	—	—	—
119 (BR)	116 (SB)	A/F sensor current pump 1	Input	[Engine is running] • Warm-up condition	0.01 - 0.11 V
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)	29 (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)	29 (B)	Sensor power supply (Engine coolant temperature sensor)	—	[Ignition switch: ON]	5.0 V
134 (R)	—	Sensor ground (Exhaust gas temperature sensor 1)	—	—	—
136 (P)	29 (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

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
138 (L)	134 (R)	Exhaust gas temperature 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
140 (W)	29 (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 (BR)	29 (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.	
144 (B)	29 (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 high pressure 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)	29 (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	

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
148 (W)	29 (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 high pressure EGR volume control valve operation.	 JSBIA4827ZZ
149 (R)	29 (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)	29 (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)	29 (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.	 JSBIA4828ZZ
				[Ignition switch: OFF] More than 20 seconds after turning ignition switch OFF	1.23 V
153 (Y)	29 (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.	 JSBIA4829ZZ
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	 JSBIA4830ZZ

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
154 (BG)	29 (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)	29 (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 (BG)	29 (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	

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
157 (R)	29 (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)	29 (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 (P)	29 (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

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 attachement 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
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
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

DTC No.	Detected items	Engine operating condition in fail-safe mode
P0135 P2244	A/F sensor circuit	Stop closed-loop control
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

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
P0651		• Air conditioner deactivation • Torque limitation • CCSL deactivation with dashboard message • Freeshift inhibited • After sales routines forbidden • FAN 2 activation
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
P0833	DPF pressure sensor	CC/SL not available
P1010 P1012 P1013	Intake manifold runner control valve	Stop intake manifold runner control valve control (Fully open position)
P1011		• Stop intake manifold runner control valve control (Fully open position) • CCSL deactivation • Freeshift inhibition
P1453	DPF pressure sensor	• EGR valve is closed position • Throttle control motor is opened • Prohibit DPF regeneration
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
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
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.
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	
P0833	CPP switch		—	—
P1512	Starter motor			Prohibit the stop/start system operation from the next time
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:0000000010309004

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, P1503	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
	P1525	ASCD 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
	P1546, P2002	Diesel particulate filter
	P2263	Turbocharger system
	P2264	Water diesel detector
	P2504	Alternator
	P253F	Engine oil dilution

DTC Index

INFOID:0000000010309005

DTC*	Items (CONSULT screen terms)	Trip	MI lighting up		Reference
			Yellow	Red	
U0111	LOST COMMUNICATION WITH BATTERY ENERGY FROM LIN	10	—	×	EC9-166
U0121	MLTIPLXD TRACTION CNTRL CONN	10	—	—	EC9-167
U0298	—	1	—	—	EC9-168
U0299	—	1	—	—	EC9-170
U0315	VEHICLE SPEED	1	—	—	EC9-172
U0415	MLTIPLXD TRACTION CNTRL CONN	3 or 10	—	—	EC9-173
B1900	—	1	—	—	EC9-174
B1901	—	1	—	—	EC9-176
B1902	—	1	—	—	EC9-178

DTC*	Items (CONSULT screen terms)	Trip	MI lighting up		Reference
			Yellow	Red	
B1903	—	1	—	—	EC9-180
B1904	—	1	—	—	EC9-182
P0001	FUEL FLOW REGULATOR CIRCUIT	3 or 10	—	×	EC9-183
P0002	FLOW CONTROL ADAPTIVE	3	—	×	EC9-185
P0016	COHER BTWN CSFT SEN/ENG SPD	3	×	—	EC9-188
P0045	TC SOLENOID VALVE CNTRL CIRC	3	×	—	EC9-190
P0095	AIR TEMP SEN/CIRC	3 or 10	×	—	EC9-192
P0100	AIR FLOW SENSOR CIRCUIT	3	×	—	EC9-194
P0101	AIR FLOW SENSOR INFORMATION	1	×	—	EC9-196
P0105	INLET MANIF PRS SEN CIRC	3	×	—	EC9-197
P0106	INLET PRESSURE CONSISTENCY	3	×	—	EC9-199
P0110	AIR TEMP SEN/CIRC	3	×	—	EC9-201
P0115	WATER TEMPERATURE SENSOR CIRC	3	×	—	EC9-203
P0120	INLET AIR FLAP POSITION SEN	3	×	—	EC9-205
P0135	PROPOR RICH SEN HEAT CIRC	10	—	—	EC9-207
P0190	RAIL PRESSURE SENSOR CIRCUIT	3	—	×	EC9-209
P0200	INJECTOR CONTROL CIRCUIT	10	—	×	EC9-211
P0201	CYLINDER 1 INJECTOR CIRC	3	× or —	× or —	EC9-213
P0202	CYLINDER 2 INJECTOR CIRC	3	× or —	× or —	EC9-213
P0203	CYLINDER 3 INJECTOR CIRC	3	× or —	× or —	EC9-213
P0204	CYLINDER 4 INJECTOR CIRC	3	× or —	× or —	EC9-213
P0217	ENGINE OVERHEATING	10	—	—	EC9-216
P0225	PEDAL POTENTIOMETER CIRCUIT TRACK 1	3	×	—	EC9-219
P0226	BRAKE/ACCELERATOR PEDAL POSITIONS	3 or 10	× or —	× or —	EC9-221
P025A	FUEL PUMP MODULE CONTROL CIRCUIT	2	—	—	EC9-221
P025B	FUEL PUMP MODULE CONTROL CIRCUIT	2	—	—	EC9-221
P0335	ENGINE SPEED SENSOR SIGNAL	3	×	—	EC9-227
P0340	CAMSHAFT SENSOR CIRCUIT	3	×	—	EC9-229
P0380	PREHEATING UNIT DIAG CONN	3	—	—	EC9-231
P0402	EGR VALVE JAMMED OPEN	3	×	—	EC9-234
P0403	EGR VLV CMD CIRC	3	—	—	EC9-236
P0409	EGR VALVE POSITION SEN CIRC	3	×	—	EC9-238
P0470	TBN UPSTR PRS SEN CIRC	3	×	—	EC9-240
P0471	PRS UPSTR OF TBN	3	×	—	EC9-242
P0487	EGR VLV CMD CIRC	1	×	—	EC9-244
P0488	EGR VALVE POSITION CNTRL	1 or 3	×	—	EC9-246
P0530	RFRG TEMP PRESS SEN VOLT	1	—	—	EC9-248
P0544	TBN UPSTR TEMP SEN CIRC	3	×	—	EC9-250
P0560	COMPUTER SUPPLY VOLTAGE	3	—	—	EC9-252
P0564	SL LMTR/CC FNC	1	—	—	EC9-253
P0575	CC/SL LMTR BUTTONS	1	—	—	EC9-255
P060A	—	1	—	—	EC9-257
P060B	—	1	×	—	EC9-257

DTC*	Items (CONSULT screen terms)	Trip	MI lighting up		Reference
			Yellow	Red	
P061A	—	1 or 10	× or —	—	EC9-259
P0627	LOW PRES PMP REL CIRC	10	—	—	EC9-260
P062B	COMPUTER	3	—	×	EC9-262
P0638	INLET AIR FLAP POSITION CTRL	1 or 3	×	—	EC9-263
P0641	SEN SUPPLY N-1 VOL	3	—	×	EC9-265
P0651	SEN SUPPLY N-2 VOL	3	×	—	EC9-267
P0657	MAIN RELAY CONTROL CIRCUIT	10	—	—	EC9-269
P0697	SEN SUPPLY N-3 VOL	3	—	×	EC9-271
P0833	CLUTCH SWITCH SIGNAL CONSISTENCY	10	—	—	EC9-273
P1010	SWIRL FLAP	3	× or —	—	EC9-276
P1011	SWIRL FLAP CONTROL CIRCUIT	3	—	—	EC9-278
P1012	SWIRL FLAP	3	×	—	EC9-280
P1013	SWIRL FLAP POSITION SENSOR	3	—	—	EC9-282
P1453	DIFF. PRESSURE SENSOR CIRCUIT, PARTICLE FILTER	3	×	—	EC9-284
P1480	EXHAUST AIR FLAP FUNCTION	3	×	—	EC9-286
P1481	EXHAUST E/THROTTLE CONT ACTUATOR	3	—	—	EC9-289
P1482	EXHAUST THROTTLE POSITION SENSOR	3	×	—	EC9-292
P1483	EXHAUST AIR FLAP OFFSET	3	×	—	EC9-294
P1484	LOW PRESSURE EGR VALVE	3	×	—	EC9-297
P1485	LOW PRESSURE EGR VALVE CIRCUIT	3	—	—	EC9-299
P1486	LOW PRESSURE EGR VALVE POSITION SENSOR	3	×	—	EC9-301
P1487	LOW PRESSURE EGR VALVE	3	×	—	EC9-303
P1488	LOW PRESSURE EGR VALVE	3	×	—	EC9-305
P1489	LOW PRESSURE EGR VALVE TEMPERATURE SENSOR	1 or 3	—	—	EC9-307
P148A	HIGH PRESSURE EGR VALVE FUNCTION	3	—	—	EC9-307
P148B	LOW PRESSURE EGR VALVE FUNCTION	3	—	—	EC9-307
P148C	EXHAUST AIR FLAP FUNCTION	3	—	—	EC9-307
P1503	CONTROLLED AIR VENTS INFORMATION	10	—	—	EC9-307
P1512	STARTER	1	—	—	EC9-307
P1525	CONSISTENT MULTIPLEX SIGNALS FOR CC/SL	1	—	—	EC9-320
P1544	TEMP SEN UPSTREAM OF PF	3	× or —	× or —	EC9-321
P1546	TEMP. UPSTREAM OF PF	10	—	×	EC9-324
P1589	GEAR BOX NEUTRAL CONTACTOR	10	—	—	EC9-324
P158A	END STROKE CLUTCH CONTACTOR	1	—	—	EC9-331
P160C	COMPUTER	3	×	—	EC9-333
P160D	COMPUTER	10	—	×	EC9-333
P1620	PROPOR RICH SEN FNC	10	—	—	EC9-334
P1641	THMPR 1 RLY C/CIR	10	—	—	EC9-336
P1642	THMPR 2 RLY C/CIR	10	—	—	EC9-339
P1643	THMPR 3 RLY C/CIR	10	—	—	EC9-342
P1650	STR MTR RELAY 2	1	—	—	EC9-345
P1655	ENGINE RESTART BYPASS RELAY	1	—	—	EC9-348

DTC*	Items (CONSULT screen terms)	Trip	MI lighting up		Reference
			Yellow	Red	
P1656	ENGINE RESTART BYPASS RELAY	1 or 10	—	—	EC9-352
P1675	—	1	—	—	EC9-356
P2002	PARTICLE FILTER	1 or 2 or 3	× or —	× or —	EC9-359
P2080	TBN DOWNS TEMP REG	3	×	—	EC9-361
P2100	INLET AIR FLAP CIRCUIT	3	×	—	EC9-362
P2119	AIR INLET FLAP	3	×	—	EC9-364
P2120	PEDAL POTENTIOMETER CIRCUIT TRACK 2	3	×	—	EC9-365
P2226	ATMOS PRESS SEN	3	×	—	EC9-367
P2243	PROPOR RICH SEN CIRC	10	—	—	EC9-368
P2244	PROPOR RICH SEN CIRC	10	—	—	EC9-370
P2263	BOOST PRESSURE CIRCUIT	1	×	—	EC9-372
P2264	WATER IN DIESEL DETECTOR	10	—	—	EC9-374
P2452	P/FLT DIFF PRS SEN	3	×	—	EC9-376
P2504	CHARGING SYSTEM VOLTAGE	10	—	×	EC9-378
P253F	ENG OIL DILUTION	3	×	—	EC9-379
P2626	PROPOR RICH SEN CIRC	10	—	—	EC9-380
P2681	COOLANT CIRC SWITCHING S/V	10	—	× or —	EC9-382
P2A06	PROPOR RICH SEN CIRC	10	—	—	EC9-385

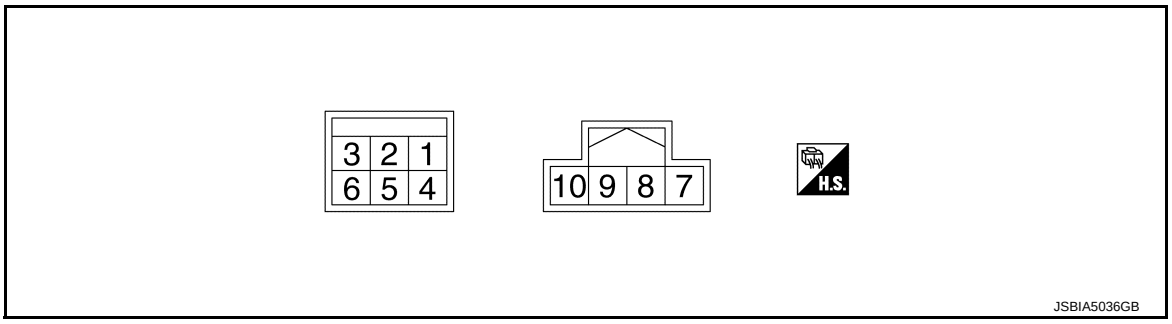
*: This number is prescribed by SAE J2012/ISO 15031-6.

DC/DC CONVERTER

Reference Value

INFOID:0000000010309010

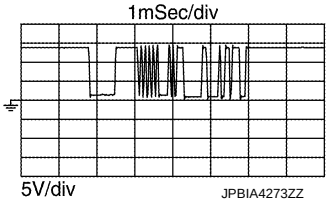
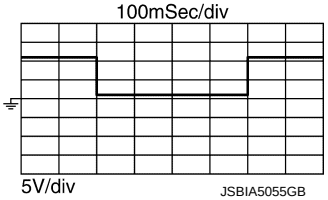
TERMINAL LAYOUT



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

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

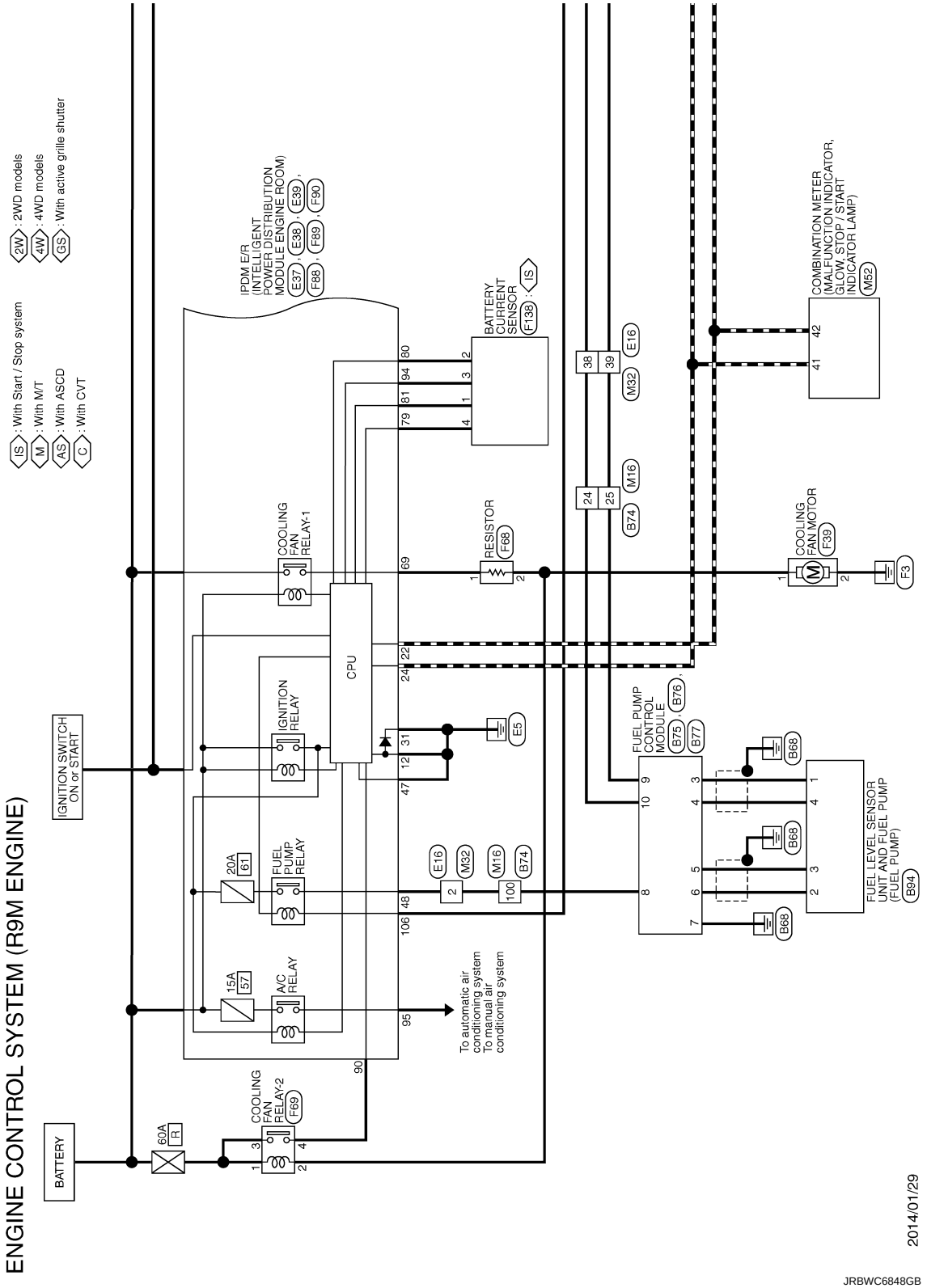
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

