SECTION ECH

ENGINE CONTROL SYSTEM (HR)

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PRECAUTION

PRECAUTIONS

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

INFOID:0000000010378999

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 SR and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SR section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

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

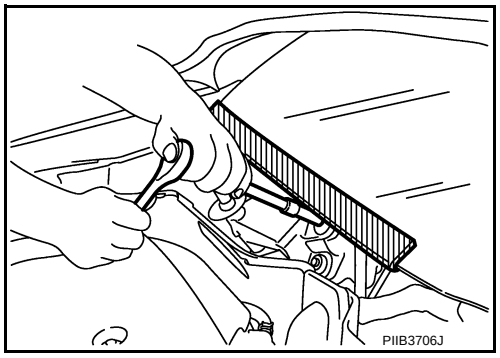
WARNING:

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

Precaution for Procedure without Cowl Top Cover

INFOID:0000000010506344

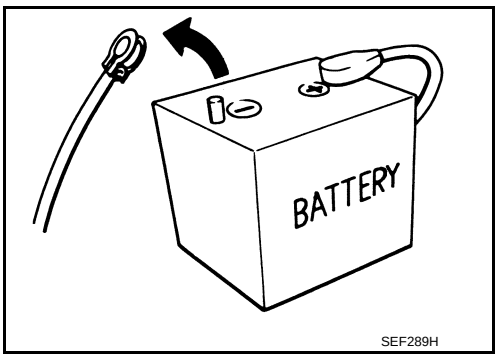
When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



Precautions for Removing Battery Terminal

INFOID:0000000010506181

- 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:0000000010506596

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:0000000010379001

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

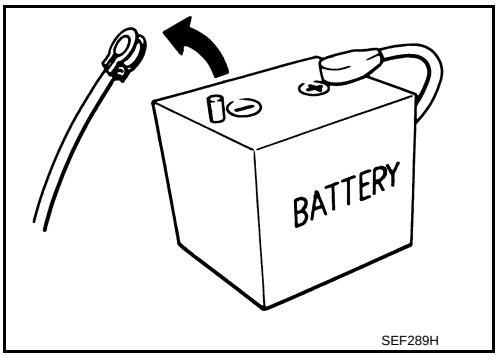
CAUTION:

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

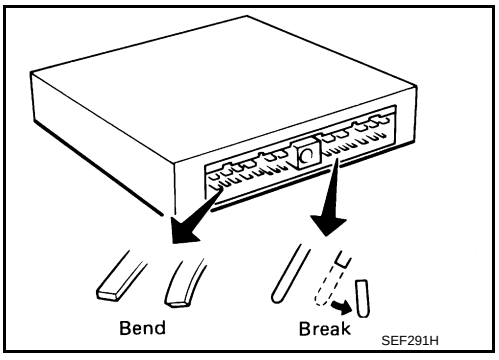
General Precautions

INFOID:0000000010379002

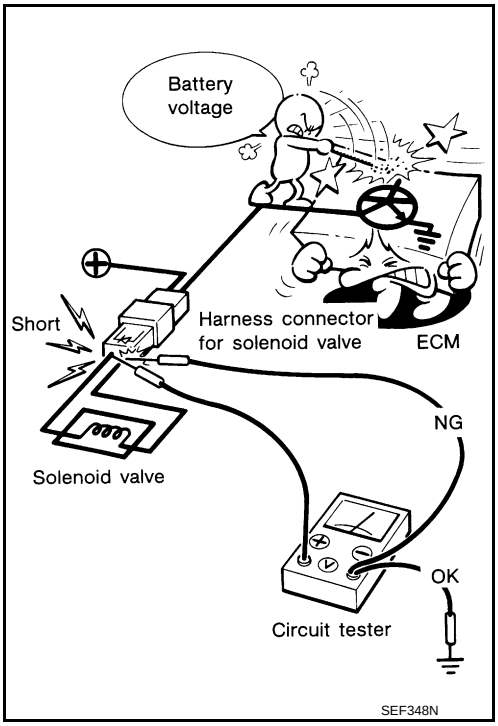
- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF, wait 3 minutes and disconnect battery negative cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect battery negative cable.**
- **Do not disassemble ECM.**



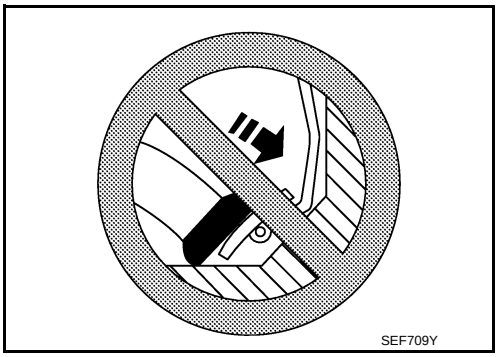
- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to IC's.
- **Keep engine control system harness at least 10cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of IC's, etc.**
- **Keep engine control system parts and harness dry.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Do not shock or jar the crankshaft position sensor.**



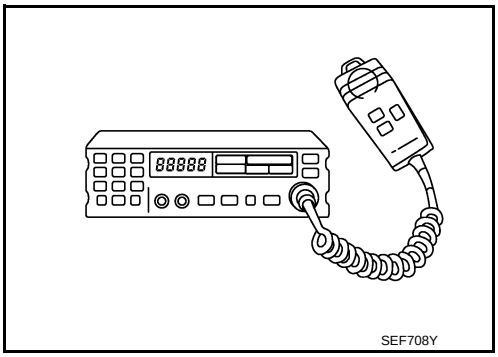
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**
- **Do not disassemble fuel pump.**
  If NG, take proper action.
- **Do not disassemble fuel injector.**
  If NG, replace fuel injector.



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



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

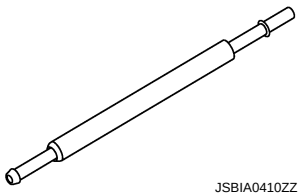


PREPARATION

PREPARATION

Special Service Tools

INFOID:0000000010379003

Tool number Tool name	Description
KV10120000 Fuel tube adapter  JSBIA0410ZZ	Measuring fuel pressure

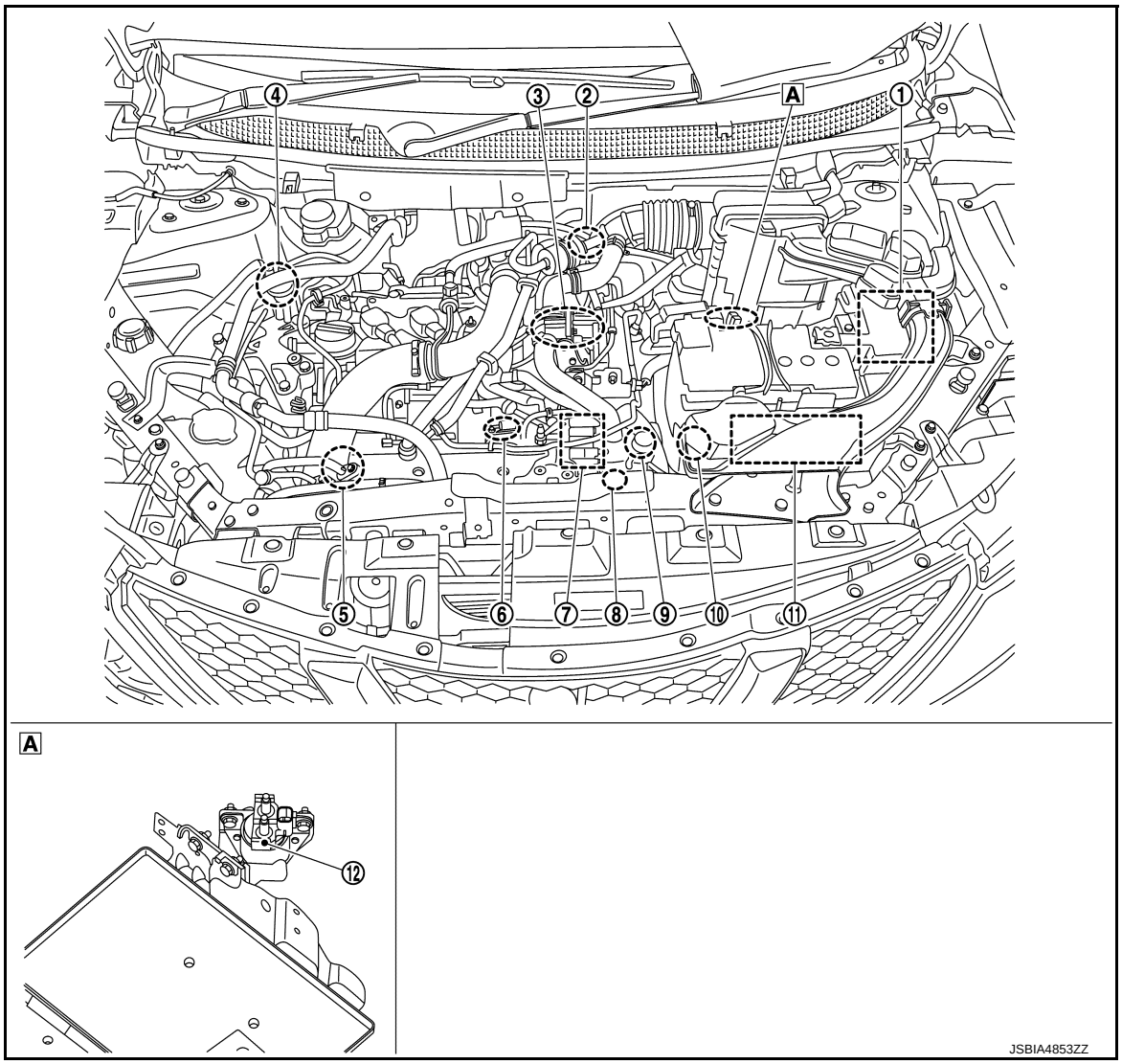
SYSTEM DESCRIPTION

COMPONENT PARTS

Component Parts Location

INFOID:0000000010379004

ENGINE ROOM COMPARTMENT

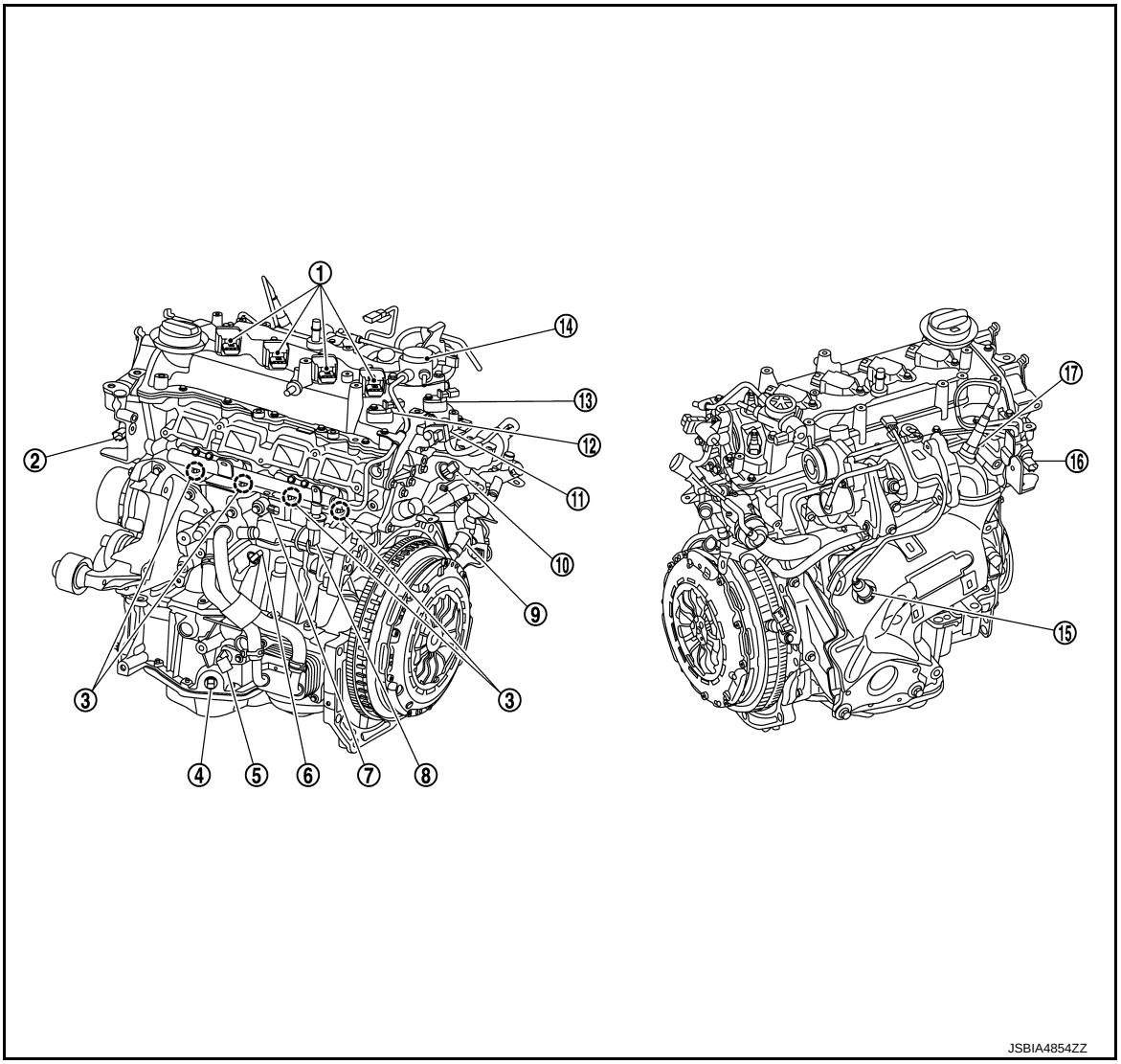


A Battery mounting bracket assembly

No.	Component	Reference
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	Turbocharger bypass valve control solenoid valve	ECH-20, "Turbocharger bypass valve control solenoid valve"
3	Turbocharger wastegate control solenoid valve	ECH-20, "Turbocharger wastegate control solenoid valve"
4	EVAP canister purge volume control solenoid valve	ECH-18, "EVAP Canister Purge Volume Control Solenoid Valve"
5	Alternator	CHG-6, "Alternator"

No.	Component	Reference
6	Intake manifold pressure sensor	ECH-19, "Intake Manifold Pressure Sensor"
7	Electric throttle control actuator	ECH-16, "Electric Throttle Control Actuator"
8	Turbocharger boost sensor (with intake air temperature sensor)	ECH-20, "Turbocharger Boost Sensor"
9	Hood switch	ECH-18, "Hood Switch"
10	Reverse / neutral position switch	It detects that the transmission is in reverse and neutral.
11	ECM	ECH-16, "ECM"
12	Engine restart bypass relay	ECH-17, "Engine Restart Bypass Relay"

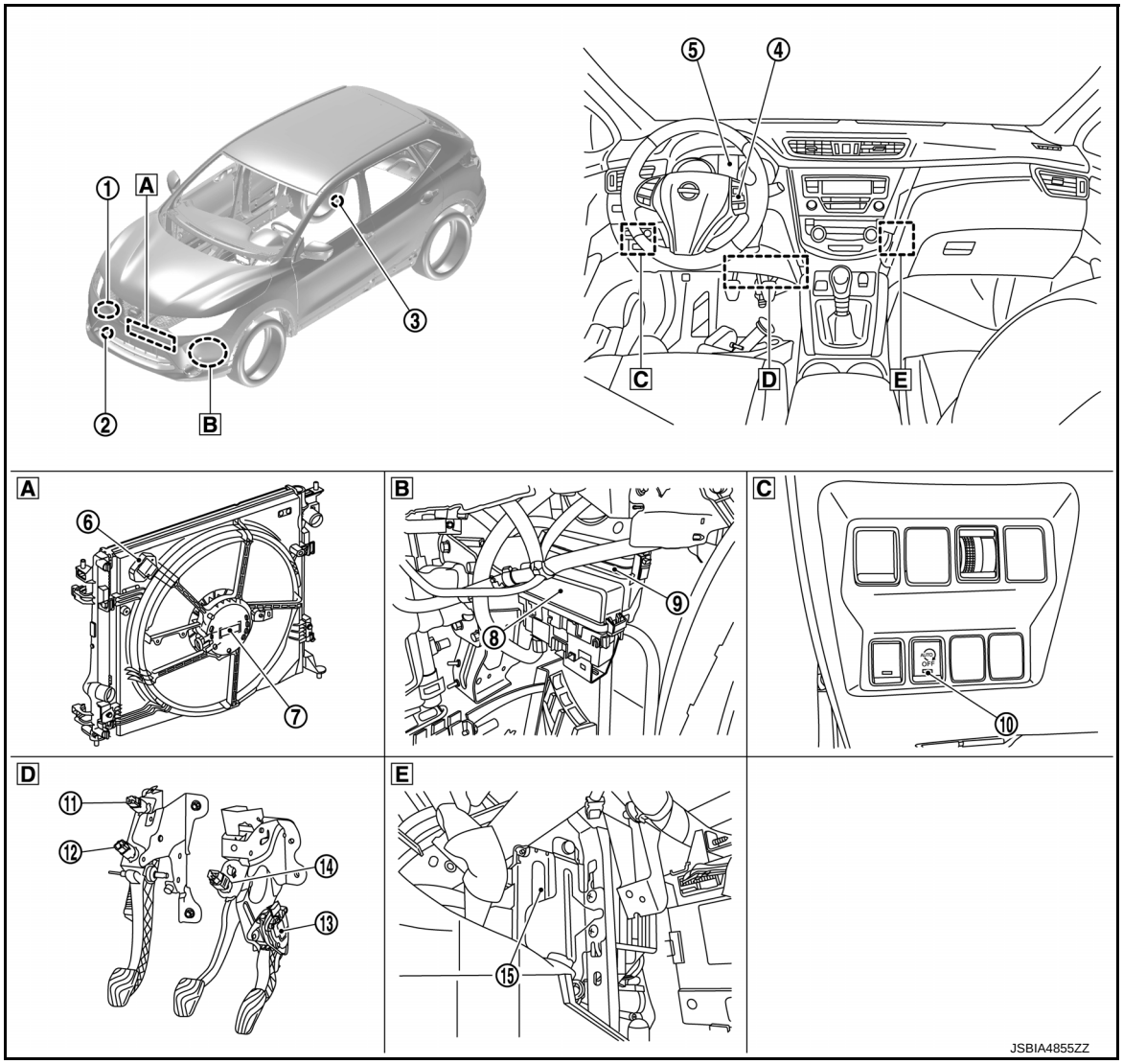
ENGINE COMPARTMENT



No.	Component	Reference
1	Ignition coil	ECH-18, "Ignition Coil"
2	Intake valve timing control solenoid valve	ECH-19, "Intake Valve Timing Control Solenoid Valve"
3	Fuel injector	ECH-18, "Fuel Injector"
4	Engine oil pressure control solenoid valve	—
5	Engine oil pressure sensor	—
6	Thermostat heater control solenoid valve	ECH-20, "Thermostat Heater Control Solenoid Valve"

No.	Component	Reference
7	Knock sensor	ECH-19, "Knock Sensor"
8	Fuel rail pressure sensor	ECH-18, "Fuel Rail Pressure Sensor"
9	Crankshaft position sensor	ECH-16, "Crankshaft Position Sensor"
10	Engine coolant temperature sensor	ECH-17, "Engine Coolant Temperature Sensor"
11	Engine coolant bypass valve control solenoid valve	ECH-17, "Engine Coolant Bypass Valve Control Solenoid Valve"
12	Camshaft position sensor	ECH-15, "Camshaft Position Sensor"
13	Exhaust valve timing control position sensor	ECH-18, "Exhaust Valve Timing Control Position Sensor"
14	High pressure fuel pump	ECH-18, "High Pressure Fuel Pump"
15	Heated oxygen sensor 2	ECH-18, "Heated Oxygen Sensor 2"
16	Exhaust valve timing control solenoid valve	ECH-18, "Exhaust Valve Timing Control Solenoid Valve"
17	Heated oxygen sensor 1	ECH-18, "Heated Oxygen Sensor 1"

BODY COMPARTMENT



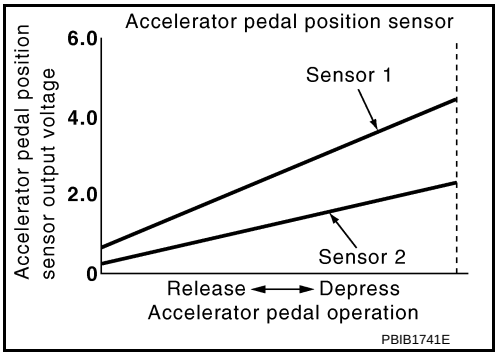
A Radiator assembly
B Behind front fender protector LH
C Instrument lower panel
D Periphery of pedals
E Behind of glove box assembly

No.	Component	Reference
1	EVAP canister	EVAP canister stores the generated fuel vapors in the sealed fuel tank to activated charcoals of EVAP canister when the engine is not operating or when refueling to the fuel tank.
2	Refrigerant pressure sensor	ECH-19, "Refrigerant Pressure Sensor"
3	Fuel pump	ECH-19, "Fuel Pump"
4	ASCD steering switch	ECH-15, "ASCD Steering Switch"
5	Combination meter	• ECH-19, "Malfunction Indicator Lamp" • ECH-19, "Stop/Start Indicator Lamp"
6	Cooling fan resistor	ECH-16, "Cooling Fan Resistor"
7	Cooling fan	ECH-16, "Cooling Fan"
8	Relay box	—
9	Fuse block (J/B)	—
10	Stop/start OFF switch	ECH-20, "Stop/Start OFF Switch"
11	Clutch interlock switch	ECH-15, "Clutch Interlock Switch"
12	Clutch pedal position switch	ECH-15, "Clutch Pedal Position Switch"
13	Accelerator pedal position sensor	ECH-15, "Accelerator Pedal Position Sensor"
14	Stop lamp switch	ECH-19, "Stop Lamp Switch"
15	DC/DC converter	ECH-16, "DC/DC Converter"

Accelerator Pedal Position Sensor

INFOID:0000000010379005

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signals to the ECM.



ASCD Steering Switch

INFOID:0000000010471137

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

Camshaft Position Sensor

INFOID:0000000010471148

The camshaft position (CMP) sensor senses the retraction with camshaft to identify a particular cylinder. The camshaft position sensor senses the piston position. When the crankshaft position (CKP) sensor system becomes inoperative, the camshaft position sensor provides various controls of engine parts instead, utilizing timing of cylinder identification signals. The sensor consists of a permanent magnet and Hall IC.

Clutch Pedal Position Switch

INFOID:0000000010379006

Clutch switch signal is applied to the ECM through the clutch pedal position switch when the clutch pedal is depressed.

Clutch Interlock Switch

INFOID:0000000010471128

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

Clutch pedal	Clutch interlock switch
Released	OFF
Depressed	ON

Cooling Fan

INFOID:0000000010379007

Cooling fan operates at each speed when the current flows in the cooling fan motor as follows.
Refer to ECH-31, "COOLING FAN CONTROL : System Description" for cooling fan operation.

Cooling Fan Resistor

INFOID:0000000010503741

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.

Crankshaft Position Sensor

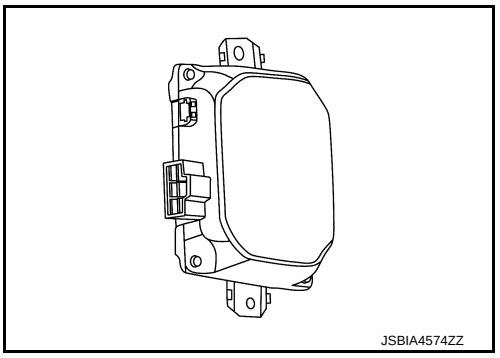
INFOID:0000000010379008

The crankshaft position (CKP) sensor is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate. The ECM receives the voltage signal and detects the function of the engine revolution.
The crankshaft position sensor also senses the piston position.

DC/DC Converter

INFOID:0000000010471141

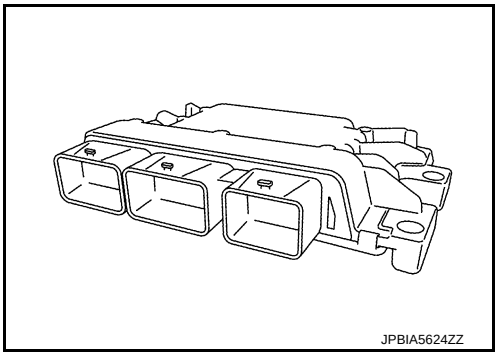
The DC/DC converter is installed at the behind of the glove box assembly and supplies power to the electrical equipment.
This converter is connected to ECM via the engine communication line and includes an internal voltage converter. When restarting the vehicle from the stop/start system operating condition, 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 ECH-33, "STOP/START SYSTEM : System Description".