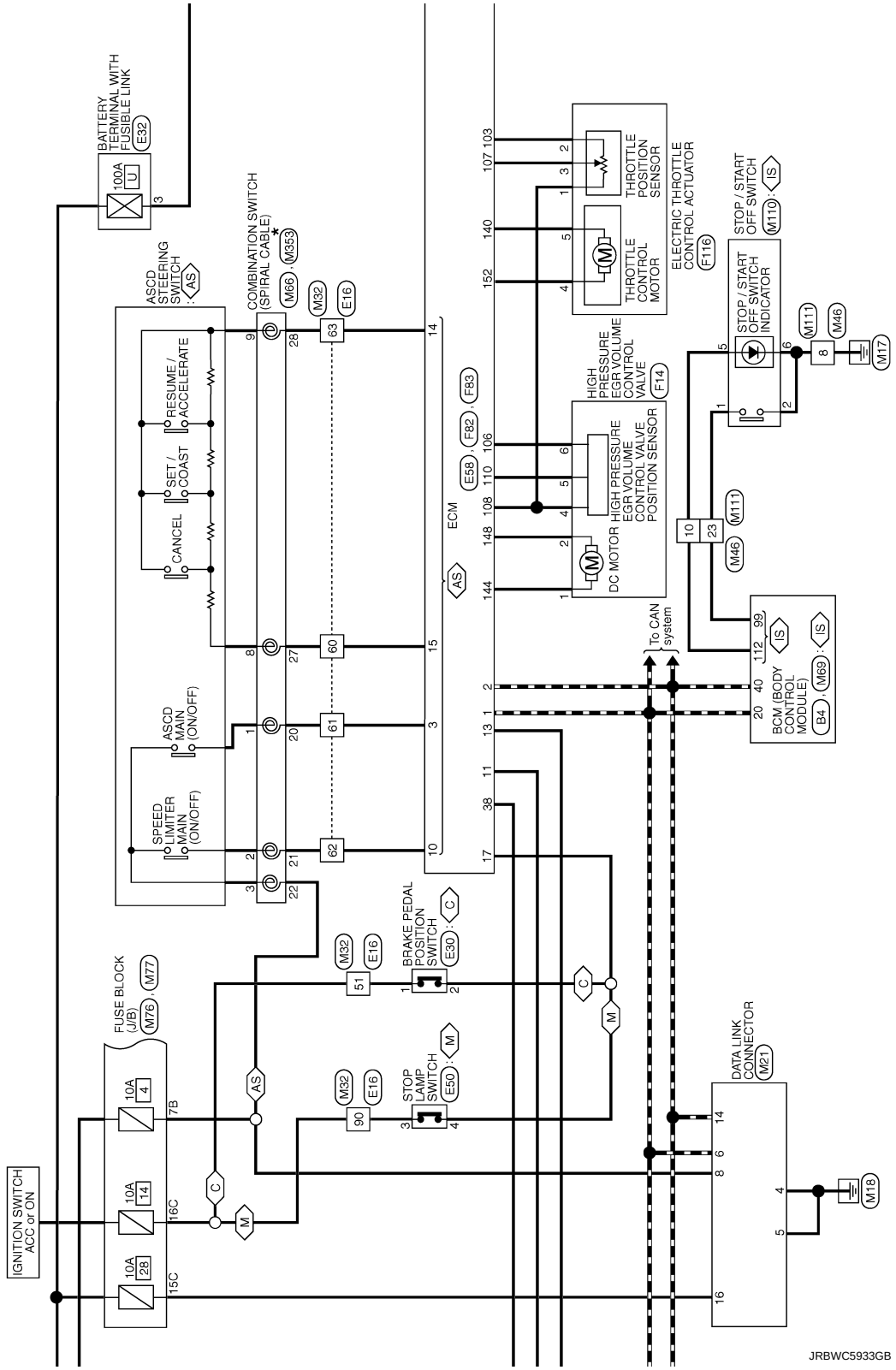
WIRING DIAGRAM

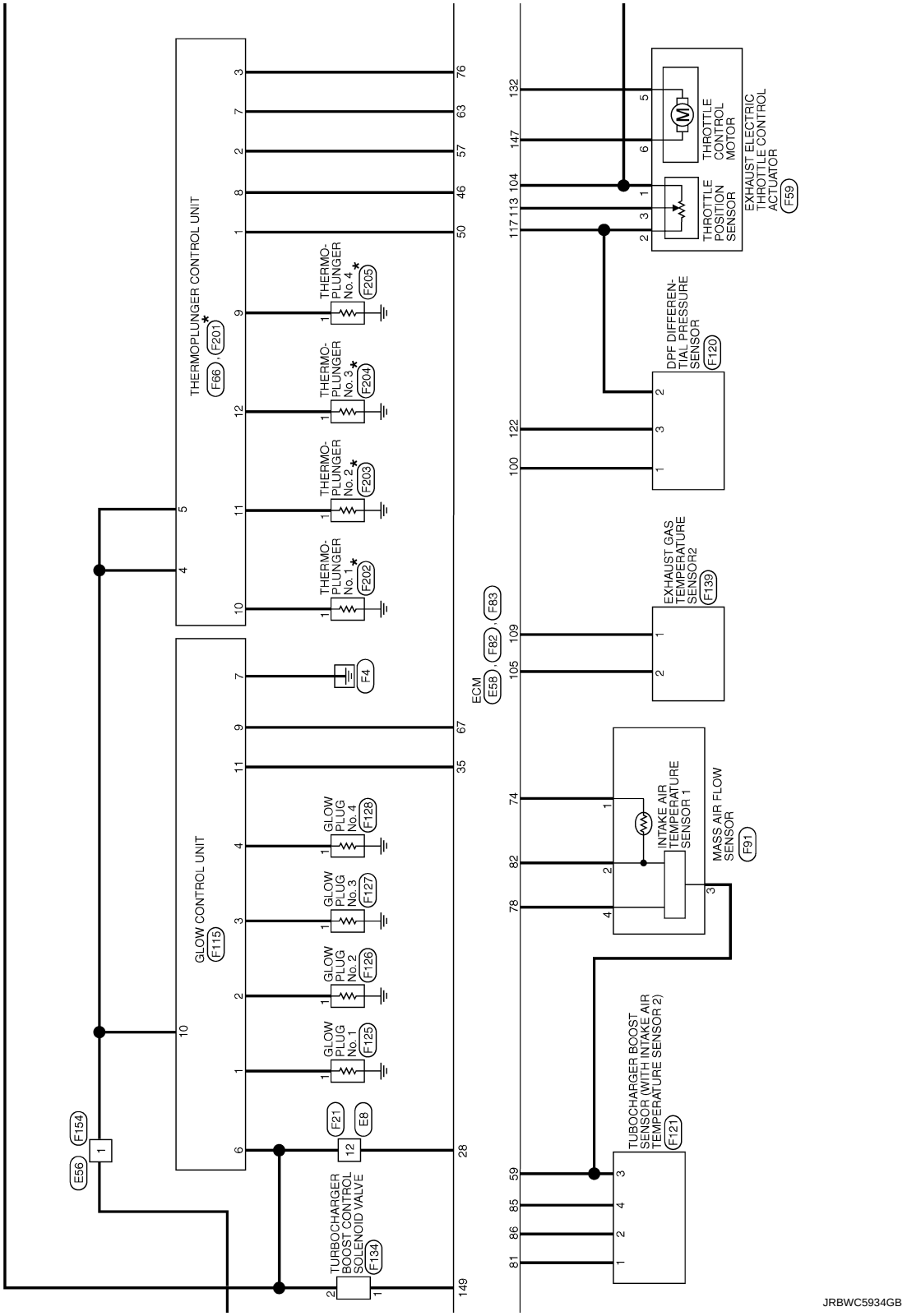
ENGINE CONTROL SYSTEM

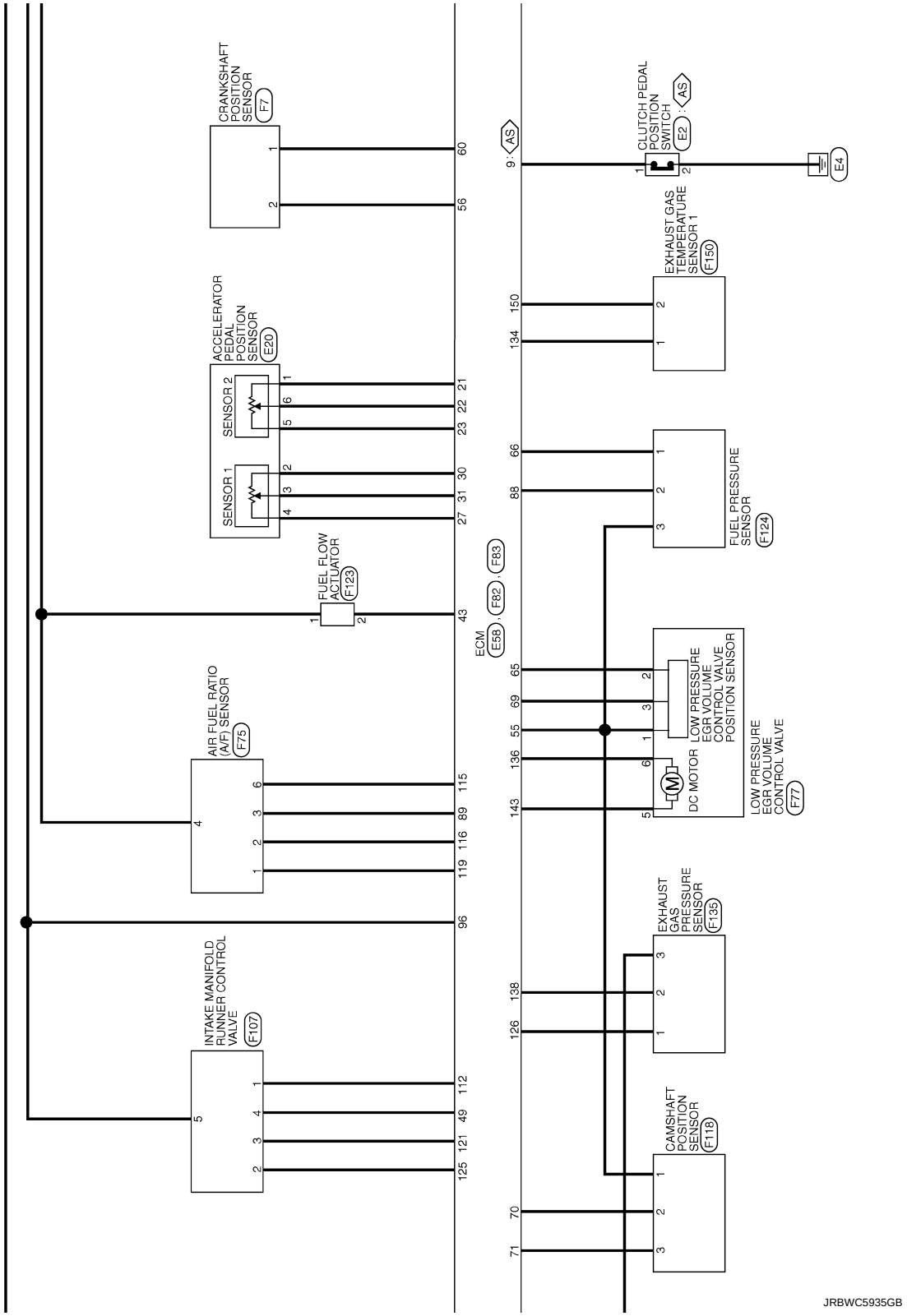
Wiring Diagram

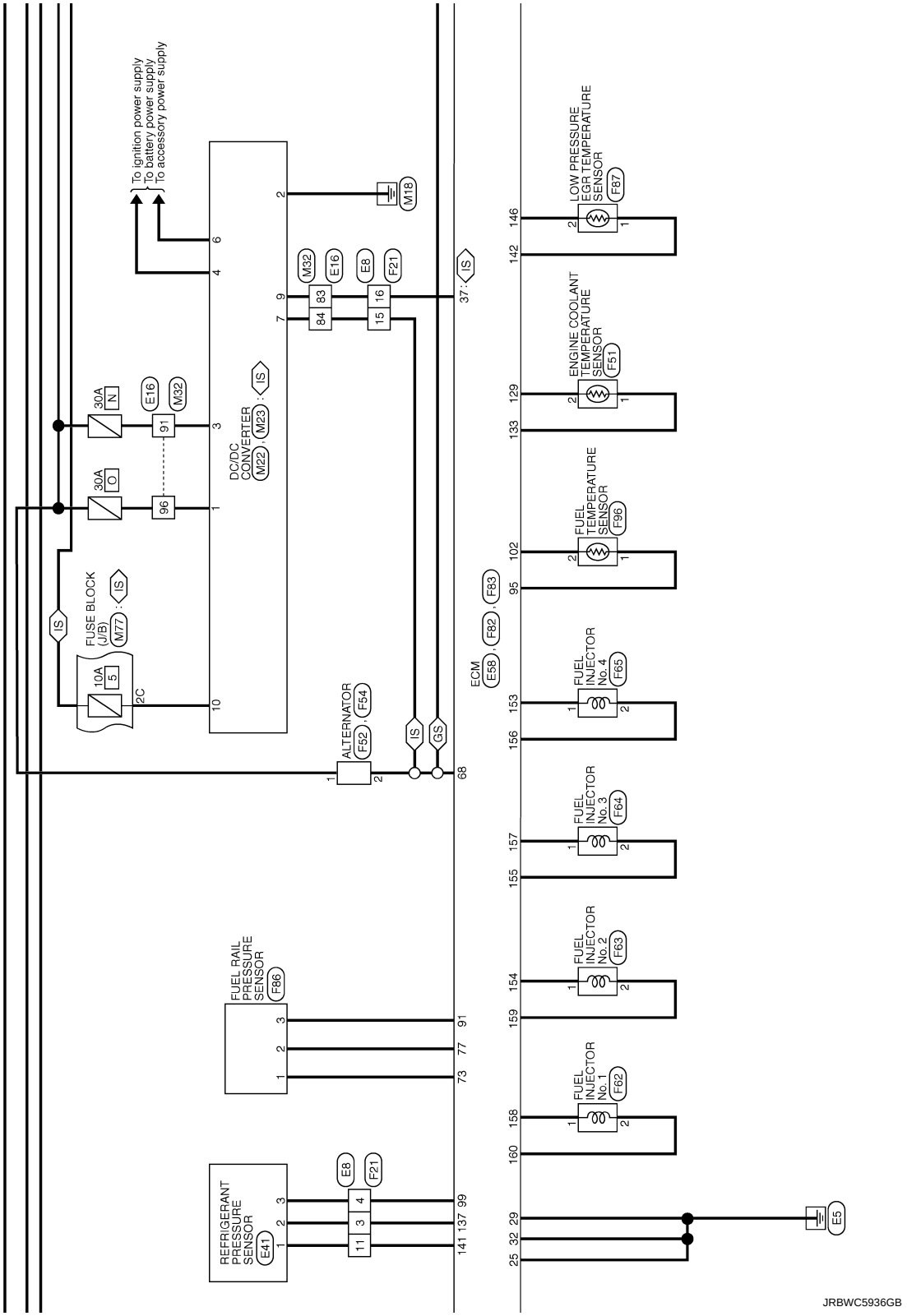
INFOID:0000000010309011

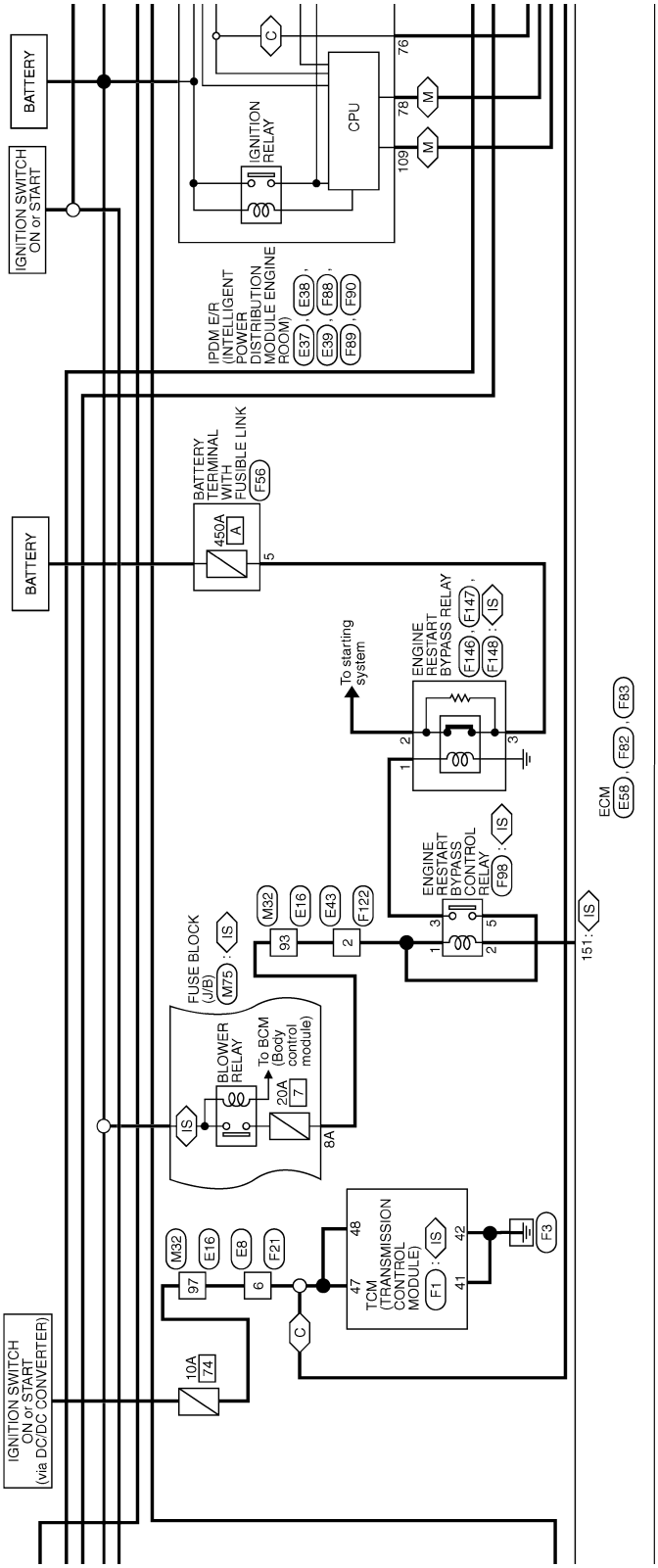



BATTERY
TERMINAL WITH FUSIBLE LINK
E32
100A
U
3
ASCD STEERING SWITCH
AS
RESUME / ACCELERATE
SET / COAST
CANCEL
COMBINATION SWITCH (SPIRAL CABLE)
M66
M353
M32
E16
63
60
61
62
ASCD MAIN (ON/OFF)
SPEED LIMITER MAIN (ON/OFF)
ECM
AS
E58
F82
F83
106
110
108
148
144
107 103
140
152
THROTTLE POSITION SENSOR
THROTTLE CONTROL MOTOR
ELECTRIC THROTTLE CONTROL ACTUATOR
F116
HIGH PRESSURE EGR VOLUME CONTROL VALVE
F14
DC MOTOR
HIGH PRESSURE EGR VOLUME CONTROL VALVE POSITION SENSOR
STOP / START OFF SWITCH
IS
M110
STOP / START OFF SWITCH INDICATOR
M111
M46
M17
To CAN system
BCM (BODY CONTROL MODULE)
B4
M69
112
99
FUSE BLOCK (J/B)
M76
M77
10A
4
14
28
7B
16C
15C
IGNITION SWITCH ACC or ON
BRAKE PEDAL POSITION SWITCH
C
E30
51
STOP LAMP SWITCH
M
E50
90
DATA LINK CONNECTOR
M21
M18
JRBWC5933GB


THERMOPLUNGER CONTROL UNIT
F66, F201*
THERMO-PLUNGER No. 4* F205
THERMO-PLUNGER No. 3* F204
THERMO-PLUNGER No. 2* F203
THERMO-PLUNGER No. 1* F202
GLOW CONTROL UNIT F115
GLOW PLUG No. 4 F128
GLOW PLUG No. 3 F127
GLOW PLUG No. 2 F126
GLOW PLUG No. 1 F125
F4
E56, F154
F21, E8
TURBOCHARGER BOOST CONTROL SOLENOID VALVE F134
ECM E58, F82, F83
THROTTLE CONTROL MOTOR
THROTTLE POSITION SENSOR
EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR F59
DPF DIFFERENTIAL PRESSURE SENSOR F120
EXHAUST GAS TEMPERATURE SENSOR2 F139
INTAKE AIR TEMPERATURE SENSOR 1
MASS AIR FLOW SENSOR F91
TUBOCHARGER BOOST SENSOR (WITH INTAKE AIR TEMPERATURE SENSOR 2) F121
JRBWC5934GB


CRANKSHAFT POSITION SENSOR F7
ACCELERATOR PEDAL POSITION SENSOR E20
SENSOR 2
SENSOR 1
FUEL FLOW ACTUATOR F123
AIR FUEL RATIO (A/F) SENSOR F75
INTAKE MANIFOLD RUNNER CONTROL VALVE F107
ECM E58, F82, F83
CLUTCH PEDAL POSITION SWITCH E2 : AS
E4
EXHAUST GAS TEMPERATURE SENSOR 1 F150
FUEL PRESSURE SENSOR F124
LOW PRESSURE EGR VOLUME CONTROL VALVE POSITION SENSOR
DC MOTOR
LOW PRESSURE EGR VOLUME CONTROL VALVE F77
EXHAUST GAS PRESSURE SENSOR F135
CAMSHAFT POSITION SENSOR F118
JRBWC5935GB


To ignition power supply
To battery power supply
To accessory power supply
DC/DC CONVERTER
M22, M23
FUSE BLOCK (J/B)
M77
ALTERNATOR
F52, F54
ECM
E58, F82, F83
FUEL RAIL PRESSURE SENSOR
F86
REFRIGERANT PRESSURE SENSOR
E41
LOW PRESSURE EGR TEMPERATURE SENSOR
F87
ENGINE COOLANT TEMPERATURE SENSOR
F51
FUEL TEMPERATURE SENSOR
F96
FUEL INJECTOR No. 4
F65
FUEL INJECTOR No. 3
F64
FUEL INJECTOR No. 2
F63
FUEL INJECTOR No. 1
F62
JRBWC5936GB



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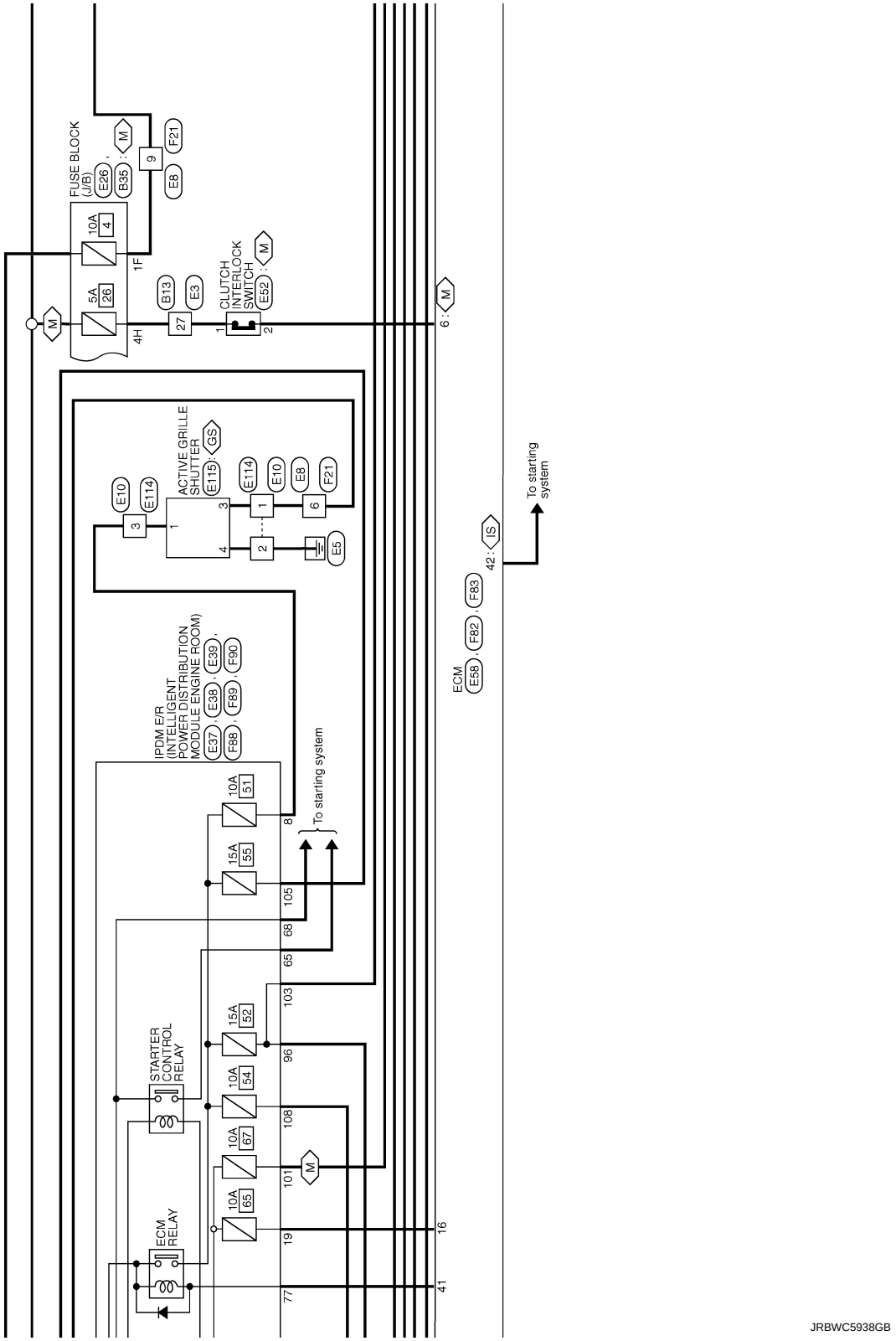

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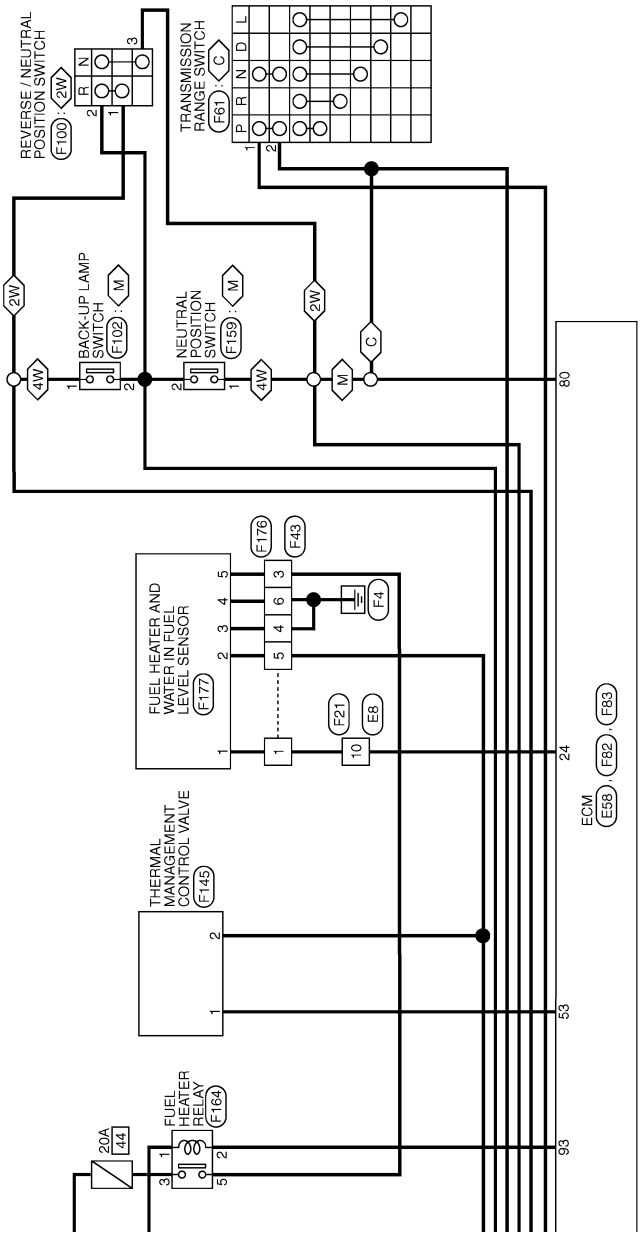

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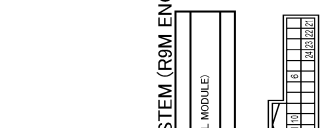
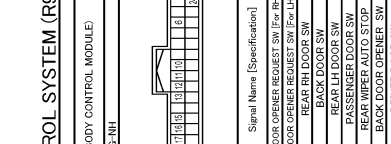
ENGINE CONTROL SYSTEM (R9M ENGINE)

Connector No.	B4
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	TH40FG-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
6	B	BACK DOOR OPENER REQUEST SW [For RHD models]
6	Y	BACK DOOR OPENER REQUEST SW [For LHD models]
10	R	REAR RH DOOR SW
11	B	BACK DOOR SW
12	W	REAR LH DOOR SW
13	R	PASSENGER DOOR SW
15	G/W	REAR WIPER AUTO STOP
16	B	BACK DOOR OPENER SW
17	SB	DRIVER DOOR SW
20	L	CAN-H
21	BR	REAR BMPR ANT –
22	Y	ROOM ANT 2 –
23	L	ROOM ANT 2 +
24	G	REAR BMPR ANT +
38	G	SIREN
39	W	HIGH-MOUNTED STOP LAMP
40	P	CAN-L

Connector No.	B13
Connector Name	WIRE TO WIRE
Connector Type	TH80MW-CS16-TM4

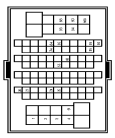


Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	–
2	G	–
5	O	–
20	G	–
21	BR	–
22	SB	–
23	BG	–
24	SB	–
25	G	–
26	B	–
27	P	–

Connector No.	B35
Connector Name	FUSE BLOCK (J/B)
Connector Type	NS06FW-CS

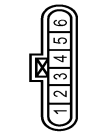
Terminal No.	Color Of Wire	Signal Name [Specification]
1H	GR	–
2H	P	–
3H	G	–
4H	P	–
5H	G	–
6H	Y	–

Connector No.	B74
Connector Name	WIRE TO WIRE
Connector Type	TH80MW-CS16-TM4



Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	–
2	L	–
3	LG	–
4	P	–
9	SB	–
20	G	– [With gasoline engine]
20	L	– [With diesel engine]
21	B	–
24	G	–
25	BR	–
55	LG	–
66	GR	–
74	R	–
79	V	–
84	L	–
85	W	–
89	BG	–
90	BR	–
93	Y	–
94	P	–
98	L	–
99	LG	–
100	GR	– [With diesel engine]
100	R	– [With gasoline engine]

Connector No.	B75
Connector Name	FUEL PUMP CONTROL MODULE
Connector Type	E06FGY-RS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	–
2	W	–
3	G	–
4	O	–
5	G/Y	–
6	G/R	–

Connector No.	B76
Connector Name	FUEL PUMP CONTROL MODULE
Connector Type	FEA02FBR-RZ

Terminal No.	Color Of Wire	Signal Name [Specification]
7	B	–
8	GR	–

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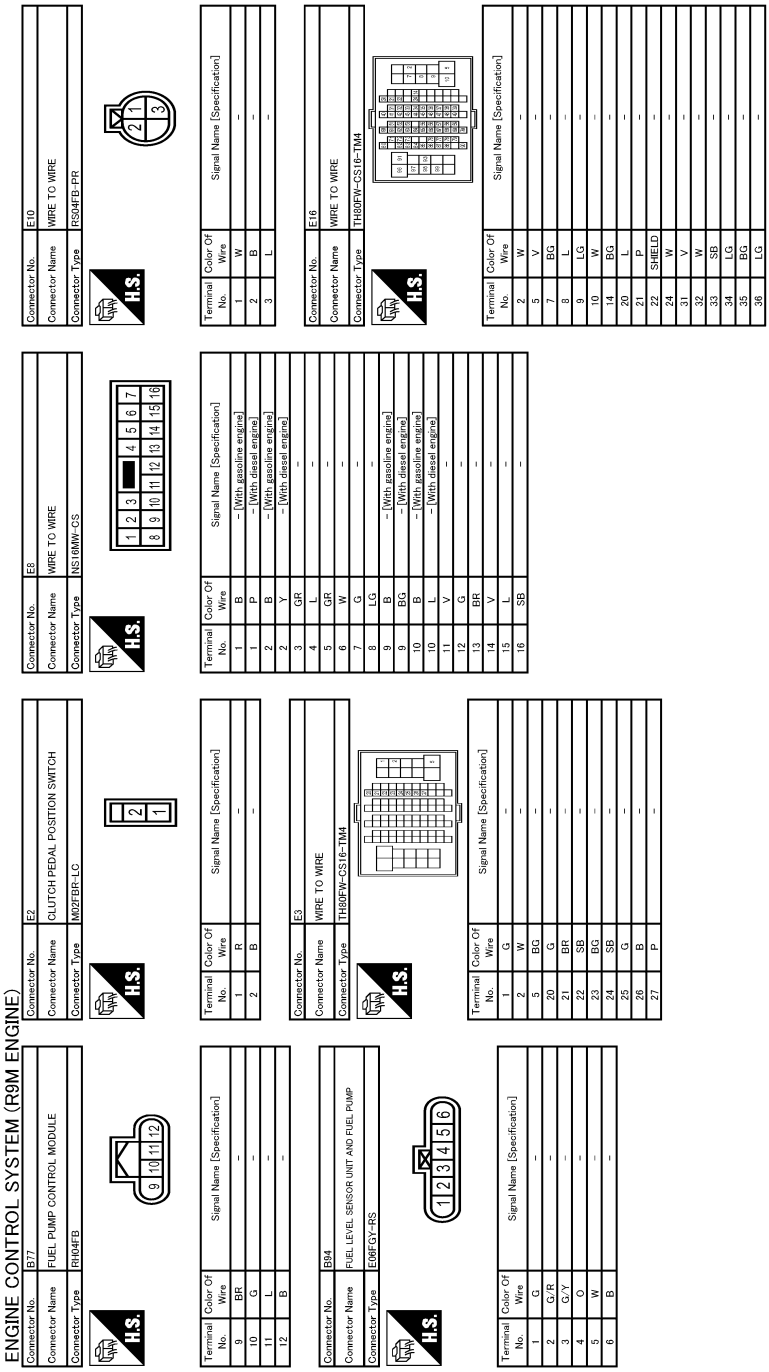

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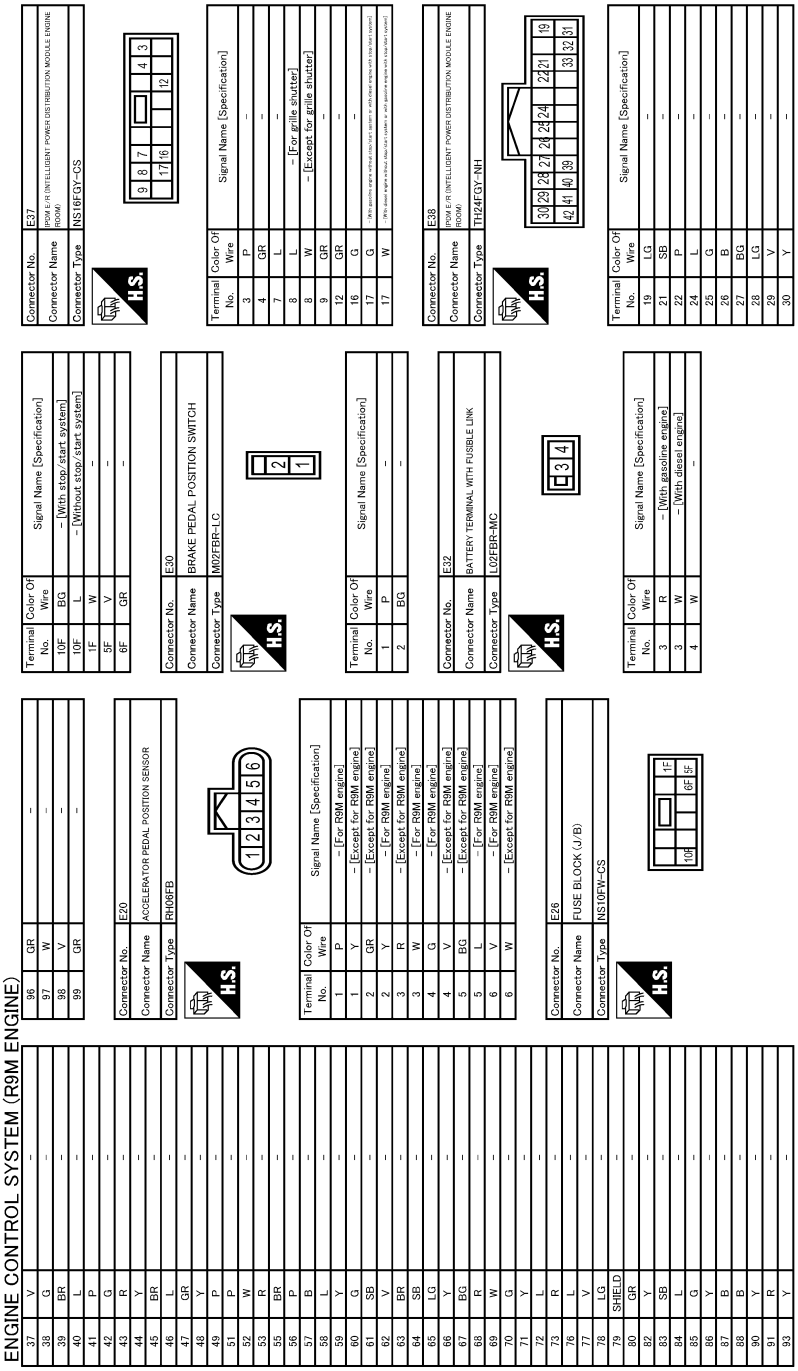

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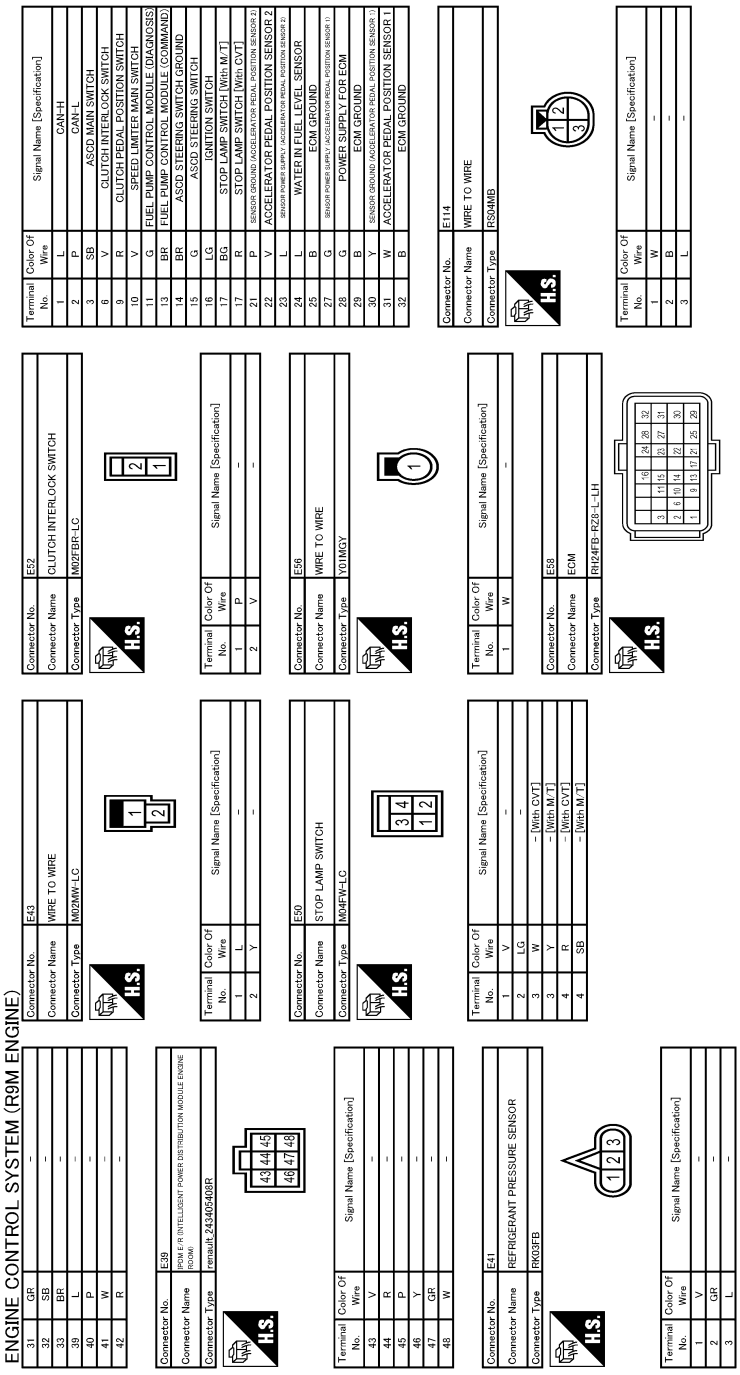

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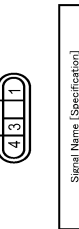
ENGINE CONTROL SYSTEM (R9M ENGINE)

Connector No.	E115
Connector Name	ACTIVE GRILLE SHUTTER
Connector Type	RH04FB

Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	–
3	W	–
4	B	–

Connector No.	F1
Connector Name	TCM (TRANSMISSION CONTROL MODULE)
Connector Type	RH40FB-RZ8-L-LH

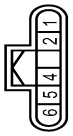


Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	ELECTRIC OIL PUMP RELAY
2	SB	–
4	Y	D RANGE SW
5	P	N RANGE SW
6	G	R RANGE SW
7	V	P RANGE SW
11	LG	SENSOR GROUND
12	BR	CVT FLUID TEMPERATURE SENSOR
14	P	G SENSOR
16	L	SECONDARY PRESSURE SENSOR
17	P	PRIMARY PRESSURE SENSOR
23	P	CAN-L
24	LG	INPUT SPEED SENSOR
25	GR	ELECTRIC OIL PUMP COMMAND SIGNAL
26	BG	SENSOR POWER SUPPLY
30	GR	LINE PRESSURE SOLENOID VALVE
32	SB	ELECTRIC OIL PUMP STATUS SIGNAL
33	L	CAN-H
34	W	OUTPUT SPEED SENSOR
35	R	PRIMARY SPEED SENSOR
37	SB	SELECT SOLENOID VALVE
38	G	TORQUE CONVERTER CLUTCH SOLENOID VALVE
39	Y	SECONDARY PRESSURE SOLENOID VALVE
40	V	PRIMARY PRESSURE SOLENOID VALVE
41	B	GROUND
42	B	GROUND
45	V	BATTERY POWER SUPPLY (MEMORY BACK-UP)
46	P	BATTERY POWER SUPPLY (MEMORY BACK-UP)
47	BG	IGNITION POWER SUPPLY
48	BR	IGNITION POWER SUPPLY

Connector No.	F7
Connector Name	CRANKSHAFT POSITION SENSOR (POS)
Connector Type	RH02FGY

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

Connector No.	F14
Connector Name	HIGH PRESSURE EGR VOLUME CONTROL VALVE
Connector Type	RH06FB



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

5	L	–
6	BG	–

Connector No.	F21
Connector Name	WIRE TO WIRE
Connector Type	NS16FW-CS

Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	– [With diesel engine]
1	V	– [With gasoline engine]
2	GR	– [With gasoline engine]
2	Y	– [With diesel engine]
3	P	– [Except for R9M engine]
3	SB	– [For R9M engine]
4	BR	– [With MR20 engine]
4	L	– [With HR engine or R9M engine]
4	W	– [With K9K engine]
5	B	– [With gasoline engine]
5	R	– [With diesel engine]
6	BG	– [With R9M engine with CVT]
6	L	– [With diesel engine with M/T]
6	V	– [With MR20 engine]
7	G	–
8	SB	–
9	B	– [With gasoline engine]
9	W	– [With diesel engine]
10	B	– [With MR20 engine]
10	L	– [With K9K engine]
10	V	– [With R9M engine]
11	BR	– [With K9K engine]
11	R	– [With MR20 engine]
11	V	– [With HR engine or R9M engine]
12	L	– [With diesel engine]
12	P	– [With gasoline engine]
13	R	– [With diesel engine with stop/start system]
13	W	– [With gasoline engine with stop/start system]
13	Y	– [Without stop/start system]
14	GR	– [With M/T]
14	V	– [With CVT]
15	L	–

16	LG	–

Connector No.	F39
Connector Name	COOLING FAN MOTOR
Connector Type	renault 243407063R

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

Connector No.	F43
Connector Name	WIRE TO WIRE
Connector Type	RS06MB

Terminal No.	Color Of Wire	Signal Name [Specification]
1	V	–
3	W	–
4	B	–
5	R	–
6	B	–

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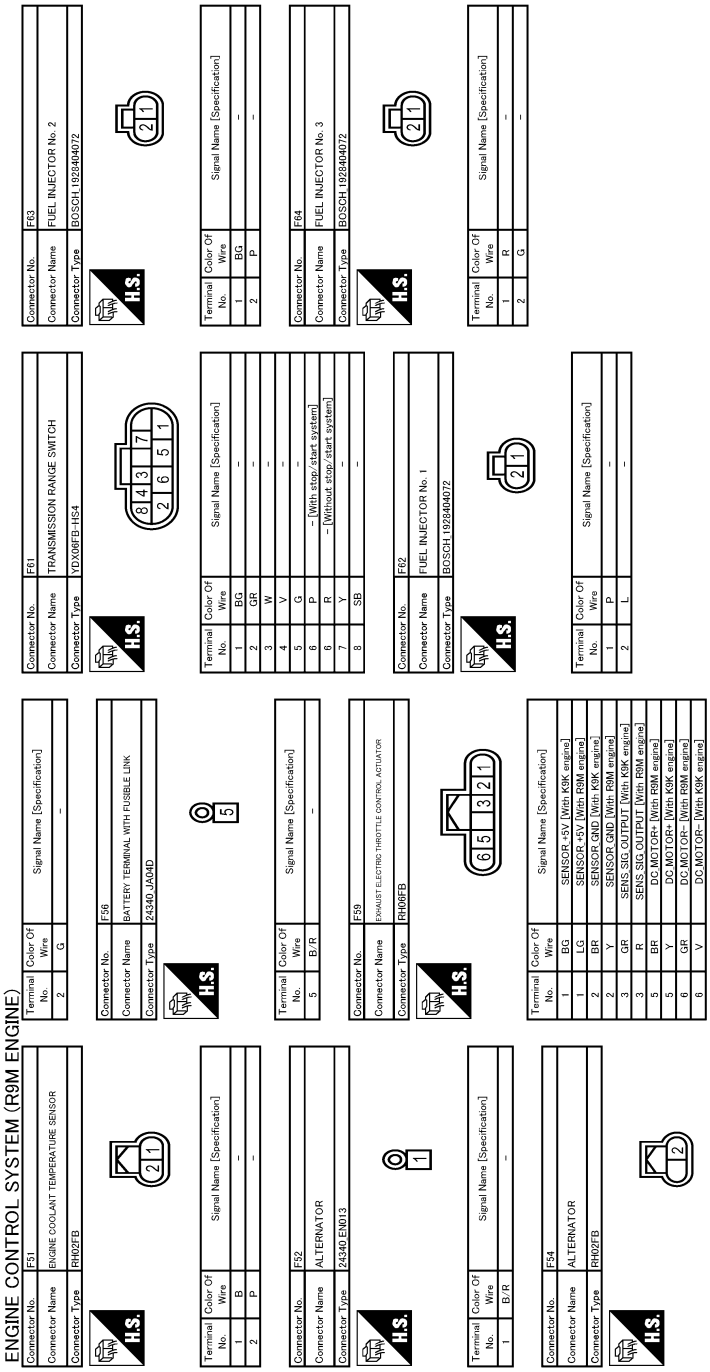
ENGINE CONTROL SYSTEM (R9M ENGINE)
Connector No. F51
Connector Name ENGINE COOLANT TEMPERATURE SENSOR
Connector Type RH02FB
Terminal No. Color Of Wire Signal Name [Specification]
1 B –
2 P –
Connector No. F52
Connector Name ALTERNATOR
Connector Type 24340 EN013
Terminal No. Color Of Wire Signal Name [Specification]
1 B/R –
Connector No. F54
Connector Name ALTERNATOR
Connector Type RH02FB
Terminal No. Color Of Wire Signal Name [Specification]
2 G –
Connector No. F56
Connector Name BATTERY TERMINAL WITH FUSIBLE LINK
Connector Type 24340 JA04D
Terminal No. Color Of Wire Signal Name [Specification]
5 B/R –
Connector No. F59
Connector Name EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR
Connector Type RH06FB
Terminal No. Color Of Wire Signal Name [Specification]
1 BG SENSOR +5V [With K9K engine]
1 LG SENSOR +5V [With R9M engine]
2 BR SENSOR GND [With K9K engine]
2 Y SENSOR GND [With R9M engine]
3 GR SENS SIG OUTPUT [With K9K engine]
3 R SENS SIG OUTPUT [With R9M engine]
5 BR DC MOTOR+ [With R9M engine]
5 Y DC MOTOR+ [With K9K engine]
6 GR DC MOTOR– [With R9M engine]
6 V DC MOTOR– [With K9K engine]
Connector No. F61
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 P – [With stop/start system]
6 R – [Without stop/start system]
7 Y –
8 SB –
Connector No. F62
Connector Name FUEL INJECTOR No. 1
Connector Type BOSCH 1928404072
Terminal No. Color Of Wire Signal Name [Specification]
1 P –
2 L –
Connector No. F63
Connector Name FUEL INJECTOR No. 2
Connector Type BOSCH 1928404072
Terminal No. Color Of Wire Signal Name [Specification]
1 BG –
2 P –
Connector No. F64
Connector Name FUEL INJECTOR No. 3
Connector Type BOSCH 1928404072
Terminal No. Color Of Wire Signal Name [Specification]
1 R –
2 G –
H.S.
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ENGINE CONTROL SYSTEM (R9M ENGINE)

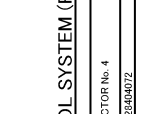
Connector No.	F65
Connector Name	FUEL INJECTOR No. 4
Connector Type	BOSCH, I928404072

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	–
2	BG	–

Connector No.	F66
Connector Name	THERMOPLUNGER CONTROL UNIT
Connector Type	FHX06FB-AN22

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	CO
2	SB	CO
3	Y	DIA
4	W	+BAT 1
5	W	+BAT 2
7	LG	DIA
8	P	CO

Connector No.	F68
Connector Name	COOLING FAN RESISTOR
Connector Type	renault 8200573202

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	–
2	G	–

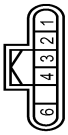
Connector No.	F69
Connector Name	COOLING FAN RELAY-2
Connector Type	24347-9F900

H.S.

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

Connector No.	F75
Connector Name	AIR FUEL RATIO (A/F) SENSOR
Connector Type	RH06FB

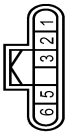
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	–
2	SB	–
3	BR	–
4	L	–
6	V	–

Connector No.	F77
Connector Name	LOW PRESSURE EGR VOLUME CONTROL VALVE
Connector Type	RH06FB

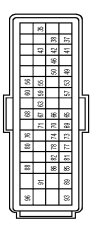
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	V	–
2	SB	–
3	L	–
5	BR	–
6	P	–

Connector No.	F82
Connector Name	ECM
Connector Type	RH56FB-RZ8-R-LH

H.S.



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	P	THERMOPLUNGER RELAY 2
49	G	INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR (-)
50	BG	THERMOPLUNGER RELAY 1
53	Y	THERMAL MANAGEMENT CONTROL VALVE
55	V	SENSOR-ECM (ABS1), ACCELERATOR PEDAL POSITION SENSOR 1, ACCELERATOR PEDAL POSITION SENSOR 2, THROTTLE POSITION SENSOR 1, THROTTLE POSITION SENSOR 2
56	B	CRANKSHAFT POSITION SENSOR (POS)
57	SB	THERMOPLUNGER RELAY 3
59	Y	SENSOR POWER SUPPLY 1, ACCELERATOR PEDAL POSITION SENSOR 1, ACCELERATOR PEDAL POSITION SENSOR 2, THROTTLE POSITION SENSOR 1, THROTTLE POSITION SENSOR 2, MASS AIR FLOW SENSOR
60	R	SENSOR POWER SUPPLY (CRANKSHAFT POSITION SENSOR, CAMSHAFT POSITION SENSOR)
63	LG	THERMOPLUNGER DIAGNOSIS 1
65	SB	G R EGR2
66	SB	SENSOR GROUND (FUEL RAIL PRESSURE SENSOR)
67	W	GLOW PLUG CONTROL (DIAGNOSIS)
68	G	B D COM1
69	L	1 A EGR2
70	Y	SENSOR GROUND (CAMSHAFT POSITION SENSOR)
71	L	CAMSHAFT POSITION SENSOR
73	GR	SENSOR GROUND (FUEL RAIL PRESSURE SENSOR)
74	R	MASS AIR TEMPERATURE SENSOR
76	Y	THERMOPLUNGER DIAGNOSIS 2
77	BR	FUEL RAIL PRESSURE SENSOR
78	P	MASS AIR FLOW SENSOR
80	W	NEUTRAL SWITCH (With M/T)
81	L	SENSOR GROUND (TURBOCHARGER BOOST SENSOR)
82	G	SENSOR GROUND (MASS AIR FLOW SENSOR)
85	V	TURBOCHARGER BOOST SENSOR
86	R	INTAKE AIR TEMPERATURE SENSOR 2
88	W	FUEL PRESSURE SENSOR
89	BR	A/F SENSOR HEATER
91	G	SENSOR POWER SUPPLY (FUEL RAIL PRESSURE SENSOR)

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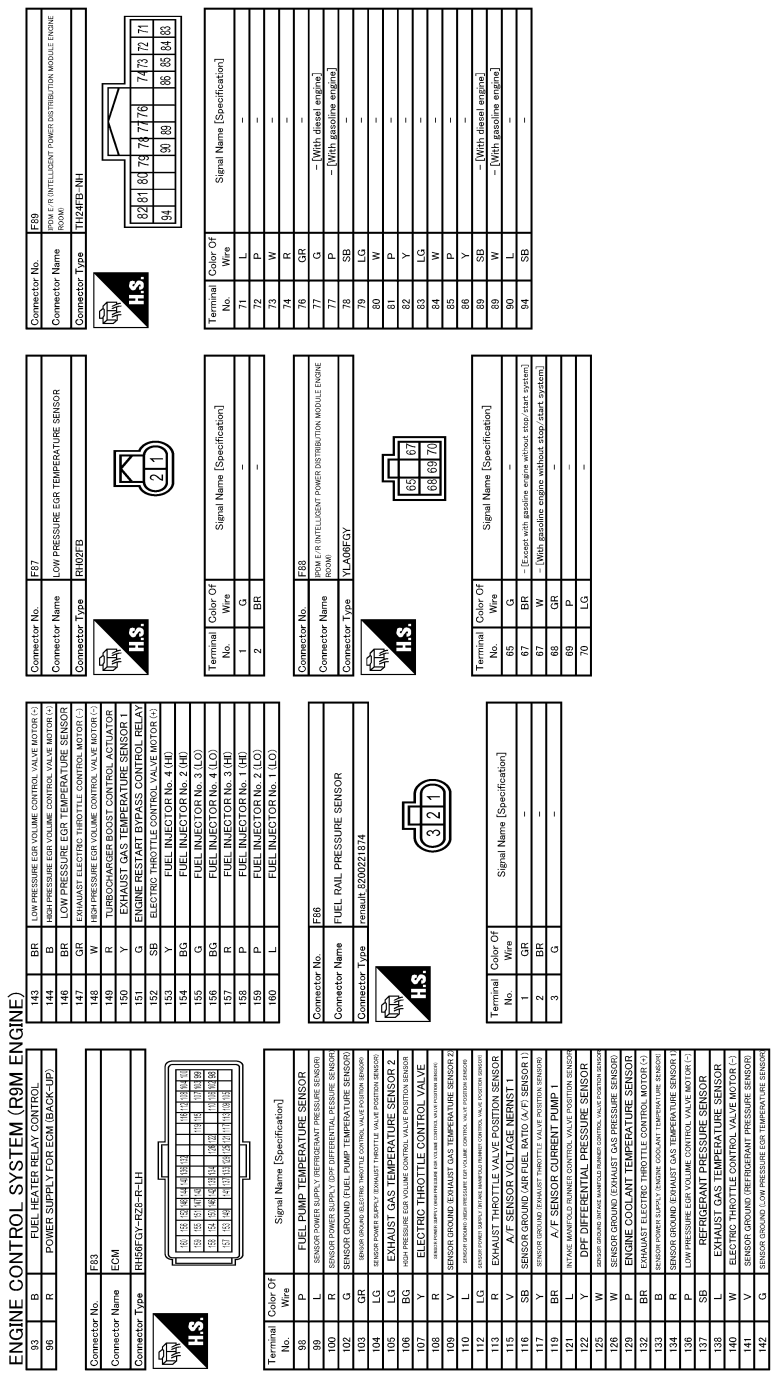
ENGINE CONTROL SYSTEM (R9M ENGINE)



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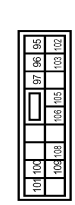
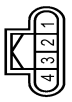
ENGINE CONTROL SYSTEM (R9M ENGINE)

Connector No.	F90
Connector Name	PDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS16FW-CS



Terminal No.	Color Of Wire	Signal Name [Specification]
95	P	–
96	GR	– [With K9K engine]
96	L	– [With R9M engine]
96	R	– [With gasoline engine]
97	V	–
100	BG	– [With diesel engine with CVT]
100	BR	– [With gasoline engine with CVT]
100	GR	– [With M/T]
101	W	–
102	GR	–
103	R	– [With diesel engine]
103	Y	– [With gasoline engine]
105	BR	– [With MR20 engine]
105	L	– [With diesel engine]
105	R	– [With HR engine]
106	GR	– [With diesel engine]
106	L	– [With gasoline engine]
108	L	– [With gasoline engine]
108	R	– [With diesel engine]
109	G	–

Connector No.	F91
Connector Name	MASS AIR FLOW SENSOR
Connector Type	RH04FB

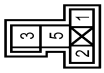


Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	– [With R9M engine]
1	V	– [With K9K engine]
2	G	–
3	L	–
4	GR	– [With K9K engine]
4	P	– [With R9M engine]

Connector No.	F96
Connector Name	FUEL TEMPERATURE SENSOR
Connector Type	FEA02FGY-LC

Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	–
2	G	–

Connector No.	F98
Connector Name	ENGINE RESTART BYPASS CONTROL RELAY
Connector Type	MS02FL-M2-LC



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	–
2	G	–
3	R	–
5	W	–

Connector No.	F100
Connector Name	REVERSE / NEUTRAL POSITION SWITCH
Connector Type	FEA03FG

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

Connector No.	F102
Connector Name	BACK-UP LAMP SWITCH
Connector Type	RK02FB

Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	–
2	W	–

Connector No.	F107
Connector Name	INTAKE MANIFOLD RUNNER CONTROL VALVE
Connector Type	RH06FB

Terminal No.	Color Of Wire	Signal Name [Specification]
1	LG	+5V
2	W	GND
3	L	SGN
4	G	MOR–
5	R	MOR+

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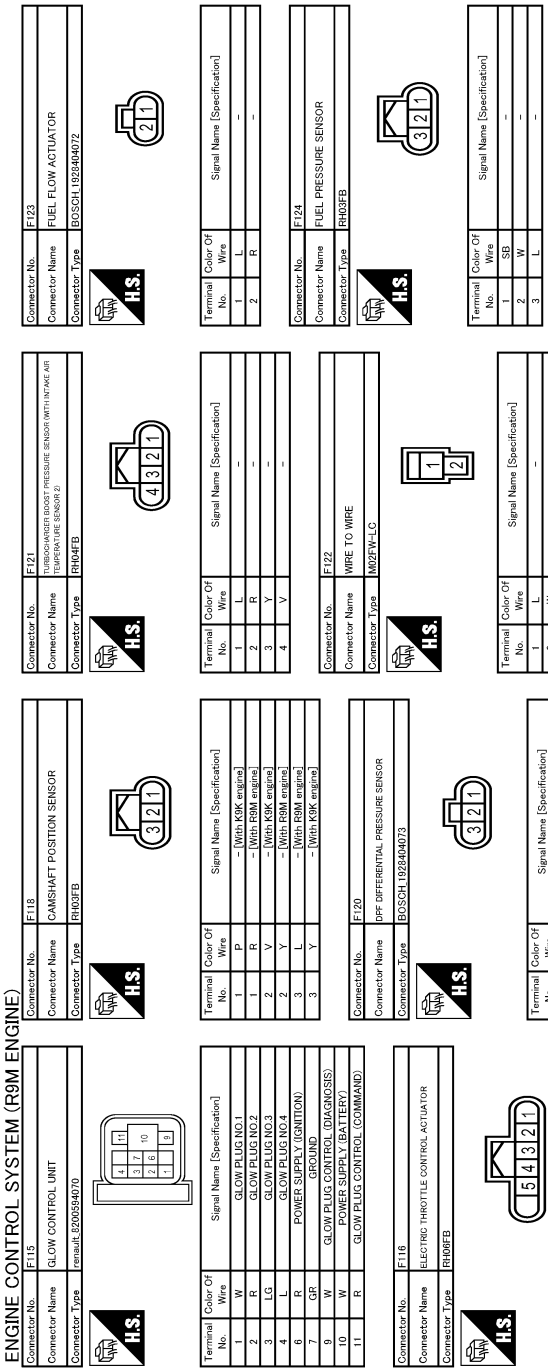
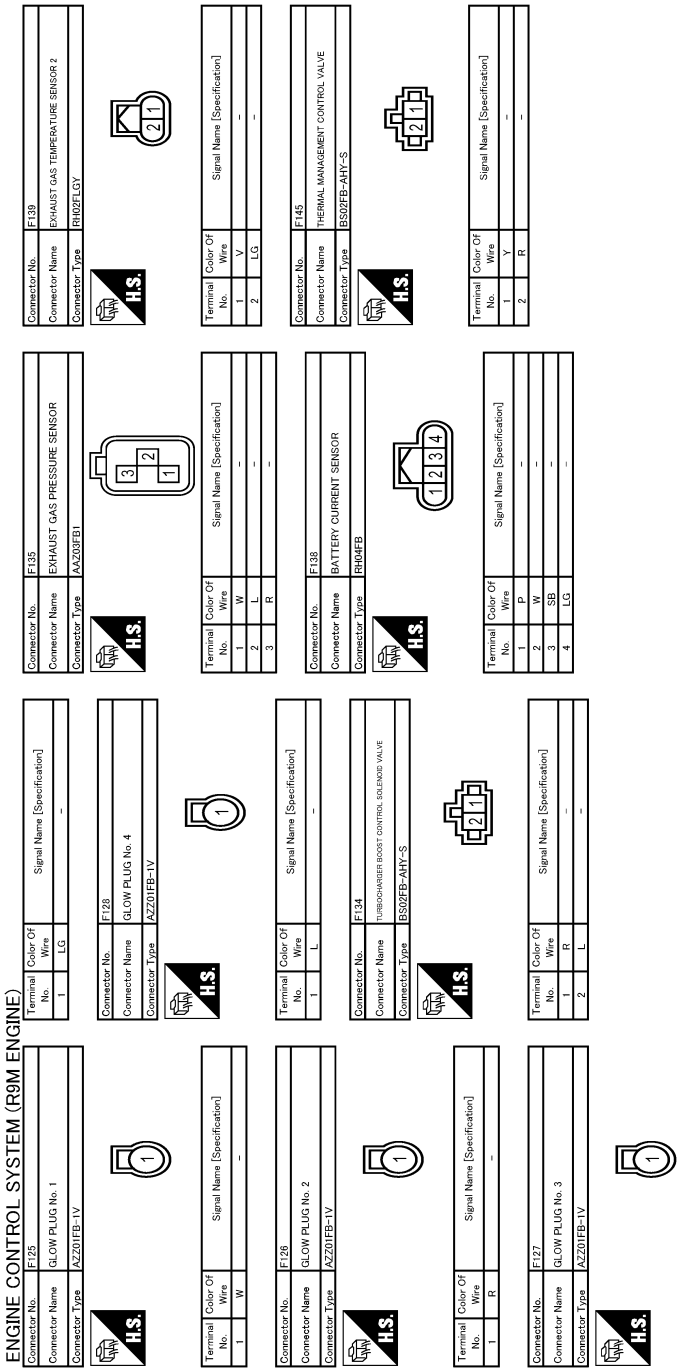


JRBWC6113GB



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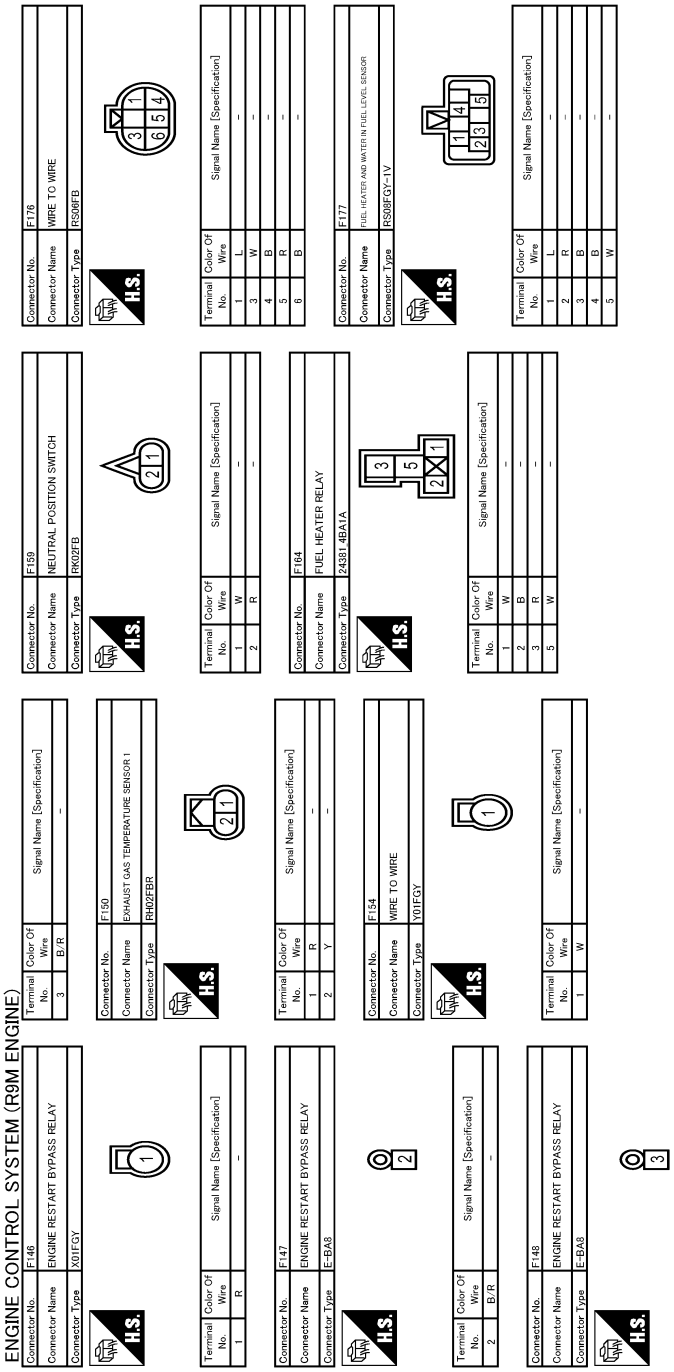