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ECM

INFOID:0000000010379009

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


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Electric Throttle Control Actuator

INFOID:0000000010379010

OUTLINE

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

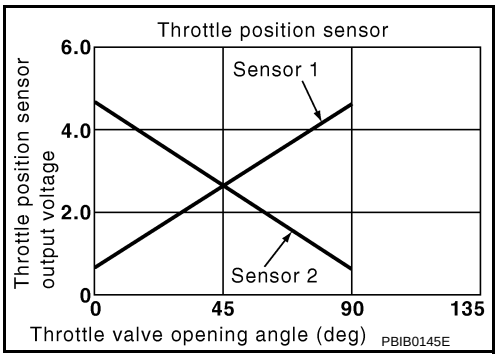
THROTTLE CONTROL MOTOR

The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The current opening angle of the throttle valve is detected by the throttle position sensor. The throttle position sensor provides

feedback to the ECM, when opens/closes the throttle valve in response to driving conditions via the throttle control motor.

THROTTLE POSITION SENSOR

The throttle position sensor responds to the throttle valve movement. The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



Engine Coolant Bypass Valve

INFOID:0000000010471168

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:0000000010471169

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.

Engine Coolant Temperature Sensor

INFOID:0000000010379011

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input.

Engine Oil Pressure Control Solenoid Valve

INFOID:0000000010471166

The engine oil pressure control solenoid valve regulates the engine oil pressure.

Engine Restart Relay

INFOID:0000000010471138

The engine restart relay is controlled by ECM when restarting the engine during the stop/start system operation.

Engine Restart Bypass Control Relay

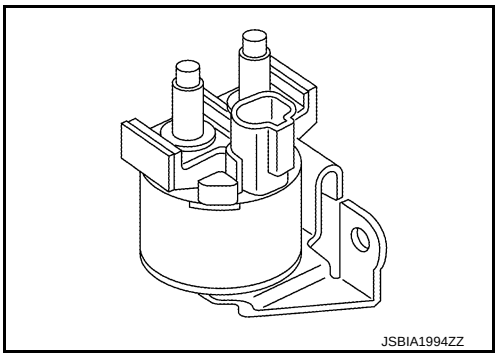
INFOID:0000000010471139

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

Engine Restart Bypass Relay

INFOID:0000000010471140

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 ECH-33, "STOP/START SYSTEM : System Description".



EVAP Canister Purge Volume Control Solenoid Valve

INFOID:0000000010379012

The EVAP canister purge volume control solenoid valve controls the flow rate of fuel vapor from the EVAP canister.

Exhaust Valve Timing Control Position Sensor

INFOID:0000000010471157

Exhaust valve timing control position sensor detects the protrusion of the signal plate installed to the exhaust camshaft.
This sensor signal is used for sensing a position of the exhaust camshaft.

Exhaust Valve Timing Control Solenoid Valve

INFOID:0000000010471149

Exhaust valve timing control solenoid valve is controlled by ECM.

Fuel Injector

INFOID:0000000010379013

For the fuel injector, a high pressure fuel injector is used and this enables a high-pressure fuel injection within a short time.

Fuel Rail Pressure Sensor

INFOID:0000000010471147

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.

Heated Oxygen Sensor 1

INFOID:0000000010379015

DESCRIPTION

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio.

HEATED OXYGEN SENSOR 1 HEATER

Heated oxygen sensor 1 heater is integrated in the sensor.
The ECM performs ON/OFF control of the heated oxygen sensor 1 heater.

Heated Oxygen Sensor 2

INFOID:0000000010379016

DESCRIPTION

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

HEATED OXYGEN SENSOR 2 HEATER

Heated oxygen sensor 2 heater is integrated in the sensor.
The ECM performs ON/OFF control of the heated oxygen sensor 2 heater.

High Pressure Fuel Pump

INFOID:0000000010471146

High pressure fuel pump pumps fuel to the fuel rail.

Hood Switch

INFOID:0000000010471143

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.

Ignition Coil

INFOID:0000000010379017

ECM turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.

Intake Air Temperature Sensor

INFOID:0000000010379018

The intake air temperature sensor detects intake air temperature and transmits a signal to the ECM.

Intake Manifold Pressure Sensor

INFOID:0000000010379021

The intake manifold pressure sensor is installed to the intake manifold. Detects intake manifold pressure, and transmits a voltage signal to the ECM.

Intake Valve Timing Control Solenoid Valve

INFOID:0000000010471150

Intake valve timing control solenoid valve is controlled by ECM.

Knock Sensor

INFOID:0000000010379019

The knock sensor is attached to the cylinder block. It senses engine knocking.

Fuel Pump

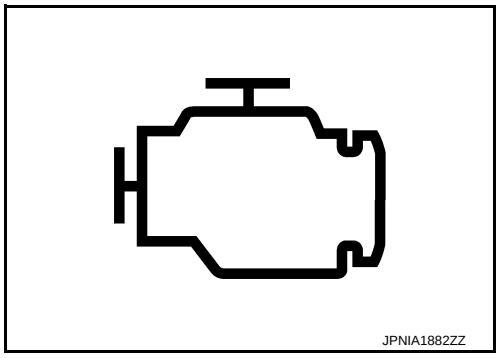
INFOID:0000000010379014

Fuel pump is installed in the fuel tank and pumps fuel to the high puressure fuel pump.

Malfunction Indicator Lamp

INFOID:0000000010379020

Malfunction Indicator lamp (MIL) is located on the combination meter.
MIL will illuminate when the ignition switch is turned ON without the engine running. This is a bulb check.
When the engine is started, MIL should turn OFF. If the MIL remains illuminated, the on board diagnostic system has detected an engine system malfunction.


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Reverse/Neutral Position Switch

INFOID:0000000010471177

Reverse/Neutral position switch detects gear position is reverse/neutral.

Refrigerant Pressure Sensor

INFOID:0000000010379022

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

Stop Lamp Switch

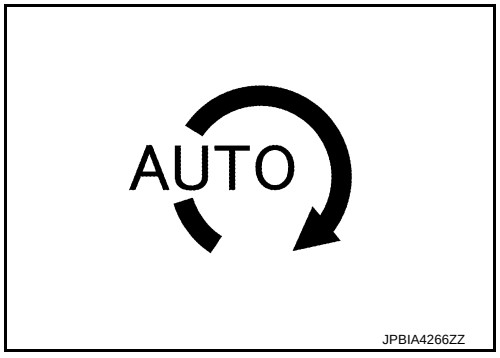
INFOID:0000000010379023

Stop lamp switch is installed to brake pedal bracket.
Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is being driven.

Stop/Start Indicator Lamp

INFOID:0000000010471144

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.



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Stop/start indicator lamp status

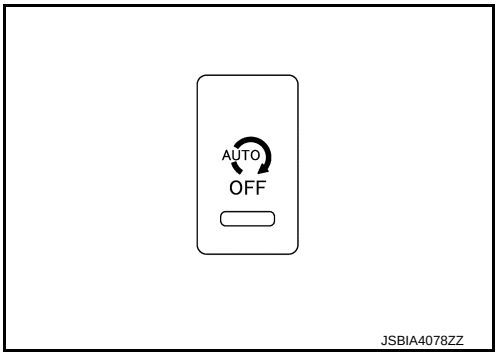
System condition	Condition	Stop/start indicator lamp	Warning chime
Operate	Normal	Illuminate	—
	Door (driver side) open and seat belt released	High speed blinking	Sound
	Hood open	High speed blinking*	Sound*
Fail-Safe	Starter motor operation counter: too much	Slow speed blinking	—
	Malfunction of stop/start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

*: Engine is stalled after alert for 1.5 seconds.

Stop/Start OFF Switch

INFOID:0000000010471145

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 ECH-44, "STOP/START SYSTEM : Switch Name and Function".



Thermostat Heater Control Solenoid Valve

INFOID:0000000010471165

The thermostat heater control solenoid valve regulates the coolant temperature within normal operation temperature.

Turbocharger wastegate control solenoid valve

INFOID:0000000010436298

Turbocharger wastegate control solenoid valve actuates the wastegate diaphragm. An output pressure of the valve is between ambient pressure and boost pressure. When this valve is driven, the wastegate valve closes.

Turbocharger Boost Sensor

INFOID:0000000010436212

Turbocharger boost sensor is used to get the boost pressure information in order to adapt the intake manifold pressure to the set-point.

Turbocharger bypass valve control solenoid valve

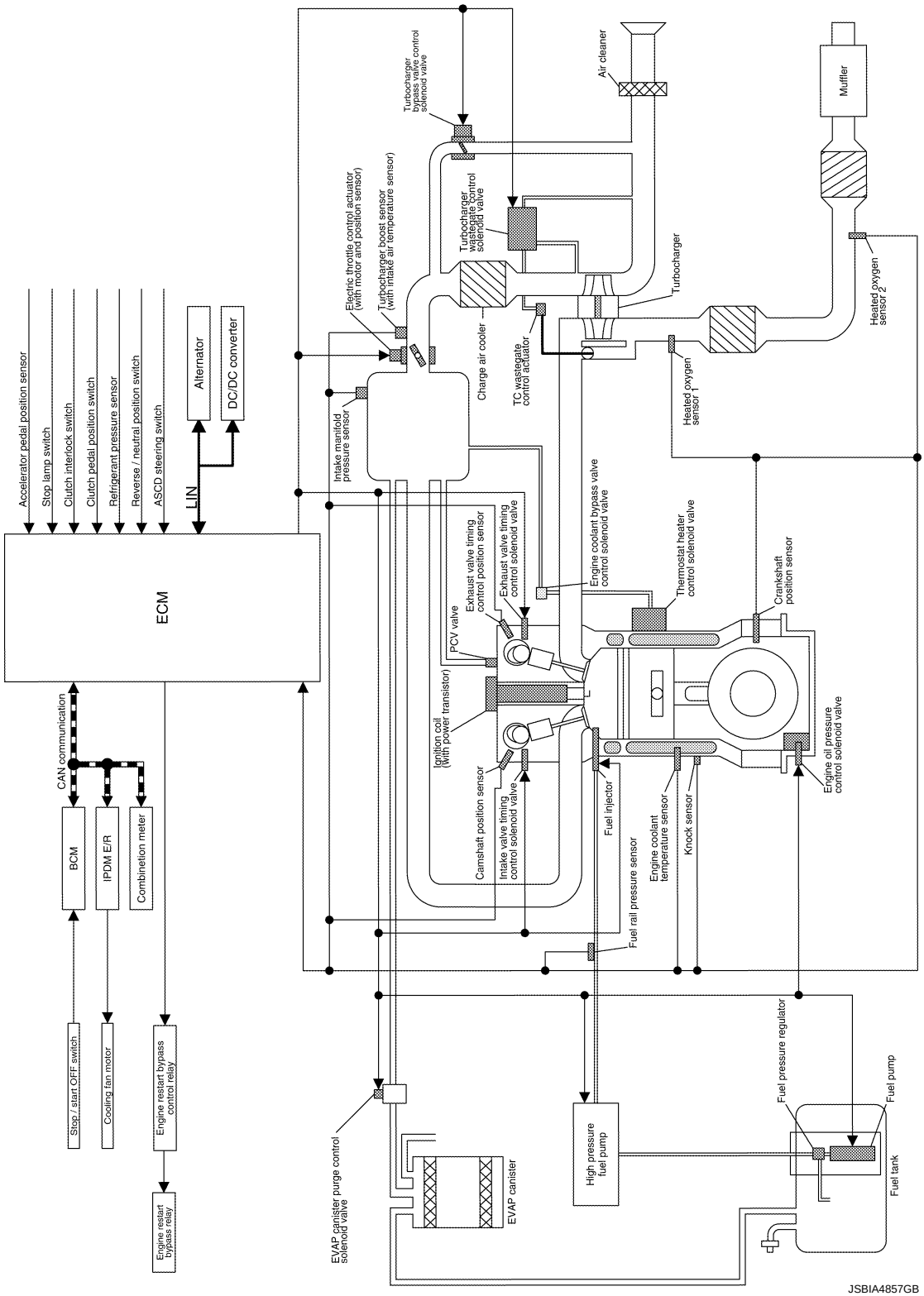
INFOID:0000000010436213

Turbocharger bypass valve control solenoid valve is used to release high pressure air upstream the compressor in order to decrease pressure between the turbocharger outlet and throttle valve. Accordingly, this operation prevents the decrease in turbine speed and improves the response time of charging when shifting gears.

SYSTEM
ENGINE CONTROL SYSTEM
ENGINE CONTROL SYSTEM : System Description

INFOID:0000000010379026

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

ECM controls the engine by various functions.

Function	Reference
ENGINE SPEED CONTROL SYSTEM	ECH-22, "ENGINE SPEED CONTROL : System Description"
POWERTRAIN COORDINATION CONTROL	ECH-23, "POWERTRAIN COORDINATION CONTROL : System Description"
INTAKE AIR SYSTEM	ECH-24, "INTAKE AIR SYSTEM : System Description"
VARIABLE VALVE TIMING CONTROL	ECH-24, "VARIABLE VALVE TIMING CONTROL : System Description"
TURBOCHARGER BOOST CONTROL	ECH-25, "TURBOCHARGER BOOST CONTROL : System Description"
ENGINE TORQUE CONTROL	ECH-25, "ENGINE TORQUE CONTROL : System Description"
COMBUSTION CONTROL	ECH-27, "COMBUSTION CONTROL : System Description"
AFTER TREATMENT SYSTEM	ECH-31, "AFTER TREATMENT SYSTEM : System Description"
COOLING FAN CONTROL	ECH-31, "COOLING FAN CONTROL : System Description"
THERMOSTAT CONTROL	ECH-31, "THERMOSTAT CONTROL : System Description"
ENERGY MANAGEMENT SYSTEM	ECH-32, "ENERGY MANAGEMENT SYSTEM : System Description"
STOP/START SYSTEM	ECH-33, "STOP/START SYSTEM : System Description"
AUTOMATIC SPEED CONTROL DEVICE (ASCD)	ECH-40, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description"
SPEED LIMITER	ECH-41, "SPEED LIMITER : System Description"
GEAR SHIFT INDICATOR SYSTEM	ECH-42, "GEAR SHIFT INDICATOR SYSTEM : System Description"
CAN COMMUNICATION	ECH-42, "CAN COMMUNICATION : System Description"

ENGINE SPEED CONTROL

ENGINE SPEED CONTROL : System Description

INFOID:0000000010379027

SYSTEM DESCRIPTION

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

CRANKING AND CYLINDER IDENTIFICATION

ECM controls the engine speed during cranking.
ECM sets and resets fuel injection timing.
ECM decides engine speed in cranking by detections restart status and controls fuel injection quantity.
ECM identifies a cylinder without camshaft sensor.
The aim of this function is to confirm whether the phase is correct.
The gathering composed of five flywheel teeth is stored and measured for every each TDC (top dead center).
The engine speed must be up to around 300 rpm and less than around 5000 rpm.
This function is functional 95% of the time.

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 from following load and signal:
- Post treatment

- Catalyst warm-up
• Electric consumers
- Cooling fan
- Power window
- Air heater (air conditioning system)
- 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
- Intake manifold pressure sensor signal

The final engine idle speed set point is computed from each consumer's engine idle speed set point:

• Three correction torques for idle speed regulation are computed:
- Proportional
- Integral
- Derivative
• 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:0000000010379028

SYSTEM DESCRIPTION

The powertrain coordination can be explained by following:

• Powertrain coordination inputs
• Preventive anti-jerk
• Gear shift indicator (for details, refer to ECH-42, "GEAR SHIFT INDICATOR SYSTEM : System Description".)

POWERTRAIN COORDINATION INPUTS

ECM detects following signals necessary to decide the torque set point:

• Gear position
• Accelerator pedal operation
• Brake pedal operation
• Status of Cruise Control System or Speed Limiter
• Torque request from automatic transmission
• Torque request from ABS system

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.

Abrupt change of torque are delivered by engine excites a torsion 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.

INTAKE AIR SYSTEM

INTAKE AIR SYSTEM : System Description

INFOID:0000000010379029

THROTTLE CONTROL

The aim of electric throttle control actuator is to manage intake air quantity.
In normal operating conditions, the intake air flow is directly linked to the required engine torque. (For details of engine torque control, refer to ECH-25, "ENGINE TORQUE CONTROL : System Description".)
ECM learns the fully closed position of the throttle valve by monitoring the throttle position sensor output signal.

Standard Operating Phase:
In standard operation condition, as the engine is running, ECM controls the throttle valve position according to realize the required intake air flow.

Corrections and Limitations:
During regulation, ECM also performs the following tasks:
- Prevent the flap oscillations to prevent unwanted engine torque change.
- Prevent mechanical stress of the component by limiting the flap speed around the maximum/minimum position.
- Prevent acoustic issues by limiting the throttle opening at certain engine speeds and during engine stop.

Learning Phase:
ECM learns fully closed position and limp-home position of the throttle valve and checks their validity. During this phase, the component reaches its closed position 3 times then the limp-home position 2 times. This phase occurs in the following conditions:
- At vehicle first IGNITION SW ON.
- When ECM has replaced or reprogrammed
- When the teach-in (s) has been reinitialized by CONSULT.

Limp-home Position Checking Phase:
When engine is stopped, ECM checks that the limp-home position did not change since the last learning phase. During this phase, throttle valve reaches the limp-home position 4 times.

CALCULATION OF THE AIR FLOW

The aim of the Air System Function is to command the Throttle Flap in order to realize the Torque Demand.

The Mass Air Flow Set-point
The Mass Air Flow set-point comes from the Torque Structure Function. A Canister Purge Mass Air Flow Correction is taken into account in order to correct the set-point.

The Air Flow Calculation
ECM takes into account the manifold pressure, the boost pressure, and the inlet air temperature to have the mass air flow per unity of throttle Efficient Area.

VARIABLE VALVE TIMING CONTROL

VARIABLE VALVE TIMING CONTROL : System Description

INFOID:0000000010435873

DESCRIPTION

A variable valve timing control allows to move the angle of distribution according to the engine speed and to the load.
By choosing the good compromise of adjustment the shifter of camshaft allows:
- to improve the stability of the slow idle speed
- to decrease the consumptions
- to decrease polluting broadcasts
- to increase the performances of the engine

This system consists of the following:
- Shifter(s) (integrated cam sprocket)

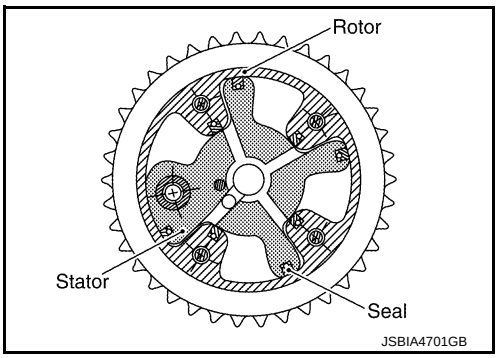
- Control solenoid valve(s)

COMPONENT DESCRIPTION

Shifter

- It is a hydraulic shifter: the rotor (in 4 pallets) moves in the stator by rotation under the influence of the oil pressing.
- The rotor is fixed to the tip of the camshaft.
- A pawn of locking with conical tip (accommodated in the rotor) maintains the phase shifter in position by default in absence of pressure of oil (phases of driving starting up).

The levying of this pawn is ordered by the coming oil pressing of the circuit advance or the circuit delay.



CONTROL OUTLINE

The closed roop regulation works as follows:

1. A system of target/sensor sending to ECM the position of the camshaft.
2. ECM transmits an opening or locking request signals to the Intake/Exhaust Valve Timing Control Solenoid Valve.
3. The resultant oil pressure in the shifter between the rotor and the stator shifts the camshaft.

TURBOCHARGER BOOST CONTROL

TURBOCHARGER BOOST CONTROL : System Description

INFOID:0000000010435871

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.

CONTROL OUTLINE

The boost pressure control adequately adjusts intake manifold pressure according to various driving conditions.

This system has a turbocharger waste gate control solenoid valve. The turbocharger waste control solenoid valve opens/closes the waste gate valve to adjust exhaust gas flow passing through the turbocharger turbine. Through this operation, the turbocharger waste control solenoid valve controls boost pressure.

ENGINE TORQUE CONTROL

ENGINE TORQUE CONTROL : System Description

INFOID:0000000010379030

SYSTEM DESCRIPTION

The torque function can be explained by the following:

- Accessories torque management
- Minimum available torque
- Maximum available torque
- Fast set-points to complete torque request
- Slow set-points to complete torque request
- Final torque requests setting
- Injection cut
- Full load
- Torque correction in the knocking zone

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.

Alternator

ECM controls idle speed depending on charge status of alternator.

MINIMUM AVAILABLE TORQUE

The minimum available torque is used for the minimum driver set-point 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 torque for the minimum manifold pressure with a ramp.

The torque for the minimum manifold pressure is designed to avoid any oil consumption (oil vapor back up in the intake manifold).

It is estimated in function of the engine capacity displacement, the manifold air volume, the manifold air pressure, the manifold air temperature, the cylinder fill-up efficiency, the ignition efficiency and the number of cylinders. It is corrected in function of the coolant temperature to avoid ‘poor combustion’.

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
- Low gasoline level in the tank

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 fail-safe mode of the throttle valve. This limit is computed and corrected with:

- Number of available cylinders
- Intake air temperature
- Atmospheric pressure
- Engine speed
- Over-torque limit
- Torque losses (friction, pumping, etc.) to calculate the maximum effective engine torque

Torque for the heating protection

This torque limit is dedicated to the protection of the engine from an overheating. It depends on the engine speed, the engine coolant temperature, the intake air temperature and the vehicle speed.

Protection torque

This torque is computed in function of the low gasoline level in the tank and the engine speed.

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) or level 2 (mean limitation).

FAST SET-POINTS TO COMPLETE TORQUE REQUEST

This control aims to compute:
- The number of cylinders to cut
- The final ignition advance calculated by the torque structure without limitations
- The final ignition advance calculated by the torque structure

In function of:
- The final indicated torque set-point
- The final indicated target torque
- The fresh mass air flow

The torque efficiency correction is calculated to compensate the fact that the target torque request cannot be realized by the throttle full opening.
In deceleration and in engine over speed, the cutting of the all injectors is authorized. In a limp-home mode, the number of cylinders to cut is limited.

SLOW SET-POINTS TO COMPLETE TORQUE REQUEST

This control computes:
- The fresh air mass flow set-points passing through the engine
- The fresh air mass flow set-points passing through the throttle
- The torque efficiency corresponding to the maximum ignition advance
- The torque efficiency for the idle speed control
- The correction of the torque efficiency for the catalytic converter warm-up

The torque efficiency for idle speed control is function of the idle speed set-point and the engine air load.
The correction is applied when the engine is running autonomous and when one of the following catalytic converter warm-up phases is in action: the catalytic converter warm-up by exhaust air injection, the catalytic converter heating in progress, the lean burn catalytic converter heating conditions or the richness distribution.
The correction takes into account the type of transmission and the Park/Neutral state for an automatic transmission, the starting coolant temperature and is adapted to the duration of the catalytic converter warm-up.

FINAL TORQUE REQUESTS SETTING

The final torque requests are computed by the arbitration with the driver request, the intersystem torque request (ESP), the torque limitations and the curative anti-jerk correction.

INJECTION CUT

When no torque is requested by the driver, the injection is cut to reduce the fuel consumption if the following conditions are met:
- The engine is in autonomous state after a delay function of the coolant temperature
- The coolant temperature is over a threshold
- The engine speed is over a minimum engine threshold and above a maximum engine threshold
- There is no intersystem request

FULL LOAD

When the driver torque is on the maximum available torque and the kick-down detected, the throttle is full opened.
For turbocharged engines, the full load is also activated when the driver torque request is greater than the threshold above which controlled the wastegate.
The full load is disabled when the turbocharger is out of order or if we have an intersystem torque request in progress (ABS/TCM).

TORQUE CORRECTION IN THE KNOCK ZONE

For the protection of boost engines against the knock, it is necessary to correct the engine load: limitation of opening throttle. The only use of the ignition correction during the overfeed phase, generates a rise in the exhaust temperature and consequently a rise in the energy to the turbine.
This supplementary energy generates an overfeed pressure increase hence increasing the knock zone phenomenon risk. This strategy decreases the load by decreasing the torque driver request.