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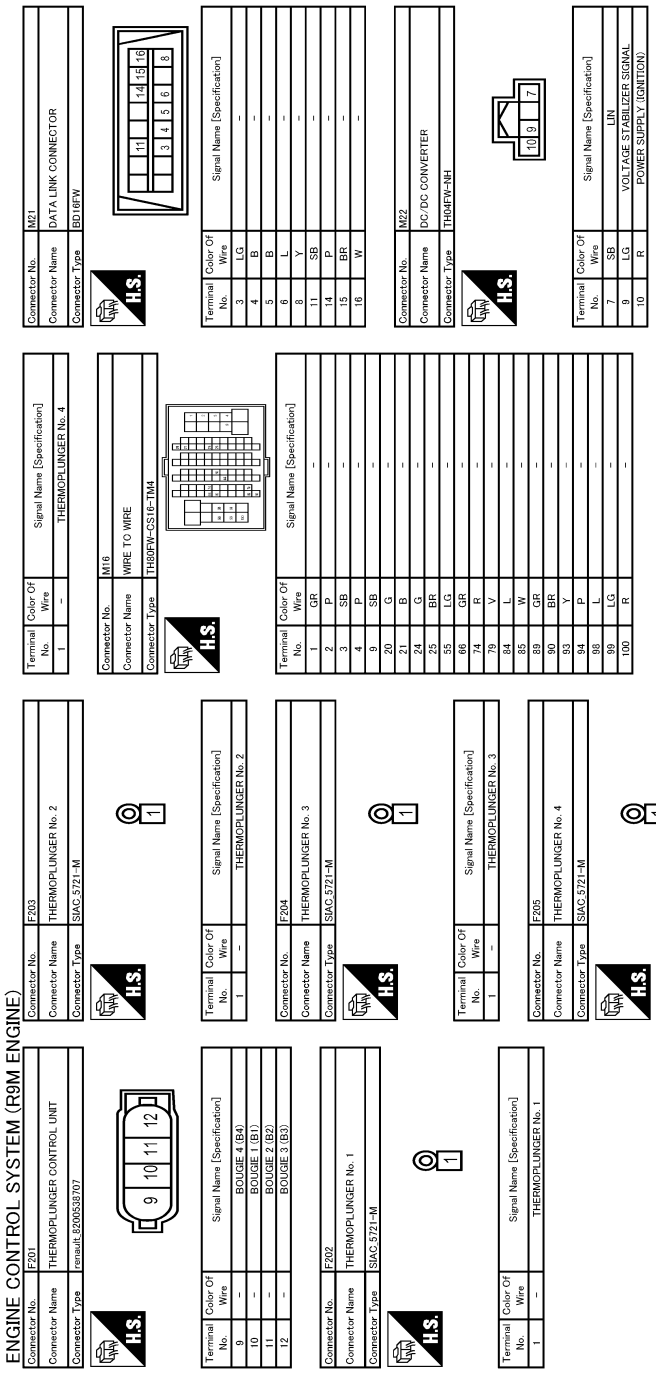

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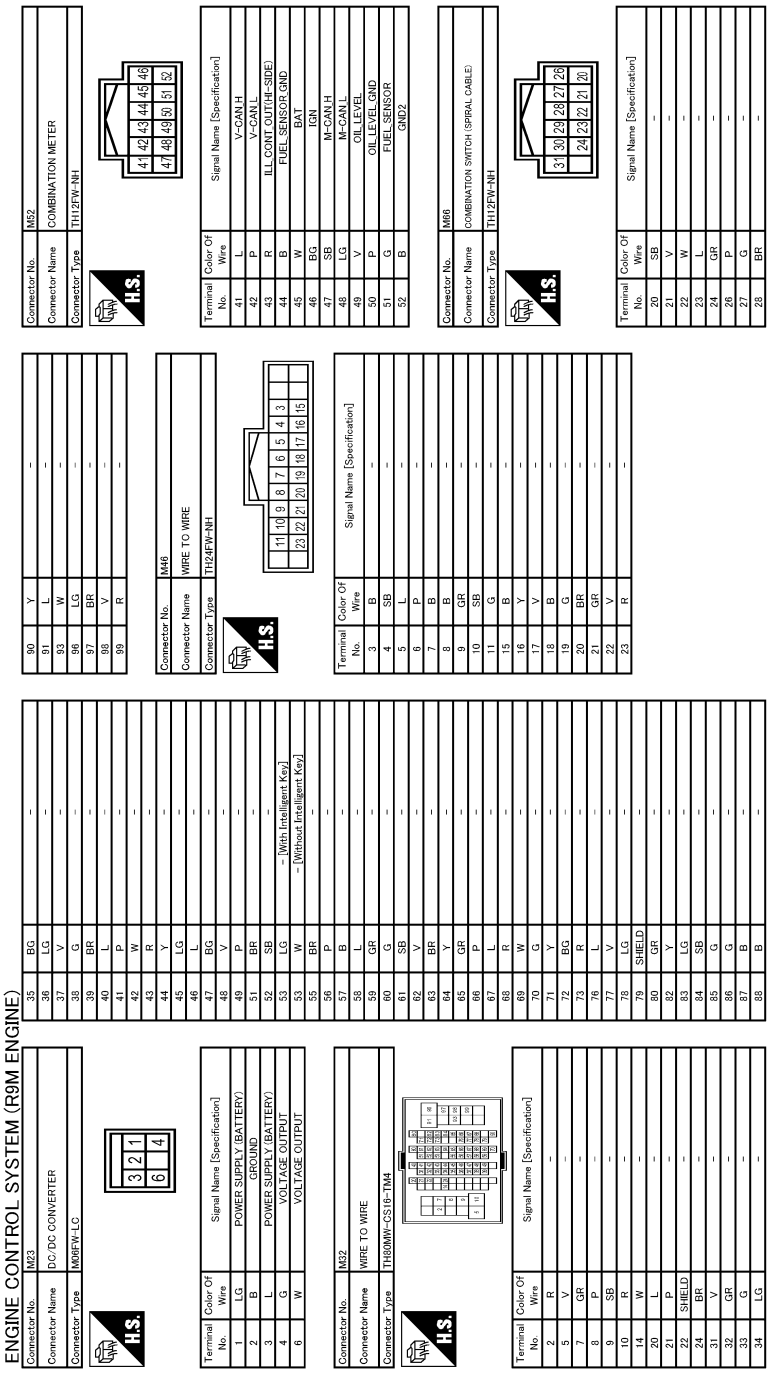
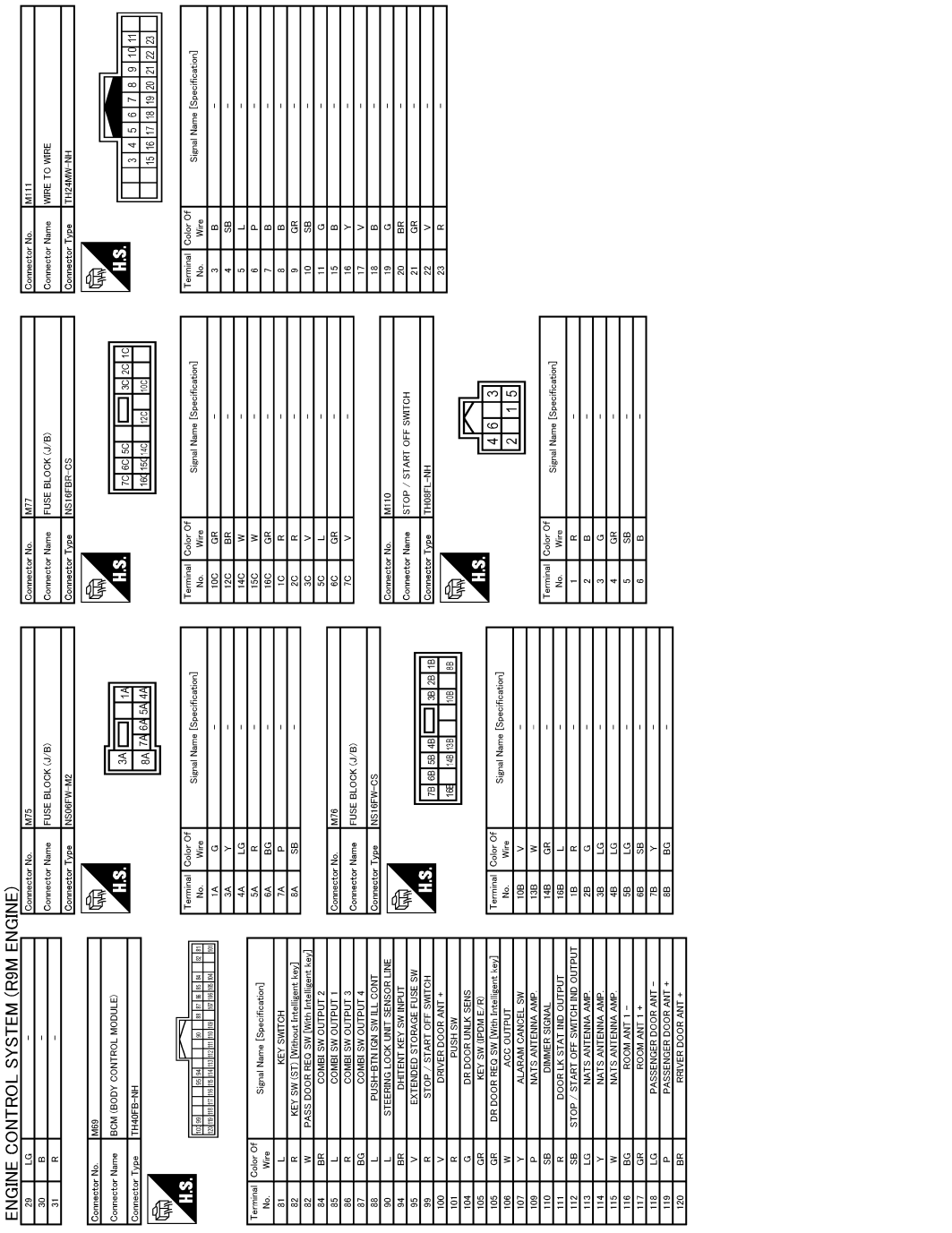


JRBWC6117GB

ENGINE CONTROL SYSTEM (R9M ENGINE)



JRBWC6118GB

BASIC INSPECTION

BASIC INSPECTION

Work Procedure

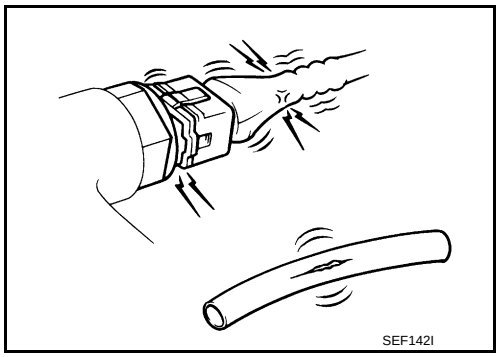
INFOID:0000000010309013

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-37, "R9M : 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.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>> GO TO 2.

2.CHECK IDLE SPEED

Check idle speed.
For procedure, refer to EC9-403, "Inspection".
For specification, refer to EC9-411, "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-380, "Exploded View".

4.BLEED AIR FROM FUEL SYSTEM

Use priming pump to bleed air from fuel system. Refer to FL-47, "Air Bleeding".

>> GO TO 5.

5.CHECK IDLE SPEED AGAIN

Check idle speed.
For procedure, refer to EC9-403, "Inspection".
For specification, refer to EC9-411, "Idle Speed".

Is the inspection result normal?

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

6.DRAIN WATER FROM FUEL FILTER

1. Stop engine.
2. Drain water from fuel filter. Refer to FL-47, "Water Draining".

>> GO TO 7.

7. CHECK IDLE SPEED AGAIN

Check idle speed.
For procedure, refer to EC9-403, "Inspection".
For specification, refer to EC9-411, "Idle Speed".

Is the inspection result normal?

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

8. CHECK AIR CLEANER FILTER

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace air cleaner filter. Refer to EM-380, "Removal and Installation".

9. CHECK BATTERY VOLTAGE

Check battery voltage.

Voltage: More than 12.13V

Is the inspection result normal?

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

10. CHECK BATTERY

Refer to PG-136, "FOR MAINTENANCE REQUIRED BATTERY MODELS : How to Handle Battery" (for maintenance required battery models) or PG-142, "FOR MAINTENANCE FREE BATTERY MODELS : How to Handle Battery" (for maintenance free battery models).

Is the inspection result normal?

YES >> Check charging system. Refer to CHG-15, "Work Flow".
NO >> Repair or replace. Refer to PG-155, "Removal and Installation".

11. CHECK COMPRESSION PRESSURE

Check compression pressure.

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair or replace error-detected parts.

12. CHECK IDLE SPEED AGAIN

Check idle speed.
For procedure, refer to EC9-403, "Inspection".
For specification, refer to EC9-411, "Idle Speed".

Is the inspection result normal?

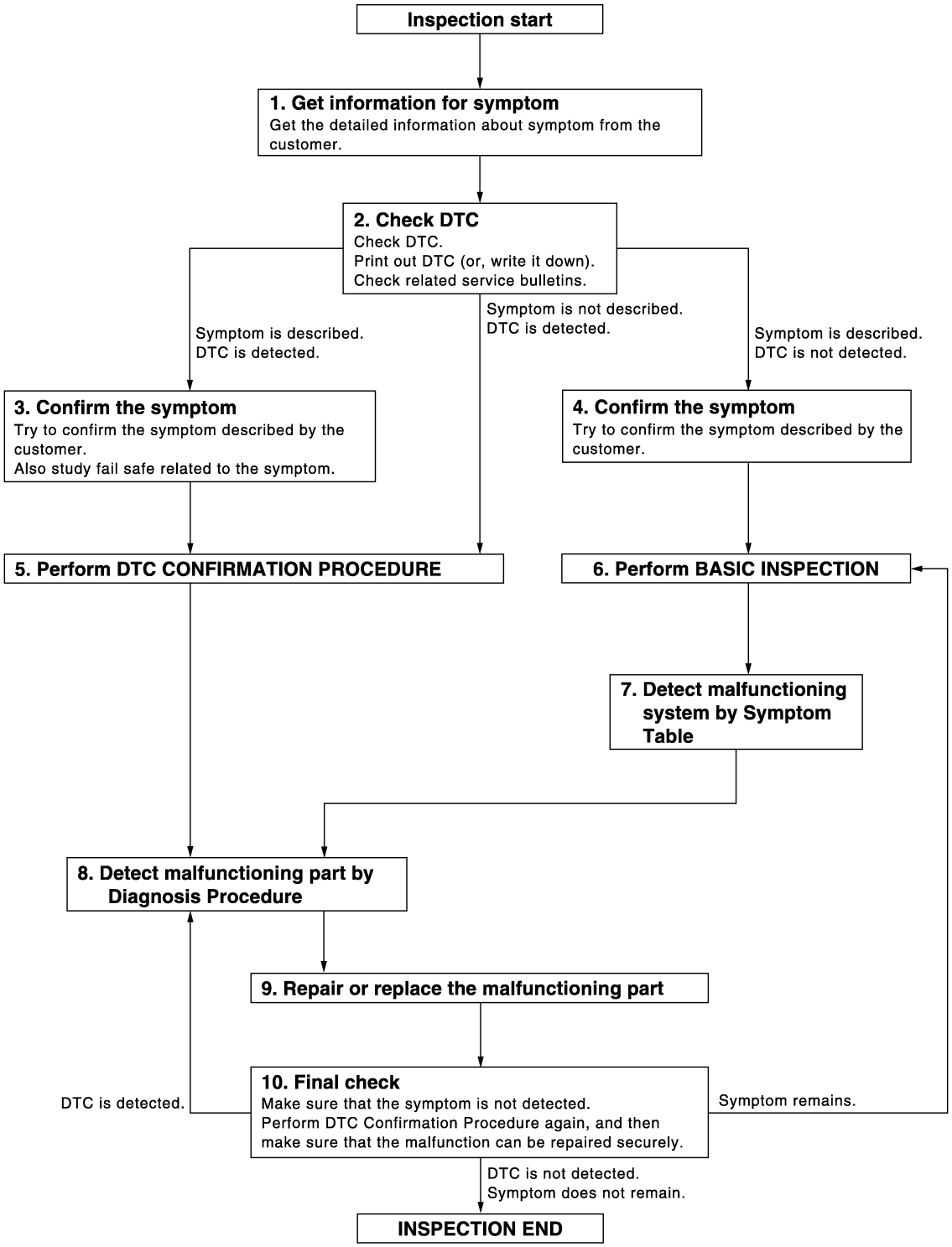
YES >> INSPECTION END
NO >> 1. Replace fuel injector. Refer to EM-404, "Removal and Installation".
2. Perform EC9-147, "Work Procedure".
3. GO TO 2.

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000010309014

OVERALL SEQUENCE



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DETAILED FLOW

1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the “Diagnostic Work Sheet”. (Refer to EC9-141, "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 EC9-397, "Symptom Table" (for engine control system) or EC9-400, "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 EC9-101, "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 EC9-107, "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-41, "Intermittent Incident".

6.PERFORM BASIC INSPECTION

Perform EC9-137, "Work Procedure".

>> GO TO 7.

7.DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to EC9-397, "Symptom Table" (for engine control system) or EC9-400, "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-43, "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 EC9-89, "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 EC9-59, "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:0000000010309015

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

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WORKSHEET SAMPLE

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

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SERVICE AFTER REPLACING OR REMOVING ENGINE PARTS

Special Repair Requirement List

INFOID:0000000010466535

×:Applicable

Part name	Service performed		Required service	Reference
	Replacement	Removal*1		
ECM	×	—	Additional service when replacing ECM	EC9-144
Fuel injector	×	—	Injector adjustment value registration	EC9-147
Electric throttle control actuator	×	×	Throttle valve position learning	EC9-149
Exhaust electric throttle control actuator	×	×	Exhaust throttle valve position learning	EC9-150
High pressure EGR volume control valve	×	×	High pressure EGR volume control valve position learning	EC9-151
Low pressure EGR volume control valve	×	×	Low pressure EGR volume control valve position learning	EC9-152
Intake manifold runner control valve	×	×	Intake manifold runner control valve position learning	EC9-153
DPF (Diesel Particulate Filter)	×	—	DPF (Diesel Particulate Filter) data clear	EC9-157
High pressure fuel pump	×	—	Fuel pump learning value clearing	EC9-158
Starter motor	×	—	Starter motor operating counter clear	EC9-160
Engine oil	×	—	Oil change remaining distance reset	EC9-159

*1:Harness connector disconnection included.

ADDITIONAL SERVICE WHEN REPLACING ECM

Description

INFOID:0000000010309016

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 EC9-144, "Work Procedure".

Work Procedure

INFOID:0000000010309017

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 EC9-405, "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.

7.REPLACE ECM

1. Turn ignition switch OFF and wait at least 1 minute.
2. Replace ECM. Refer to EC9-405, "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 EC9-147, "Work Procedure".

>> GO TO 12.

12.PERFORM THROTTLE VALVE POSITION LEARNING

Perform EC9-149, "Work Procedure".

>> GO TO 13.

13.PERFORM EXHAUST THROTTLE VALVE POSITION LEARNING

Perform EC9-150, "Work Procedure".

>> GO TO 14.

14.PERFORM HIGH PRESSURE EGR VOLUME CONTROL VALVE POSITION LEARNING

Perform EC9-151, "Work Procedure".

>> GO TO 15.

15.PERFORM LOW PRESSURE EGR VOLUME CONTROL VALVE POSITION LEARNING

Perform EC9-152, "Work Procedure".

>> GO TO 16.

16.PERFORM INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION LEARNING

Perform EC9-153, "Work Procedure".

>> GO TO 17.

17. PERFORM SERVICE REGENERATION

Perform EC9-154, "Work Procedure".

>> GO TO 18.

18. CHANGE ENGINE OIL

Refer to LU-49, "Draining" or LU-49, "Refilling".

>> GO TO 19.

19. PERFORM ENGINE OIL DATA RESET

Perform EC9-159, "Work Procedure".

>> GO TO 20.

20. CHECK DTC

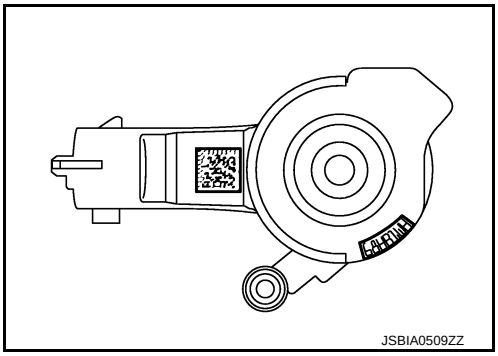
1. Turn ignition switch OFF and wait at least 1 minute.
2. Turn ignition switch ON.
3. Check DTC. If DTC is displayed, erase it.

>> END

INJECTOR ADJUSTMENT VALUE REGISTRATION

Description

INFOID:0000000010309020



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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 EC9-144, "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																

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Work Procedure

INFOID:0000000010309021

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.

- “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																

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6. Repeat step 4 - 5 till there is no cylinder which needs Injector Adjustment Value Registration, and touch “START”.
   NOTE:
   When touching “START”, injector adjustment values stored in CONSULT are written onto ECM memory.
7. 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.

8. Turn ignition switch OFF and wait at least 1 minute.

>> END

THROTTLE VALVE POSITION LEARNING

Description

INFOID:0000000010309022

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 EC9-144, "Work Procedure".

Work Procedure

INFOID:0000000010309023

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

Description

INFOID:0000000010309024

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 EC9-144, "Work Procedure".

Work Procedure

INFOID:0000000010309025

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

Description

INFOID:0000000010309026

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 EC9-144, "Work Procedure".

Work Procedure

INFOID:0000000010309027

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

Description

INFOID:0000000010309028

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 EC9-144, "Work Procedure".

Work Procedure

INFOID:0000000010309029

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

Description

INFOID:0000000010309030

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 EC9-144, "Work Procedure".

Work Procedure

INFOID:0000000010309031

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:0000000010309032

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 EC9-144, "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:0000000010309033

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 EC9-108, "DTC Index".
NO >> GO TO 2.

2.CHECK ENGINE OIL LEVEL

Refer to LU-48, "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.

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-48, "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-30, "Removal and installation".
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-49, "Draining" or LU-49, "Refilling".
2. Perform “ENGINE OIL DATA RESET”. Refer to EC9-159, "Work Procedure".
3. Erase DTC.

>> END

DIESEL PARTICULATE FILTER DATA CLEAR

Description

INFOID:0000000010309034

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:0000000010309035

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:0000000010309036

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:0000000010309037

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

Description

INFOID:0000000010309038

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.

Work Procedure

INFOID:0000000010309039

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

STARTER OPERATION COUNTER CLEAR

Description

INFOID:0000000010309043

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:0000000010309044

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

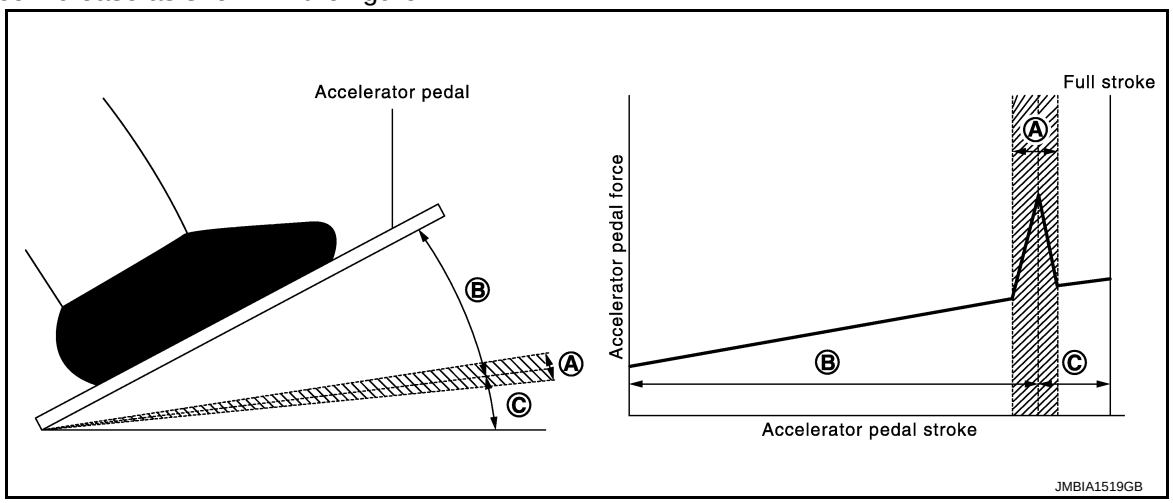
ACCELERATOR PEDAL

Work Procedure

INFOID:0000000010309040

1.PERFORM ACCELERATOR PEDAL FORCE-I

1. Turn ignition switch OFF.
2. Depress the accelerator pedal and check if there is a specific point (A) in the pedal stroke where the pedal force increase as shown in the figure.



Is the inspection result normal?

YES-1 >> GO TO 2.
NO >> Replace accelerator pedal assembly. Refer to ACC-3, "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		
E20	31 (APP sensor 1)	30	Depressing range of the accelerator pedal: Within (C) as indicated in the figure	More than 4.35 V
	22 (APP sensor 2)	21		More than 2.17 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

FUEL PRESSURE CHECK

Work Procedure

INFOID:0000000010309042

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:0000000010309047

1.CHECK FUSE

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

Fuse No.	Capacity
#54	10 A
#55	15 A
#65	10 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-43, "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		
F90	105	Ground	Battery voltage
	108		

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	
F82	41	F89	77	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.

5.CHECK ECM POWER SUPPLY (INGNITION POWER SUPPLY)

Check the voltage between IPDM E/R and ground.

+		–	Voltage
IPDM E/R			
Connector	Terminal		
E38	19	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-66, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-67, "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		
E58	25	Ground	Existed
	29		
	32		

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		ECM relay		
Connector	Terminal	Connector	Terminal	
E58	16	E38	19	Existed
	28	F90	105	
F82	96		108	

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-41, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

U0111 LIN COMMUNICATION

DTC Logic

INFOID:0000000010499280

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Alternator • Harness and connectors

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 EC9-166, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010828197

1.CHECK LIN COMMUNICATION CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and alternator harness connector.
3. Disconnect active grille shutter harness connector and DC/DC conveter harness connector.
4. Check the continuity between ECM harness connector and alternator harness connector.

+		–		Continuity
ECM		Alternator		
Connector	Terminal	Connector	Terminal	
F82	68	F54	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-15, "Work Flow".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace alternator. Refer to CHG-31, "R9M : Removal and Installation".

3.CHECK DTC

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to EC9-166, "DTC Logic".

Is DTC detected again?

YES >> Replace ECM.
NO >> INSPECTION END

U0121 CAN COMMUNICATION

DTC Logic

INFOID:0000000010309054

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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).	ABS actuator and electric unit (control unit)

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 >> EC9-167, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309055

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

Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-42, "CONSULT Function".

Is DTC detected?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Perform trouble shooting relevant to DTC indicated.

U0298 DC/DC CONVERTER

DTC Logic

INFOID:0000000010309056

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness and connectors (Voltage stabilizer signal line is open or circuit shorted.) • DC/DC converter

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 EC9-39, "STOP/START SYSTEM : System Description (M/T models)" (M/T models), EC9-47, "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 EC9-168, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309057

1.CHECK VOLTAGE STABILIZER SIGNAL

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			
M22	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, and active grille shutter 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	
M22	9	F82	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-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to EC9-408, "Removal and Installation".
NO >> Repair or replace error-detected parts.

4.CHECK INTERMITTENT INCIDENT

Perform intermittent incident. Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace ECM. Refer to EC9-405, "Removal and Installation".
NO >> Repair or replace error-detected parts.

U0299 LOST COMMUNICATION (DC/DC CONVERTER)

DTC Logic

INFOID:0000000010499282

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• DC/DC converter • Harness and connectors (LIN communication line)

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

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC9-170, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Start the engine and let it idle for at least 5 minutes.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC9-170, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010499283

1.CHECK ENGINE COMMUNICATION LINE

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect DC/DC converter harness connector, alternator harness connector, and active grille shutter harness connector.
4. Check the continuity between ECM harness connector and DC/DC converter harness connector.

+		–		Continuity
ECM		DC/DC converter		
Connector	Terminal	Connector	Terminal	
F82	68	M22	7	Existed

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

Is the inspection result normal?

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

2.CHECK INTERMITTENT INCIDENT

Perform intermittent incident. Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to EC9-408, "Removal and Installation".
NO >> Repair or replace error-detected parts.

U0315 CAN COMMUNICATION [ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)]

DTC Logic

INFOID:0000000010499284

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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).	ABS actuator and electric unit (control unit)

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC U0315 can not duplicate.

>> Proceed to EC9-172, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010499285

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

Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-42, "CONSULT Function".

Is DTC detected?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Perform trouble shooting relevant to DTC indicated.

U0415 CAN COMMUNICATION

DTC Logic

INFOID:0000000010309060

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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).	ABS actuator and electric unit (control unit)

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC U0415 can not duplicate.

>> Proceed to EC9-173, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309061

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

Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-42, "CONSULT Function".

Is DTC detected?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Perform trouble shooting relevant to DTC indicated.

B1900 DC/DC CONVERTER

DTC Logic

INFOID:0000000010309073

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness and connectors (DC/DC converter power supply input 1 circuit is open or shorted.) • DC/DC converter

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 EC9-174, "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 EC9-39, "STOP/START SYSTEM : System Description (M/T models)" (M/T models), EC9-47, "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 EC9-174, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309074

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		
M23	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		
M23	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-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to EC9-408, "Removal and Installation".
NO >> Repair or replace error-detected parts.

B1901 DC/DC CONVERTER

DTC Logic

INFOID:0000000010309075

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness and connectors (DC/DC converter power supply input 2 circuit is open or shorted.) • DC/DC converter

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 EC9-176, "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 EC9-39, "STOP/START SYSTEM : System Description (M/T models)" (M/T models), EC9-47, "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?

YES >> Proceed to EC9-176, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309076

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		
M23	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		
M23	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-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to EC9-408, "Removal and Installation".
NO >> Repair or replace error-detected parts.

B1902 DC/DC CONVERTER

DTC Logic

INFOID:0000000010309077

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
B1902	— (—)	DC/DC converter detects power supply output 1 is 5.0 V or less when restart the engine.	• 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

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 EC9-39, "STOP/START SYSTEM : System Description (M/T models)" (M/T models), EC9-47, "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 EC9-178, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309078

1.CHECK FUSE

Check that the following fuse is not fusing.

Fuse No.	Capacity
#71	10 A
#72	10 A
#73	10 A
#74 (only in models with CVT)	10 A

Refer to PG-11, "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		
M23	4	Switching circuit (+)	Existed

Refer to PG-11, "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-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to EC9-408, "Removal and Installation".
NO >> Repair or replace error-detected parts.

B1903 DC/DC CONVERTER

DTC Logic

INFOID:0000000010309079

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
B1903	— (—)	DC/DC converter detects power supply output 2 is 5.0 V or less when restart the engine.	• 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

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 EC9-39, "STOP/START SYSTEM : System Description (M/T models)" (M/T models), EC9-47, "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 EC9-180, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309080

1.CHECK FUSE

Check that the following fuse is not fusing.

Fuse No.	Capacity
#76	10 A
#77	10 A

Refer to PG-11, "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		
M23	6	Switching circuit (+)	Existed

Refer to PG-11, "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-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to EC9-408, "Removal and Installation".
NO >> Repair or replace error-detected parts.

B1904 DC/DC CONVERTER

DTC Logic

INFOID:0000000010309081

DTC DETECTION LOGIC

NOTE:
If DTC B1904 is displayed with DTC B1900 or B1901, perform the trouble diagnosis for DTC B1900 or B1901. Refer to EC9-174, "DTC Logic" or EC9-176, "DTC Logic".

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
B1904	— (—)	DC/DC converter function is malfunctioning.	DC/DC converter

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 EC9-39, "STOP/START SYSTEM : System Description (M/T models)" (M/T models), EC9-47, "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 EC9-182, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309082

1. INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC Confirmation Procedure. Refer to EC9-182, "DTC Logic".
4. Check DTC.

Is the DTC B1904 displayed again?

YES >> Replace DC/DC converter. Refer to EC9-408, "Removal and Installation".
NO >> INSPECTION END

P0001 FUEL PUMP

DTC Logic

INFOID:0000000010309083

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Fuel flow actuator circuit is open or shorted.) • Fuel flow actuator

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 EC9-183, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309084

1.CHECK FUEL FLOW ACTUATOR POWER SUPPLY CIRCUIT

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

+		-	Voltage
Fuel flow actuator			
Connector	Terminal		
F123	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
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	
F123	2	F82	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 EC9-184, "Component Inspection (Fuel Flow Actuator)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace high pressure fuel pump.

Component Inspection (Fuel Flow Actuator)

INFOID:0000000010309085

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-408, "Removal and Installation".

P0002 FUEL PRESSURE

DTC Logic

INFOID:0000000010309086

DTC DETECTION LOGIC

NOTE:
If DTC P0002 is displayed with DTC P0001, P0115, P0190, P0200, P0201, P0202, P0203, or P0204, perform trouble diagnosis for DTC P0001, P0115, P0190, P0200, P0201, P0202, P0203, or P0204. Refer to EC9-108, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• 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

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC P0002 can not duplicate.

>> Proceed to EC9-185, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309087

1.CHECK FUEL LEVEL

Check that the fuel level is enough.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Refuel.

2.PERFORM FUEL FILTER AIR BLEEDING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.; caused by lack of fuel), it may become normal by performing following procedure.

1. Turn ignition switch ON.
2. Perform fuel filter air bleeding. Refer to FL-47, "Air Bleeding".
3. Erase DTC.
4. Perform DTC confirmation procedure again. Refer to EC9-185, "DTC Logic".

Is the DTC P0002 detected again?

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

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 EC9-187, "Component Inspection (Fuel Tempearature 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 EC9-186, "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 EC9-186, "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 EC9-209, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace error-detected parts.

9.CHECK FUEL PUMP

Check low pressure fuel pump system. Refer to EC9-387, "Component Function Check".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (Fuel Flow Actuator)

INFOID:0000000010309088

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-408, "Removal and Installation".

Component Inspection (Fuel Injector)

INFOID:0000000010309089

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-404, "Removal and Installation".

Component Inspection (Fuel Tempearature Sensor)

INFOID:0000000010500940

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 Logic

INFOID:0000000010309090

DTC DETECTION LOGIC

NOTE:

- **If DTC P0016 is displayed with DTC P0335, P0560, P0657, or P0641, perform the trouble diagnosis for DTC P0335, P0560, P0657, or P0641. Refer to EC9-108, "DTC Index".**

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• 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

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 >> EC9-188, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309091

1.CHECK CKP SENSOR

Check CKP sensor. Refer to EC9-189, "Component Inspection (Crankshaft Position Sensor)".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace error-detected parts.

2.CHECK CMP SENSOR

Check CMP sensor. Refer to EC9-189, "Component Inspection (Camshaft Position Sensor)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace error-detected parts.

3.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 4.
NO >> Repair or replace camshaft. Refer to EM-421, "Removal and Installation".

4.CHECK SIGNAL PLATE WITH FLYWHEEL

Visually check for chipping signal plate with flywheel.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace signal plate with flywheel. Refer to EM-446, "Exploded View".

5. CHECK TIMING CHAIN

Check timing chain. Refer to EM-413, "Removal and Installation".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace timing chain. Refer to EM-413, "Removal and Installation".

Component Inspection (Crankshaft Position Sensor)

INFOID:0000000010309092

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 EC9-12, "Component Parts Location".

Component Inspection (Camshaft Position Sensor)

INFOID:0000000010309093

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.

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-421, "Exploded View".

P0045 TC BOOST CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000010309094

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Turbocharger boost control solenoid valve circuit is open or shorted.) • Turbocharger boost control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 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 EC9-190, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309095

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-5, "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.

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		
F134	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	
F134	1	F83	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 Logic

INFOID:0000000010309100

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Intake air temperature sensor 2 circuit is open or shorted. • Intake air temperature sensor 2

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC P0095 can not duplicate.

>> Proceed to EC9-192, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309101

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 EC9-193, "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

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	
F82	59	F121	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 EC9-193, "Component Inspection (Low Pressure EGR Volume Control Valve Upstream Temperature Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (Intake Air Temperature Sensor 2)

INFOID:0000000010309102

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)	2.499 – 2.583 kΩ

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:0000000010309103

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)	57.094 – 65.836 kΩ

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace low pressure EGR temperature sensor.

P0100 MAF SENSOR

DTC Logic

INFOID:0000000010309104

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Mass air flow sensor circuit is open or shorted.) • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always 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 EC9-194, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309105

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		
F91	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.

+		-		Continuity
ECM		Mass air flow sensor		
Connector	Terminal	Connector	Terminal	
F82	78	F91	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 EC9-195, "Component Inspection (Mass Air Flow Sensor)".

Is the inspection result normal?

YES >> Replace error-detected parts.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

Component Inspection (Mass Air Flow Sensor)

INFOID:0000000010309106

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 Logic

INFOID:0000000010309107

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors • Mass air flow sensor • Turbocharger boost sensor • Intake air temperature sensor 2 • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC P0101 can not duplicate.

>> Proceed to EC9-196, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309108

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.

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 (±10°C).

Is the inspection result normal?

YES >> Replace mass air flow sensor.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

P0105 TC BOOST SENSOR

DTC Logic

INFOID:0000000010309110

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (TC boost sensor circuit is open or shorted.) • TC boost sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to EC9-197, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309111

1.CHECK TURBOCHARGER BOOST SENSOR

Check turbocharger boost sensor. Refer to EC9-198, "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.
2. Check the power supply of the turbocharger boost sensor.

+		-	Voltage (Approx.)
Turbocharger boost sensor			
Connector	Terminal		
F121	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	
F82	59	F121	3	Existed
	81		1	
	85		4	

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Turbocharger Boost Sensor)

INFOID:0000000010309112

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 Logic

INFOID:0000000010309113

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors • TC boost sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 second.
2. Check DTC.

Is DTC detected?

YES >> EC9-199, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309114

1.CHECK TURBOCHARGER BOOST SENSOR FITTING CONDITION

Check turbocharger boost sensor fitting condition.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Adjust parts fitting condition.

2.CHECK FOR CHARGE AIR LEAK

1. Start the engine and let it idle.
2. Listen for an charge air leak.

Is intake air leak detected?

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

3.CHECK TURBOCHARGER

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 EC9-200, "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		
F121	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	
F82	59	F121	3	Existed
	81		1	
	85		4	

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Turbocharger Boost Sensor)

INFOID:0000000010309115

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.

P0110 IAT SENSOR

DTC Logic

INFOID:0000000010309116

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Intake air temperature sensor 1 circuit is open or shorted.) • Intake air temperature sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always 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 EC9-201, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309117

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.

+		-		Continuity
ECM		Mass air flow sensor		
Connector	Terminal	Connector	Terminal	
F82	74	F91	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 EC9-202, "Component Inspection (Intake Air Temperature Sensor 1)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (Intake Air Temperature Sensor 1)

INFOID:0000000010309118

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 Logic

INFOID:0000000010309119

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Engine coolant temperature sensor circuit is open or shorted.) • Engine coolant temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC9-203, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309120

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?

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	
F83	129	F51	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 EC9-204, "Component Inspection (Engine Coolant Temperature Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (Engine Coolant Temperature Sensor)

INFOID:0000000010309121

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	1	Temperature°C (°F)	25 (77)	2.140 – 2.364 kΩ

Is the inspection result normal?

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

P0120 TP SENSOR

DTC Logic

INFOID:0000000010309122

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Throttle position sensor circuit is open or shorted.) • Throttle position sensor • Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 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 EC9-205, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309123

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 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	
F83	103	F116	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 EC9-206, "Component Inspection (Throttle Position Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (Throttle Position Sensor)

INFOID:0000000010309124

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC9-149, "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			
F83	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 Logic

INFOID:0000000010309130

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (The air fuel ratio sensor heater circuit is open or shorted.) • Air fuel ratio sensor heater

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 EC9-207, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309131

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.

+		-		Continuity
ECM		A/F sensor		
Connector	Terminal	Connector	Terminal	
F82	89	F75	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 EC9-208, "Component Inspection (A/F Sensor Heater)".

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.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:0000000010501521

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 Logic

INFOID:0000000010309135

DTC DETECTION LOGIC

NOTE:
If DTC P0190 is displayed with DTC P0697, first perform the trouble diagnosis for DTC P0697. Refer to EC9-271, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Fuel rail pressure sensor circuit is open or shorted.) • Fuel rail pressure sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC P0190 can not duplicate.

>> Proceed to EC9-209, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309136

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 FUEL RAIL PRESSURE SENSOR HARNESS CONNECTOR CONNECTIONS

Check fuel rail pressure sensor harness connector connection.

Is the inspection result normal?

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

3.CHECK FUEL PIPING

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

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

4.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		
F86	91	Ground	5.0 V

Is the inspection result normal?

YES >> GO TO 5.
NO >> Perform trouble diagnosis for power supply circuit.

5. 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	
F82	73	F86	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 Logic

INFOID:0000000010309137

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0200	INJECTOR CONTROL CIRCUIT (Injector circuit/open) • 1.DEF: VALUES OUT-SIDE TOLERANCES	• ECM detects fuel injectors circuit malfunction. • Injector code is not stored into ECM.	• Harness or connectors • Injector code error

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 >> EC9-211, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309138

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 EC9-212, "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.

Cylinder	+		-		Continuity
	ECM		Fuel injector		
	Connector	Terminal	Connector	Terminal	
No.1	F83	158	F62	1	Existed
		160		2	
No.2		154	F63	1	
		159		2	
No.3		157	F64	1	
		155		2	
No.4		153	F65	1	
		156		2	

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Fuel Injector)

INFOID:0000000010309139

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-404, "Removal and Installation".

P0201, P0202, P0203, P0204 FUEL INJECTOR

DTC Logic

INFOID:0000000010309140

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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	• Harness or connectors (The fuel injector circuit is open.) • Fuel injector • Injector code 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		

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 >> EC9-214, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309141

1.PERFORM FUEL INJECTOR ADJUSTMENT VALUE REGISTRATION

1. Perform FUEL INJECTOR ADJUSTMENT VALUE REGISTRATION. Refer to EC9-147, "Work Procedure".
2. Perform DTC confirmation procedure. Refer to EC9-213, "DTC Logic".

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 EC9-215, "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.

Cylinder	+		-		Continuity
	ECM		Fuel injector		
	Connector	Terminal	Connector	Terminal	
No.1	F83	158	F62	1	Existed
		160		2	
No.2		154	F63	1	
		159		2	
No.3		157	F64	1	
		155		2	
No.4		153	F65	1	
		156		2	

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Fuel Injector)

INFOID:0000000010309142

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-404, "Removal and Installation".

P0217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000010309143

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	Possible cause
P0217	ENGINE OVERHEATING (Engine coolant over temperature condition) • 1.DEF: OPERATION TEMPERATURE TOO HIGH	When engine coolant temperature is 110°C or more.	• Cooling fan • Radiator hose • Radiator • Radiator cap • Water pump • Thermostat • Engine coolant bypass valve • Engine coolant temperature sensor

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.**

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC9-216, "Component Function Check".

NOTE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC9-217, "Diagnosis Procedure".

Component Function Check

INFOID:0000000010309144

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.

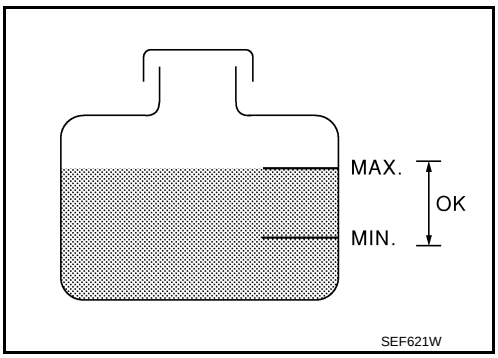
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

Check the coolant level in the reservoir tank and radiator.

Allow engine to cool before checking coolant level.

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

YES >> Proceed to EC9-217, "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 EC9-217, "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 EC9-217, "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 >> INSPECTION END
NO >> Proceed to EC9-217, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309145

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 EC9-382, "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 EC9-203, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Perform overheating cause analysis. Refer to CO-87, "Troubleshooting Chart".
NO >> Replace engine coolant temperature sensor.

P0225 APP SENSOR

DTC Logic

INFOID:0000000010309146

DTC DETECTION LOGIC

NOTE:
If DTC P0225 is displayed with DTC P0641, first perform the trouble diagnosis for DTC P0641. Refer to EC9-265, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Accelerator pedal position sensor circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1)

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 EC9-219, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309147

1.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

Check the power supply of the accelerator pedal position sensor 1.

+		-	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E20	4	Ground	5.0 V

Is the inspection result normal?

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

2.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	
E58	27	E20	4	Existed
	30		2	
	31		3	

Is the inspection result normal?

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

3.CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to EC9-220, "Component Inspection (Accelerator Pedal Position Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:0000000010309148

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				
E58	31	30	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	22	21		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 Logic

INFOID:0000000010309149

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	Possible cause
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.	• Harness or connectors (APP sensor 1 and 2 circuit is open or shorted.) • Accelerator pedal position sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC P0226 can not duplicate.

>> Proceed to EC9-221, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010502686

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		
E20	4	Ground	5.0 V
	5		

Is the inspection result normal?

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	E58	27	E20	4	Existed
		30		2	
		31		3	
2		21		1	
		22		6	
		23		5	

Is the inspection result normal?

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

4. CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to EC9-222, "Component Inspection (Accelerator Pedal Position Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:0000000010309151

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				
E58	31	30	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	22	21		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 Logic

INFOID:0000000010499286

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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	• Harness or connectors (Fuel pump relay circuit is open or shorted.) • Fuel pump relay

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 EC9-223, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010499287

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection. Refer to Ground Inspection in GI-43, "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	
F82	38	E58	25	Battery voltage

Is the inspection result normal?

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

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	
F82	38	F90	106	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 >> GO TO 5.
NO >> Replace 20A fuse.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

P025B FUEL PUMP CONTROL MODULE CONTROL

DTC Logic

INFOID:0000000010499288

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (FPCM command circuit is open or shorted.) • FPCM

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 EC9-225, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010499289

1.CHECK COMMAND VOLTAGE

Check FPCM command voltage as the following conditions.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
E58	13	29	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 >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
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.
3. Check the continuity between ECM harness connector and FPCM harness connector.

+		–		Continuity
ECM		FPCM		
Connector	Terminal	Connector	Terminal	
E58	13	B77	9	Existed

Is the inspection result normal?

YES >> Replace FPCM. Refer to EC9-410, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0335 CKP SENSOR

DTC Logic

INFOID:0000000010309152

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (The sensor circuit is open or shorted.) • Crankshaft position sensor • Signal plate

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC P0335 can not duplicate.

>> Proceed to EC9-227, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309153

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 EC9-227, "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.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace signal plate.

Component Inspection (Crankshaft Position Sensor)

INFOID:0000000010309154

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 Logic

INFOID:0000000010309155

DTC DETECTION LOGIC

NOTE:
If DTC P0340 is displayed with DTC P0016, P0335, P0560, P0641, P0651, and P0657, perform the trouble diagnosis for DTC P0016, P0335, P0560, P0641, P0651, and P0657. Refer to EC9-108, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (The sensor circuit is open or shorted.) • Camshaft position sensor • Signal plate

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC P0340 can not duplicate.

>> Proceed to EC9-229, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309156

1.CHECK CMP SENSOR-1

Visually check camshaft position (CMP) sensor for chipping.

Is the inspection result normal?

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

2.CHECK CMP SENSOR HARNESS CONNECTOR CONNECTIONS

Check CMP sensor harness connector connection.

Is the inspection result normal?

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

3.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	
F82	55	F118	1	Existed
	70		2	
	71		3	

Is the inspection result normal?

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

4.CHECK CMP SENSOR-2

Refer to EC9-230, "Component Inspection (Camshaft Position Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (Camshaft Position Sensor)

INFOID:0000000010309157

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 Logic

INFOID:0000000010309158

DTC DETECTION LOGIC

NOTE:
If DTC P0380 is displayed with DTC P0560 and P0657, perform the trouble diagnosis for DTC P0560 and P0657. Refer to EC9-108, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• 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

DTC CONFIRMATION PROCEDURE

1.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 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 EC9-231, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309159

1.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		
F115	6	Ground	Battery voltage
	10		

Is the inspection result normal?

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

2.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	
F82	35	F115	11	Existed
	67		9	

Is the inspection result normal?

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

3.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	
F115	1	F125	1	Existed
	2	F126	1	
	3	F127	1	
	4	F128	1	

Is the inspection result normal?

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

4.CHECK GLOW PLUG

Refer to EC9-232, "Component Inspection (Glow Plug)".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace error-detected parts.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace glow control unit.
NO >> Repair or replace.

Component Inspection (Glow Plug)

INFOID:0000000010309160

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 Logic

INFOID:0000000010309161

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors • High Pressure EGR volume control valve

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 EC9-234, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309162

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?

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	
F83	144	F14	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 EC9-234, "DTC Logic".

Is the DTC P0402 displayed again?

YES >> GO TO 6.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

6. CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to EC9-235, "Component Inspection (High Pressure EGR Volume Control Valve Motor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (High Pressure EGR Volume Control Valve Motor)

INFOID:0000000010309163

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 Logic

INFOID:0000000010309164

DTC DETECTION LOGIC

NOTE:
If DTC P0380 is displayed with DTC P0641, first perform the trouble diagnosis for DTC P0641 Refer to EC9-108, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (High Pressure EGR volume control valve command circuit is open or shorted.) • High Pressure EGR volume control valve

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 EC9-236, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010502693

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?

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	
F83	144	F14	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 EC9-236, "DTC Logic".

Is the DTC P0403 displayed again?

YES >> GO TO 6.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

6. CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to EC9-237, "Component Inspection (High Pressure EGR Volume Control Valve Motor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (High Pressure EGR Volume Control Valve Motor)

INFOID:0000000010309166

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.

P0409 EGR VOLUME CONTROL VALVE POSITION SENSOR

DTC Logic

INFOID:0000000010309167

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• 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

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 EC9-238, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309168

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?

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	
F83	106	F14	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 Logic

INFOID:0000000010309172

DTC DETECTION LOGIC

NOTE:
If DTC P0470 is displayed with DTC P0651, and P2263, perform the trouble diagnosis for DTC P0651, and P2263. Refer to EC9-108, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	Exhaust gas pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC9-240, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309173

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 GAS PRESSURE SENSOR HARNESS CONNECTOR CONNECTIONS

Check exhaust gas pressure sensor 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 POWER SUPPLY CIRCUIT

Check the power supply of the exhaust gas pressure sensor.

+		-	Voltage (Approx.)
Exhaust gas pressure sensor			
Connector	Terminal		
F135	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> Perform trouble diagnosis for power supply circuit.

4. 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	
F83	104	F135	3	Existed
	126		1	
	138		2	

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK EXHAUST GAS PRESSURE SENSOR

Refer to EC9-241, "Component Inspection (Exhaust Gas Pressure Sensor)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace error-detected parts.

6. DTC CONFIRMATION PROCEDURES

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to EC9-240, "DTC Logic".

Is the DTC P0470 displayed again?

YES >> GO TO 7.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

7. CHECK TURBOCHARGER

Check turbocharger.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Repair or replace malfunctioning parts.

Component Inspection (Exhaust Gas Pressure Sensor)

INFOID:0000000010309174

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 Logic

INFOID:0000000010309175

DTC DETECTION LOGIC

NOTE:
If DTC P0471 is displayed with DTC P0335, P0470, and P2226, perform the trouble diagnosis for DTC P0335, P0470, and P2226. Refer to EC9-108, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0471	PRS UPSTR OF TBN (Exhaust pressure sensor “A” circuit range/performance) • 1.DEF: INCORRECT SENSOR MOUNTING • 2.DEF: SIGNAL INCOHERENCE	• Difference between barometric pressure and exhaust pressure while engine stopped. • Exhaust pressure is excessively low while engine is running.	Exhaust gas pressure sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC P0471 can not duplicate.

>> Proceed to EC9-242, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010502768

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 GAS PRESSURE SENSOR HARNESS CONNECTOR CONNECTIONS

Check exhaust gas pressure sensor 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 POWER SUPPLY CIRCUIT

Check the power supply of the exhaust gas pressure sensor.

+		-	Voltage (Approx.)
Exhaust gas pressure sensor			
Connector	Terminal		
F135	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform trouble diagnosis for power supply circuit.

4.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	
F83	104	F135	3	Existed
	126		1	
	138		2	

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK EXHAUST GAS PRESSURE SENSOR

Refer to EC9-241, "Component Inspection (Exhaust Gas Pressure Sensor)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace error-detected parts.

6.DTC CONFIRMATION PROCEDURES

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to EC9-240, "DTC Logic".

Is the DTC P0471 displayed again?

YES >> GO TO 7.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

7.CHECK TURBOCHARGER

Check turbocharger.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Repair or replace malfunctioning parts.

Component Inspection (Exhaust Gas Pressure Sensor)

INFOID:0000000010309177

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.

P0487 EGR VOLUME CONTROL VALVE

DTC Logic

INFOID:0000000010309178

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors • High pressure EGR volume control valve • High pressure EGR valve position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to EC9-244, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309179

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?

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	
F83	106	F14	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 EC9-244, "DTC Logic".

Is the DTC P0487 displayed again?

YES >> GO TO 6.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

6. CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to EC9-245, "Component Inspection (High Pressure EGR Volume Control Valve Motor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (High Pressure EGR Volume Control Valve Motor)

INFOID:0000000010309180

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 Logic

INFOID:0000000010309181

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0488	EGR VALVE POSITION CONTRL (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.	• Harness or connectors • High pressure EGR volume control valve • High pressure EGR volume control valve position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to EC9-246, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010502829

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?

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	
F83	106	F14	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 EC9-246, "DTC Logic".

Is the DTC P0488 displayed again?

YES >> GO TO 6.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

6. CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to EC9-247, "Component Inspection (High Pressure EGR Volume Control Valve Motor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (High Pressure EGR Volume Control Valve Motor)

INFOID:0000000010309183

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 Logic

INFOID:0000000010309189

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Refrigerant pressure sensor circuit is open or shorted.) • Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 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 >> Go to EC9-248, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309190

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		
E41	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.

+		-		Continuity
Refrigerant pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
E41	1	F83	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	
E41	2	F83	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-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.
NO >> Repair or replace.

P0544 EGT SENSOR 1

DTC Logic

INFOID:0000000010309191

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Exhaust gas temperature sensor 1 circuit is open or shorted.) • Exhaust gas temperature sensor 1

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC P0544 can not duplicate.

>> Proceed to EC9-250, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309192

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	
F83	134	F150	1	Existed
	150		2	

Is the inspection result normal?

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

4.CHECK EXHAUST GAS TEMPERATURE SENSOR 1

Refer to EC9-251, "Component Inspection (Exhaust Gas Temperature Sensor 1)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (Exhaust Gas Temperature Sensor 1)

INFOID:0000000010309193

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 >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace exhaust gas temperature sensor 1.

P0560 BATTERY VOLTAGE

DTC Logic

INFOID:0000000010309197

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	Possible cause
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.	• Harness or connectors (ECM power supply circuit is open or shorted.) • Battery • Battery terminal • Alternator • IPDM E/R

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 EC9-252, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309198

1.CHECK BATTERY VOLTAGE

1. Turn ignition switch ON.
2. Check battery voltage.

Voltage: Above 11 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> Recharge the battery.

2.CHECK BATTERY TERMINALS

1. Turn ignition switch OFF.
2. Check battery terminals condition.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair the battery terminals.

3.CHECK BATTERY AND ALTERNATOR

Check that the proper type of battery and type of alternator are installed.
Refer to, PG-158, "Battery" and CHG-34, "Alternator".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace with a proper one.

P0564 ASCD STEERING SWITCH

DTC Logic

INFOID:0000000010309199

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (The switch circuit is open or shorted.) • ASCD steering switch

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. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
3. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Check DTC.

Is DTC detected?