COMBUSTION CONTROL

COMBUSTION CONTROL : System Description

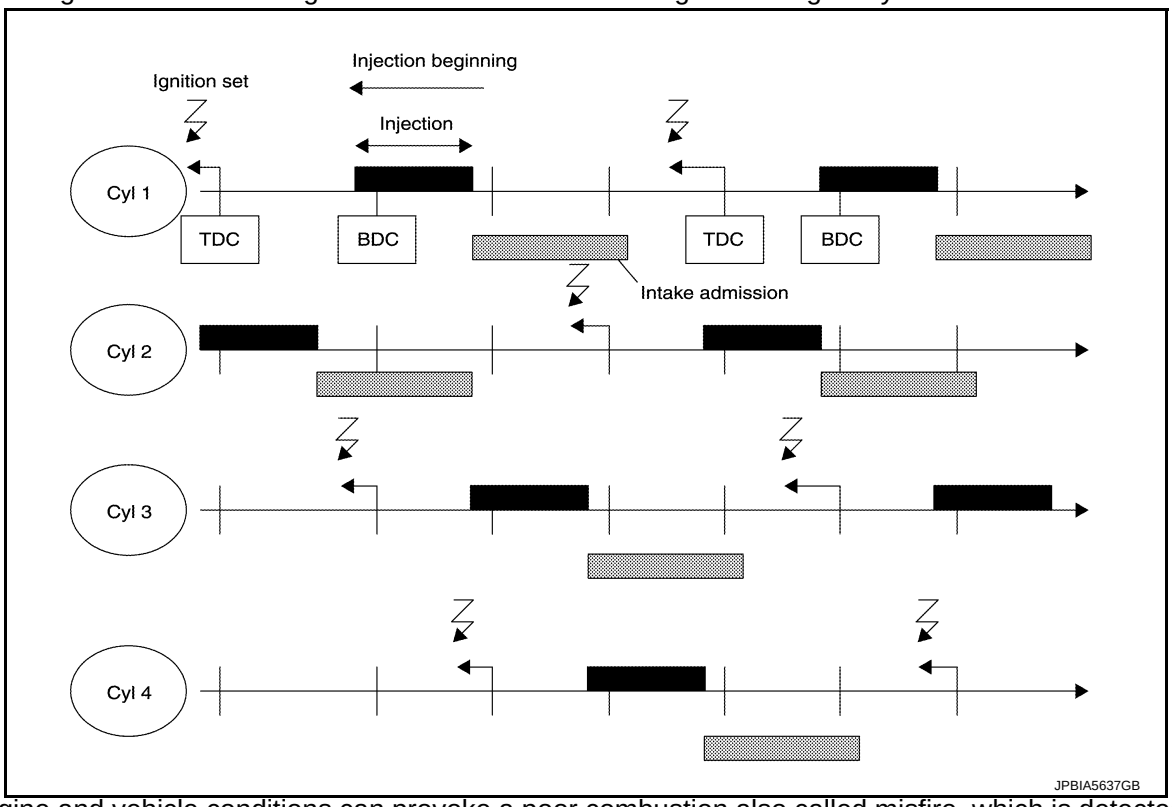
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SYSTEM DESCRIPTION

A gasoline engine needs ignition coils: it is a piloted ignition.
The wished torque set-point is realized with the two following settings:
- Fuel quantity injected
- Ignition set point

Others parameters are also taken into consideration for different reasons such as acoustic, performance and emissions:
- Richness (ratio between fuel and air quantities)
- Injection phasing

The following illustration shows general combustion functioning on an engine cycle.



The engine and vehicle conditions can provoke a poor combustion also called misfire, which is detected by an OBD strategy.
Misfire diagnosis specifies the function for misfires detection through software “torque-meter”:
It corresponds to the analysis of a cylinder on which there is no combustion. The reason for the misfire can be a wiring or mechanical combustion necessary component default (injector, ignition coil, spark plug) resulting in a lack of compression in the same cylinder. The diagnosis is also able to detect an occasional dysfunction on a cylinder.
The ECM detects two types of misfire:

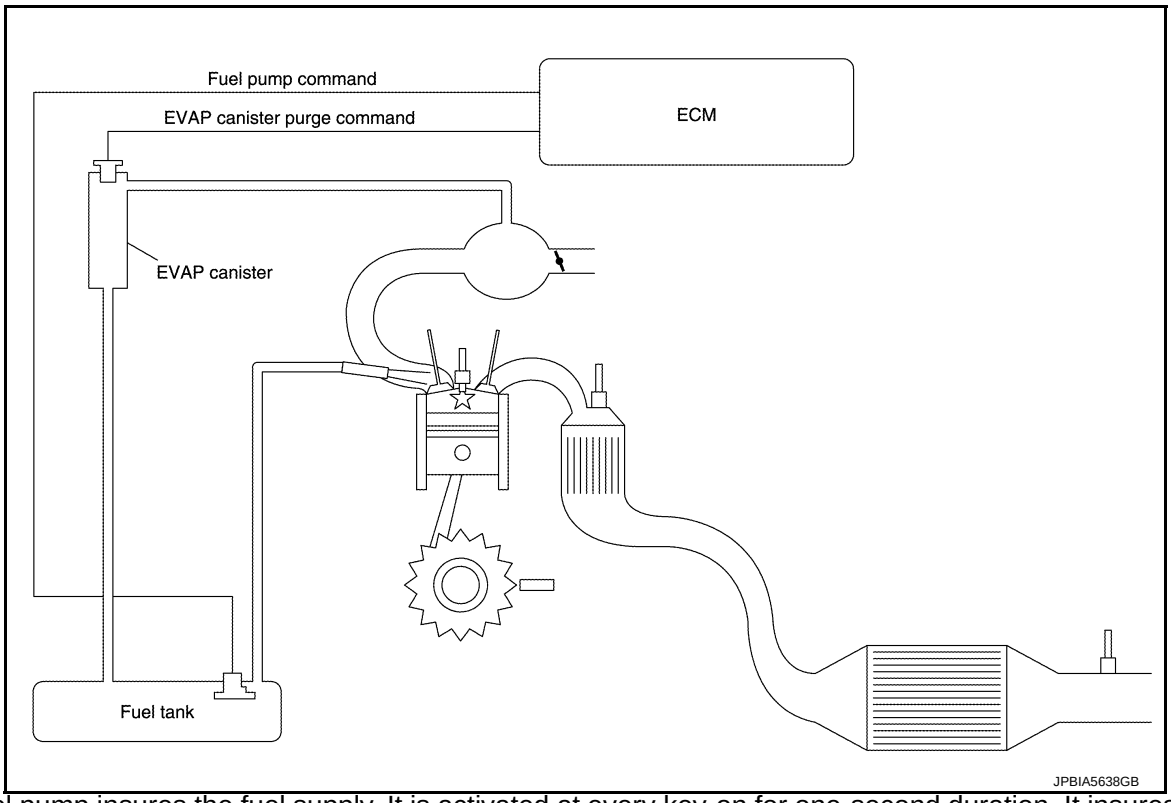
Catalytic Converter Misfire

The aim is to detect large misfire rates, which provoke a rise of temperature in the catalytic converter susceptible to damage it. The misfire rates that must be detected are variable according to the working point (by 2D calibration). The malfunction indicator lamp (MIL) should blink immediately.
Besides the function has to allow the most accurate identification the misfiring cylinders, and set an alert flag to inhibit the functional diagnoses of the exhaust line (probe, three way catalyst, engine oil system, fuel system) in order to avoid false diagnoses.

Pollution Misfire

The aim is to detect small misfire rates. This detection has to be effective during the certification cycle test. The malfunction indicator lamp (MIL) must lighten before the end of a defined number of driving cycles with the current defaults.

MANAGEMENT OF THE FUEL ALIMENTATION



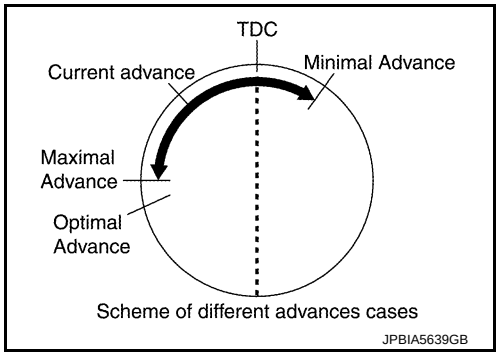
The fuel pump insures the fuel supply. It is activated at every key-on for one-second duration. It insures a minimal pressure level in the circuit and enables to obtain a correct start, especially after a long period without use of the vehicle.
When the engine is running, the relay is always commanded, so the pump is always active.
The setting with the atmosphere of the gasoline tank is carried out through a EVAP canister, which is filled with active charcoals. These active charcoals catch the gasoline vapors. The vacuum pressure engine performs the purging of EVAP canister. It flows in the intake filling session, through a hose whose section is controlled by a EVAP canister purge volume control solenoid valve. EVAP canister purge volume control solenoid valve is driven by the ECM. For noise reason, two frequencies are available to control the EVAP canister vent control valve.

- A slow frequency (8Hz)
- An high frequency (20 Hz)

The EVAP canister is purged as soon as the activation conditions are OK, in order to limit vapor fumes in the atmosphere, as it happens when the EVAP canister is saturated.
Vacuum pressure regulation is mechanical and not driven by ECM.

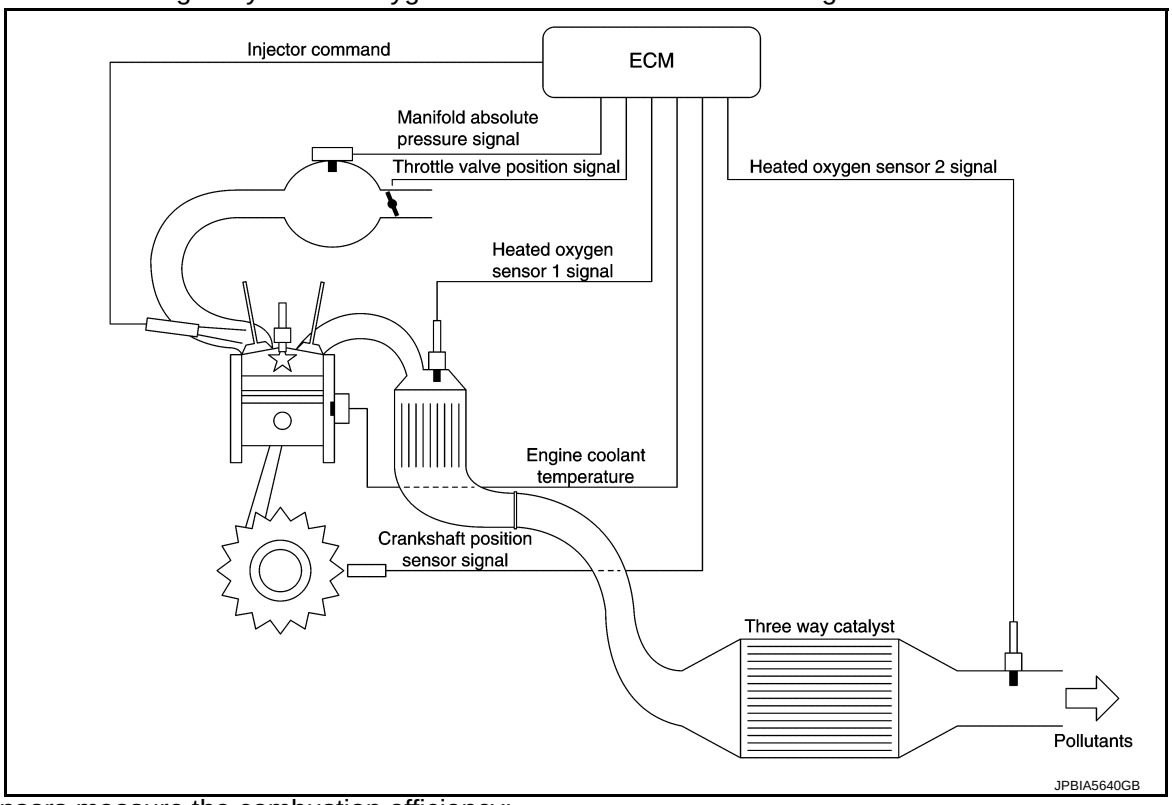
ADVANCE/MANAGEMENT OF THE IGNITION

The management of ignition allows to manage the quality of combustion and so the engine performances.
For a positive advance, the ignition set point is before TDC (top dead center), nevertheless the advance can take negative values.
The more the optimal advance is away from the TDC, the more the performances increase. So, the optimal advance is the best value to optimize the combustion.
The ignition is realized by ignition coils in order to ignite cylinders. Besides, if there is some detected failure on ignition coils (short circuit to ground, short circuit to battery or open circuit) a cut request for the corresponding injectors is managed.
A lack of efficiency could be felt in some specified conditions like engine over heat or hot atmospheric conditions or a low RON (Research Octane Number) Fuel. Indeed, it will provoke a knock phenomenon detected by stronger noise combustion.
This noise is detected by an accelerometer only during the combustion window.



RICHNESS REGULATION

The richness is managed by heated oxygen sensors shown in the following scheme:



Two sensors measure the combustion efficiency:

Heated Oxygen Sensor 1

The heated oxygen sensor 1 enables the richness closed loop mode. This is a differential sensor and the richness signal directly depends on the information given by this component:

- Lean (less fuel than air) if the voltage is under 450 mV, so mixture needs an enrichment.
- Rich (more fuel than air) if the voltage is above 450 mV, so mixture needs a richness reduction.

Heated Oxygen Sensor 2

The heated oxygen sensor 2 enables the application of the richness double loop mode and diagnosis of catalyst. Its working technology is the same as the heated oxygen sensor 1.

To be operational very quickly, theses sensors need to be warmed by electric signal and exhaust gas.

The richness regulation is managed by the heated oxygen sensor 1. It consists in applying a correction on the injection time which depends on the richness states.

Those states depend on the engine speed and engine load. In closed loop mode, fuel injected mass is regulated by the information given by heated oxygen sensors (around reference point). In open-loop mode, richness is no more regulated and is specific to the mode (above reference point). In full load, richness increase in order to have the best performance (maximal richness).

Closed loop richness mode is a regulation system using heated oxygen sensor information to quantify the fuel injected mass; it enables the engine to stay in the catalytic working window, which reduces pollutant emissions. Those sensors (heated oxygen sensor 1 and 2) reflect efficiency of the combustion. More precisely, if the mixture lacks fuel (lean mixture) the system will then increase the fuel rate, in the opposite case (rich mixture) the fuel rate will be decreased.

The richness double loop regulation is managed by the heated oxygen sensor 2. It consists in computing one more correction, added to the richness in order to have the best three way catalyst efficiency. For its activation, the driver has to run nearly 1.5 minutes with a warm running engine out of the idle speed state.

The richness management also includes richness adaptation function.

It consists in learning the injectors lift and wearing effects on richness basic settings. It also shifts the engine richness mean value around the reference point with a correction, directly modifying the injection time.

The richness is affected by the ‘wall wetting’ phenomena (deposit of a fuel film in the intake ports). ECM compensates the effects by a correction on the fuel injected mass set point.

In order to respect pollutants emissions rules, a gasoline engine needs a catalyst.

The catalyst warm-up quickly enables to trigger this component. There are different phases during this cycle; several of them affecting richness (richness increased) especially in cold temperature conditions.

AFTER TREATMENT SYSTEM

AFTER TREATMENT SYSTEM : System Description

INFOID:0000000010379032

THREE WAY CATALYST PRINCIPLE

The three way catalyst possesses one main function:

- Use the present oxygen in exhaust gases to transform CO in CO2 and the HC in CO2 + H2O.

A ceramic (honey comb) support dressed in a fine layer of miscellaneous precious metals (platinum, palladium and rhodium) constitutes the catalytic converter.

The toxic components of exhaust gases (hydrocarbons, nitric oxides and carbon monoxides) are transformed into harmless substances (steam) during their access in the three way catalyst by a chemical process (catalysis) which puts in contact toxic gases and precious metals.

The heated oxygen sensor 1 placed upstream to the exhaust line controls the content in oxygen of exhaust gases and controls the refusals (effluents). The pre-catalytic converter treats the not burnt hydrocarbons and the carbon monoxide. The temperature sensor allows the ECM to determine the state of saturation of the catalytic converter.

COOLING FAN CONTROL

COOLING FAN CONTROL : System Description

INFOID:0000000010379033

SYSTEM DESCRIPTION

The cooling of the engine is done by a double speed motor driven fan unit (FAN1: low 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 101°C (213.8°F) and a deactivated request is sent when the engine coolant temperature becomes lower than 99°C (210.2°F).

When the engine coolant temperature continues to increase, a request for FAN2 activation is sent when the engine coolant temperature exceeds 105°C (221°F) and a deactivated request is sent when the engine coolant temperature becomes lower than 103°C (217.4°F).

When the engine coolant temperature continues to increase and exceeds the alert threshold calibrated at 115°C (239°F), ECM judges the engine is over temperature status until the temperature becomes lower than 110°C (230°F).

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.

THERMOSTAT CONTROL

THERMOSTAT CONTROL : System Description

INFOID:0000000010437169

SYSTEM DESCRIPTION

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.

ENERGY MANAGEMENT SYSTEM

ENERGY MANAGEMENT SYSTEM : System Description

INFOID:0000000010500314

DESCRIPTION

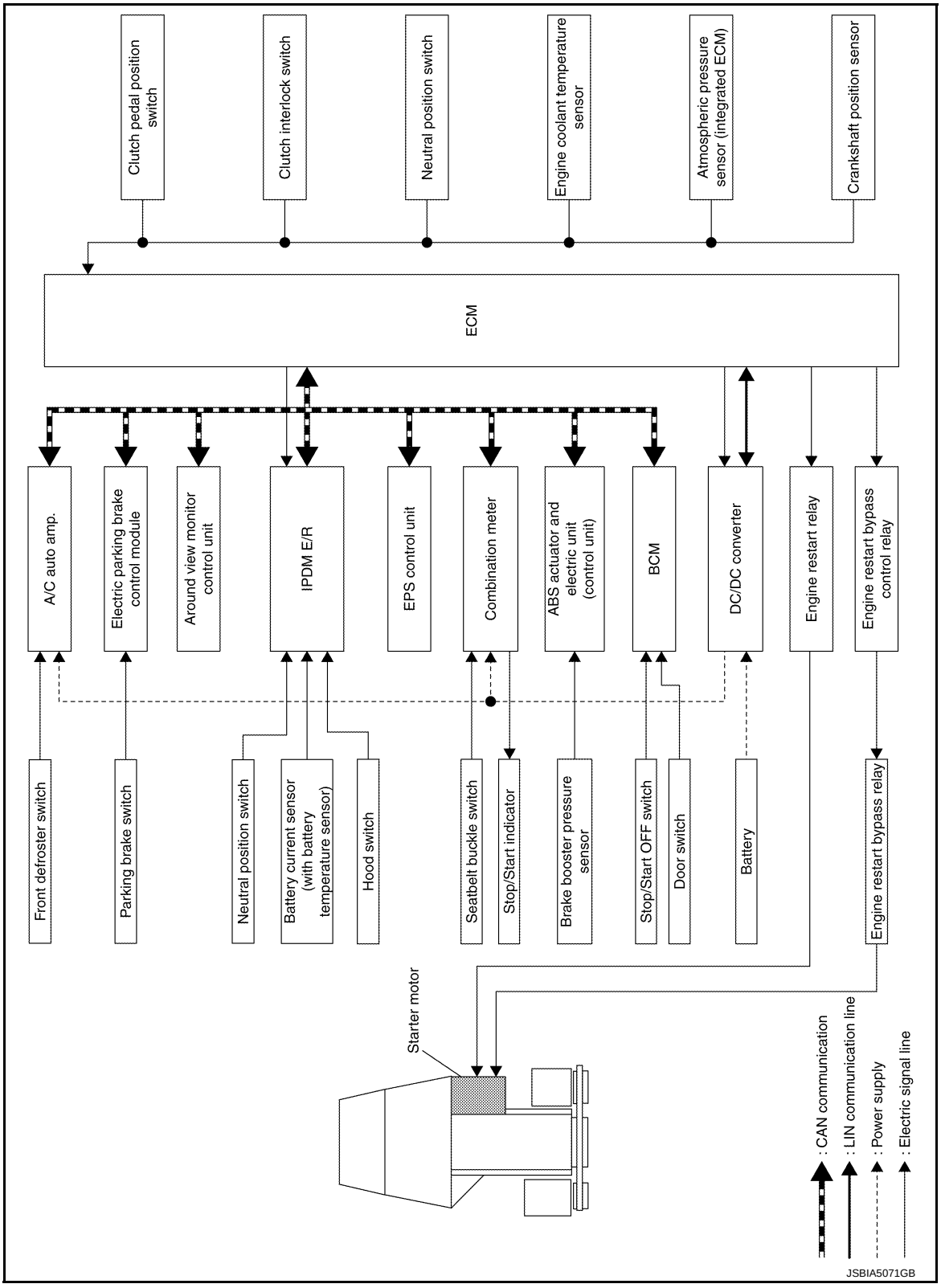
ECM transmits a target power generation voltage signal received from IPDM E/R to the generator via LIN communication.
The generator includes a self-diagnosis function and transmits a diagnosis signal to ECM via LIN communication when detecting a malfunction. When ECM receives a diagnosis signal, ECM 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".

STOP/START SYSTEM

STOP/START SYSTEM : System Description

INFOID:0000000010499034

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 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.

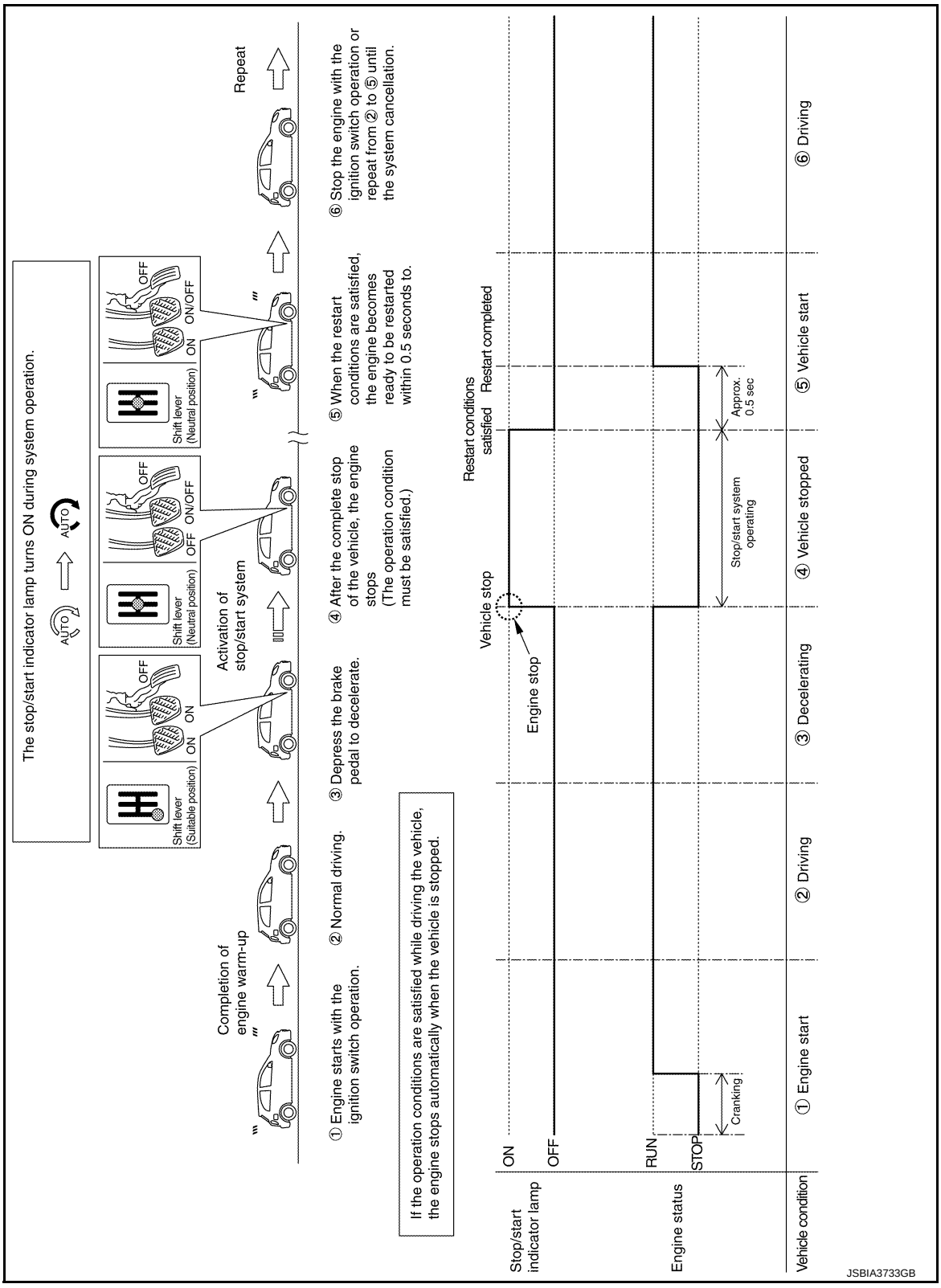
ECM detects a vehicle condition, engine condition and driver′s operation condition based on signals sent from each unit and the sensors to comprehensively control the stop/start system.