YES >> Go to EC9-253, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309200

1.CHECK ASCD STEERING SWITCH CIRCUIT

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

ECM			Condition	Voltage (Approx.)
Connector	+	–		
	Terminal			
E58	15	14	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

Is the inspection result normal?

YES >> GO TO 5.
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	
M66	28	E58	14	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	
M66	27	E58	15	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 EC9-254, "Component Inspection (ASCD Steering Switch)".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace ASCD steering switch.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Steering Switch)

INFOID:0000000010309201

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			
M353	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
NO >> Replace ASCD steering switch.

P0575 ASCD STEERING SWITCH

DTC Logic

INFOID:0000000010309207

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible Cause
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.	ASCD steering switch

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 >> Go to EC9-255, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309208

1.CHECK ASCD STEERING SWITCH SIGNAL-1

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

+ ECM Connector	+ ECM Terminal	–	Condition	Voltage (Approx.)
E58	3	Ground	• ASCD MAIN switch: NOT pressed • Speed Limiter MAIN switch: NOT pressed	0 V
	10			
	3		• ASCD MAIN switch: Pressed • Speed Limiter MAIN switch: NOT pressed	Battery Voltage
	10			0 V
	3		• ASCD MAIN switch: NOT pressed • Speed Limiter MAIN switch: Pressed	0 V
	10			Battery Voltage

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
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.

Combination switch (spiral cable)			Continuity
Connector	+	-	
	Terminal		
M353	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		
M66	20	21	Not existed

Is the inspection result normal?

YES >> Replace spiral cable. Refer to SR-17, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P060A ECM

DTC Logic

INFOID:0000000010309216

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P060A	— (Internal control module monitoring processor performance)	Internal monitoring processor error.	ECM

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 EC9-257, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309217

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 EC9-144, "Work Procedure".

>> INSPECTION END

P060B ECM

DTC Logic

INFOID:0000000010499290

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P060B	— (Internal control module A/D processing performance) • 1.DEF: Internal electronic fault	ECM internal malfunction	ECM

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 EC9-258, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010499291

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 EC9-405, "Removal and Installation".
2. Go to EC9-137, "Work Procedure".

>> INSPECTION END

P061A ECM

DTC Logic

INFOID:0000000010309218

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	Possible cause
P061A	— (Internal control module torque performance)	ECM detects internal error.	ECM

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC P061A can not duplicate.

>> Proceed to EC9-259, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309219

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 EC9-144, "Work Procedure".

>> INSPECTION END

P0627 FUEL PUMP

DTC Logic

INFOID:0000000010309220

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Fuel pump relay circuit is open or shorted.) • Fuel pump relay • Fuel pressure sensor • FPCM

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 EC9-260, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309221

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.

+		–	Voltage (Approx.)
Fuel pressure sensor			
Connector	Terminal		
F124	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	
F124	3	F82	55	Existed

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

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
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	
F124	1	F82	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 EC9-260, "DTC Logic".

Is DTC detected again?

YES >> Replace fuel pump (in fuel tank).
NO >> Repair or replace fuel return circuit.

P062B ECM

DTC Logic

INFOID:0000000010309222

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P062B	COMPUTER (Internal control module fuel injector control performance) • 1.DEF: —	ECM calculation function is malfunctioning.	ECM

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 >> EC9-262, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309223

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 EC9-144, "Work Procedure".

>> INSPECTION END

P0638 ELECTRIC THROTTLE CONTROL ACTUATOR FUNCTION

DTC Logic

INFOID:0000000010309224

DTC DETECTION LOGIC

NOTE:
If DTC P0638 is displayed with DTC P0120 or P2100, first perform the trouble diagnosis for DTC P0120 or P2100. Refer to EC9-108, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Electric throttle control actuator • Throttle valve stuck • Throttle chamber clogged

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 EC9-263, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309225

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 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 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	
F83	103	F116	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. DTC CONFIRMATION PROCEDURES

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to EC9-263, "DTC Logic".

Is the DTC P0638 displayed again?

YES >> GO TO 5.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

5. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Perform EC9-206, "Component Inspection (Throttle Position Sensor)" (throttle position sensor), EC9-363, "Component Inspection" (throttle control motor).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC9-149, "Work Procedure".

>> INSPECTION END

P0641 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000010309226

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (The sensor power supply 1 circuit is shorted.) • High pressure EGR volume control valve position sensor • Throttle valve 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

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 EC9-265, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309227

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		
E58	27	Ground	5 V
F82	55		
	59		
F83	100		
	108		
	112		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
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
E58	27	Accelerator pedal position sensor (sensor 1)	E20	4
F82	55	Low pressure EGR volume control valve position sensor	F77	1
		Camshaft position sensor	F118	1
	59	Turbocharger boost sensor	F121	3
F83	100	DPF differential pressure sensor	F120	1
	108	High pressure EGR volume position sensor	F14	4
		Throttle valve position sensor	F116	1
	112	Intake manifold runner control valve position sensor	F107	1

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 EC9-365, "Diagnosis Procedure".
- Low pressure EGR volume control valve position sensor. Proceed to EC9-298, "Component Inspection (Low Pressure EGR Volume Control Valve Motor)".
- Camshaft position sensor. Proceed to EC9-230, "Component Inspection (Camshaft Position Sensor)".
- Turbocharger boost sensor. Proceed to EC9-198, "Component Inspection (Turbocharger Boost Sensor)".
- DPF pressure sensor. Proceed to EC9-376, "Diagnosis Procedure".
- High pressure EGR volume control valve position sensor. Proceed to EC9-238, "Diagnosis Procedure".
- Throttle valve position sensor. Proceed to EC9-206, "Component Inspection (Throttle Position Sensor)".
- Intake manifold runner control valve position sensor. Proceed to EC9-282, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace malfunctioning component.

P0651 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000010309231

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• 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

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 EC9-267, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309232

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		
E58	23	Ground	5.0 V
F82	99		
F83	100		
	104		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
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
E58	23	Accelerator pedal position sensor 2	E20	5
F82	99	Refrigerant pressure sensor	E41	3
F83	100	DPF differential pressure sensor	F120	1
	104	Exhaust electric throttle control actuator	F59	1
		Exhaust gas pressure sensor	F135	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.
- Accelerator pedal position sensor. Refer to EC9-220, "Component Inspection (Accelerator Pedal Position Sensor)".
- Refrigerant pressure sensor. Proceed to EC9-248, "Diagnosis Procedure".
- DPF differential pressure sensor. Proceed to EC9-285, "Component Inspection (DPF Differential Pressure Sensor)".
- Exhaust electric throttle control actuator. Proceed to EC9-287, "Component Inspection (Exhaust Throttle Control Motor)".
- Exhaust gas pressure sensor. Proceed to EC9-241, "Component Inspection (Exhaust Gas Pressure Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace malfunctioning component.

P0657 ECM RELAY

DTC Logic

INFOID:0000000010309233

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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)	• Harness or connectors (ECM relay control circuit is short-ed.) • ECM relay

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 EC9-269, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309234

1.CHECK FUSE

Check that the fuse is not fusing.

#54	10A
#55	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		
E58	28	Ground	Battery voltage
F82	96		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
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		
F82	41	Ground	Battery voltage

3. Turn ignition switch ON.
4. Check the voltage between ECM harness connector and ground.

+		-	Voltage (Approx.)
ECM			
Connector	Terminal		
F82	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	
F82	41	F89	77	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	
E58	28	F90	105	Existed
F82	96	F90	108	

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 Logic

INFOID:0000000010309236

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Fuel rail pressure sensor circuit is shorted.) • Fuel rail pressure sensor • Crankshaft position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to EC9-271, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309237

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		
F82	60	Ground	5 V
	91		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
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
F82	60	Crankshaft position sensor	F7	1
	91	Fuel rail pressure sensor	F86	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 EC9-227, "Component Inspection (Crankshaft Position Sensor)".
- Fuel rail pressure sensor. Proceed to EC9-209, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace malfunctioning component.

P0833 CPP SWITCH

DTC Logic

INFOID:0000000010309247

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness and connectors • Clutch pedal position switch

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 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 >> Go to EC9-274, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

Perform component function check. Refer to EC9-273, "Component Function Check".

NOTE:
Use component function check to check the overall function of the clutch switch circuit. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC9-274, "Diagnosis Procedure".

Component Function Check

INFOID:0000000010309248

1.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

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

ECM			Condition		Voltage
Connector	+	–			
	Terminal				
E58	9	29	Clutch pedal	Fully released	Approx. 0 V
				Fully depressed	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC9-274, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309249

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		
E2	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	
E2	1	E58	9	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 EC9-274, "Component Inspection (Clutch Pedal Position Switch)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace clutch pedal position switch.

Component Inspection (Clutch Pedal Position Switch)

INFOID:0000000010309250

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.

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-11, "Inspection".
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 Logic

INFOID:0000000010309257

DTC DETECTION LOGIC

NOTE:
If DTC P1010 is displayed with DTC P1011 and P1013, perform the trouble diagnosis for DTC P1011 and P1013. Refer to EC9-108, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Intake manifold runner control valve • Intake manifold runner control valve stuck • Intake manifold clogged

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 EC9-276, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309258

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.

+		-	Voltage
Intake manifold runner control valve			
Connector	Terminal		
F107	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	
F82	49	F107	4	Existed
F83	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 5.
NO >> Repair or replace error-detected parts.

5. DTC CONFIRMATION PROCEDURES

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to EC9-276, "DTC Logic".

Is the DTC P1010 displayed again?

YES >> Replace intake manifold runner control valve.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

P1011 SWIRL CONTROL VALVE ACTUATOR

DTC Logic

INFOID:0000000010309259

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness and connectors (Intake manifold runner control valve control circuit is open or shorted.) • Intake manifold runner control valve

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 EC9-278, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309260

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.

+		-		Continuity
ECM		Intake manifold runner control valve		
Connector	Terminal	Connector	Terminal	
F82	49	F107	4	Existed
F83	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.

P1012 SWIRL CONTROL VALVE ACTUATOR

DTC Logic

INFOID:0000000010309261

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1012	SWIRL FLAP (Swirl flap) • 1.DEF: OFFSET IMPLAUSIBLE	ECM detects the intake manifold runner control valve regulation error.	• Harness and 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

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 EC9-153, "Work Procedure".
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC9-280, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309262

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.

+		-		Continuity
ECM		Intake manifold runner control valve		
Connector	Terminal	Connector	Terminal	
F82	49	F107	4	Existed
F83	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 >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

5. CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE FITTING CONDITION

Check intake manifold runner control valve fitting condition.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P1013 SWIRL CONTROL VALVE POSITION SENSOR

DTC Logic

INFOID:0000000010309263

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness and connectors (Intake manifold runner control valve position sensor circuit is open or shorted.) • Intake manifold runner control valve position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to EC9-282, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309264

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.

+		-	Voltage
Intake manifold runner control valve			
Connector	Terminal		
F107	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	
F82	49	F107	4	Existed
F83	112		1	
	121		3	
	125		2	

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

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P1453 DIESEL PARTICULATE FILTER PRESSURE SENSOR

DTC Logic

INFOID:0000000010309272

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness and connectors • DPF differential pressure sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC P1453 can not duplicate.

>> Proceed to EC9-284, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309273

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	
F83	100	F120	1	Existed
	117		2	
	122		3	

Is the inspection result normal?

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

4.CHECK DPF DIFFERENTIAL PRESSURE SENSOR

Refer to EC9-285, "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 >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Repair DPF differential pressure sensor tube.

Component Inspection (DPF Differential Pressure Sensor)

INFOID:0000000010309274

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 Logic

INFOID:0000000010309275

DTC DETECTION LOGIC

NOTE:
If DTC P1480 is displayed with DTC P1481 and P1482, perform trouble diagnosis for DTC P1481 and P1482. Refer to EC9-108, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Exhaust throttle valve stuck • Exhaust electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 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 EC9-286, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309276

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.

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		
F59	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	
F83	104	F59	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 EC9-286, "DTC Logic".

Is the DTC P1480 displayed again?

YES >> GO TO 6.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

6.CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

Perform EC9-288, "Component Inspection (Exhaust Throttle Position Sensor)", EC9-287, "Component Inspection (Exhaust Throttle Control Motor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace exhaust electric throttle control actuator.

Component Inspection (Exhaust Throttle Control Motor)

INFOID:0000000010309277

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:0000000010503305

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 Logic

INFOID:0000000010309278

DTC DETECTION LOGIC

NOTE:
If DTC P1481 is displayed with DTC P0651, first perform the trouble diagnosis for DTC P0651. Refer to EC9-267, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1481	EXHAUST E/THROTTLE CONT ACTUATOR (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.	• Harness and connectors (Exhaust electric throttle control actuator command circuit is open or shorted.) • Exhaust electric throttle control actuator • Exhaust throttle valve stuck

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 wait at least 1 second.
2. Check DTC.

Is DTC detected?

YES >> EC9-289, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010503309

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.

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		
F59	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	
F83	104	F59	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 EC9-286, "DTC Logic".

Is the DTC P1481 displayed again?

YES >> GO TO 6.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

6.CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

Perform EC9-291, "Component Inspection (Exhaust Throttle Position Sensor)", EC9-290, "Component Inspection (Exhaust Throttle Control Motor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace exhaust electric throttle control actuator.

Component Inspection (Exhaust Throttle Control Motor)

INFOID:0000000010503310

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:0000000010503311

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 Logic

INFOID:0000000010309281

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness and connectors (Exhaust throttle valve position sensor circuit is open or shorted.) • Exhaust throttle valve position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to EC9-292, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309282

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.

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		
F59	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	
F83	113	F59	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 EC9-293, "Component Inspection (Exhaust Throttle Position Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace exhaust electric throttle control actuator.

Component Inspection (Exhaust Throttle Position Sensor)

INFOID:0000000010309283

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 Logic

INFOID:0000000010309284

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1483	EXHAUST AIR FLAP OFF-SET (Exhaust air flap offset) • 1.DEF: OFFSET IMPLAUSIBLE	ECM detects the exhaust throttle valve regulation error.	• Harness and 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

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 EC9-294, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010503312

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.

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		
F59	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	
F83	104	F59	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 EC9-286, "DTC Logic".

Is the DTC P1483 displayed again?

YES >> GO TO 6.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

6. CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

Perform EC9-295, "Component Inspection (Exhaust Throttle Position Sensor)", EC9-295, "Component Inspection (Exhaust Throttle Control Motor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace exhaust electric throttle control actuator.

Component Inspection (Exhaust Throttle Control Motor)

INFOID:0000000010503313

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:0000000010503314

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 Logic

INFOID:0000000010309287

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Low pressure EGR volume control valve clogged • Low pressure EGR volume control valve stuck • Low pressure EGR volume control valve

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 EC9-297, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309288

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 EC9-359, "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.

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	
F82	55	F77	1	Existed
	65		2	
	69		3	
F83	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 EC9-297, "DTC Logic".

Is the DTC P1484 displayed again?

YES >> GO TO 7.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

7. CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to EC9-298, "Component Inspection (Low Pressure EGR Volume Control Valve Motor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (Low Pressure EGR Volume Control Valve Motor)

INFOID:0000000010309289

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.

P1485 LOW PRESSURE EGR VOLUME CONTROL VALVE

DTC Logic

INFOID:0000000010309290

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Low pressure EGR volume control valve circuit is shorted.) • Low pressure EGR volume control valve

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 EC9-299, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010503342

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 EC9-359, "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.

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	
F82	55	F77	1	Existed
	65		2	
	69		3	
F83	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 EC9-297, "DTC Logic".

Is the DTC P1485 displayed again?

YES >> GO TO 7.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

7. CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to EC9-306, "Component Inspection (Low Pressure EGR Volume Control Valve Motor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (Low Pressure EGR Volume Control Valve Motor)

INFOID:0000000010503343

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.

P1486 LOW PRESSURE EGR VOLUME CONTROL VALVE POSITION SENSOR

DTC Logic

INFOID:0000000010309293

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Low pressure EGR volume control valve position sensor circuit is open or shorted.) • Low pressure EGR volume control valve position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to EC9-301, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010503344

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 EC9-359, "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.

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	
F82	55	F77	1	Existed
	65		2	
	69		3	
F83	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 EC9-297, "DTC Logic".

Is the DTC P1486 displayed again?

YES >> GO TO 7.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

7. CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to EC9-306, "Component Inspection (Low Pressure EGR Volume Control Valve Motor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (Low Pressure EGR Volume Control Valve Motor)

INFOID:0000000010503345

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.

P1487 LOW PRESSURE EGR VOLUME CONTROL VALVE

DTC Logic

INFOID:0000000010309296

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1487	LOW PRESSURE EGR VALVE (Low pressure EGR valve) • 1.DEF: OFFSET IMPLAUSIBLE	ECM detects the low pressure EGR volume control valve regulation error.	• 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

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 EC9-303, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010503346

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 EC9-359, "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.

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	
F82	55	F77	1	Existed
	65		2	
	69		3	
F83	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 EC9-297, "DTC Logic".

Is the DTC P1486 displayed again?

YES >> GO TO 7.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

7.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to EC9-306, "Component Inspection (Low Pressure EGR Volume Control Valve Motor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (Low Pressure EGR Volume Control Valve Motor)

INFOID:0000000010503347

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.

P1488 LOW PRESSURE EGR VOLUME CONTROL VALVE

DTC Logic

INFOID:0000000010309299

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• 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

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 EC9-305, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010503348

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 EC9-359, "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.

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	
F82	55	F77	1	Existed
	65		2	
	69		3	
F83	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 EC9-297, "DTC Logic".

Is the DTC P1488 displayed again?

YES >> GO TO 7.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

7. CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to EC9-306, "Component Inspection (Low Pressure EGR Volume Control Valve Motor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (Low Pressure EGR Volume Control Valve Motor)

INFOID:0000000010503349

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.

P1489 LOW PRESSURE EGR VOLUME CONTROL VALVE UPSTREAM TEMPERATURE SENSOR

DTC Logic

INFOID:0000000010309302

DTC DETECTION LOGIC

NOTE:
If DTC P1489 is displayed with following DTC, first perform the trouble diagnosis for following DTC. Refer to EC9-108, "DTC Index".
- **P1480, P1481, P1482, P1483, P1484, P1485, P1486, P1487 and P1488.**

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Low pressure EGR volume control valve upstream temperature sensor circuit is shorted.) • Low pressure EGR volume control valve upstream temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC9-307, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309303

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 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 3.
NO >> Repair or replace error-detected parts.

3.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	
F82	55	F77	1	Existed
	65		2	
	69		3	
F83	136		6	
	143		5	

Is the inspection result normal?

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

4.CHECK DIESEL PARTICULATE FILTER

Refer to EC9-359, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace diesel particulate filter.

5.CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE UPSTREAM TEMPERATURE SENSOR

Refer to EC9-308, "Component Inspection (Low Pressure EGR Temperature Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (Low Pressure EGR Temperature Sensor)

INFOID:0000000010309304

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.

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 Logic

INFOID:0000000010499293

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
148A	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.	• Harness or connectors • High pressure EGR volume control valve • High pressure EGR volume control valve volume control valve position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. 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 EC9-309, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010499294

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.
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	
F83	144	F14	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 EC9-309, "DTC Logic".

Is the DTC P148A displayed again?

YES >> GO TO 6.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

6.CHECK HIGH PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to ECK-239, "Component Inspection (EGR Volume Control Valve Motor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace high pressure EGR volume control valve.

Component Inspection (High Pressure EGR Volume Control Valve Motor)

INFOID:0000000010499295

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				
1	2	Temperature °C (°F)	23 (73)	2.4 Ω

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace high pressure EGR volume control valve.

P148B LOW PRESSURE EGR VOLUME CONTROL VALVE

DTC Logic

INFOID:0000000010499298

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Low pressure EGR volume control valve clogged • Low pressure EGR volume control valve stuck • Low pressure EGR volume control valve

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 EC9-311, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010499299

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 ECK-359, "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.

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	
F83	136	F77	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 EC9-311, "DTC Logic".

Is the DTC P148B displayed again?

YES >> GO TO 7.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

7. CHECK LOW PRESSURE EGR VOLUME CONTROL VALVE MOTOR

Refer to EC9-312, "Component Inspection (Low Pressure EGR Volume Control Valve Motor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (Low Pressure EGR Volume Control Valve Motor)

INFOID:0000000010499300

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 Logic

INFOID:0000000010499301

DTC DETECTION LOGIC

NOTE:
If DTC P1480 is displayed with DTC P1481 and P1482, perform trouble diagnosis for DTC P1481 and P1482. Refer to ECK-97, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Exhaust throttle valve stuck • Exhaust electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 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 EC9-313, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010499302

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.

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		
F59	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	
F83	104	F59	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 EC9-313, "DTC Logic".

Is the DTC P148C displayed again?

YES >> GO TO 6.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

6.CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

Perform ECK-303, "Component Inspection (Exhaust Throttle Position Sensor)", EC9-314, "Component Inspection (Exhaust Throttle Control Motor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> GO TO 7.

7.REPLACE EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace exhaust electric throttle control actuator.
2. Perform ECK-137, "Work Procedure".

>> INSPECTION END

Component Inspection (Exhaust Throttle Control Motor)

INFOID:0000000010499303

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:0000000010503584

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.

P1503 ACTIVE GRILLE SHUTTER

DTC Logic

INFOID:0000000010499304

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1503	CONTROLLED AIR VENTS INFORMATION (Controlled air vents information) • 1.DEF: NO BUS SIGNAL • 2.DEF: NO RESPONSE FROM THE VALVE MOTOR • 3.DEF: CLOSING OF AIR INLET FLAP • 4.DEF: FAULT ALERTED VIA THE CONTROL UNIT • 5.DEF: INITIALIZATION NOT VALID • 6.DEF: MECHANICAL FAULT • 7.DEF: NO SIGNAL SPECIFIC SUBTYPE	• LIN communication error with active grille shutter • Detects the malfunction of initial position learning or operational malfunctions for specified times. • Detects the temperature of active grille shutter actuator is more than 155°C (311°F) for more than 5 seconds for accumulation. • Detects the temperature of active grille shutter actuator is more than 155°C (311°F) for more than specified times.	• Harness or connectors • Active grille shutter actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been preciously 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 switch ON and wait at least 5 seconds.
2. Check DTC.

Is the DTC detected?

YES >> Proceed to EC9-316, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Start the engine and wait at least 60 seconds.
2. Check DTC.

Is the DTC detected?

YES >> Proceed to EC9-316, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010499305

1.CHECK DTC OF IPDM E/R

Check DTC of IPDM E/R.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to PCS-37, "DTC Index".
NO >> GO TO 2.

2.CHECK ECM HARNESS CONNECTOR CONNECTIONS

Check ECM harness connector and active grille shutter harness connector connection.

Is the inspection result normal?

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

3. CHECK ACTIVE GRILLE SHUTTER

1. Check if any foreign objects interferes with active grille shutter.
2. Check the installation condition of active grille shutter.

Is the inspection result normal?

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

4. CHECK FUSE

Check #51 fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace the fuse after repairing the applicable circuit.

5. CHECK ACTIVE GRILLE SHUTTER POWER SUPPLY-1

1. Reinsert the fuse which pulled out.
2. Turn ignition switch ON.
3. Check the voltage between IPDM E/R harness connector and ground.

+		-	Voltage
IPDM E/R			
Connector	Terminal		
E37	8	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> Perform trouble diagnosis for power supply circuit.

6. CHECK ACTIVE GRILLE SHUTTER POWER SUPPLY-2

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

+		-	Voltage
Active grille shutter			
Connector	Terminal		
E115	1	Ground	Battery voltage

Is the inspection result normal?

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

7. CHECK ACTIVE GRILLE SHUTTER POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check IPDM E/R harness connector and active grille shutter harness connector.

+		-		Continuity
IPDM E/R		Active grille shutter		
Connector	Terminal	Connector	Terminal	
E37	8	E115	1	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

8. CHECK LIN COMMUNICATION CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector, DC/DC converter harness connector, and alternator harness connector.
3. Check ECM harness connector and active grille shutter harness connector.

+		-		Continuity
ECM		Active grille shutter		
Connector	Terminal	Connector	Terminal	
F82	68	E115	3	Existed

Is the inspection result normal?

YES >> Replace active grille shutter.
NO >> Replace error-detected parts.

P1512 STARTER MOTOR

Description

INFOID:0000000010309305

ECM multiplies operation counter of starter motor which operated in operation with key switch and operation with restart and memorizes it.

DTC Logic

INFOID:0000000010309306

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	Starter motor

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 EC9-319, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309307

1.REPLACE STARTER MOTOR

Replace starter motor. Refer to STR-32, "R9M : Removal and Installation".

>> INSPECTION END

P1525 ASCD SYSTEM

DTC Logic

INFOID:0000000010309308

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	Possible cause
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.	• Harness or connectors • Others systems • ECM

Diagnosis Procedure

INFOID:0000000010309309

DTC P1525 is displayed with another DTC.
Perform trouble diagnosis for the corresponding DTC. Refer to EC9-108, "DTC Index".

P1544 EGT SENSOR 2

DTC Logic

INFOID:0000000010309310

DTC DETECTION LOGIC

NOTE:
If DTC P1544 is displayed with other DTC, perform trouble diagnosis for the other DTC. Refer to EC9-108, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• 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)

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC P1544 can not duplicate.

>> Proceed to EC9-321, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309311

1.CHECK EXHAUST LEAKAGE

Check exhaust leakage. Refer to EX-21, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts. And then GO TO 11.

2.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 3.
NO >> Repair or replace error-detected parts. And then GO TO 11.

3.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		
F139	2	Ground	5 V

Is the inspection result normal?

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

4. 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	
F83	105	F139	2	Existed

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

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Repair or replace error-detected parts. And then GO TO 11.

5. 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	
F83	109	F139	1	Existed

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. And then GO TO 11.

6. CHECK EXHAUST GAS TEMPERATURE SENSOR 2

Refer to EC9-323, "Component Inspection (DPF Upstream Temperature Sensor)".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace error-detected parts. And then GO TO 11.

7. CHECK TC BOOST SENSOR ROUTING CIRCUIT

Refer to EC9-197, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace error-detected parts. And then GO TO 11.

8. CHECK AIR FUEL RATIO (A/F) SENSOR ROUTING CIRCUIT

Refer to EC9-368, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace error-detected parts. And then GO TO 11.

9.CHECK EXHAUST ELECTRIC THROTTLE CONTROL ACTUATOR ROUTING CIRCUIT

Refer to EC9-286, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace error-detected parts. And then GO TO 11.

10.CHECK FUEL INJECTOR ROUTING CIRCUIT

Refer to EC9-214, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace error-detected parts. And then GO TO 11.

11.CHECK DIESEL PARTICULATE FILTER

Refer to EC9-359, "Component Inspection".

Is the inspection result normal?

YES-1 (Every inspection result are normal)>>Check intermittent incident. Refer to GI-41, "Intermittent Incident".
YES-2 (After repairing any malfunctioning part)>>INSPECTION END
NO >> Replace diesel particulate filter.

Component Inspection (DPF Upstream Temperature Sensor)

INFOID:0000000010309312

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 Logic

INFOID:0000000010309313

DTC DETECTION LOGIC

NOTE:

If DTC P1546 is displayed with following DTC, first perform the trouble diagnosis for following DTC. Refer to EC9-108, "DTC Index".

- **DTC P0001, P0002, P0101, P0190, P0200, P0201, P0202, P0203, P0204, P0627, P1453, P1544 and P2002.**

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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).	Diesel particulate filter

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:

DTC P1546 can not duplicate.

>> Proceed to EC9-324, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309314

1.CHECK OTHER DTC

If DTC P1546 is displayed with other DTC, perform trouble diagnosis for other DTC.

>> INSPECTION END.

P1589 NEUTRAL SWITCH

DTC Logic

INFOID:0000000010499334

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1589	GEAR BOX NEUTRAL CONTACTOR (Gear box neutral contactor) • 1.DEF: IMPLAUSIBLE SIGNAL	Neutral position switch signal remains ON for a long driving distance.	• Harness and connectors (Neutral position switch circuit is shorted.) • Neutral position switch

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC9-325, "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.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC9-326, "2WD : Diagnosis Procedure" (2WD models), EC9-327, "4WD : Diagnosis Procedure" (4WD models).

Component Function Check

INFOID:0000000010505128

1.PERFORM COMPONENT FUNCTION CHECK

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				
F82	80	Ground	Shift lever	Neutral	Battery voltage
				Except above	0 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC9-326, "2WD : Diagnosis Procedure" (2WD models), EC9-327, "4WD : Diagnosis Procedure" (4WD models).