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 ECH-19, "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.

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)
	Engine coolant temperature		26 - 105 °C (79 -221 °F)
	Starter motor		The number of starter motor 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 ECH-8, "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-150, "System Description".)
	Clutch pedal position	Released
Engine	Engine speed	Around idle speed (Approx. 750 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.)

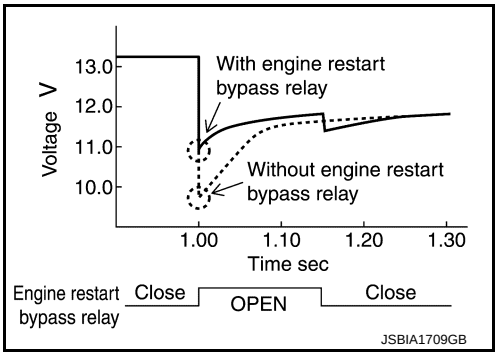
VOLTAGE STABILIZER FUNCTION

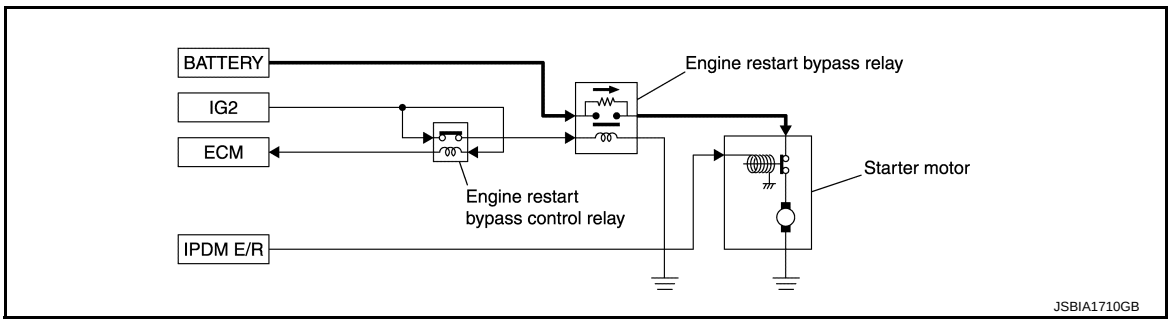
ECM transmits a voltage stabilizer signal to the DC/DC converter during cranking at an engine restart. The DC/DC converter temporarily increases the voltage to prevent the electric equipment from reset due to low voltage. The adoption of the DC/DC converter enables a stable power supply to the electric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





AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description

INFOID:0000000010435772

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
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to neutral position.
- Less than 33 km/h (20 MPH).

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:0000000010435773

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 (20 MPH) and 180 km/h (115 MPH) (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)

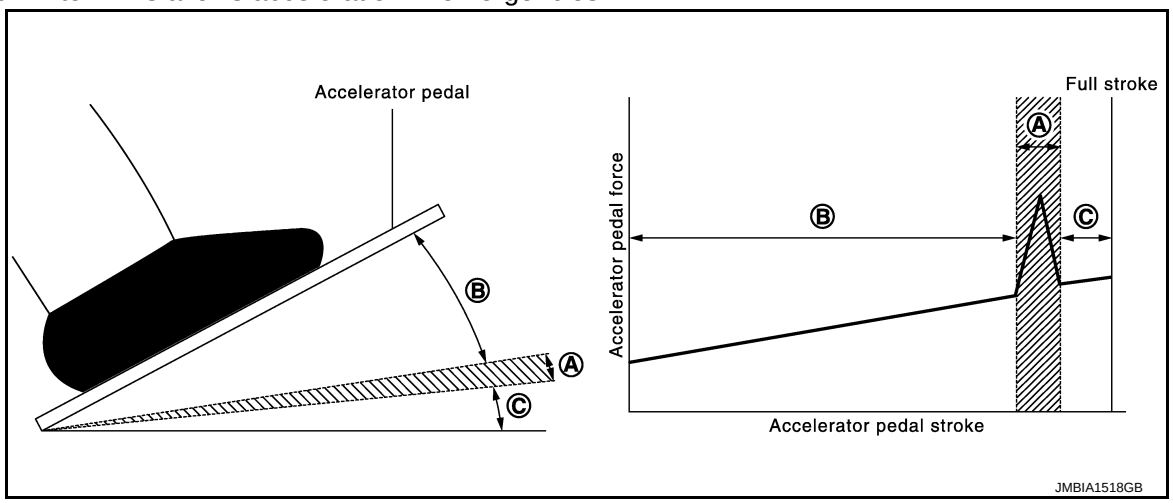
When pressing the RESUME/ACCELERATE switch, the set speed can be increased.

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)
- 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

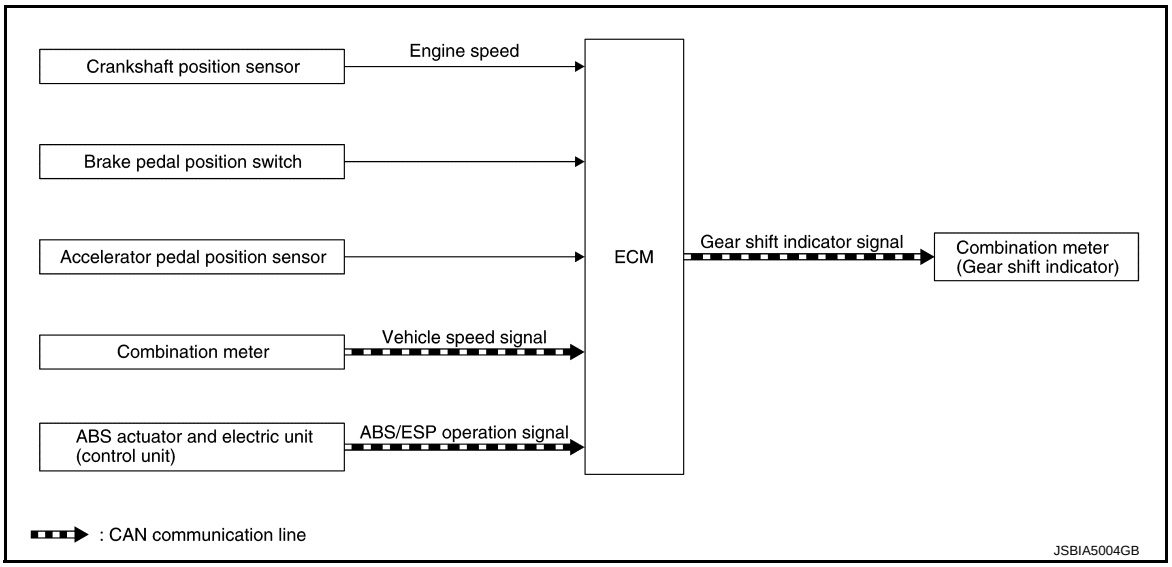
After the speed limiter is released by other method than the MAIN switch, the RESUME/ACCELERATE switch allows to set the vehicle speed again to the one that is previously set before releasing the speed limiter.

GEAR SHIFT INDICATOR SYSTEM

GEAR SHIFT INDICATOR SYSTEM : System Description

INFOID:0000000010507155

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.

CAN COMMUNICATION

CAN COMMUNICATION : System Description

INFOID:0000000010379034

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-15, "CAN COMMUNICATION SYSTEM : System Description", about CAN communication for detail.

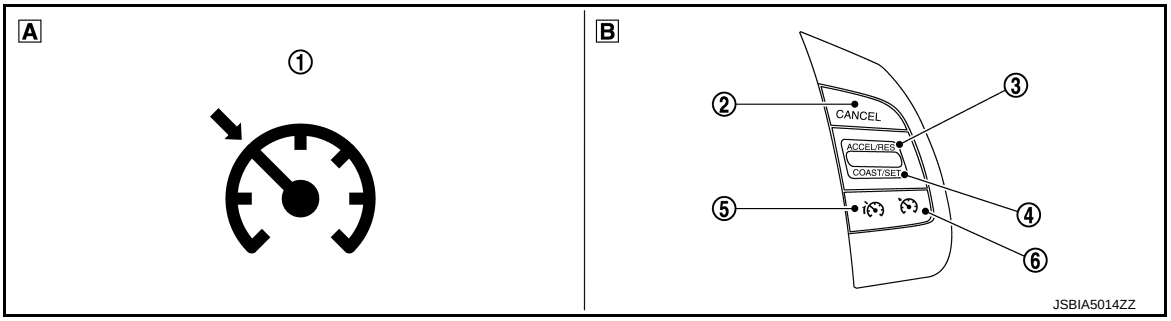
OPERATION

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

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

INFOID:0000000010499122

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

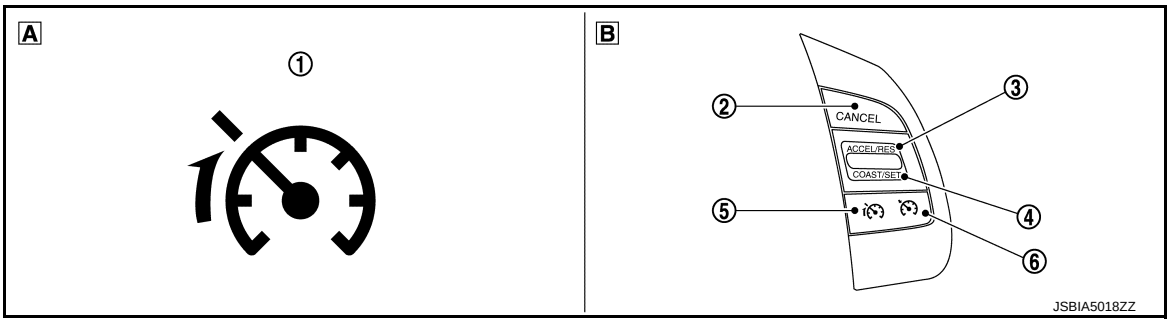
SPEED LIMITER : Switch Name and Function

INFOID:0000000010499123

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

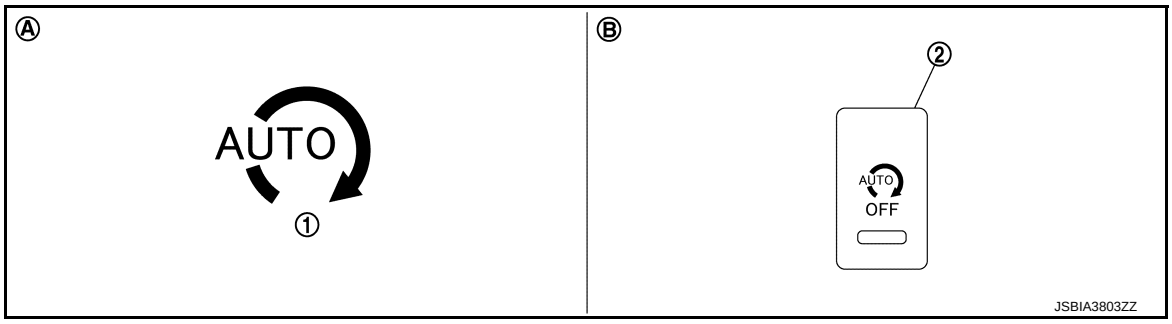
Item	Function
CANCEL switch	Cancels the speed limiter control.
ACCL/RES switch	• Resumes the set speed. • Increases the set speed incrementally.
COAST/SET switch	• Sets desired speed. • Decreases the set speed incrementally.
Speed limiter MAIN switch	Master switch to activate the speed limiter system.

STOP/START SYSTEM

STOP/START SYSTEM : Switch Name and Function

INFOID:0000000010499125

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:0000000010499126

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 ECH-33, "STOP/START SYSTEM : System Description".

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.
- 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

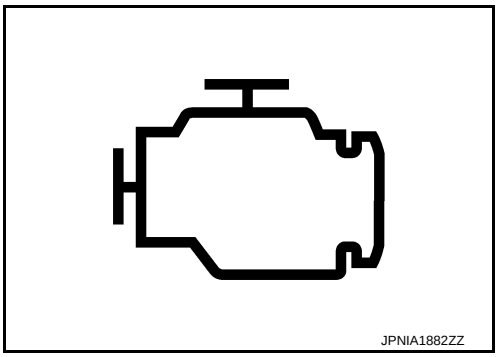
INFOID:0000000010379035

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

NOTE:
OBD is not applied for regions where it is not mandated.

MALFUNCTION INDICATOR LAMP

When detecting a DTC that affects exhaust gas, the exhaust emission-related control module transmits a malfunction indicator signal to ECM via CAN communication line.
ECM prioritizes the signal received from the exhaust emission-related control module and the ECM-stored DTC that affects exhaust gas and transmits a malfunction indicator lamp signal to the combination meter via CAN communication line.
The combination meter turns ON the MIL, according to the signal transmitted from ECM, and alerts the driver of malfunction detection.



DIAGNOSIS SYSTEM (ECM)

CONSULT Function

INFOID:0000000010379036

FUNCTION

Diagnostic test mode	Function
Self Diagnostic Result	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.

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

- Diagnostic trouble codes

SELF DIAGNOSTIC RESULT MODE

Self Diagnostic Item

Regarding items detected in “SELF-DIAG RESULTS” mode, refer to ECH-71, "DTC Index".

How to Erase DTC

With CONSULT

NOTE:

If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 12 minutes and then turn it ON (engine stopped) again.

1. Select “ENGINE” with CONSULT.
2. Select “SELF-DIAG RESULTS”.
3. Touch “ERASE”. (DTC in ECM will be erased)

Freeze Frame Data and 1st Trip Freeze Frame Data

Item*		Unit	Remarks
CONSULT screen terms	Full spell		
GDI - Fuel Rail Pressure	GDI - Fuel Rail Pressure	bar	
FUEL RAIL PRESSURE SETPOINT	Fuel rail pressure set-point	bar	
ENG OIL TEMP	Oil temperature - engine	°C	
ENGINE STATUS	Engine status	—	• Ignition ON and engine stopped. • engine driven • Engine Stalled • engine autonomous
IVT CONTROL SOL VALVE POSITION SETPOINT	Intake valve timing control solenoid valve position set-point	°Crk	
IVT CONTROL SOL VALVE POSITION	Intake valve timing control solenoid valve position	°Crk	
IVT CONTROL SOL VALVE PWM	Intake valve timing control solenoid valve pulse width modulation	%	
EVT CONTROL SOL VALVE PWM	Exhaust valve timing control solenoid valve pulse width modulation	%	
EVT CONTROL SOL VALVE POSITION	Exhaust valve timing control solenoid valve position	°Crk	
EVT CONTROL SOL VALVE POSITION SETPOINT	Exhaust valve timing control solenoid valve position set-point	°Crk	

Item*		Unit	Remarks
CONSULT screen terms	Full spell		
COMPARE CAMSHAFT POSITION AND EEPROM	Compare exhaust camshaft and electrically erasable programmable read-only memory	—	• NO VALUE • MATCH
Camshaft_crankshaft synchronization state	Camshaft/crankshaft synchronization state	—	• not synchronized • SYNCED
CRANKSHAFT SYNCHRONIZATION	Crankshaft synchronization	—	• NOT • OK
CRANKSHAFT SYNCHRONIZATION COUNTER	Crankshaft synchronization counter	—	
INT MANI PRES	Intake manifold pressure	mbar	
FILTERED EVT CONTROL SOL VALVE POSITION	Filtered exhaust valve timing control solenoid valve position	°Crk	
ENG COOLANT TEMP	Engine coolant temperature	°C	
Intake manifold temperature	Intake manifold temperature	°C	
BOOST PRESSUR	Boost pressure	mbar	
CALCULATED MANIFOLD PRESSURE	Calculated manifold pressure	hpa	
OPENING ANGLE CYLINDER 3	Opening angle cylinder 3	°Crk	
INTAKE AIR TEMPERATURE SENSOR VOLTAGE	Intake air temperature sensor voltage	V	
AMOUNT OF AIR INTO CYLINDER	Amount of air into cylinder	kg/h	
MANIFOLD PRESSURE VALUE FROM MODEL	Manifold pressure value from model	hpa	
MANIFOLD PRESSURE VALUE FROM SENSOR	Manifold pressure from sensor	hpa	
INTAKE MANIFOLD PRESSURE SENSOR VOLTAGE	Intake manifold pressure sensor voltage	V	
MOTOR FAN REQUEST 7	Motor fan requests 7	—	• FAN 2 CAN N/REQUEST • FAN 2 CAN REQUEST
MOTOR FAN REQUEST 6	Motor fan requests 6	—	• FAN 1 CAN N/REQUEST • FAN 1 CAN REQUEST
MOTOR FAN REQUEST 5	Motor fan requests 5	—	• FAN 2 N/REQUEST FROM A/T • FAN 2 REQUEST FROM A/T
MOTOR FAN REQUEST 4	Motor fan requests 4	—	• FAN 1 N/REQUEST FROM A/T • FAN 1 REQUEST FROM A/T
MOTOR FAN REQUEST 3	Motor fan requests 3	—	• FAN 2 N/REQUEST FROM A/C • FAN 2 REQUEST FROM A/C
MOTOR FAN REQUEST 2	Motor fan requests 2	—	• FAN 1 N/REQUEST FROM A/C • FAN 1 REQUEST FROM A/C
MOTOR FAN REQUEST 1	Motor fan requests 1	—	• FAN 2 N/REQUEST FROM ECM • FAN 2 REQUEST FROM ECM
MOTOR FAN REQUEST 0	Motor fan requests 0	—	• FAN 1 N/REQUEST FROM ECM • FAN 1 REQUEST FROM ECM
CURRENT GEAR POSITION	Current gear position	—	
ENGINE COOLANT TEMPERATURE SEN VOLTAGE	Engine coolant temperature sensor voltage	V	
SEN SUPPLY N-1 VOL	Sensors supply voltage 1	mV	
THROTTLE VALVE POSITION 1	Throttle valve position 1	%	

Item*		Unit	Remarks
CONSULT screen terms	Full spell		
THROTTLE VALVE POSITION 2	Throttle valve position 2	%	
Richness regulation status	Richness regulation status	—	• starting mode • open loop mode • full load mode • before closed loop mode • closed loop mode • Richness state machine is in OBD mode
RICHNESS REGULATIION CORRECTION	Richness regulation correction	%	
RICHNESS ADAPTATION FACTOR	Richness adaptation factor	—	
RICHNESS ADAPTATION OFFSET	Richness adaptation offset	µs	
FUEL SYSTEM STATUS 07	Fuel system status 07	—	
FUEL SYSTEM STATUS 06	Fuel system status 06	—	
FUEL SYSTEM STATUS 05	Fuel system status 05	—	
FUEL SYSTEM STATUS 04	Fuel system status 04	—	
FUEL SYSTEM STATUS 03	Fuel system status 03	—	
FUEL SYSTEM STATUS 02	Fuel system status 02	—	
FUEL SYSTEM STATUS 01	Fuel system status 01	—	
FUEL SYSTEM STATUS 00	Fuel system status 00	—	
FUEL SYSTEM STATUS 15	Fuel system status 15	—	
FUEL SYSTEM STATUS 14	Fuel system status 14	—	
FUEL SYSTEM STATUS 13	Fuel system status 13	—	
FUEL SYSTEM STATUS 12	Fuel system status 12	—	
FUEL SYSTEM STATUS 11	Fuel system status 11	—	
FUEL SYSTEM STATUS 10	Fuel system status 10	—	
FUEL SYSTEM STATUS 09	Fuel system status 09	—	
FUEL SYSTEM STATUS 08	Fuel system status 08	—	
ATMOSPHERIC PRESSURE	Atmospheric pressure	mbar	
BOOST PRES SEN V	Boost pressure sensor voltage	V	
Catalyst exhaust gas upstream oxygen sensor voltage	Catalyst exhaust gas upstream oxygen sensor voltage	mV	
HEATED OXYGEN SENSOR 1 PWM	Heated oxygen sensor 1 pulse width modulation	%	
HEATED OXYGEN SENSOR 1 ACTIVATION TIME	Heated oxygen sensor 1 activation time	TDC	
HEATED OXYGEN SENSOR 2 VOLTAGE	Heated oxygen sensor 2 voltage	mV	
HEATED OXYGEN SENSOR 2 PWM	Heated oxygen sensor 2 pulse width modulation	%	
HEATED OXYGEN SENSOR HEATER STATE	Heated oxygen sensor heater state	—	• COLD SENSOR • START STRATEGY APPLIED • RESTRT
CRRCTV FACTOR DEPENDING ON FUEL QUANTITY	Corrective factor depending on fuel quantity	—	

Item*		Unit	Remarks
CONSULT screen terms	Full spell		
Corrected average ALFACL for memorized fuel system diagnostic	Corrected average ALFACL for memorized fuel system diagnostic	—	
MISFIRE COUNTER	Misfire counter	—	
TANK TEMPERATURE	Tank temperature	°C	
AIR FUEL RATIO	Air fuel ratio	—	
Accelerator pedal voltage - track 1	Accelerator pedal voltage - track 1	mV	
Accelerator pedal voltage - track 2	Accelerator pedal voltage - track 2	mV	
SEN SUPPLY N-2 VOL	Sensors supply voltage 2	mV	
SEN SUPPLY N-3 VOL	Sensors supply voltage 3	mV	
CONTRADICTION ACCELERATOR/BRAKE PEDAL	Contradiction acceleration/brake pedal	—	
BOOST PRESSURE SET-POINT	Boost pressure set-point	hpa	
BOOST PRESSURE PWM	Boost pressure pulse width modulation	%	
FUEL PRESSURE	Fuel pressure	bar	
FUEL PUMP ACTUATOR PWM	Fuel pump actuator pulse width modulation	%	
LOW FUEL LEVEL	Fuel low level	—	• OK • Low
MISFIRE COUNTER - CYLINDER 1	Misfire counter - cylinder 1	—	
MISFIRE COUNTER - CYLINDER 2	Misfire counter - cylinder 2	—	
MISFIRE COUNTER - CYLINDER 3	Misfire counter - cylinder 3	—	
MISFIRE COUNTER - CYLINDER 4	Misfire counter - cylinder 4	—	
LAST TORQUE METER VALUE	Last torque meter value	—	
CORRECTION TORQUE METER VALUE	Correction torque meter value	—	
Knock counter detection - cylinder 1	Knock counter detection - cylinder 1	—	
Knock counter detection - cylinder 2	Knock counter detection - cylinder 2	—	
Knock counter detection - cylinder 3	Knock counter detection - cylinder 3	—	
Knock counter detection - cylinder 4	Knock counter detection - cylinder 4	—	
Mean knock noise	Mean knock noise	—	
CRANKSHAFT SENSOR SIGNAL	Crankshaft sensor signal	—	• Not detected • DETECT
IGNITION ADVANCE	Ignition advance	—	
MEMORIZED VARIABLE OF FUEL LEVEL	Memorized variable of fuel level	—	
Raw Tank differential pressure	Raw Tank differential pressure	—	

Item*		Unit	Remarks
CONSULT screen terms	Full spell		
DRAIN CUT VALVE DIAGNOSIS CRITERIA	Drain cut valve diagnosis criteria	—	
CC/SL STATUS	Cruise control/speed limiter status	—	• CC/SL OFF • SL ON (ACTIVE/OVER-SPEED) • SL ON (AWAITING/SUSPEND) • SL REQUESTED/ERROR • CC ON (ACTIVE) • CC ON (AWAITING/SUSPEND) • CC REQUESTED/ERROR • CC/SL NOT PRESENT
CC/SL IRREVERSIBLE EERROR 2	Cruise control/speed limiter irreversible error 2	—	• NO ACTIVATION OF CL SW • ACTIVATION OF CL SW
CC/SL IRREVERSIBLE EERROR 1	Cruise control/speed limiter irreversible error 1	—	• NO ACTIVATION OF BRK SW • ACTIVATION OF BRK SW
CC/SL IRREVERSIBLE EERROR 0	Cruise control/speed limiter irreversible error 0	—	• NO PRESENCE OF CC FORCE • PRESENCE OF CC FORCE
IDLE SPEED SETPOINT	Idle speed set-point	rpm	
Idle engine speed regulation status	Idle engine speed regulation status	—	• out of idle speed regulation • take off state • start state • after start state • condition state • activation state
IDLE SPEED REQUESTED BY AIR CONDITIONING	Idle speed requested by air conditioning	rpm	
ADPTV CORRECTION OF IDLE SPEED REGULATOR	Adaptive correction of idle speed regulator	Nm	
REFRIGERANT PRESSURE SENSOR VOLTAGE	Refrigerant pressure sensor voltage	V	
REFRIGERANT PRESSURE	Refrigerant pressure	bar	
IGNITION SWITCH STATE	Ignition switch state	—	• KEY OFF • KEY ON
STATE OF PTC HEATER ICING PREVENTION	State of positive temperature coefficient prevention heater icing prevention	—	• EV/HEV • Activated
Alternator power	Alternator power	W	
ALT LOAD	Alternator load	%	
CC/SL STEERING SWITCH VOLTAGE	Cruise control/speed limiter steering switch voltage	mV	
CC/SL STEERING SWITCH STATE	Cruise control/speed limiter steering switch state	—	• UNPRESSED • INVALID VOLTAGE • CO = open circuit • SUSPEND PRESSED • SET (-) PRESSED • SET (+) PRESSED • RESUME PRESSED • DISTANCE PRESSED
Brake pedal - close active switch state	Brake pedal - close active switch state	—	• reserved • NO PRS • Brake pedal pressed.
Brake pedal - open active switch state	Brake pedal - open active switch state	—	• reserved • NO PRS • Brake pedal pressed.
BRAKE PEDAL SWITCH (N/CLOSE) BLOCKED	Brake pedal switch (normally close) blocked	s	

Item*		Unit	Remarks
CONSULT screen terms	Full spell		
BRAKE PEDAL SWITCH (N/OPEN) BLOCKED	Brake pedal switch (normally open) blocked	s	
VEHICLE SPEED (CAN)	Vehicle speed (controller area network)	km/h	
VEHICLE SPEED UNIT	Vehicle speed unit	km/h or mph	
THERMOSTAT HEATER CONTROL SOL VALVE PWM	Thermostat heater control solenoid valve pulse width modulation	%	
FINAL INDICATED TORQUE SETPOINT	Final indicated torque set-point	Nm	
TORQUE SAFETY MONITORING STATUS FLAGS	Torque safety monitoring status flags	—	
THROTTLE VALVE POSITION SETPOINT	Throttle valve position set-point	%	
GAS PUMP COMMAND STATE	Gas pump command state	—	• OFF • ON
GAS PUMP PRIMING STATE	Gas pump priming state	—	• [DEACTIVATED] • Activated
GAS PUMP PRIMING DONE	Gas pump priming done	—	• NO • YES
LIMP HOME POSITION OF THE INLET THROTTLE	Limp home position of the inlet throttle	%	
FINAL ALCOHOL ADAPTIVE	Final alcohol adaptive	%	
COUNTER OF ALCOHOL ADPTV CMPTNG PHASES	Counter of alcohol adaptive computing phases	—	
CC/SL REVERSIBLE ERROR 5	Cruise control/speed limiter reversible error 5	—	• NO SL ENGINE INHIBITION • SL ENGINE INHIBITION
CC/SL REVERSIBLE ERROR 4	Cruise control/speed limiter reversible error 4	—	• N/CHNG OF DSPLY SPD UNIT • CHNG OF DSPLY SPD UNIT
CC/SL REVERSIBLE ERROR 3	Cruise control/speed limiter reversible error 3	—	• N/DSPLY VHCL SPD ABSNC • DSPLY VHCL SPD ABSNC
CC/SL REVERSIBLE ERROR 2	Cruise control/speed limiter reversible error 2	—	• N/REAL VHCL SPD ABSNC • REAL VHCL SPD ABSNC
CC/SL REVERSIBLE ERROR 1	Cruise control/speed limiter reversible error 1	—	• N/DSPLY VHCL SPD UNVLBL • DSPLY VHCL SPD UNVLBL
CC/SL REVERSIBLE ERROR 0	Cruise control/speed limiter reversible error 0	—	• N/REAL VHCL SPD UNVLBL • REAL VHCL SPD UNVLBL
CRUISE CONTROL REVERSIBLE ERROR 7	Cruise control reversible error 7	—	• NO CC ENGINE INHIBITION • CC ENGINE INHIBITION
CRUISE CONTROL REVERSIBLE ERROR 6	Cruise control reversible error 6	—	• N/GEARBOX IN LIMP HOME • GEARBOX IN LIMP HOME
CRUISE CONTROL REVERSIBLE ERROR 5	Cruise control reversible error 5	—	• N/BRK DTCT WO BRK INFMTN • BRK DTCT WO BRK INFRMTN
CRUISE CONTROL REVERSIBLE ERROR 4	Cruise control reversible error 4	—	• N/BRK DTCT WO BRK INFMTN • BRK DTCT WO BRK INFRMTN
CRUISE CONTROL REVERSIBLE ERROR 3	Cruise control reversible error 3	—	• N/BRK INFRMTN ABSNC • BRK INFRMTN ABSNC
CRUISE CONTROL REVERSIBLE ERROR 2	Cruise control reversible error 2	—	• N/BRK INFRMTN UNVLBL • BRK INFRMTN UNVLBL
CRUISE CONTROL REVERSIBLE ERROR 1	Cruise control reversible error 1	—	• N/CLUTCH INFRMTN ABSNC • CLUTCH INFRMTN ABSNC
CRUISE CONTROL REVERSIBLE ERROR 0	Cruise control reversible error 0	—	• N/CLUTCH INFRMTN UNVLBL • CLUTCH INFRMTN UNVLBL

Item*		Unit	Remarks
CONSULT screen terms	Full spell		
THROTTLE VALVE OFFSET - MIN POSITION	Throttle valve offset - minimum position	%	
FLOW WATER VALVE	Flow water valve	—	• [DEACTIVATED] • Activated
AIR FLAPS PWM COMMAND	Air flaps pulse width modulation command	%	
CANISTER DRAIN VALVE COMMAND	Canister drain valve command	%	
FUNTIONAL STATE OF VEHICLE WITH S/S SYSEM	Functional state of the vehicle with stop/start system	—	• NOT ACTIVE • AUTO START • AUTO STOP • ENGINE RUNNING (S/S ON) • FUEL CUT • WAITING RESTART • S/S AVTIVATED • ENGINE STALLED • ENGINE START W/STARTER
STARTER STATUS	Starter status	—	• OFF • MECHANICAL PROTECTION • Thermal protection • ON
STOP/START SYSTEM MALFUNCTION CAUSE	Stop/start system malfunction case	—	• UNAVAILABLE • ACTIVATED • INHIBITED BY DRIVER • MALFUNCTION • END OF LIFE
ENG RESTART BYPASS RELAY ACTIVATION REQ	Engine restart bypass relay activation request	—	• NO REQ • REQ
STARTER RELAY CONDITION	Starter relay condition	—	• DEACTIVATED • ACTIVATED
NEUTRAL SWITCH	Neutral switch	—	• OFF • ON • no norm
SEVERAL START DETECTION W/O NEUTRAL	Several start detection without neutral	—	• NOT DETECTED • DETECTED
CLUTCH FULL SW ON DETECTN LONG DISATNC	Clutch full switch ON detection long distance	—	• No Default • DETECTED
NEUTRAL SWITCH FROM WIRE	Neutral switch from wire	—	• Contactor is not used (normal permanent state) • Contactor is used (non permanent state) • There is no contactor • Contactor is not available
VOLTAGE STABILIZER ACTIVATION REQUEST	Voltage stabilizer activation request	—	• NO REQ • REQ
ACCELERATOR PEDAL POS SEN 1 (RAW VALUE)	Accelerator pedal position sensor 1 (raw value)	—	
ESTIMATED TORQUE	Estimated torque	—	
ENGINE SPEED	Engine speed	—	
ERROR CODE INCOHERENCE	Error code incoherence	—	
ADMISSIBLE TORQUE	Admissible torque	—	

Item*		Unit	Remarks
CONSULT screen terms	Full spell		
WIRE BEGIN CLUTCH SWITCH STATE	Wire begin clutch switch state	—	• Contactor is not used (normal permanent state) • Contactor is used (non permanent state) • There is no contactor
CLUTCH PEDAL FULL SWITCH FROM WIRE	Clutch pedal full switch from wire	—	• Contactor is not used (normal permanent state) • Contactor is used (non permanent state) • There is no contactor • Contactor is noble
CLUTCH FULL SWITCH ACTIVE W/O DRIVER	Clutch full switch active without driver	—	• No Default • DETECTED

*: 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
ENG COOLANT TEMP	°C	Indicates engine coolant temperature	
ENGINE SPEED	rpm	Indicates the engine speed computed from the signal of the crankshaft position sensor and camshaft position sensor	
BATTERY VOLTAGE	V	Indicates power supply voltage of ECM	
VEHICLE DISTANCE	km	Indicates total vehicle distance	
ENG OIL TEMP	°C	Indicates engine oil temperature	
FUEL TEMP SENSOR	°C	Indicates fuel temperature	
ATMOSPHERIC PRESSURE	mbar	Indicates atmospheric pressure	
ACCLRATOR PDL POS SEN 1	mV	Indicates the signal voltage of APP sensor 1	
ACCLRATOR PDL POS SEN 2	mV	Indicates the signal voltage of APP sensor 2	
ENGINE STATUS	—	Indicates engine status • ENGINE STOPPED: ignition ON and engine stopped (not engine stalled) • DRIVEN: Starter motor activates or engine is running • ENGINE STALLED: Engine stalled	
CAMSHFT/CRANKSHFT SYNC	—	Indicates syncronization status of crankshaft and cam shaft	
BRAKE PEDAL SW 1 STATE	—	Indicates brake switch (normal close) status	
BRAKE PEDAL SW 2 STATE	—	Indicates brake switch (normal open) status	
ACCEL PEDAL POSI	—	Indicates accelerator pedal position	
ALTERNATOR POWER	W	Indicates alternator output	
CLUTCH PEDAL SW 1 STATE	—	Indicates status of clutch pedal position switch	
IDLE SPD REGULATION STAT	—	Indicates status of idle speed regulation control	
RQSTED IDLE SPD	rpm	Indicates idle speed set-point (for LCV)	
CONFIG/CLUTCH PEDAL SW	—	Indicates configuration status of clutch pedal position switch	
CONFIG/BRAKE PEDAL SW	—	Indicates configuration status of brake switch	
ALT LOAD	%	Indicates alternator load	
CONFIG/ACCSSRS IDLE SPD	—	Indicates idle speed set-point (for accessories)	

Monitor item	Unit	Description	Remarks
OWE/ENGINE REVOLUTIONS	trs	Indicates engine revolution counts from last engine oil replacement	
OWE/DRIVING DISTANCE	km	Indicates total distance at last engine oil replacement	
LEARN H/TURN DEFULT STAT	—	Indicates default status of half-turn learning	
LONG ENG START REQUEST	—	Indicates requested long operation of engine start	
SAFETY AUTHORIZATN FLAG	—	Indicates safety authorization from other ECU	
CUMULATIVE ENG STARTS 1	—	Indicates cumulated engine start count	
ENG FIRST START COUNTS	—	—	
CUMULATIVE ENG STARTS 2	—	Indicates cumulated engine start count with ignition switch	
IDLE SPEED REQUEST (BCM)	—	Indicates status of idle request from BCM (for LCV)	
MAXIMUM VEHICLE SPEED	km/h	Indicates parmitted maximum vehicle speed (for LCV)	
VALIDITY OF LEARN DFLT VAL	—	—	
CLUTCH PEDAL SW 2 STAT	—	Indicates clutch switch status (for ASCD)	
CAMSHAFT POSI (EEPROM)	—	Indicates check result of camshaft angle	
TORQUE CORRECTION (IDLE)	Nm	Indicates correction value of engine torque at idle	
EONV DIAGNOSIS INHIBITION	—	Indicates diagnosis inhibition status of EONV	
CL PDL FULL SW FROM WIRE	—	Indicates status of the clutch interlock switch	
INT MANI PRES	mbar	Indicates intake manifold pressure	
TP SENSOR 1	mV	Indicates sensor voltage of throttle position sensor 1	
TP SENSOR 2	mV	Indicates sensor voltage of throttle position sensor 1	
SOOT MASS IN CSF	g	Indicates quantity of soot mass	
THROTTLE VALVE POSITION	%	Indicates throttle open angle	
CSF/RGNRTN DIAG STATE	—	Indicates diagnosis state of CSF regeneration	
TEMP DWNSTREAM TURBINE	°C	Indicates temperature downstream of turbine	
INTAKE MANIFOLD TEMP	°C	Indicates intake manifold temperature	
CSF UPSTREAM TEMP	°C	Indicates temperature upstream catalyst	
CATALYST UPSTREAM O2S	mV	Indicates signal voltage of O2 sensor upstream of catalyst	
INLT THRTTL UPSTRM TEMP	°C	Indicates temperature upstream of throttle valve	
THROTTLE VALVE LEARNING	—	Indicates learning status of throttle valve	
CSF/REGENERATION STATE	—	Indicates regeneration status of CSF	
CSF/REGENERATION PRGRS	%	Indicates progress of CSF regeneration	
RESULT OF CATALYST DIAG	—	Indicates diagnosis result of catalyst	
RESLT OF CAT UPS O2S DIAG	—	Indicates diagnosis result upstream of catalyst	
ADPTV TRM OF TC WG CNTRL	%	Indicates adaptive term of TC wastegate control	
CRCLTN RQST OF COOLANT	—	Indicates status of coolant circulation request	
KNOCK COUNTS - CYL1	—	Indicates cylinder 1 knock count	
KNOCK COUNTS - CYL2	—	Indicates cylinder 2 knock count	
KNOCK COUNTS - CYL3	—	Indicates cylinder 3 knock count	
KNOCK COUNTS - CYL4	—	Indicates cylinder 4 knock count	
KNOCK NOISE COUNTS	—	Indicates knock noise count	
RICHNSS REGULATION STAT	—	Indicates status of richness regulation	
MEMORIZED FUEL SYS DIAG	—	—	
REQUEST OF M/V DIAG SQNC	—	—	
MASTERVAC PRESSURE STAT	—	Indicates status of vacuum pump activation request	
FUEL RAIL PRESSURE	bar	Indicates fuel rail pressure	

Monitor item	Unit	Description	Remarks
GLOBAL MASS OF INJECTION	mg/strk	Indicates fuel injection quantity per each cylinder	
MODE SWITCH	—	Indicates mode switch status	
CLUTCH PEDAL STATE	—	Indicates clutch pedal status	
ALTRNTR VOLT SETPOINT	V	Indicates set voltage of alternator	
RFRNC BATTERY VOLTAGE	V	Indicates reference voltage of fully charged battery	
CMMND OF DRAIN CUT VALVE	—	Indicates command status of EVAP drain cut valve	
INTAKE MANIFOLD PRESS	kPa	Indicates intake manifold pressure	
RAW TANK DFFRNTL PRESS	Pa	Indicates differential pressure of tank (law value)	
AVE SIG OF FUEL PRES SEN	V	Indicates signal voltage of fuel pressure sensor (averaged value)	
EXH CAMSHAFT POSITION 07	°CRK	Indicates exhaust camshaft angle	
EXH CAMSHAFT POSITION 06	°CRK	Indicates exhaust camshaft angle	
EXH CAMSHAFT POSITION 05	°CRK	Indicates exhaust camshaft angle	
EXH CAMSHAFT POSITION 04	°CRK	Indicates exhaust camshaft angle	
EXH CAMSHAFT POSITION 03	°CRK	Indicates exhaust camshaft angle	
EXH CAMSHAFT POSITION 02	°CRK	Indicates exhaust camshaft angle	
EXH CAMSHAFT POSITION 01	°CRK	Indicates exhaust camshaft angle	
EXH CAMSHAFT POSITION 00	°CRK	Indicates exhaust camshaft angle	
LAST VALUE OF CAM POSI	°CRK	Indicates the last camshaft position when ignition switch OFF	
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
AFTR ELECTRIC THRTTL CNTRL ACTUATOR RPLCMNT	In this mode, electric throttle control actuator data can be initialized.	When electric throttle control actuator is replaced.
AFTER TURBOCHARGER REPLACEMENT	In this mode, turbocharger data should be initialized.	When turbocharger is replaced.
AFTER TC SOLENOID VALVE REPLACEMENT	In this mode, turbocharger data should be initialized.	When turbocharger wastegate control solenoid valve is replaced.
AFTER CLUCH PEDAL SWITCH REPLACEMENT	In this mode, clutch pedal data can be initialized.	When clutch pedal position switch or clutch interlock switch is replaced.
AFTER CAMSHAFT POS SENSOR REPLACEMENT	In this mode, camshaft data can be initialized.	When camshaft position sensor is replaced.
AFTER CRANKSHAFT POS SENSOR REPLACEMENT	In this mode, crankshaft data can be initialized.	When crankshaft position sensor is replaced.
AFTER HIGH PRESSURE FUEL PUMP REPLACEMENT	In this mode, high pressure fuel pump data can be initialized.	When high pressure fuel pump is replaced.
AFTER FUEL RAIL PRESSURE SENSOR REPLACEMENT	In this mode, fuel rail pressure sensor data can be initialized.	When high pressure fuel rail pressure sensor is replaced.
AFTER FUEL INJECTOR REPLACEMENT	In this mode, fuel injector data can be initialized.	When fuel injector is replaced.

WORK ITEM	DESCRIPTION	USAGE
WRITE SAVED DATA	In this mode, write data stored by “SAVE COMPUTER DATA” in work support mode to ECM.	When perform ECM replacement
SAVE COMPUTER DATA	In this mode, save data that is in ECM.	When perform ECM replacement
RESET STARTER COUNTER	In this mode, starter motor operation counter can be cleared.	When starter motor is replaced.
INPUT STARTER COUNTER	—	—

ACTIVE TEST MODE

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
GAS PUMP COMMAND STATE (GASOLINE)	—	—	—
INTAKE CAMSHAFT PHASER PWM COMMAND	—	—	—
BOOST PRESSURE PWM COMMAND (GASOLINE)	—	—	—
CATALYST EXHAUST GAS UPSTREAM OXYGEN RESISTANCE HEATER PWM COMMAND	—	—	—
CATALYST EXHAUST GAS DOWNSTREAM OXYGEN RESISTANCE HEATER PWM COMMAND	—	—	—
OIL PRESSURE RCO COMMAND WITH MONITOOL	—	—	—
VVT CONTROL SOLENOID (EXHAUST)	—	—	—
CONTROLLED THERMOSTAT	—	—	—
THROTTLE VALVE POSITION SETPOINT	—	—	—

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
CANISTER DRAIN VALVE COMMAND (CONTI)	—	—	—
AUTO STOP START	• Engine: After warming up, run engine at idle. • Gear position: Neutral • 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

ECU DIAGNOSIS INFORMATION

ECM

Fail-safe

INFOID:0000000010700938

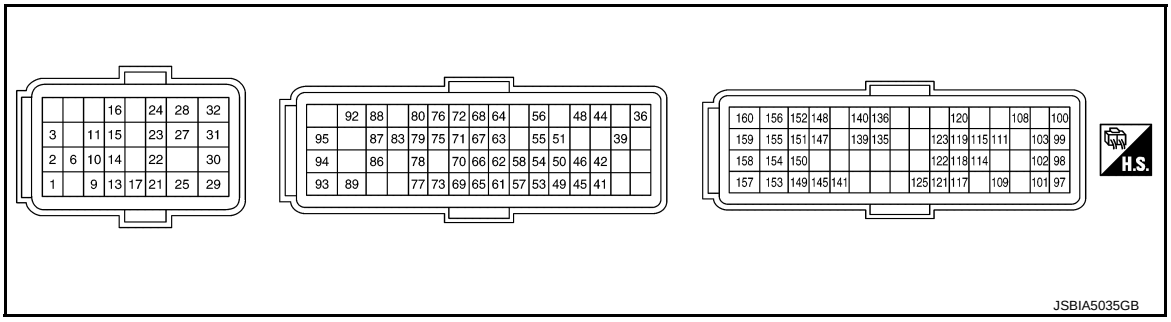
STOP/START SYSTEM

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	Electric throttle control function	Prohibit the stop/start system operation		

Reference Value

INFOID:0000000010379037

TERMINAL LAYOUT

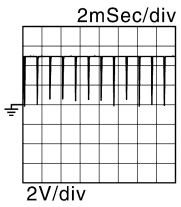
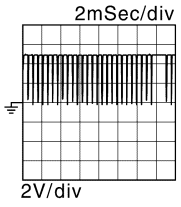
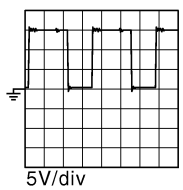


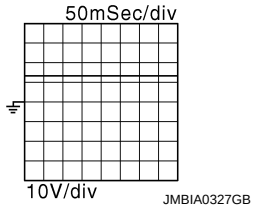
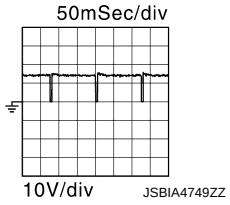
PHYSICAL VALUES

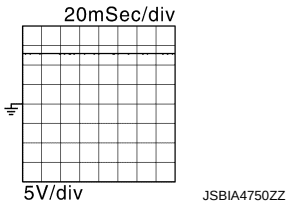
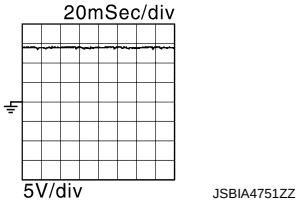
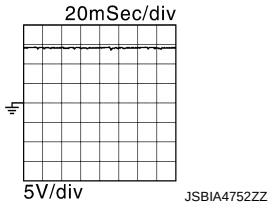
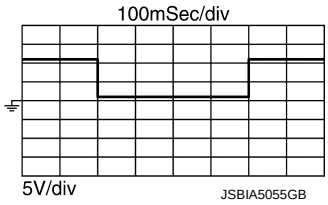
NOTE:
Pulse signal is measured by CONSULT.