2WD

2WD : Diagnosis Procedure

INFOID:0000000010499335

1.CHECK FUSE

Check that the following fuse is not fusing.

Fuse No.	Capacity
#67	10 A

Is the fuse fusing?

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

2.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 (Approx.)
Reverse/Neutral position switch			
Connector	Terminal		
F100	2	Ground	Battery voltage

Is the inspection result normal?

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

3.CHECK REVERSE/NEUTRAL POSITION SWITCH POWER SUPPLY CIRCUIT

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

+		–		Continuity
Reverse/Neutral position switch		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F100	2	F90	101	Existed

Is the inspection result normal?

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

4.CHECK REVERSE/NEUTRAL POSITION INPUT SIGNAL CIRCUIT-1

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	
F100	3	F82	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 reverse/neutral position switch harness connector and IPDM E/R harness connector.

+		–		
Reverse/Neutral position switch		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F100	3	F89	78	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-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace reverse/Neutral position switch.
NO >> Repair or replace error-detected parts.

4WD

4WD : Diagnosis Procedure

INFOID:0000000010505115

1. CHECK FUSE

Check that the following fuse is not fusing.

Fuse No.	Capacity
#67	10 A

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		
F159	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	
F159	2	F90	101	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	
F159	1	F82	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.

+		–		Continuity
Neutral position switch		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F159	2	F89	78	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-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace neutral position switch.
NO >> Repair or replace error-detected parts.

P158A CLUTCH SWITCH

DTC Logic

INFOID:0000000010505194

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P158A	END STROKE CLUTCH CONTACTOR (End stroke clutch contactor) • 1.DEF: IMPLAUSIBLE SIGNAL	ECM detects clutch interlock switch malfunction.	• Harness and connectors • Clutch interlock switch

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC9-329, "Component Function Check".

NOTE:

Use component function check to check the overall function of the clutch switch circuit. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC9-329, "Diagnosis Procedure".

Component Function Check

INFOID:0000000010505195

1.PERFORM COMPONENT FUNCTION CHECK

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

+		–	Condition		Voltage
ECM					
Connector	Terminal				
E58	6	Ground	Clutch pedal	Fully released	Battery voltage
				Fully depressed	Approx. 0 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC9-329, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010505196

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		
E52	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.

+		-		Continuity
Clutch interlock switch		ECM		
Connector	Terminal	Connector	Terminal	
E52	2	E58	6	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 EC9-330, "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 EC9-273, "Component Function Check".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Clutch Pedal Position Switch)

INFOID:0000000010505197

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 Logic

INFOID:0000000010309331

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P160C	COMPUTER (Computer) • 1.DEF: —	ECM function is malfunctioning.	ECM

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 EC9-331, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309332

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 EC9-108, "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.

Is the DTC P160C displayed again?

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

4.REPLACE ECM

1. Replace ECM.

2. Go to EC9-144, "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 EC9-108, "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 >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

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 EC9-108, "DTC Index".
NO >> INSPECTION END

P160D ECM

DTC Logic

INFOID:0000000010309333

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P160D	COMPUTER (Computer) • 1.DEF: VALUES OUTSIDE TOLERANCES	ECM internal power supply malfunction.	ECM

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 EC9-333, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309334

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 EC9-144, "Work Procedure".

>> INSPECTION END

P1620 ECM

DTC Logic

INFOID:0000000010309335

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1620	PROPOR RICH SEN FNC (Proportional richness sensor function) • 1.DEF: VALUES OUTSIDE TOLERANCES	ECM function is malfunctioning.	ECM

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC P1620 can not duplicate.

>> Proceed to EC9-334, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309336

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	
F82	89	F75	3	Existed
F83	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-41, "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**

P1641 THERMOPLUNGER CONTROL UNIT

DTC Logic

INFOID:0000000010309337

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Thermoplunger control unit circuit is open or shorted.) • Thermoplunger control unit

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 EC9-336, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309338

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.

+		-	Voltage
Thermoplunger control unit			
Connector	Terminal		
F66	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 EC9-89, "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	
F82	46	F66	8	Existed
	50		1	
	57		2	
	63		7	
	76		3	

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
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 EC9-89, "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	
F82	46	F66	8	Existed
	50		1	
	57		2	
	63		7	
	76		3	

Is the inspection result normal?

YES >> Replace thermoplunger control unit.
NO >> Repair or replace error-detected parts.

8. CHECK THERMOPLUNGER

Check thermoplunger. Refer to EC9-338, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace malfunctioning thermoplunger.

Component Inspection

INFOID:0000000010309339

1. CHECK THERMOPLUNGER

1. Turn ignition switch OFF.
2. Disconnect thermoplunger harness connector.
3. Check the resistance between thermoplunger terminal and ground.

+		
Thermoplunger	-	Resistance
Terminal		
1	Ground	608 ± 61 mΩ

is the inspection result normal?

YES >> INSPECTION END
NO >> Replace thermoplunger.

P1642 THERMOPLUNGER CONTROL UNIT

DTC Logic

INFOID:0000000010309340

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Thermoplunger control unit circuit is open or shorted.) • Thermoplunger control unit

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 EC9-339, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309341

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.

+		-	Voltage
Thermoplunger control unit			
Connector	Terminal		
F66	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 EC9-89, "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	
F82	46	F66	8	Existed
	50		1	
	57		2	
	63		7	
	76		3	

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
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 EC9-89, "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	
F82	46	F66	8	Existed
	50		1	
	57		2	
	63		7	
	76		3	

Is the inspection result normal?

YES >> Replace thermoplunger control unit.
NO >> Repair or replace error-detected parts.

8. CHECK THERMOPLUNGER

Check thermoplunger. Refer to EC9-341, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace malfunctioning thermoplunger.

Component Inspection

INFOID:0000000010309342

1. CHECK THERMOPLUNGER

1. Turn ignition switch OFF.
2. Disconnect thermoplunger harness connector.
3. Check the resistance between thermoplunger terminal and ground.

+		
Thermoplunger	-	Resistance
Terminal		
1	Ground	608 ± 61 mΩ

is the inspection result normal?

YES >> INSPECTION END
NO >> Replace thermoplunger.

P1643 THERMOPLUNGER CONTROL UNIT

DTC Logic

INFOID:0000000010309343

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Thermoplunger control unit circuit is open or shorted.) • Thermoplunger control unit

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 EC9-342, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309344

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.

+		-	Voltage
Thermoplunger control unit			
Connector	Terminal		
F66	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 EC9-89, "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	
F82	46	F66	8	Existed
	50		1	
	57		2	
	63		7	
	76		3	

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
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 EC9-89, "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	
F82	46	F66	8	Existed
	50		1	
	57		2	
	63		7	
	76		3	

Is the inspection result normal?

YES >> Replace thermoplunger control unit.
NO >> Repair or replace error-detected parts.

8. CHECK THERMOPLUNGER

Check thermoplunger. Refer to EC9-344, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace malfunctioning thermoplunger.

Component Inspection

INFOID:0000000010309345

1. CHECK THERMOPLUNGER

1. Turn ignition switch OFF.
2. Disconnect thermoplunger harness connector.
3. Check the resistance between thermoplunger terminal and ground.

+		
Thermoplunger	-	Resistance
Terminal		
1	Ground	608 ± 61 mΩ

is the inspection result normal?

YES >> INSPECTION END
NO >> Replace thermoplunger.

P1650 STARTER MOTOR RELAY 2

DTC Logic

INFOID:0000000010501207

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition		Possible cause
P1650	STR MTR RELAY 2 (Starter motor relay 2)	A	Engine restart relay is stuck ON.	• Starter control relay • Engine restart relay
		B	Engine restart relay is stuck OFF.	• Harness and 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

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 EC9-345, "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 EC9-39, "STOP/START SYSTEM : System Description (M/T models)" (M/T models), EC9-47, "STOP/START SYSTEM : System Description (CVT models)" (CVT models).

CAUTION:
Always drive vehicle at a safe speed.

Is stop/start system activated normal?

YES >> INSPECTION END
NO >> Proceed to EC9-345, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010501208

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		
F163	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	
F163	2	E39	44	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 relay.
3. Check the continuity between engine restart relay harness connector and starter relay harness connector.

+		–		Continuity
Starter relay		Engine restart relay		
Connector	terminal	Connector	terminal	
F162	3	F163	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 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.

+		–		Continuity
Engine restart relay		ECM		
Connector	terminal	Connector	terminal	
F163	1	F82	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	
F163	3	F88	65	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	
F163	3	F104	1	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 EC9-347, "Component Inspection".

Is the inspection result normal?

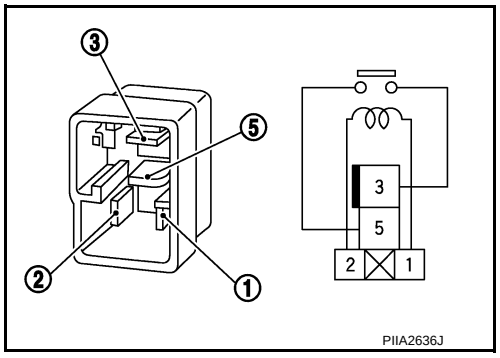
YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace engine restart relay.

Component Inspection

INFOID:0000000010501209

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?

YES >> INSPECTION END
NO >> Replace engine restart relay.

P1655 ENGINE RESTART BYPASS RELAY

DTC Logic

INFOID:0000000010501210

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1655	ENGINE RESTART BY-PASS RELAY (Engine restart bypass relay)	At an engine restart by stop/start system, the voltage drop allowance is less thanApprox. 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.	• 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

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 EC9-39, "STOP/START SYSTEM : System Description (M/T models)" (M/T models), EC9-47, "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 EC9-348, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010501211

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)	7	20 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		
F98	1	Ground	Battery voltage
	5		

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	
F98	2	F83	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.

+		–		Continuity
Engine restart bypass control relay		Engine restart bypass relay		
Connector	Terminal	Connector	Terminal	
F98	3	F146	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 EC9-350, "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 EC9-350, "Component Inspection (Engine Restart Bypass Relay)".

Is the inspection result normal?

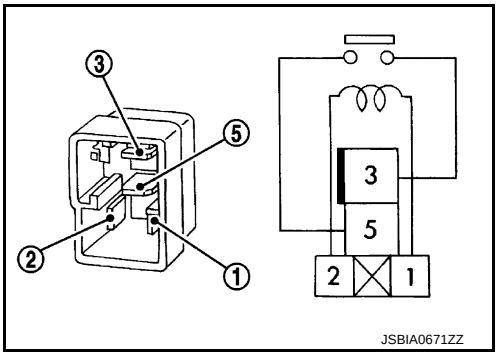
YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (Engine Restart Bypass Control Relay)

INFOID:0000000010501212

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?

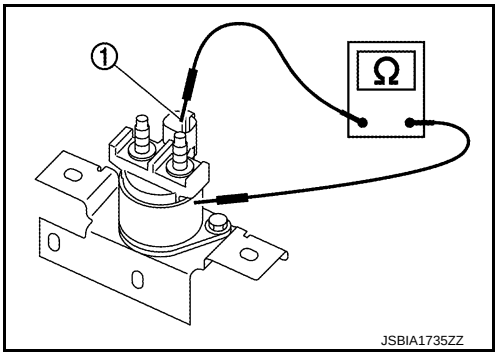
YES >> INSPECTION END
NO >> Replace engine restart bypass control relay.

Component Inspection (Engine Restart Bypass Relay)

INFOID:0000000010501213

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 EC9-409, "Exploded View".
4. Check the continuity between engine restart bypass relay terminal and engine restart bypass relay body.



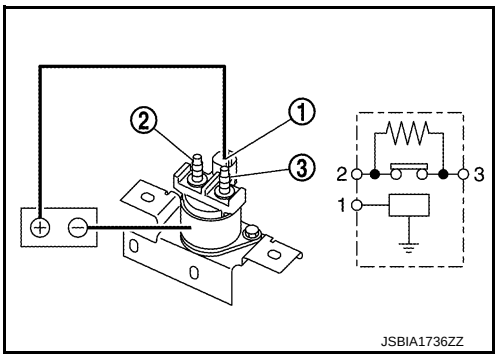
+	–	Continuity
Engine restart bypass relay		
Terminal		
1	Engine restart bypass relay body	Existed

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine restart bypass relay. Refer to EC9-409, "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 EC9-409, "Removal and Installation".

P1656 ENGINE RESTART BYPASS RELAY

DTC Logic

INFOID:0000000010309362

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1656	ENGINE RESTART BY-PASS 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.	• Harness and 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

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 EC9-39, "STOP/START SYSTEM : System Description (M/T models)" (M/T models), EC9-47, "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 EC9-352, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010507872

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)	7	20 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		
F98	1	Ground	Battery voltage
	5		

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	
F98	2	F83	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.

+		–		Continuity
Engine restart bypass control relay		Engine restart bypass relay		
Connector	Terminal	Connector	Terminal	
F98	3	F146	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 EC9-354, "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 EC9-354, "Component Inspection (Engine Restart Bypass Relay)".

Is the inspection result normal?

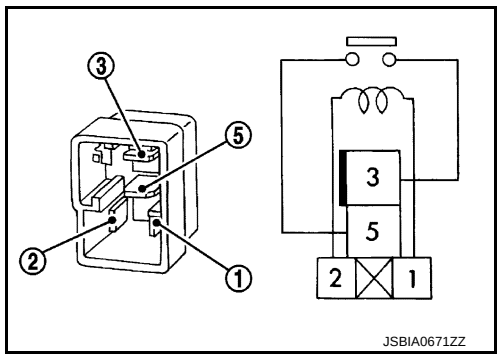
YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (Engine Restart Bypass Control Relay)

INFOID:0000000010507873

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?

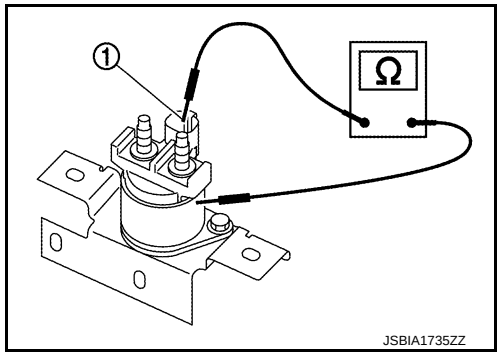
YES >> INSPECTION END
NO >> Replace engine restart bypass control relay.

Component Inspection (Engine Restart Bypass Relay)

INFOID:0000000010507874

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 EC9-409, "Exploded View".
4. Check the continuity between engine restart bypass relay terminal and engine restart bypass relay body.



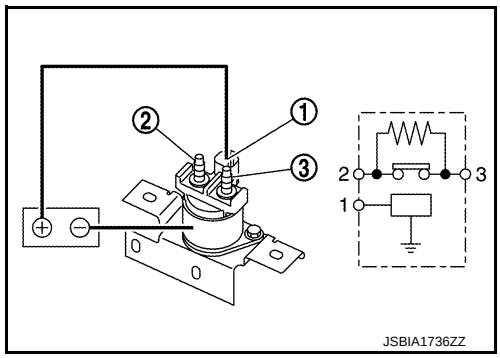
+	–	Continuity
Engine restart bypass relay		
Terminal		
1	Engine restart bypass relay body	Existed

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine restart bypass relay. Refer to EC9-409, "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 EC9-409, "Removal and Installation".

P1675 ENGINE COOLANT TEMPERATURE

DTC Logic

INFOID:0000000010507878

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	Possible cause
P1675	— (—)	When engine coolant temperature is too high.	• Cooling fan • Radiator hose • Radiator • Radiator cap • Water pump • Thermostat • Engine coolant bypass valve • Engine coolant temperature sensor

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.**

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC9-356, "Component Function Check".

NOTE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC9-357, "Diagnosis Procedure".

Component Function Check

INFOID:0000000010507879

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.

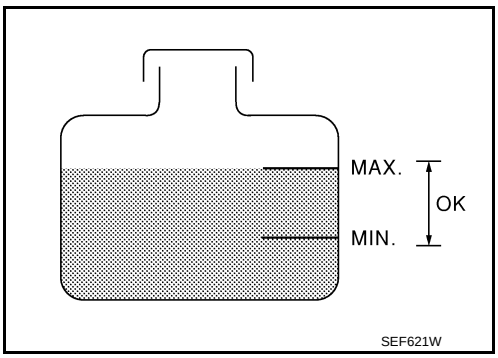
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

Check the coolant level in the reservoir tank and radiator.

Allow engine to cool before checking coolant level.

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

YES >> Proceed to EC9-357, "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 EC9-357, "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 EC9-357, "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 >> INSPECTION END
NO >> Proceed to EC9-357, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010507880

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 EC9-382, "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 EC9-203, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Perform overheating cause analysis. Refer to CO-87, "Troubleshooting Chart".
NO >> Replace engine coolant temperature sensor.

P2002 DIESEL PARTICULATE FILTER

DTC Logic

INFOID:0000000010309370

DTC DETECTION LOGIC

NOTE:
If DTC P2002 is displayed with following DTC, perform the trouble diagnosis for following DTC. Refer to EC9-108, "DTC Index".

- **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.**

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	Diesel particulate filter

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC P2002 can not duplicate.

>> Proceed to EC9-359, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309371

1.CHECK DIESEL PARTICULATE FILTER

Refer to EC9-359, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace diesel particulate filter.

2.CHECK INTAKE AIR SYSTEM

Check the intake air system for leakage.

Is the inspection result normal?

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

3.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 EC9-154, "Work Procedure".

Component Inspection

INFOID:0000000010309372

1.CHECK DIESEL PARTICULATE FILTER

Check diesel particulate filter for damage.

Is the inspection result normal?

YES >> Perform “SERVICE REGENERATION”. Refer to EC9-154, "Work Procedure".
NO >> Replace diesel particulate filter.

P2080 EGT SENSOR 1

DTC Logic

INFOID:0000000010309375

DTC DETECTION LOGIC

NOTE:
If DTC P2080 is displayed with DTC P0544, first perform the trouble diagnosis for DTC P0544. Refer to EC9-250, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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)	• Intake air leaks • Electric throttle actuator • Fuel injector • Exhaust gas leaks

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC P2080 can not be duplicate.

>> Proceed to EC9-361, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309376

1.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 2.
NO >> Repair or replace error-detected parts.

2.CHECK ELECTRIC THROTTLE ACTUATOR

Check the electric throttle actuator. Refer to EC9-363, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace electric throttle actuator.

3.CHECK FUEL INJECTOR

Check the fuel injector. Refer to EC9-212, "Component Inspection (Fuel Injector)".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace malfunctioning fuel injector.

4.CHECK EXHAUST SYSTEM

Check the exhaust gas leakage.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P2100 THROTTLE CONTROL MOTOR RELAY

DTC Logic

INFOID:0000000010309377

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Throttle control motor circuit is open or shorted) • Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 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 EC9-362, "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 EC9-362, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309378

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	
F83	103	F116	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 EC9-363, "Component Inspection".

Is the inspection result normal?

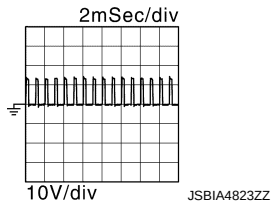
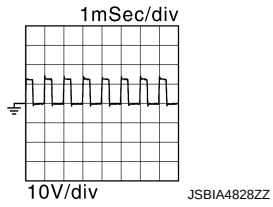
YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace electric throttle control actuator.

Component Inspection

INFOID:0000000010309379

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.

ECM				Condition	Voltage
+		–			
Connector	Terminal	Connector	Terminal		
F83	140	E58	29	[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 Logic

INFOID:0000000010309383

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2119	AIR INLET FLAP (Throttle actuator control throttle body range/performance) • 1.DEF: OFFSET IMPLAUSIBLE	ECM detects abnormally closed position of throttle control valve.	• Harness or connectors (Throttle control motor circuit is open or shorted) • Electric throttle control actuator

Diagnosis Procedure

INFOID:0000000010309384

1.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "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 EC9-149, "Work Procedure".

>> INSPECTION END

P2120 APP SENSOR

DTC Logic

INFOID:0000000010309385

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (APP sensor 2 circuit is open or shorted.) • APP sensor 2

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 EC9-365, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309386

1.CHECK ACCELERATOR PEDAL POSITION (APP) SENSOR POWER SUPPLY

Check the power supply of the APP sensor.

+		-	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E20	4	Ground	5.0 V
	5		

Is the inspection result normal?

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

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	
E58	23	E20	5	Existed
	27		4	

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC9-163, "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	
E58	21	E20	1	Existed
	22		6	
	30		2	
	31		3	

Is the inspection result normal?

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

4.CHECK APP SENSOR

Refer to EC9-366, "Component Inspection (Accelerator Pedal Position Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:0000000010309387

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				
E58	31	30	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	22	21		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 Logic

INFOID:0000000010309388

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	ECM

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 EC9-367, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309389

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 EC9-405, "Removal and Installation".
NO >> Remove foreign matter.

P2243 A/F SENSOR

DTC Logic

INFOID:0000000010309390

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (A/F sensor circuit is open.) • A/F sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC P2243 can not duplicate.

>> Proceed to EC9-368, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309391

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	
F82	89	F75	3	Existed
F83	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-41, "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**

P2244 A/F SENSOR

DTC Logic

INFOID:0000000010309392

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (A/F sensor circuit is shorted.) • A/F sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to EC9-370, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010508255

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	
F82	89	F75	3	Existed
F83	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-41, "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**

P2263 TC SYSTEM

DTC Logic

INFOID:0000000010309394

DTC DETECTION LOGIC

NOTE:
If DTC P2263 is displayed with following DTC, first perform the trouble diagnosis for following DTC. Refer to EC9-108, "DTC Index".

- **P0001, P0002, P0045, P0105, P0106, P0115, P0190, P0200, P0201, P0202, P0203, P0204, P0217, P0402, P0409, P0487, P0488, P0627, P0641 and P0651.**

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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)	• 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

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC P2263 can not be duplicate.

>> Proceed to EC9-372, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309395

1.CHECK AIR FILTER

Check that air filter is not obstructed.

Is the inspection result normal?

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

2.CHECK INTAKE AIR DUCT

Check that intake air duct is not obstructed.

Is the inspection result normal?

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

3.CHECK EXHAUST GAS LEAK

Check exhaust gas leak.

Is the inspection result normal?

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

4.CHECK TURBOCHARGER BOOST SENSOR

Check the turbocharger boost sensor. Refer to EC9-198, "Component Inspection (Turbocharger Boost Sensor)".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace turbocharger boost sensor.

5. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Check the turbocharger boost control solenoid valve. Refer to EC9-190, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK TURBOCHARGER

Check the turbocharger.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. CHECK EGR CIRCUIT

Check the EGR circuit.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8. CHECK FUEL FLOW ACTUATOR CIRCUIT

Check fuel flow actuator circuit.

+		-		Continuity
ECM		Fuel flow actuator		
Connector	Terminal	Connector	Terminal	
F82	43	F123	2	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P2264 WATER IN FUEL SENSOR

DTC Logic

INFOID:0000000010309396

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Detection sensor circuit is open.) • Water in fuel level sensor • Fuel filter

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 EC9-374, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309397

1.PERFORM DIESEL FUEL FILTER WATER DRAINING

Perform diesel fuel filter water draining. Refer to FL-47, "Water Draining".

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?

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		
F177	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	
E58	24	F177	1	Existed

+		-	Continuity
Fuel heater and water level sensor			
Connector	Terminal		
F177	3	Ground	Existed
	4		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P2452 DIESEL PARTICULATE FILTER PRESSURE SENSOR

DTC Logic

INFOID:0000000010309399

DTC DETECTION LOGIC

NOTE:
If DTC P2452 is displayed with DTC P0641, P0651 or P0697, first perform the trouble diagnosis for DTC P0641, P0651 or P0697. Refer to EC9-265, "DTC Logic", EC9-267, "DTC Logic" or EC9-271, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Diesel particulate filter differential pressure sensor circuit is open or shorted.) • Diesel particulate filter differential pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to EC9-376, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309400

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

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 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 3.
NO >> Repair or replace error-detected parts.

3.CHECK DPF DIFFERENTIAL PRESSURE SENSOR POWER SUPPLY

Check the DPF differential pressure sensor power supply.

+		-	Voltage (Approx.)
DPF differential pressure sensor			
Connector	Terminal		
F120	1	Ground	5.0 V

Is the inspection result normal?

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

4. 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	
F83	100	F120	1	Existed
	117		2	

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5. 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	
F83	122	F120	3	Existed

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. REPLACE DPF DIFFERENTIAL PRESSURE SENSOR

Replace DPF differential pressure sensor.

>> GO TO 7.

7. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC Confirmation Procedure.
See EC9-376, "DTC Logic".

Is the DTC P2452 detected again?

YES >> Replace ECM. Refer to EC9-405, "Removal and Installation".
NO >> INSPECTION END

P2504 CHARGING SYSTEM VOLTAGE

DTC Logic

INFOID:0000000010499345

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors • Alternator

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 EC9-378, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010624055

1.CHECK DRIVE BELT

Check drive belt. Refer to EM-373, "Checking".

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-15, "Work Flow".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Repair or replace error-detected part.

P253F ENGINE OIL DETERIORATED

DTC Logic

INFOID:0000000010309401

DTC DETECTION LOGIC

NOTE:
If DTC P253F is displayed with DTC P0115, first perform the trouble diagnosis for DTC P0115. Refer to EC9-203, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P253F	ENG OIL DILUTION (Engine oil deteriorated) • 1.DEF: SIGNAL INCOHERENCE	When engine oil is too much quantity.	Too much engine oil

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 EC9-379, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309402

1.CHECK ENGINE OIL LEVEL

Check the engine oil level. Refer to LU-48, "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-49, "Draining" or LU-49, "Refilling".

2.CHECK OIL LEVEL SENSOR

Check oil level sensor. Refer to MWI-67, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace engine oil level sensor. Refer to EC9-12, "Component Parts Location".

P2626 A/F SENSOR

DTC Logic

INFOID:0000000010309403

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (A/F sensor circuit is open.) • A/F sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC P2626 can not duplicate.

>> Proceed to EC9-380, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309404

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	
F82	89	F75	3	Existed
F83	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-41, "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**

P2681 ENGINE COOLANT BYPASS VALVE

DTC Logic

INFOID:0000000010309405

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (Engine coolant bypass valve control solenoid valve circuit is open or shorted.) • Engine coolant bypass valve

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 EC9-382, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010309406

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-136, "FOR MAINTENANCE REQUIRED BATTERY MODELS : How to Handle Battery" (for maintenance required battery models) or PG-142, "FOR MAINTENANCE FREE BATTERY MODELS : How to Handle Battery" (for maintenance free battery models).

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.

+		-	Voltage
Engine coolant bypass valve			
Connector	Terminal		
F145	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	
F145	2	F90	103	Existed

4. Also check harness for short to gound.

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	
F145	1	F82	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 EC9-383, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace engine coolant bypass valve.

Component Inspection

INFOID:0000000010309407

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.

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 Logic

INFOID:0000000010309408

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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.	• Harness or connectors (A/F sensor circuit is open.) • A/F sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC P2A06 can not duplicate.

>> Proceed to EC9-385, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309409

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	
F83	89	F75	3	Existed
	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-41, "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

Component Function Check

INFOID:0000000010500944

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 >> EC9-387, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010500945

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		
B75	8	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform the trouble diagnosis for power supply circuit. Refer to EC9-163, "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		
B76	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	
B77	9	E58	13	Existed
	10		11	

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 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	
B75	3	B94	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 EC9-388, "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:0000000010500946

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

Component Function Check

INFOID:0000000010309410

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				
E58	17	25	Brake pedal	Slightly de-pressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC9-389, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309411

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		
E50	3	Ground	Battery voltage

CVT models

+		–	Voltage
Brake pedal position switch			
Connector	Terminal		
E30	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	
E50	4	E58	17	Existed

CVT models

+		–		Continuity
Brake pedal position switch		ECM		
Connector	Terminal	Connector	Terminal	
E30	2	E58	17	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 EC9-390, "Component Inspection (Stop Lamp Switch)" (M/T models), EC9-390, "Component Inspection (Brake Pedal Position Switch)" (CVT models).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace stop lamp switch.

Component Inspection (Stop Lamp Switch)

INFOID:0000000010309412

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 de-pressed	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-8, "Inspection and Adjustment" (LHD models) or BR-52, "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 de-pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch.