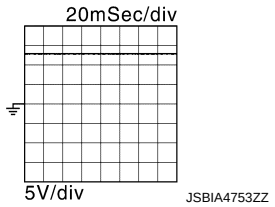
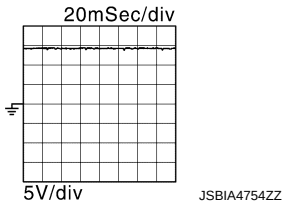
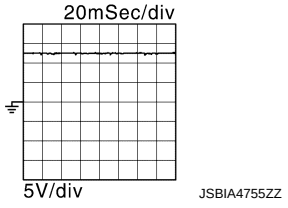
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
1 (L)	—	CAN communication line (CAN-H)	Input/ Output	—	—
2 (P)	—	CAN communication line (CAN-L)	Input/ Output	—	—

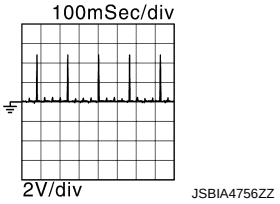
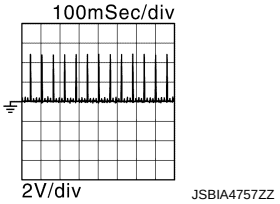
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
3 (SB)	29 (B)	ASCD MAIN switch	Input	[Ignition switch: ON] ASCD MAIN switch: OFF	0 V
				[Ignition switch: ON] ASCD MAIN switch: ON	Battery voltage (11 - 14 V)
6 (V)	29 (B)	Clutch interlock switch	Input	[Ignition switch: ON] • Engine stopped • Clutch pedal: Fully released	0 V
				[Ignition switch: ON] • Engine stopped • Clutch pedal: Fully depressed	11.81 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	Battery voltage (11 - 14 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)
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]	Battery voltage (11 - 14 V)
17 (BG)	29 (B)	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0 V
				[Ignition switch: OFF] • Brake pedal: Slightly depressed	Battery voltage (11 - 14 V)
21 (Y)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
22 (W)	21 (Y)	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	2.28 V
23 (BG)	—	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5 V
25 (B)	—	ECM ground	—	—	—
27 (V)	—	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5 V

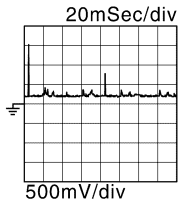
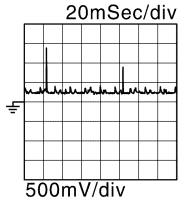
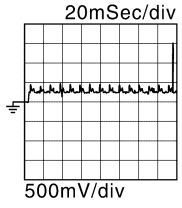
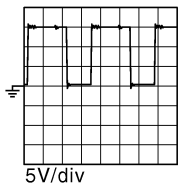
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
28 (G)	—	Power supply for ECM	Input	[Ignition switch: ON]	Battery voltage (11 - 14 V)
29 (B)	—	ECM ground	—	—	—
30 (GR)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—
31 (R)	30 (GR)	Accelerator 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	4.55 V
32 (B)	—	ECM ground	—	—	—
35 (R)	37 (B)	Crankshaft position sensor (POS)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	4.72 V★  JSBIA4747ZZ
				[Engine is running] • Engine speed: 2,000 rpm	4.4 V★  JSBIA4748ZZ
37 (B)	—	Sensor ground (Crankshaft position sensor)	—	—	—
38 (W)	42 (B)	Knock sensor	Input	[Engine is running] • Idle speed	0 V
39 (Y)	29 (B)	Engine restart relay control signal	Output	[Stop/start system operate] • While cranking of restart	11.76 V (While operating the starter motor)
				[Engine is running] • Warm-up condition • Idle speed	14.34 V
40 (GR)	29 (B)	Exhaust valve timing control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	14.34 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	(8.7 - 14.34 V)★  JMBIA0038GB

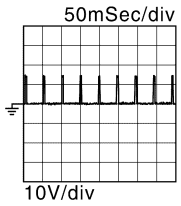
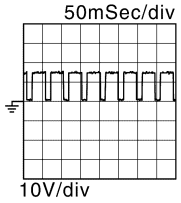
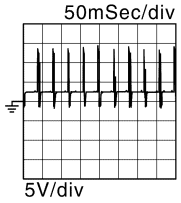
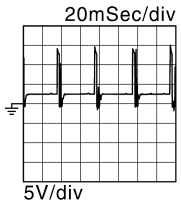
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
41 (W)	37 (B)	Sensor power supply (Crankshaft position sensor)	—	[Ignition switch: ON]	5.0 V
42 (B)	—	Sensor ground (Knock sensor)	—	—	—
44 (BG)	29 (B)	EVAP canister purge volume control solenoid valve	Output	[Engine is running] • Idle speed • Accelerator pedal: Not depressed even slightly, after engine starting	Battery voltage (14.34 V)★  JMBIA0327GB
				[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.)	13.38 - 14.34 V★  JSBIA4749ZZ
45 (W)	62 (R)	Sensor power supply (Fuel rail pressure sensor)	—	[Ignition switch: ON]	5.0 V
46 (—)	—	Shield	—	—	—
48 (G)	29 (B)	Turbocharger wastegate control solenoid valve	Output	[Engine is running] Turbocharger: Not operated	—
				[Engine is running] Turbocharger: Operated	—

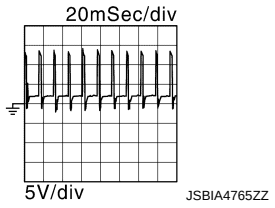
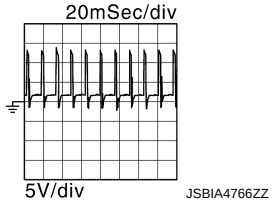
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
52 (GR)	29 (B)	Thermostat heater control solenoid valve	Output	[Ignition switch: ON]	13.31 V 
				[Engine is running] • Warm-up condition • Idle speed	14.18 V 
				[Engine is running] • Before warm-up condition • Idle speed	14.20 V 
56 (LG)	29 (B)	Voltage stabilizer signal	Output	[Stop/start system operates] • While cranking of restart	(While operating the starter motor) 
57 (L)	77 (V)	Sensor power supply (Refrigerant pressure sensor)	—	[Ignition switch: ON]	5.0 V

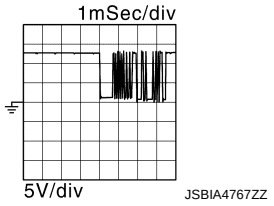
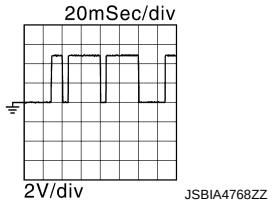
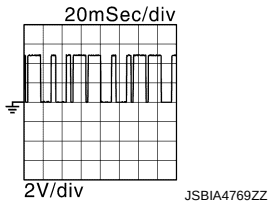
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
60 (V)	29 (B)	Engine coolant bypass valve control solenoid valve	Output	[Ignition switch: ON]	13.36 V  JSBIA4753ZZ
				[Engine is running] • Warm-up condition • Idle speed	14.20 V  JSBIA4754ZZ
				[Engine is running] • Before warm-up condition • Idle speed	14.10 V  JSBIA4755ZZ
62 (R)	—	Sensor ground (Fuel rail pressure sensor)	—	—	—
63 (G)	62 (R)	Fuel rail pressure sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.19 V
				[Engine is running] • Warm-up condition • Revving engine from idle to 4,000 rpm quickly	1.40 - 2.99 V
65 (R)	90 (B)	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5 V
68 (G)	29 (B)	Turbocharger bypass valve control solenoid valve	Output	[Engine is running] Turbocharger: Not operated	14.18 V
				[Engine is running] Turbocharger: Operated	0.47 V

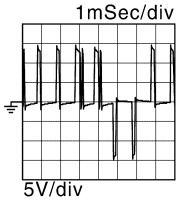
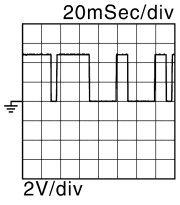
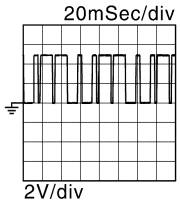
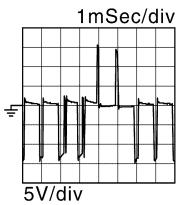
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
72 (P)	29 (B)	Ignition signal No. 1	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0.2 V★  JSBIA4756ZZ
76 (LG)		Ignition signal No. 2			
79 (Y)		Ignition signal No. 3		[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.3 V★  JSBIA4757ZZ
80 (SB)		Ignition signal No. 4			
74 (LG)	106 (BR)	Intake air temperature sensor	Input	[Engine is running]	3.13 V
75 (BR)	81 (P)	Engine coolant temperature sensor	Input	[Engine is running]	0.77 V
77 (V)	—	Sensor ground (Refrigerant pressure sensor)	—	—	—
78 (P)	77 (V)	Refrigerant pressure sensor	Input	[Engine is running] • Warm-up condition • Both A/C switch and blower fan motor switch: ON (Compressor operates)	1.44 - 1.70 V
81 (P)	—	Sensor ground (Engine coolant temperature sensor)	—	—	—
82 (W)	90 (B)	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Gear position: 1st • Accelerator pedal: Fully released	1.17 V
				[Ignition switch: ON] • Engine stopped • Gear position: 1st • Accelerator pedal: Fully depressed	1.17 V
83 (G)	29 (B)	Engine restart bypass control relay	Output	[Engine is running] • Warm-up condition • Idle speed	14.34 V
				[Stop/start system operate] While cranking of restart	0 V (While operating the starter motor)

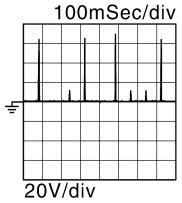
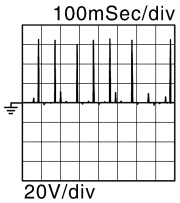
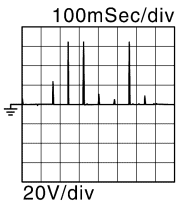
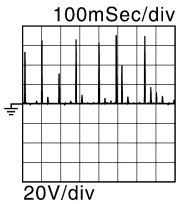
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
84 (SB)	29 (B)	Engine oil pressure control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	0.24 V  JSBIA4758ZZ
				[Engine is running] • Engine speed: 2,000 rpm	0.25 V  JSBIA4759ZZ
				[Engine is running] • Engine speed: 3,000 rpm	0.3 V  JSBIA4760ZZ
87 (G)	90 (B)	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Gear position: 1st • Accelerator pedal: Fully released	3.85 V
				[Ignition switch: ON] • Engine stopped • Gear position: 1st • Accelerator pedal: Fully depressed	3.85 V
88 (G)	29 (B)	Intake valve timing control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	14.34 V
				[Engine is running] • Warm-up condition • When revving engine up to 2,000rpm Quickly	(8.8 - 14.34 V)★  JMBIA0038GB
90 (B)	—	Sensor ground (Throttle position sensor)	—	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
91 (SB)	29 (B)	Heated oxygen sensor 1 heater	Output	[Engine is running] • Engine speed: Below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	10 V★  JSBIA4761ZZ
				[Ignition switch: ON] • Engine stopped	11.83 V
92 (L)	29 (B)	Heated oxygen sensor 2 heater	Output	[Engine is running] • Engine speed: Below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	1.4 V★  JSBIA4762ZZ
				[Ignition switch: ON] • Engine stopped	11.83 V
93 (R)	—	Power supply for ECM	Input	[Ignition switch: ON]	Battery voltage (11 - 14 V)
95 (W)	29 (B)	High pressure fuel pump (HI)	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	2.88 V ★  JSBIA4763ZZ
				[Engine is running] • Engine speed is 2,000 rpm	3.50 V ★  JSBIA4764ZZ

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
96 (B)	29 (B)	High pressure fuel pump (LO)	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	2.49 V ★ 
				[Engine is running] • Engine speed is 2,000 rpm	2.85 V ★ 
97 (V)	106 (BR)	Turbocharger boost sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.62 V
				[Engine is running] • Warm-up condition • Revving engine from idle to 4,000 rpm quickly	1.63 - 2.64 V
99 (Y)	122 (B)	Heated oxygen sensor 1	Input	[Engine is running] • Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0.2 - 0.83 V
100 (B)	—	Sensor ground (Heated oxygen sensor 1)	—	—	—
102 (W)	114 (R)	Intake manifold pressure sensor	Output	[Engine is running] • Warm-up condition • Both A/C switch and blower fan switch: ON (Compressor operates)	—
				[Engine is running] • Warm-up condition • Idle speed	—
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	—
106 (BR)	—	Sensor ground (Intake air temperature sensor, Turbocharger boost sensor)	—	—	—
111 (P)	29 (B)	ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] • A few seconds after turning ignition switch OFF	0.76 V
				[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
112 (W)	122 (B)	Heated oxygen sensor 2	Input	[Engine is running] • Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0.2 - 0.83 V
114 (R)	—	Sensor ground (Intake manifold pressure sensor)	—	—	—
115 (L)	29 (B)	Fuel pump relay	Output	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0.77 V
				[Ignition switch: ON] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14 V)
117 (G)	114 (R)	Sensor power supply (Intake manifold pressure sensor)	—	[Ignition switch: ON]	5 V
121 (R)	126 (B)	Sensor power supply (Exhaust valve timing control position sensor)	—	[Ignition switch: ON]	5 V
122 (B)	—	Sensor ground (Heated oxygen sensor 1)	—	—	—
123 (G)	29 (B)	Engine communication line	Input/ Output	[Ignition switch: ON]	10.6 V★  JSBIA4767ZZ
126 (B)	—	Sensor ground (Exhaust valve timing control position sensor)	—	—	—
127 (L)	126 (B)	Exhaust valve timing control position sensor	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	2.56 - 3.05 V★  JSBIA4768ZZ
				[Engine is running] • Engine speed is 2,000 rpm	2.56 - 2.85 V★  JSBIA4769ZZ

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
132 (R)	136 (L)	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Gear position: 1st • Accelerator pedal: Fully depressed	1.40 V★  JSBIA4770ZZ
133 (GR)	—	Sensor power supply (Camshaft position sensor)	—	[Ignition switch: ON]	5 V
134 (Y)	—	Sensor ground (Camshaft position sensor)	—	—	—
135 (L)	134 (Y)	Camshaft position sensor	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	2.56 - 3.09★  JSBIA4771ZZ
				[Engine is running] • Engine speed is 2,000 rpm	2.56 - 2.83★  JSBIA4772ZZ
136 (L)	132 (R)	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine stopped • Gear position:1st • Accelerator pedal: Fully released	1.4 V★  JSBIA4773ZZ
137 (P)	106 (BR)	Sensor power supply (Turbocharger boost sensor)	—	[Ignition switch: ON]	5 V
143 (W)	29 (B)	PNP signal	Input	[Ignition switch: ON] • Gear position: Neutral	Battery voltage (11 - 14 V)

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
153 (LG)	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	BATTERY VOLTAGE (11 - 14 V) ★  JSBIA4774ZZ
154 (LG)		Fuel injector No. 3 (HI)			
155 (P)		Fuel injector No. 2 (HI)		[Engine is running] • Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14 V) ★  JSBIA4775ZZ
156 (W)		Fuel injector No. 4 (HI)			
157 (R)	29 (B)	Fuel injector No. 1 (LO)	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14 V) ★  JSBIA4776ZZ
158 (SB)		Fuel injector No. 3 (LO)			
159 (V)		Fuel injector No. 2 (LO)		[Engine is running] • Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14 V) ★  JSBIA4777ZZ
160 (B)		Fuel injector No. 4 (LO)			

DTC Index

INFOID:0000000010379038

X: Applicable —: Not applicable

DTC*	Items (CONSULT screen item)	Trip	MIL	Fault code	Reference page
U0111	COMMUNICATION ERROR (LOST)	10	–	08, 63	ECH-126
U0121	LOST COMM (ABS)	10	–	87	ECH-127
U0298	COMMUNICATION ERROR (LOST)	10	–	01	ECH-128
U0299	COMMUNICATION ERROR (LOST)	10	–	08	ECH-130
U0315	VEHICLE SPEED	10	–	82, 86, 87	ECH-132
U0415	ABS CONTROL MODULE	10	–	64, 82	ECH-133
B1900	DC/DC CONVERTER	10	–	01	ECH-134
B1901	DC/DC CONVERTER	10	–	01	ECH-136
B1902	DC/DC CONVERTER	10	–	01	ECH-138
B1903	DC/DC CONVERTER	10	–	01	ECH-140

DTC*	Items (CONSULT screen item)	Trip	MIL	Fault code	Reference page
B1904	—	10	–	01	ECH-142
P0001	FUEL VOLUME REGULATOR	3	×	11, 12, 13	ECH-143
P0010	CAMSHAFT POS ACTUATOR A B1	10	–	11, 12, 13	ECH-145
P0011	CAMSHAFT POSITION A B1	10	–	77, 78, 92	ECH-147
P0013	CAMSHAFT POS ACTUATOR B B1	10	–	11, 12, 13	ECH-149
P0014	CAMSHAFT POSITION B B1	10	–	77, 78, 92	ECH-151
P0016	CKP/S A - CMP/S A CORRELATION B1	3	×	62	ECH-153
P0017	CKP/S B - CMP/S B CORRELATION B1	3	×	62	ECH-155
P0033	TC/SC BYPASS VALVE A	10	–	16, 17	ECH-157
P0089	FUEL PRESSURE REGULATOR 1	10	–	63	ECH-159
P0090	FUEL PRESSURE REGULATOR 1	1	×	77	ECH-160
P0095	INTAKE AIR TEMPERATURE 2 B1	3	×	16, 17	ECH-162
P0105	ABSOL PRESS SENSOR [P0105]	3	×	16, 17	ECH-164
P0106	MAP/BAROMETRIC PRESS SENSOR	3	×	64	ECH-166
P0115	COOLANT TEMP SEN [P0115]	3	×	16, 17, 2F	ECH-168
P0120	THROTTLE POSI SEN [P0120]	3	×	29	ECH-170
P012A	TC/SC INLET PRESSURE SENSOR	3	×	16, 17	ECH-172
P0130	O2 SENSOR 1 B1	1 or 3	×	09, 11, 12, 13	ECH-175
P0135	O2 SENSOR 1 HEATER B1	3	×	11, 12, 13	ECH-177
P0136	O2 SENSOR 2 B1	3	×	11, 12, 13	ECH-179
P0141	O2 SENSOR 2 HEATER B1	3	×	11, 12, 13	ECH-181
P0170	FUEL TRIM B1	3	×	09	ECH-183
P0190	FUEL RAIL PRESSURE SENSOR A	1 or 3	×	16, 17, 64	ECH-186
P0201	INJECTOR CIRC-CYL1 [P0201]	3	×	11, 12, 13, 24	ECH-188
P0202	INJECTOR CIRC-CYL2 [P0202]	3	×	11, 12, 13, 24	ECH-188
P0203	INJECTOR CIRC-CYL3 [P0203]	3	×	11, 12, 13, 24	ECH-188
P0204	INJECTOR CIRC-CYL4 [P0204]	3	×	11, 12, 13, 24	ECH-188
P0217	ENG COOLANT TEMP	10	–	98	ECH-191
P0220	THROTTLE/PEDAL POSI SEN/SW B	3	×	29	ECH-194
P0225	THROTTLE/PEDAL POSI SEN/SW C	3	×	16 or 17	ECH-196
P0226	THROTTLE/PEDAL POSI SEN/SW C	1 or 3	× or –	64, F1, F2, F3	ECH-198
P0243	TC/SC WASTEGATE SOLENOID A	3	×	11, 12, 13	ECH-200
P025A	FUEL PUMP MODULE A	1	×	00, 11, 12	ECH-202
P0300	MULTI CYL MISFIRE [P0300]	3	×	66, F8	ECH-204
P0301	CYL 1 MISFIRE [P0301]	3	×	66, F8	ECH-204
P0302	CYL 2 MISFIRE [P0302]	1 or 3	×	66, F8	ECH-204
P0303	CYL 3 MISFIRE [P0303]	1 or 3	×	66, F8	ECH-204
P0304	CYL 4 MISFIRE [P0304]	1 or 3	×	66, F8	ECH-204
P0313	MISFIRE DETECTED	1 or 3	×	66, F8	ECH-204
P0315	CRANKSHAFT POSITION SYSTEM	3	×	09	ECH-206
P0325	KNOCK SENSOR [P0325]	3	–	1C	ECH-208
P0335	CRANK POS SEN (OBD) [P0335]	3	×	25, 29, 31, 38, 62, 64, 96	ECH-210
P0340	CAMSHAFT POSI SEN [P0340]	3	×	29, 31, 38, 64	ECH-212

DTC*	Items (CONSULT screen item)	Trip	MIL	Fault code	Reference page
P0351	IGNITION COIL A	3	×	11, 12, 13	ECH-215
P0352	IGNITION COIL B	3	×	11, 12, 13	ECH-215
P0353	IGNITION COIL C	3	×	11, 12, 13	ECH-215
P0354	IGNITION COIL D	3	×	11, 12, 13	ECH-215
P0365	CAMSHAFT POSITION SENSOR B B1	3	×	29, 31, 38, 64	ECH-219
P0420	CATALYST SYSTEM	3	×	09	ECH-221
P0443	CANISTER PURGE VALVE	3 or 10	× or –	11, 12, 13	ECH-223
P0530	A/C REFRIGERANT PRESSURE SEN A			16, 17	ECH-225
P0560	BATTERY VOLTAGE	3 or 10	× or –	16, 17, 61	ECH-228
P0564	CRUISE CONTROL	10	–	15, 29, 1C	ECH-230
P0575	CRUISE CONTROL	10	–	64	ECH-232
P0597	THERMOSTAT	3 or 10	× or –	11, 12, 13	ECH-234
P0606	CONTROL MODULE	3	×	04	ECH-236
P060A	INTERNAL CONTROL MODULE	1	×	49	ECH-237
P060B	INTERNAL CONTROL MODULE	3	×	49	ECH-238
P061A	INTERNAL CONTROL MODULE	1 or 3 or 10	× or –	61, 62, 64, F9	ECH-239
P062D	FUEL INJECTOR DRIVER B1	3	×	8F, F7	ECH-240
P062E	FUEL INJECTOR DRIVER B2	3	×	8F, F7	ECH-241
P0638	THROTTLE ACTUATOR B1	1	×	77	ECH-242
P0641	SENSOR REFERENCE VOLTAGE A	1	×	16, 17	ECH-246
P0651	SENSOR REFERENCE VOLTAGE B	1	×	16, 17	ECH-248
P0657	ACTUATORS SUPPLY VOLTAGE A	10	–	11	ECH-250
P0697	SENSOR REFERENCE VOLTAGE C	1	×	16, 17	ECH-252
P0833	CLUTCH PEDAL SWITCH B	10	–	62	ECH-254
P10AA	CONTROL MODULE	3	×	16, 17, 25	ECH-258
P1512	STARTER MOTOR	10	–	01	ECH-259
P1525	CRUISE CONTROL/SPEED LIMITER	10	–	F3	ECH-260
P1589	NEUTRAL SWITCH	10	–	29, 64	ECH-261
P158A	CLUTCH SWITCH	10	–	62	ECH-263
P160C	CONTROL MODULE	3	×	04	ECH-267
P1650	—	10	–	72, 73	ECH-269
P1655	—	10	–	01	ECH-272
P1656	ENGINE RESTART BYPASS RELAY	10	–	01	ECH-276
P1675	ENGINE COOLANT TEMPERATURE	1	×	98	ECH-280
P2100	THROTTLE ACTUATOR A	3	×	01	ECH-283
P2119	THROTTLE ACTUATOR A	3	×	07, 75, 91	ECH-285
P2120	THROTTLE/PEDAL POSI SEN/SW D	3	×	16, 17	ECH-288
P2135	THRTL/PDL POS SEN/SW A/B CRL TN	3 or 10	× or –	64, 2F	ECH-291
P2263	TC/SC BOOST SYSTEM	3	×	21, 22	ECH-293
P2504	CHARGING SYSTEM	10	–	01, 79	ECH-295

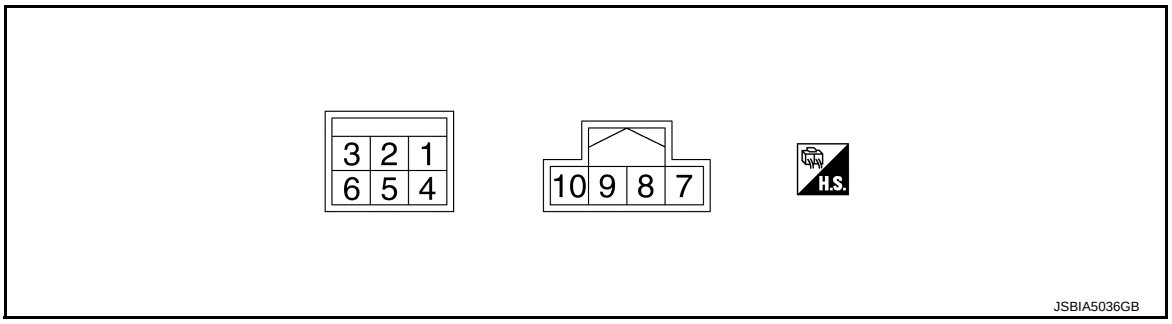
*: This number is prescribed by ISO 15031-6.