Component Inspection (Brake Pedal Position Switch)

INFOID:0000000010929195

1.CHECK BRAKE PEDAL POSITION SWITCH-1

1. Turn ignition switch OFF.

2. Disconnect brake pedal position switch 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-8, "Inspection and Adjustment" (LHD models) or BR-52, "Inspection and Adjustment" (RHD models).
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.

HOOD SWITCH

Component Function Check

INFOID:0000000010309413

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				
E100	1	Ground	Engine hood	Close	Battery voltage
				Open	0 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC9-392, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010309414

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		
E100	1	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	
E100	1	E102	60	Existed

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		
E100	2	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 EC9-393, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace hood switch.

Component Inspection

INFOID:0000000010309415

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				
1	2	Hood switch	Released	Existed
			Depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace hood switch.

STOP/START OFF SWITCH

Component Function Check

INFOID:0000000010499347

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 EC9-394, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010499348

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		
M110	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		
M110	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.

+		–	Voltage (Approx.)
Stop/start OFF switch			
Connector	Terminal		
M110	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	
M69	99	M110	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		
M110	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 EC9-395, "Component Inspection".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop/start OFF switch.

Component Inspection

INFOID:0000000010499349

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		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.

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:0000000010309424

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	
Warranty symptom code	AA				AB			AC	AD	AE		AF		
Engine body	x	x	x	x	x	x	x		x	x	x		x	EM-429
Air cleaner and duct										x	x			EM-380
ECM	x	x	x	x	x	x	x	x	x	x	x	x	x	EC9-257, EC9-259, EC9-262
Camshaft position sensor circuit			x	x										EC9-229
Crankshaft position sensor circuit		x	x	x	x	x	x	x	x	x	x			EC9-227
Mass air flow sensor circuit								x		x	x			EC9-194, EC9-196
Intake air temperature sensor 1 circuit														EC9-201, EC9-201
Turbocharger boost sensor circuit								x		x	x			EC9-197, EC9-199
Intake air temperature sensor 2 circuit														EC9-192
Air fuel ratio (A/F) sensor circuit														EC9-368, EC9-370
Engine coolant temperature sensor circuit			x		x		x						x	EC9-203
Fuel injector circuit	x	x	x	x	x	x	x	x	x	x	x	x	x	EC9-211

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	
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												EC9-209
Fuel temperature sensor circuit														EC9-187
Fuel heater circuit														—
Turbocharger boost control solenoid valve circuit								x		x	x			EC9-190
High pressure EGR volume control valve circuit								x		x	x			EC9-234, EC9-236
Low pressure EGR volume control valve circuit														EC9-297, EC9-299, EC9-303, EC9-305
Low pressure EGR volume control valve Upstream temperature sensor circuit														EC9-307
Electric throttle control actuator circuit	x	x	x	x	x	x	x			x	x			EC9-263, EC9-364
Intake manifold runner control valve										x				EC9-276, EC9-278, EC9-280
Exhaust electric throttle control actuator circuit										x				EC9-286, EC9-289, EC9-292, EC9-294
DPF (Diesel Particulate Filter)														EC9-359

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	
Warranty symptom code	AA				AB			AC	AD	AE		AF		
Exhaust gas pressure sensor 1 circuit														EC9-240, EC9-242
DPF pressure sensor circuit														EC9-284, EC9-376
Exhaust gas temperature sensor 1 circuit														EC9-250, EC9-361
Exhaust gas temperature sensor 2 circuit														EC9-321
Glow control unit circuit	x	x	x						x					EC9-231
Glow plug circuit	x	x	x						x					EC9-231
Cooling fan resister circuit					x					x				—
Thermoplunger unit circuit														—
Thermoplunger control unit circuit														EC9-336, EC9-339, EC9-342
Engine coolant bypass valve circuit														—
Engine coolant bypass valve control solenoid valve circuit														EC9-382
Accelerator pedal position sensor circuit								x		x	x			EC9-219,EC9-221, EC9-365
Refrigerant pressure sensor circuit					x	x	x							EC9-248
NATS (Nissan Anti-theft System)		x												SEC-77, SEC-231

STOP/START SYSTEM

Diagnosis Procedure

INFOID:0000000010309425

1.CHECK STOP/START SYSTEM FUNCTION-1

Activate stop/start system. Refer to EC9-39, "STOP/START SYSTEM : System Description (M/T models)".

Is the stop/start system activated?

YES >> GO TO 2.
NO >> Proceed to EC9-401, "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-54, "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 EC9-39, "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 EC9-397, "Symptom Table".
NO >> Perform the trouble diagnosis for starting system. Refer to STR-18, "Work Flow".

STOP/START SYSTEM NOT ACTIVATED

Diagnosis Procedure

INFOID:0000000010309426

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

With 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

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.

Is stop/ start system activated normal?

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

4.CHECK HIGH PRESSURE FUEL PUMP OPERATION COUNTER

With 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-408, "Removal and Installation".

5.CHECK STARTER MOTOR OPERATION COUNTER

With 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-32, "R9M : Removal and Installation".

6.CHECK IPDM E/R STATUS

With CONSULT

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 DISCHAGE COUNT” indication.

Monitor item	Indication
BAT DISCHAGE 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-155, "Removal and Installation".

8. CHARGE BATTERY

Charge battery. Refer to PG-136, "FOR MAINTENANCE REQUIRED BATTERY MODELS : How to Handle Battery" (for maintenance required battery models) or PG-142, "FOR MAINTENANCE FREE BATTERY MODELS : How to Handle Battery" (for maintenance free battery models).

>> 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-136, "FOR MAINTENANCE REQUIRED BATTERY MODELS : How to Handle Battery" (maintenance required battery) or PG-142, "FOR MAINTENANCE FREE BATTERY MODELS : How to Handle Battery" (maintenance free battery).

10. CHECK STOP/START OFF SWITCH

Check the stop/start OFF switch. Refer to EC9-394, "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 EC9-392, "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 EC9-39, "STOP/START SYSTEM : System Description (M/T models)" (M/T models), EC9-47, "STOP/START SYSTEM : System Description (CVT models)" (CVT models).

>> INSPECTION END

PERIODIC MAINTENANCE

IDLE SPEED

Inspection

INFOID:0000000010309427

1.CHECK IDLE SPEED

With CONSULT

Check “ENGINE SPEED” in “DATA MONITOR” mode with CONSULT.

Idle speed: Refer to EC9-411, "Idle Speed".

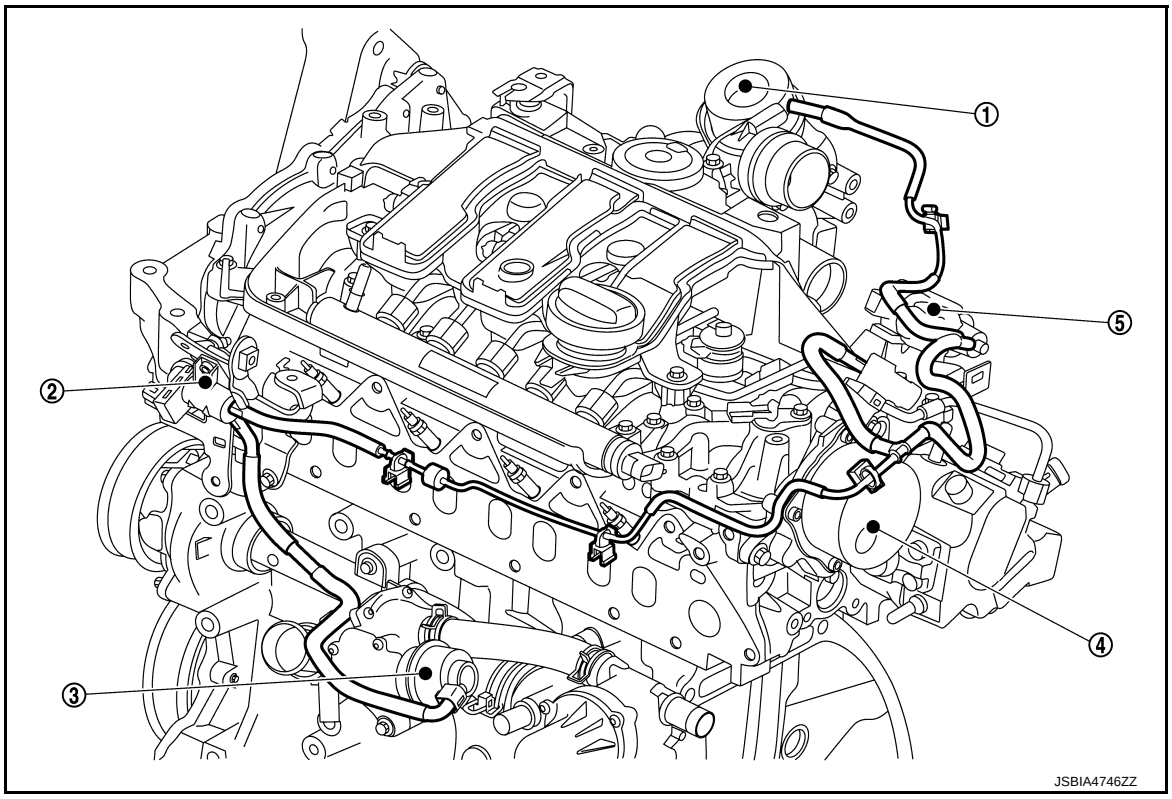
>> INSPECTION END

REMOVAL AND INSTALLATION

VACUUM LINES

Vacuum Layout

INFOID:0000000010309428



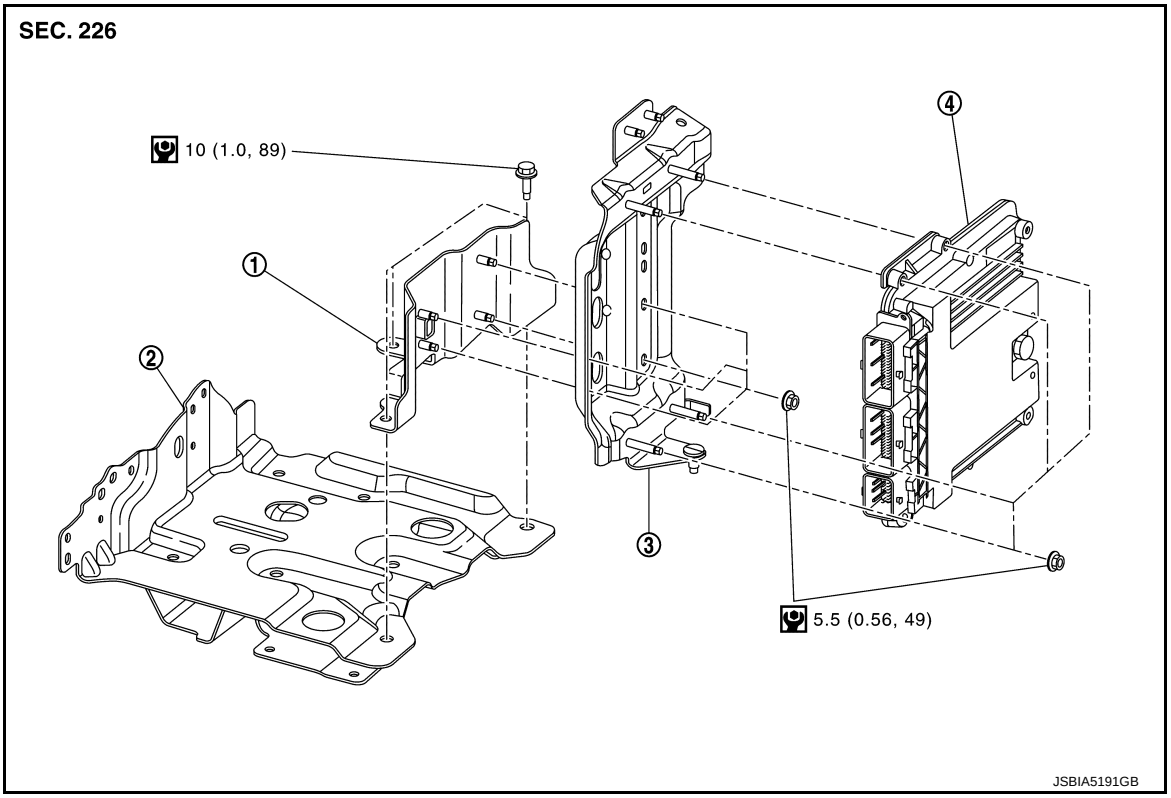
1. TC boost control actuator
2. Engine coolant bypass valve control solenoid valve
3. Engine coolant bypass valve control actuator
4. Vacuum pump
5. TC boost control solenoid valve

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

ECM

Exploded View

INFOID:0000000010309429



1. Battery mounting bracket
2. Bracket A
3. Bracket B
4. ECM

: N·m (kg-m, in-lb)

Removal and Installation

INFOID:0000000010309430

CAUTION:
Perform ADDITIONAL SERVICE WHEN REPLACING ECM. Refer to EC9-144, "Work Procedure".

REMOVAL

1. Disconnect battery negative terminal.
2. Remove air duct (inlet). Refer to EM-380, "Removal and Installation".
3. Disconnect ECM harness connectors.
4. Remove battery, battery cover and battery tray. Refer to PG-155, "Removal and Installation".
5. Remove bracket A with ECM.
6. Remove ECM from bracket B.

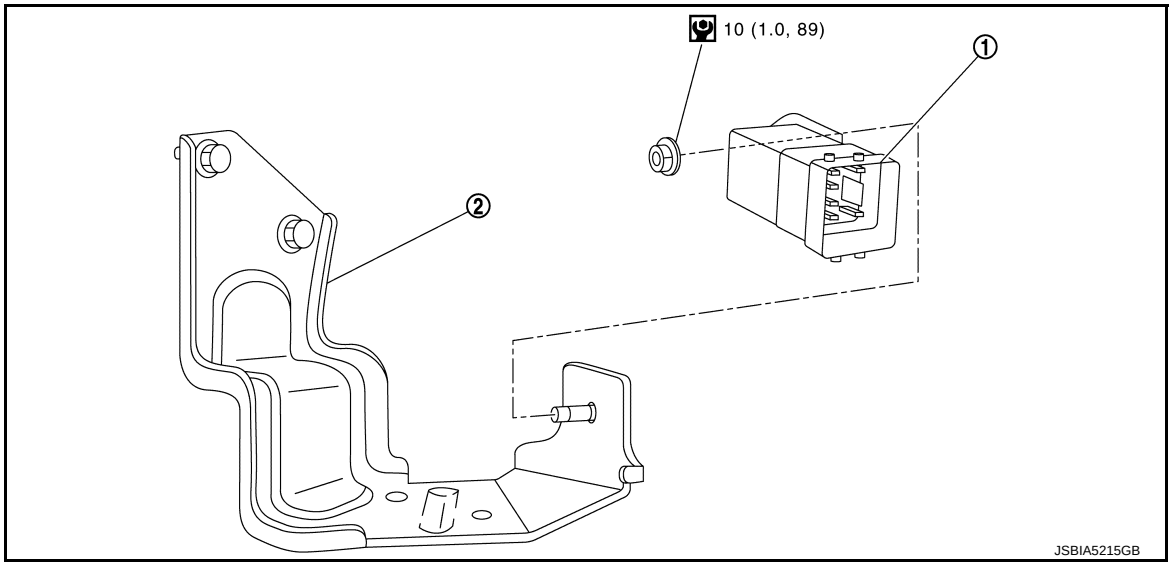
INSTALLATION

Install in the reverse order of removal.

GLOW CONTROL UNIT

Exploded View

INFOID:0000000010500754



1. Glow control unit
2. Bracket

: N·m (kg-m, in-lb)

Removal and Installation

INFOID:0000000010500755

REMOVAL

1. Remove front bumper. Refer to EXT-19, "Removal and Installation".
2. Disconnect glow control unit harness connector.
3. Remove glow control unit from bracket.

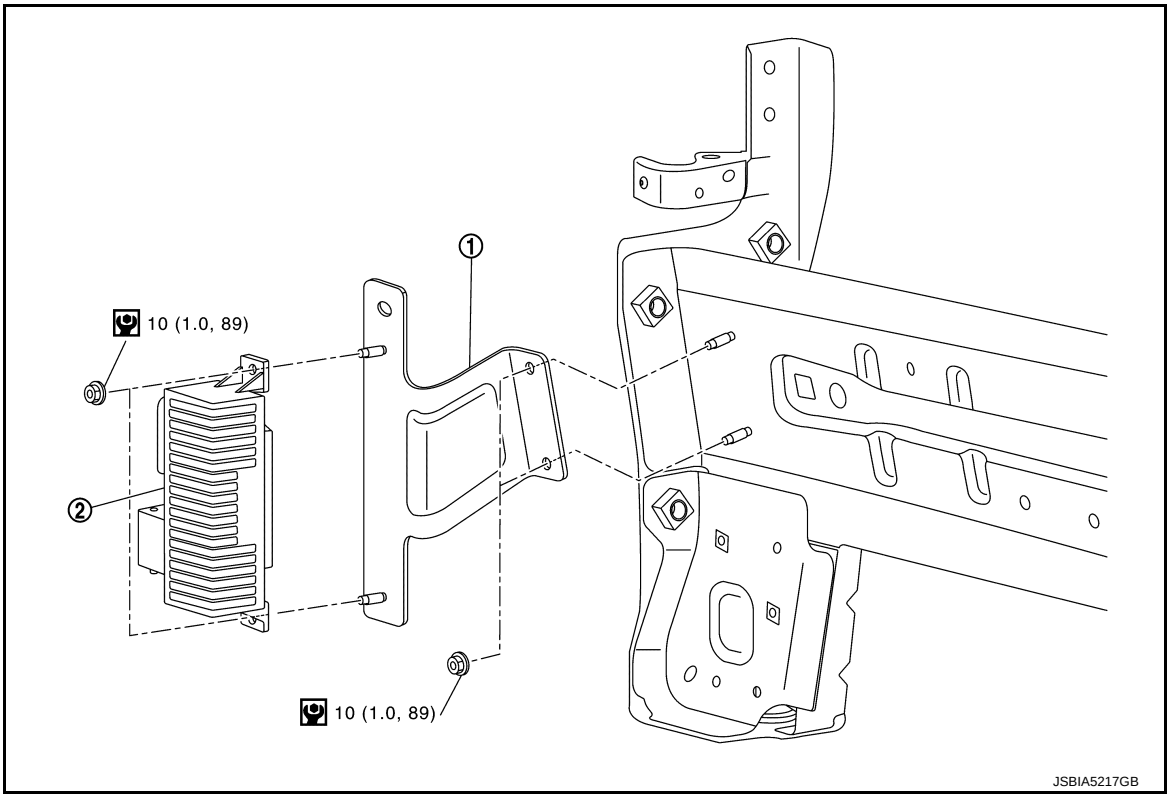
INSTALLATION

Install in the reverse order of removal.

THERMOPLUNGER CONTROL UNIT

Exploded View

INFOID:0000000010309431



1. Bracket
2. Thermoplunger control unit

: N·m (kg-m, in-lb)

Removal and Installation

INFOID:0000000010309432

REMOVAL

1. Remove front bumper. Refer to EXT-19, "Removal and Installation".
2. Disconnect thermoplunger control unit harness connector.
3. Remove thermoplunger control unit from bracket.

INSTALLATION

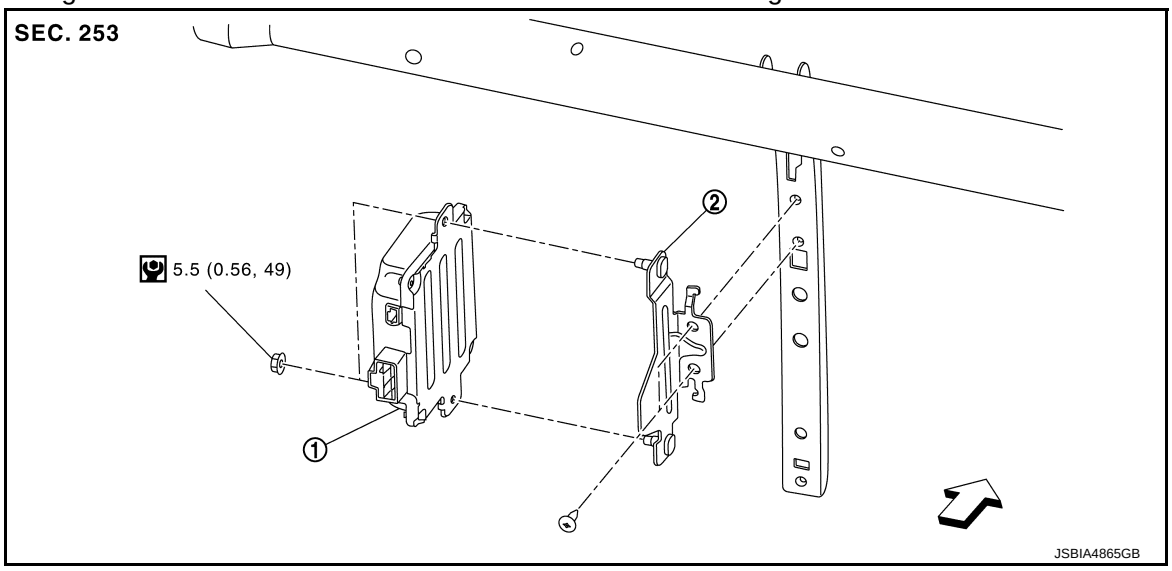
Install in the reverse order of removal.

DC/DC CONVERTER

Exploded View

INFOID:0000000010309433

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:0000000010309434

REMOVAL

1. Disconnect battery negative terminal. Refer to EC9-9, "Precautions for Removing Battery Terminal".
2. Remove glove box cover. Refer to IP-12, "Exploded View".
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.

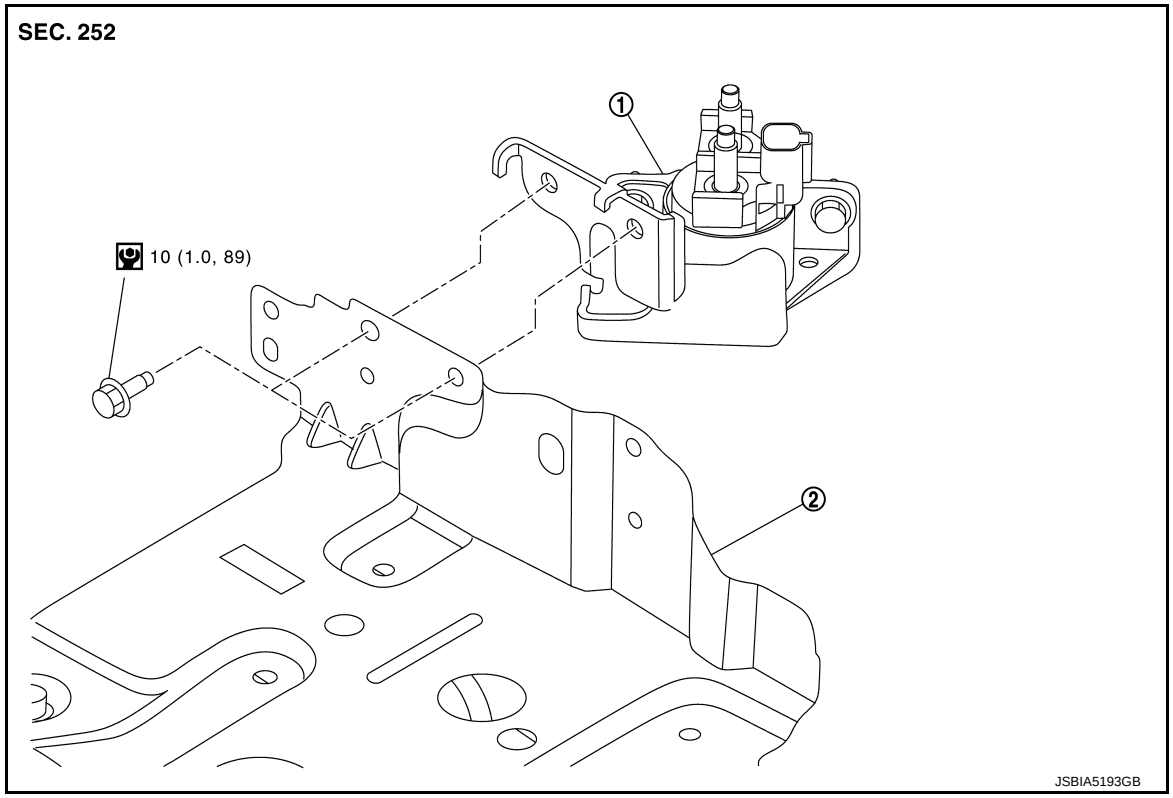
INSTALLATION

Install in the reverse order of removal.

ENGINE RESTART BYPASS RELAY

Exploded View

INFOID:0000000010309435



1. Engine restart bypass relay
2. Battery mounting bracket

: N·m (kg-m, in-lb)

Removal and Installation

INFOID:0000000010309436

REMOVAL

1. Remove battery, battery cover and battery tray. Refer to PG-155, "Removal and Installation".
2. Disconnect engine restart bypass relay harness connectors.
3. Remove bracket with engine restart bypass relay.

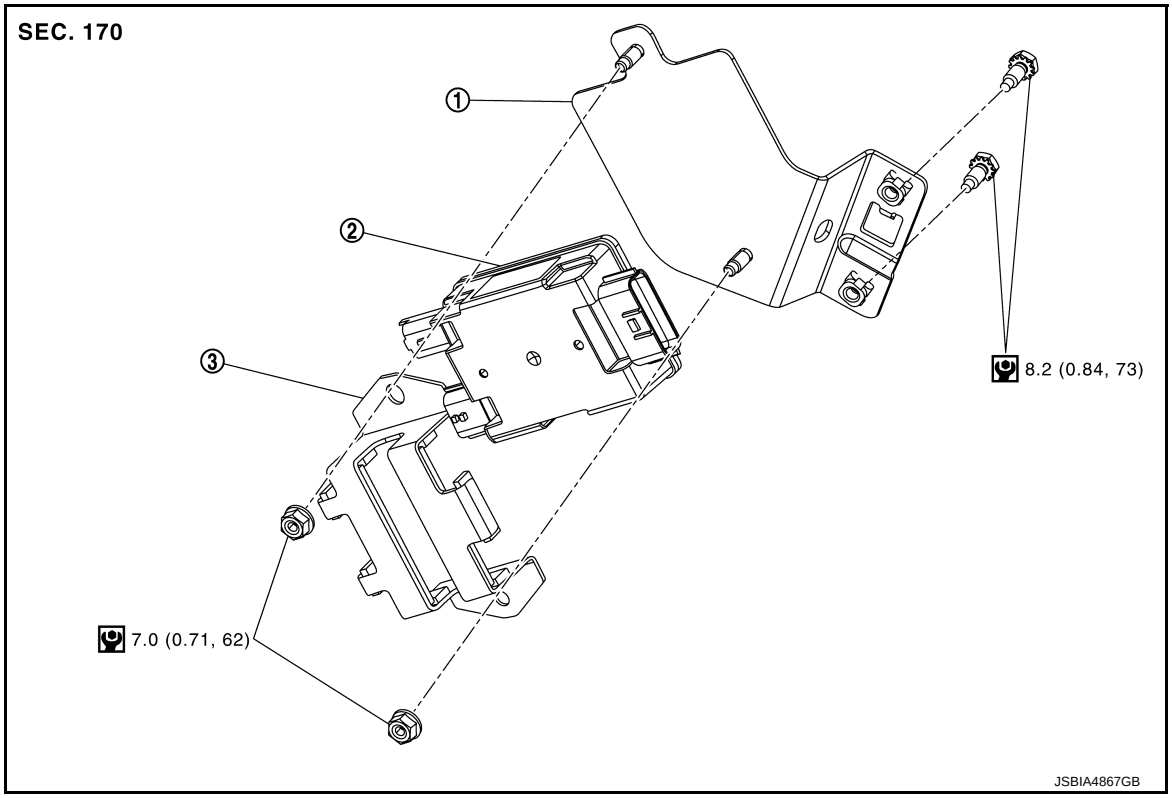
INSTALLATION

Install in the reverse order of removal.

FUEL PUMP CONTROL MODULE (FPCM)

Exploded View

INFOID:0000000010500761



1. Bracket
2. Fuel pump control module (FPCM)
3. Cover

: N·m (kg-m, in-lb)

Removal and Installation

INFOID:0000000010500762

REMOVAL

1. Remove luggage side finisher (RH). Refer to INT-28, "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:0000000010309439

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