DC/DC CONVERTER

Reference Value

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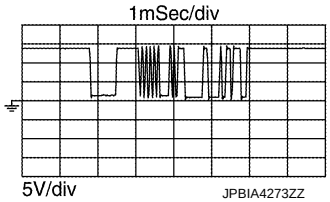
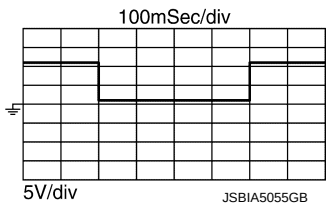
TERMINAL LAYOUT



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 operates] • While cranking of restart	12 V
				Except above	9 - 13 V
6 (W)	2 (B)	Power supply output 2	Output	[Stop/start system operates] • While cranking of restart	12 V
				Except above	9 - 13 V
7 (SB)	2 (B)	Engine communication line	Input/ Output	[Ignition switch: ON]	
9 (LG)	2 (B)	Voltage stabilizer signal	Input	[Stop/start system operates] • While cranking of restart	★ Less than 2 V 
				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

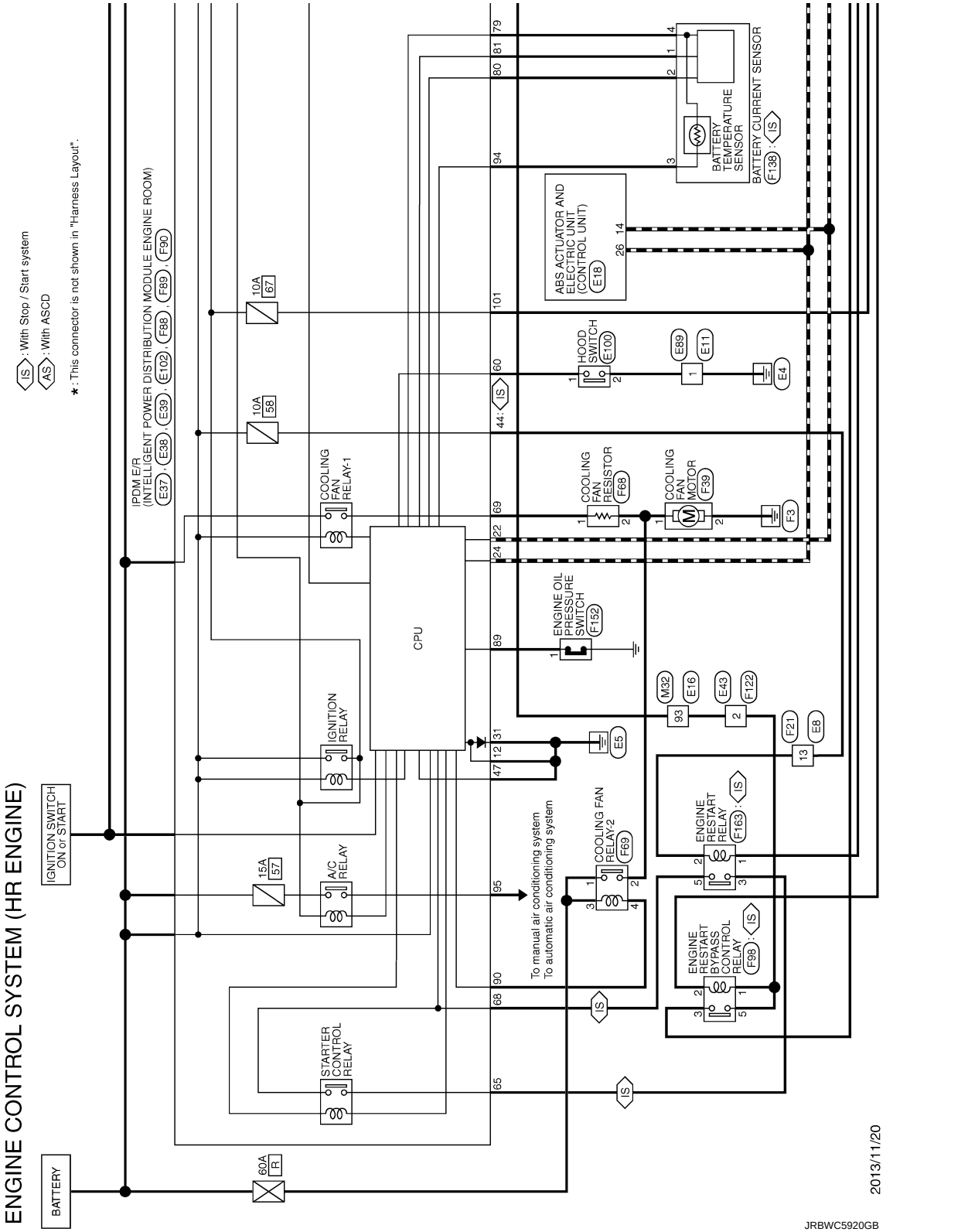
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

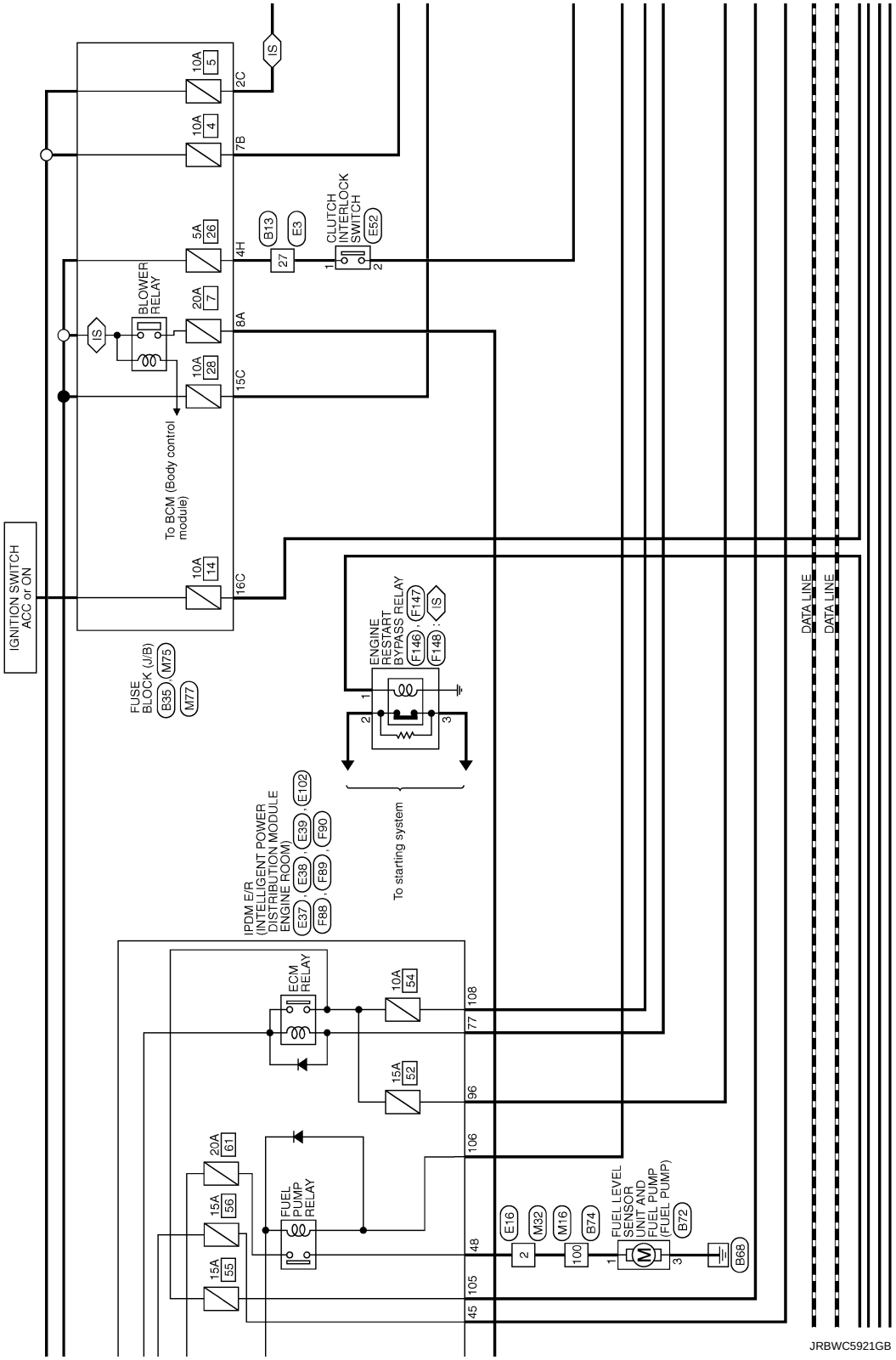
WIRING DIAGRAM

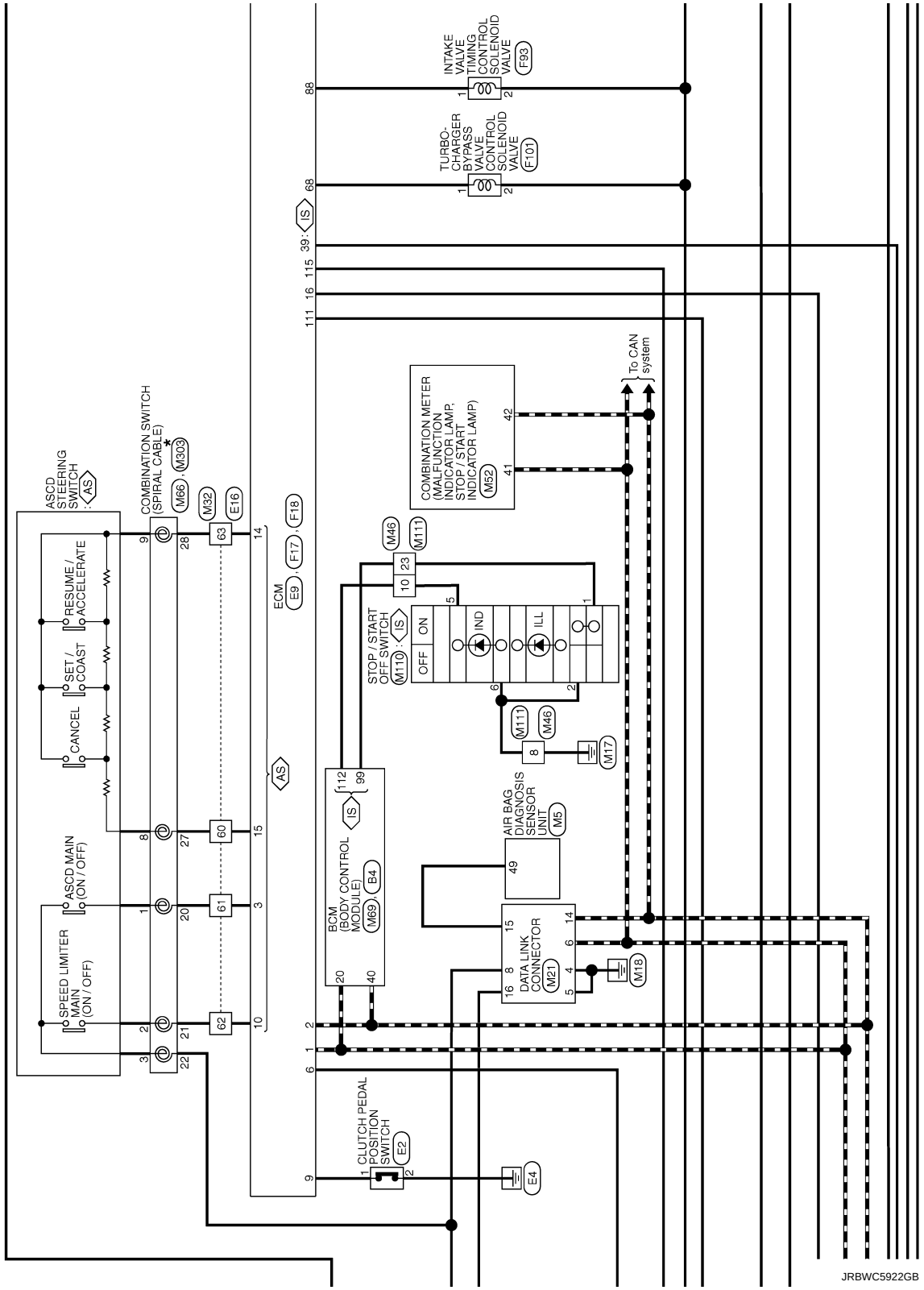
ENGINE CONTROL SYSTEM

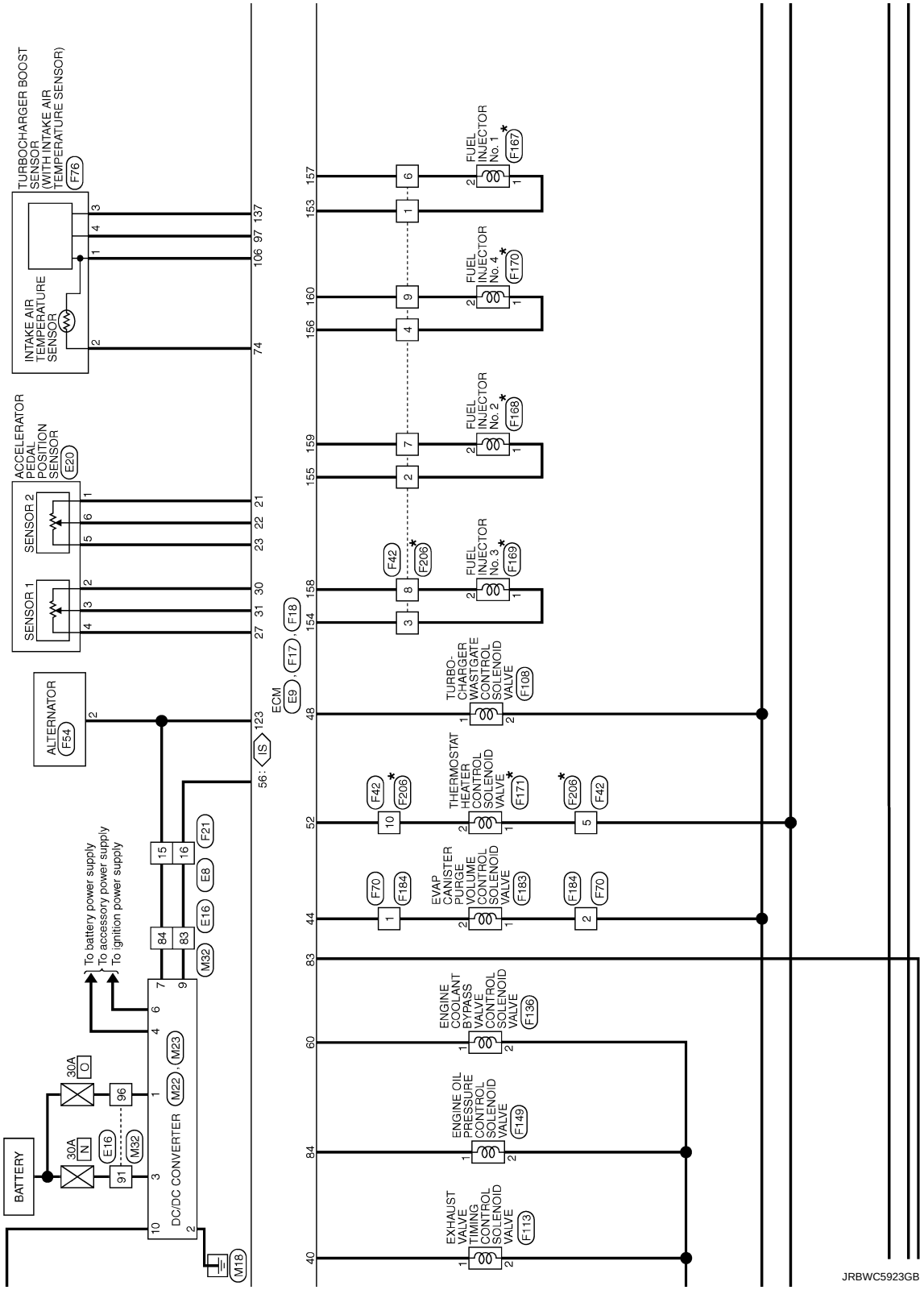
Wiring Diagram

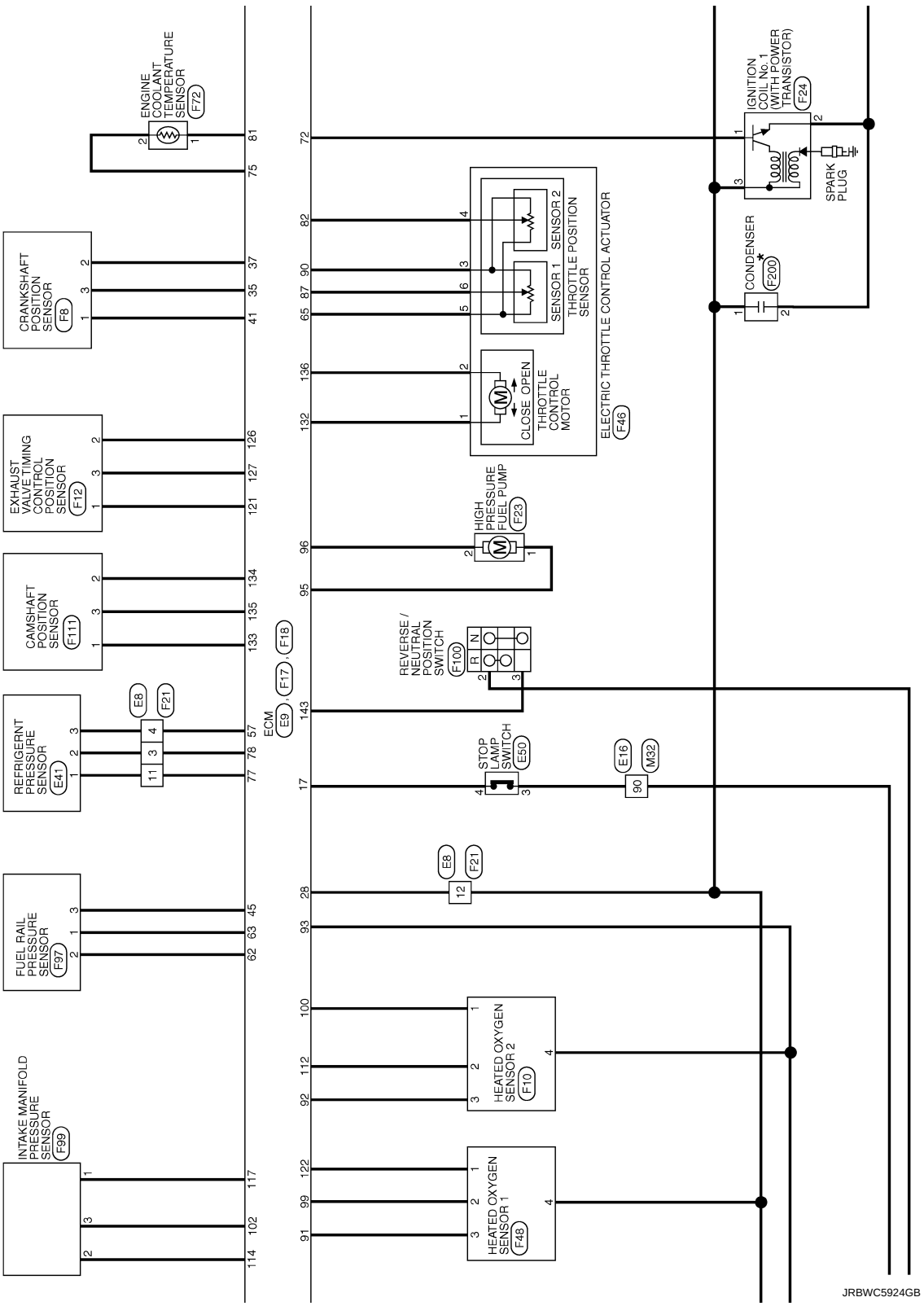
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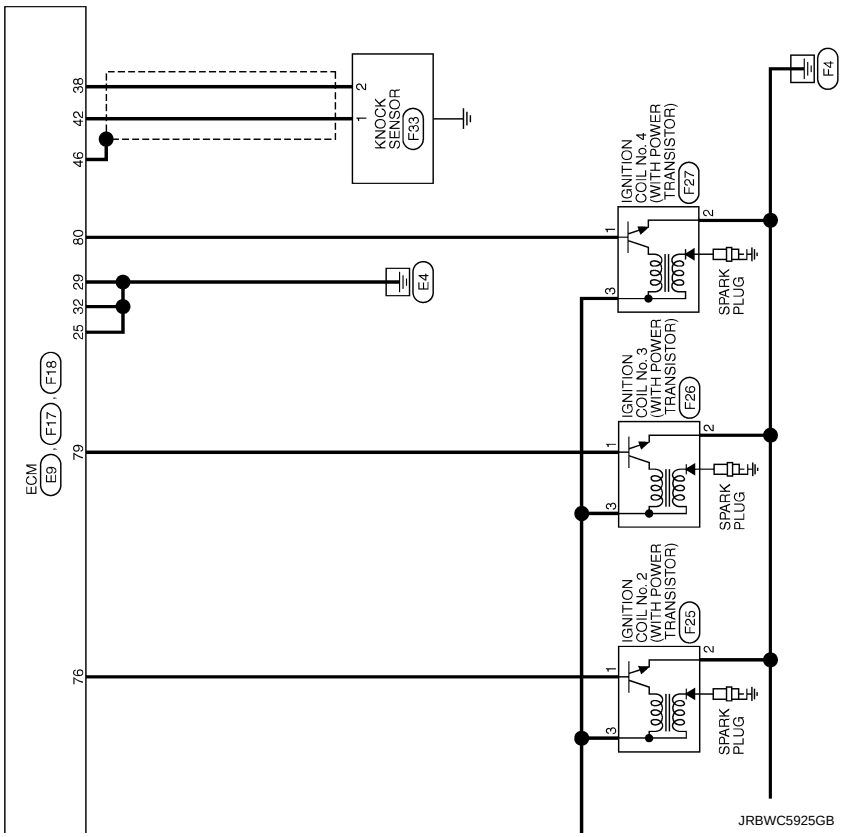



IGNITION SWITCH ACC or ON
FUSE BLOCK (J/B) M75 B35 M77
10A 5
10A 4
5A 26
20A 7
10A 28
10A 14
IS
2C
7B
4H
8A
15C
16C
BLOWER RELAY
To BCM (Body control module)
B13
E3
27
CLUTCH INTERLOCK SWITCH
E52
ENGINE RESTART BYPASS RELAY
F147 : IS
F146 : F148
To starting system
DATA LINE
DATA LINE
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
E102 : E39 : F90
E38 : F89 : E37 : F88
ECM RELAY
10A 54
15A 52
108
77
96
106
20A 61
15A 56
15A 55
FUEL PUMP RELAY
48
105
45
E16
M32
M16
B74
2
100
FUEL LEVEL SENSOR UNIT AND FUEL PUMP (FUEL PUMP)
B72
B68
JRBWC5921GB


INTAKE VALVE TIMING CONTROL SOLENOID VALVE F93
TURBO-CHARGER BYPASS VALVE CONTROL SOLENOID VALVE F101
88
68
39
115
16
111
IS
To CAN system
COMBINATION METER (MALFUNCTION INDICATOR LAMP; STOP / START INDICATOR LAMP) M52
42
41
M46
M111
23
10
5
1
STOP / START OFF SWITCH M110
IS
OFF
ON
IND
ILL
6
2
M111
M46
8
M17
AIR BAG DIAGNOSIS SENSOR UNIT M5
49
BCM (BODY CONTROL MODULE) B4 M69
112
99
20
40
DATA LINK CONNECTOR M21
15
14
6
16
8
4
5
M18
2
1
6
9
CLUTCH PEDAL POSITION SWITCH E2
1
2
E4
ECM E9, F17, F18
AS
14
15
3
10
ASCD STEERING SWITCH AS
COMBINATION SWITCH (SPIRAL CABLE) M66, M303
M32
E16
63
60
61
62
9
28
8
27
1
20
2
21
3
22
RESUME / ACCELERATE
SET / COAST
CANCEL
ASCD MAIN (ON / OFF)
SPEED LIMITER MAIN (ON / OFF)
JRBWC5922GB

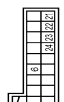

TURBOCHARGER BOOST SENSOR (WITH INTAKE AIR TEMPERATURE SENSOR) F76
INTAKE AIR TEMPERATURE SENSOR
ACCELERATOR PEDAL POSITION SENSOR E20
SENSOR 2
SENSOR 1
ALTERNATOR F54
ECM E9, F17, F18
FUEL INJECTOR No. 1 F167
FUEL INJECTOR No. 4 F170
FUEL INJECTOR No. 2 F168
FUEL INJECTOR No. 3 F169
TURBO-CHARGER WASTGATE CONTROL SOLENOID VALVE F108
THERMOSTAT HEATER CONTROL SOLENOID VALVE F171
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE F183
ENGINE COOLANT BYPASS VALVE CONTROL SOLENOID VALVE F136
ENGINE OIL PRESSURE CONTROL SOLENOID VALVE F149
EXHAUST VALVE TIMING CONTROL SOLENOID VALVE F113
BATTERY
DC/DC CONVERTER M22, M23
30A O
30A N
To battery power supply
To accessory power supply
To ignition power supply
JRBWC5923GB


ENGINE COOLANT TEMPERATURE SENSOR F72
CRANKSHAFT POSITION SENSOR F8
EXHAUST VALVE TIMING CONTROL POSITION SENSOR F12
CAMSHAFT POSITION SENSOR F111
REFRIGERNT PRESSURE SENSOR E41
FUEL RAIL PRESSURE SENSOR F97
INTAKE MANIFOLD PRESSURE SENSOR F99
ECM E9 F17 F18
E8 F21
HIGH PRESSURE FUEL PUMP F23
REVERSE / NEUTRAL POSITION SWITCH F100
STOP LAMP SWITCH E50
E16 M32
HEATED OXYGEN SENSOR 2 F10
HEATED OXYGEN SENSOR 1 F48
ELECTRIC THROTTLE CONTROL ACTUATOR F46
THROTTLE CONTROL MOTOR
CLOSE OPEN
THROTTLE POSITION SENSOR
SENSOR 1 SENSOR 2
IGNITION COIL No.1 (WITH POWER TRANSISTOR) F24
SPARK PLUG
CONDENSER F200
JRBWC5924GB


ECM
E9
F17
F18
38
42
46
80
29
32
25
79
76
KNOCK SENSOR
F33
E4
F4
IGNITION COIL No.4 (WITH POWER TRANSISTOR)
F27
IGNITION COIL No.3 (WITH POWER TRANSISTOR)
F26
IGNITION COIL No.2 (WITH POWER TRANSISTOR)
F25
SPARK PLUG
JRBWC5925GB

ENGINE CONTROL SYSTEM (HR 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	–

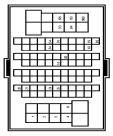
Connector No.	B72
Connector Name	FUEL LEVEL SENSOR UNIT AND FUEL PUMP
Connector Type	E06FGY-RS





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

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



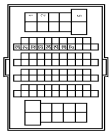
Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	–
2	L	–
3	LG	–
4	P	–
9	SB	–
20	G	– [With gasoline engine]
20	L	– [With diesel engine]
21	B	–
24	G	–
25	BR	–
55	LG	–
66	GR	–
74	R	–
79	V	–
84	L	–
85	W	–
89	BG	–
90	BR	–
93	Y	–
94	P	–
98	L	–
99	LG	–
100	GR	– [With diesel engine]
100	R	– [With gasoline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

Connector No.	E2
Connector Name	CLUTCH PEDAL POSITION SWITCH
Connector Type	M02FBR-LC



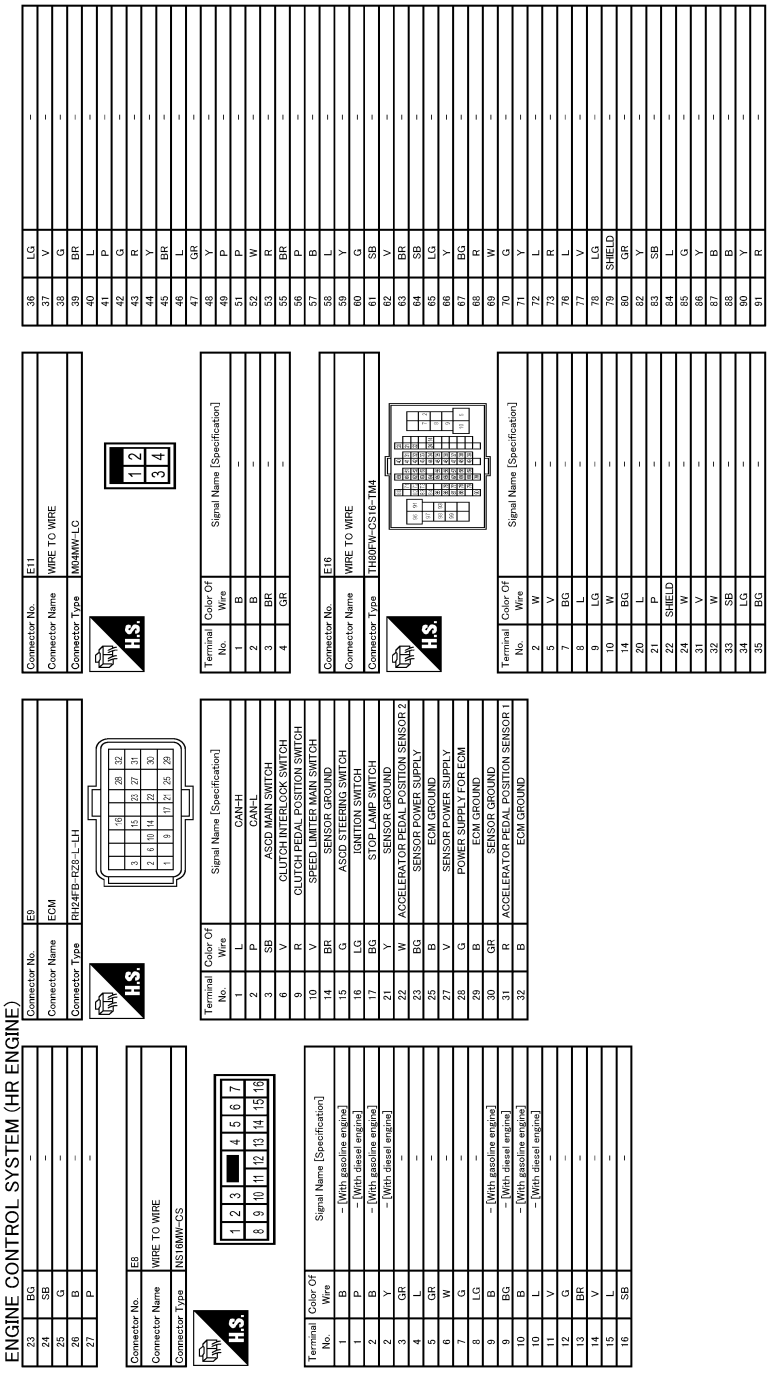
Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	–
2	B	–

Connector No.	E3
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-CS16-TM4

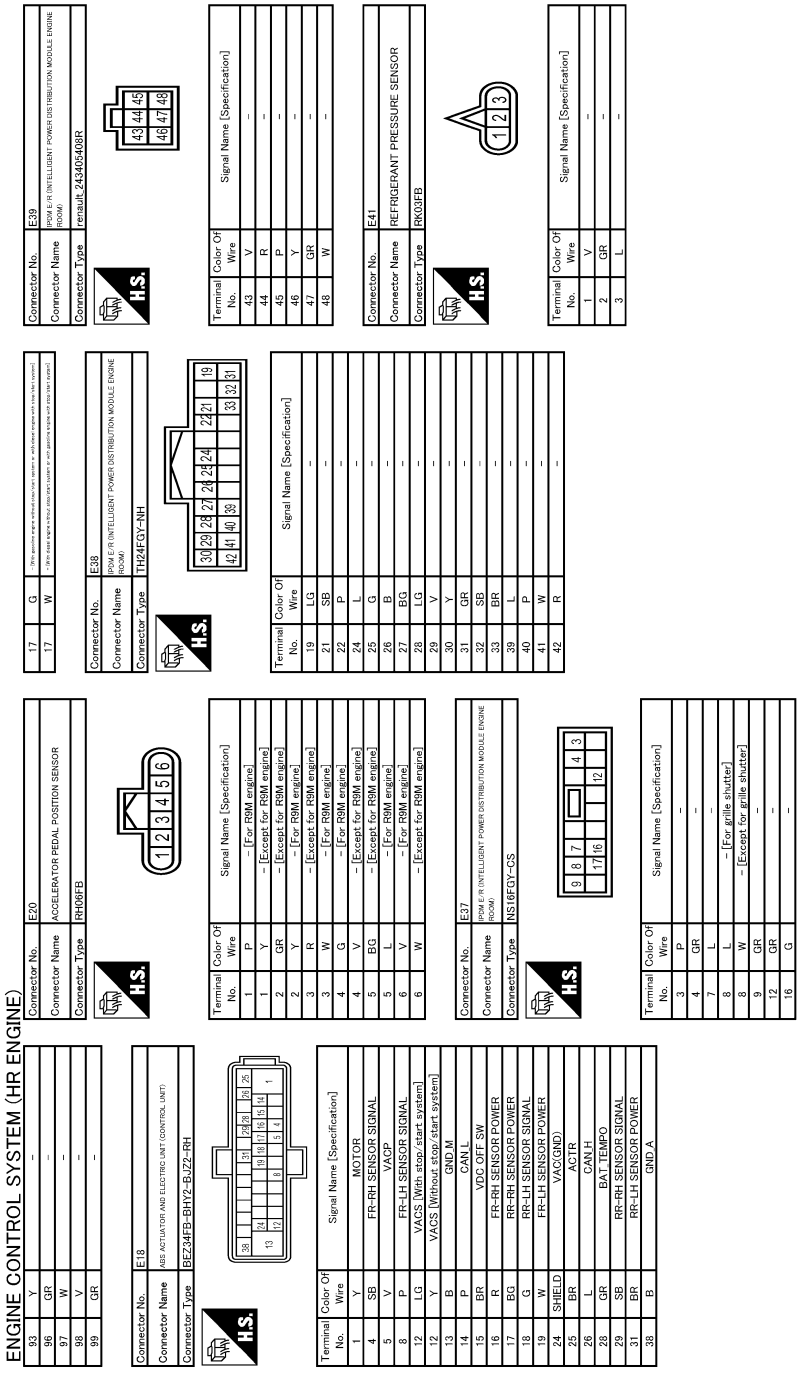


Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	–
2	W	–
5	BG	–
20	G	–
21	BR	–
22	SB	–

JRBWC6079GB



JRBWC6080GB



JRBWC6081GB

ENGINE CONTROL SYSTEM (HR ENGINE)

Connector No.	E43
Connector Name	WIRE TO WIRE
Connector Type	M02MW-LC



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

Connector No.	E50
Connector Name	STOP LAMP SWITCH
Connector Type	M04FW-LC

Terminal No.	Color Of Wire	Signal Name [Specification]
1	V	–
2	LG	–
3	W	– [With CVT]
3	Y	– [With M/T]
4	R	– [With CVT]
4	SB	– [With M/T]

Connector No.	E52
Connector Name	CLUTCH INTERLOCK SWITCH
Connector Type	M02FBR-LC

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

Connector No.	E89
Connector Name	WIRE TO WIRE
Connector Type	M04FW-LC

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

Connector No.	E100
Connector Name	HOOD SWITCH
Connector Type	W02FW

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

Connector No.	E102
Connector Name	(IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM))
Connector Type	NS08FBR-CS

Terminal No.	Color Of Wire	Signal Name [Specification]
57	R	–
58	L	–
59	V	–
60	W	–
61	GR	–
62	LG	–
63	SB	–
64	P	–

Connector No.	F8
Connector Name	CRANKSHAFT POSITION SENSOR (POS)
Connector Type	RH03FGY

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

Connector No.	F10
Connector Name	HEATED OXYGEN SENSOR 2
Connector Type	RH04FLGY

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

JRBWC6082GB

ENGINE CONTROL SYSTEM (HR ENGINE)

Connector No.	F12
Connector Name	EXHAUST VALVE TIMING CONTROL POSITION SENSOR
Connector Type	RH03FB

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

Connector No.	F17
Connector Name	ECM
Connector Type	RH56FB-RZ8-R-LH



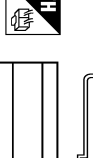
Terminal No.	Color Of Wire	Signal Name [Specification]
35	R	CRANKSHAFT POSITION SENSOR
37	B	SENSOR GROUND
38	W	KNOCK SENSOR
39	Y	ENGINE RESTART RELAY
40	GR	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE
41	W	SENSOR POWER SUPPLY
42	B	SENSOR GROUND
44	BG	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
45	W	SENSOR POWER SUPPLY
46	SHIELD	SENSOR GROUND
48	G	TURBOCHARGER WASTEGATE CONTROL SOLENOID VALVE
52	GR	THERMOSTAT HEATER CONTROL SOLENOID VALVE
56	LG	VOLTAGE STABILIZER
57	L	SENSOR POWER SUPPLY
60	V	ENGINE COOLANT BYPASS VALVE CONTROL SOLENOID VALVE
62	R	SENSOR GROUND
63	G	FUEL RAIL PRESSURE SENSOR
65	R	SENSOR POWER SUPPLY
68	G	TURBOCHARGER BYPASS VALVE CONTROL SOLENOID VALVE
72	P	IGNITION SIGNAL NO. 1
74	LG	INTAKE AIR TEMPERATURE SENSOR
75	BR	ENGINE COOLANT TEMPERATURE SENSOR
76	LG	IGNITION SIGNAL NO. 2
77	V	SENSOR GROUND
78	P	REFRIGERANT PRESSURE SENSOR
79	Y	IGNITION SIGNAL NO. 3
80	SB	IGNITION SIGNAL NO. 4
81	P	SENSOR GROUND
82	W	THROTTLE POSITION SENSOR 2
83	G	ENGINE RESTART BYPASS CONTROL RELAY
84	SB	ENGINE OIL PRESSURE CONTROL SOLENOID VALVE
87	G	THROTTLE POSITION SENSOR 1
88	G	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
90	B	SENSOR GROUND
91	SB	HEATED OXYGEN SENSOR 1 HEATER
92	L	HEATED OXYGEN SENSOR 2 HEATER
93	R	POWER SUPPLY FOR ECM
95	W	HIGH PRESSURE FUEL PUMP (HI)
96	B	HIGH PRESSURE FUEL PUMP (LO)

Connector No.	F18
Connector Name	ECM
Connector Type	RH56FGY-RZ8-R-LH



Terminal No.	Color Of Wire	Signal Name [Specification]
97	V	TURBOCHARGER BOOST SENSOR
99	Y	HEATED OXYGEN SENSOR 1
100	B	SENSOR GROUND
102	W	INTAKE MANIFOLD PRESSURE SENSOR
106	BR	SENSOR GROUND
111	P	ECM RELAY (SELF SHUT-OFF)
112	W	HEATED OXYGEN SENSOR 2
114	R	SENSOR GROUND
115	L	FUEL PUMP RELAY
117	G	SENSOR POWER SUPPLY
121	R	SENSOR GROUND
122	B	SENSOR GROUND
123	G	LIN
126	B	SENSOR GROUND
127	L	EXHAUST VALVE TIMING CONTROL POSITION SENSOR
132	R	THROTTLE CONTROL MOTOR (OPEN)
133	GR	SENSOR POWER SUPPLY
134	Y	SENSOR GROUND
135	L	CAMSHAFT POSITION SENSOR
136	L	THROTTLE CONTROL MOTOR (CLOSE)
137	P	SENSOR POWER SUPPLY
143	W	REVERSE / NEUTRAL POSITION SWITCH
153	LG	FUEL INJECTOR No. 1 (HI)
154	LG	FUEL INJECTOR No. 3 (HI)
155	P	FUEL INJECTOR No. 2 (HI)
156	W	FUEL INJECTOR No. 4 (HI)
157	R	FUEL INJECTOR No. 1 (LO)
158	SB	FUEL INJECTOR No. 3 (LO)
159	V	FUEL INJECTOR No. 2 (LO)
160	B	FUEL INJECTOR No. 4 (LO)

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.	F23
Connector Name	HIGH PRESSURE FUEL PUMP
Connector Type	HS02FLGY

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

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ENGINE CONTROL SYSTEM (HR ENGINE)

Connector No.	F24
Connector Name	IGNITION COIL No. 1 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	– [With HR engine]
1	Y	– [With MR20 engine]
2	B	–
3	R	–

Connector No.	F25
Connector Name	IGNITION COIL No. 2 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	– [With MR20 engine]
1	LG	– [With HR engine]
2	B	– [With HR engine]
2	GR	– [With MR20 engine]
3	P	– [With MR20 engine]
3	R	– [With HR engine]

Connector No.	F26
Connector Name	IGNITION COIL No. 3 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	– [With MR20 engine]
1	Y	– [With HR engine]
2	B	–
3	BG	– [With MR20 engine]
3	R	– [With HR engine]

Connector No.	F27
Connector Name	IGNITION COIL No. 4 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	SB	–
2	B	–
3	BR	– [With MR20 engine]
3	R	– [With HR engine]

Connector No.	F33
Connector Name	KNOCK SENSOR
Connector Type	RH02FB

H.S.

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

Connector No.	F39
Connector Name	COOLING FAN MOTOR
Connector Type	renault 24340706 3R

H.S.

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

Connector No.	F42
Connector Name	WIRE TO WIRE
Connector Type	RH10FB

H.S.

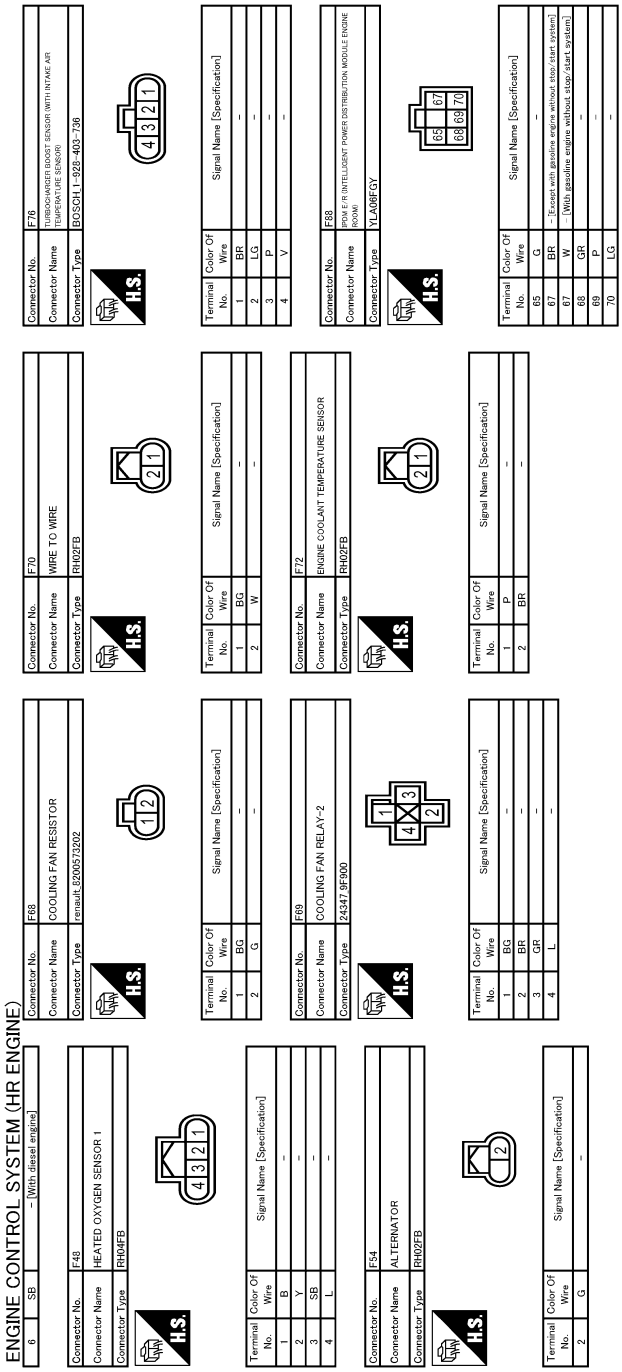
Terminal No.	Color Of Wire	Signal Name [Specification]
1	LG	–
2	P	–
3	LG	–
4	W	–
5	R	–
6	R	–
7	V	–
8	SB	–
9	B	–
10	GR	–

Connector No.	F46
Connector Name	ELECTRIC THROTTLE CONTROL ACTUATOR
Connector Type	RH06FB

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	– [With gasoline engine]
1	V	– [With diesel engine]
2	L	– [With gasoline engine]
2	W	– [With diesel engine]
3	B	– [With gasoline engine]
3	BR	– [With diesel engine]
4	G	– [With diesel engine]
4	W	– [With gasoline engine]
5	R	–
6	G	– [With gasoline engine]

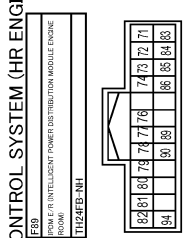
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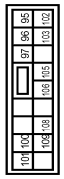
ENGINE CONTROL SYSTEM (HR ENGINE)

Connector No.	F89
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	TH24FB-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
71	L	–
72	P	–
73	W	–
74	R	–
76	GR	–
77	G	– [With diesel engine]
77	P	– [With gasoline engine]
78	SB	–
79	LG	–
80	W	–
81	P	–
82	Y	–
83	LG	–
84	W	–
85	P	–
86	Y	–
89	SB	– [With diesel engine]
89	W	– [With gasoline engine]
90	L	–
94	SB	–

Connector No.	F90
Connector Name	IPDM 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 F9M 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.	F83
Connector Name	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
Connector Type	E02FG-RS



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

Connector No.	F97
Connector Name	FUEL RAIL PRESSURE SENSOR
Connector Type	FCI 211PC032S2549



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

Connector No.	F88
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.	F99
Connector Name	INTAKE MANIFOLD PRESSURE SENSOR
Connector Type	renault-7703297954



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

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ENGINE CONTROL SYSTEM (HR ENGINE)

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

H.S.



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

Connector No.	F101
Connector Name	TURBOCHARGER BYPASS VALVE CONTROL SOLENOID VALVE
Connector Type	RH02FBR

H.S.



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

Connector No.	F108
Connector Name	TURBOCHARGER WASTGATE CONTROL SOLENOID VALVE
Connector Type	renault_7703297285

H.S.



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

Connector No.	F111
Connector Name	CAMSHAFT POSITION SENSOR
Connector Type	RH03FB

H.S.



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

Connector No.	F113
Connector Name	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE
Connector Type	E02FG-RS

H.S.



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

Connector No.	F122
Connector Name	WIRE TO WIRE
Connector Type	M02FW-LC

H.S.



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

Connector No.	F136
Connector Name	ENGINE COOLANT BYPASS VALVE CONTROL SOLENOID VALVE
Connector Type	renault_7703297285

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	V	–
2	L	–

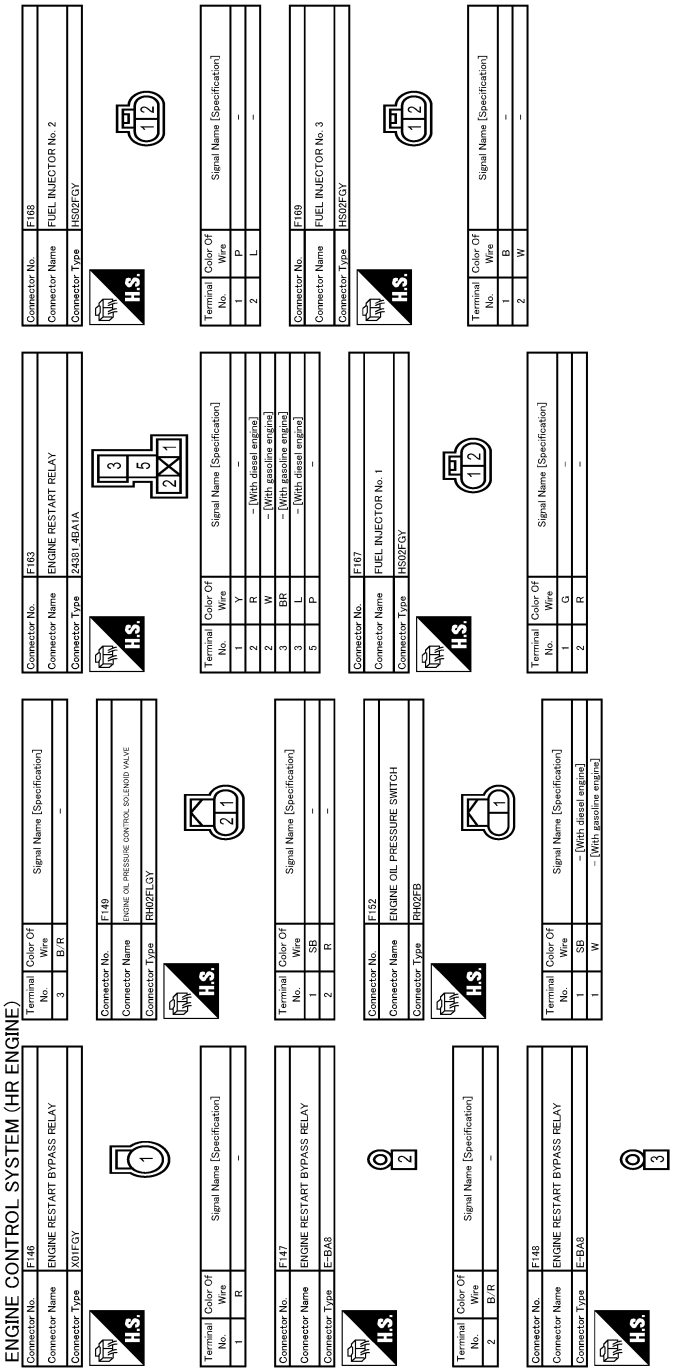
Connector No.	F138
Connector Name	BATTERY CURRENT SENSOR
Connector Type	RH04FB

H.S.



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

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ENGINE CONTROL SYSTEM (HR ENGINE)

Connector No.	F170
Connector Name	FUEL INJECTOR No. 4
Connector Type	HS02FGY

H.S.



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

Connector No.	F171
Connector Name	THERMOSTAT HEATER CONTROL SOLENOID VALVE
Connector Type	RH02FGY

H.S.



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

Connector No.	F183
Connector Name	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
Connector Type	FEA02FB-LC

H.S.



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

Connector No.	F184
Connector Name	WIRE TO WIRE
Connector Type	RH02MB

H.S.



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

Connector No.	F200
Connector Name	CONDENSER
Connector Type	M02FW-LC

H.S.



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

Connector No.	F206
Connector Name	WIRE TO WIRE
Connector Type	RH10MB

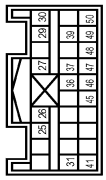
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	–
2	P	–
3	B	–
4	W	–
5	R	–
6	R	–
7	L	–
8	W	–
9	B	–
10	GR	–

Connector No.	M5
Connector Name	AIR BAG DIAGNOSIS SENSOR UNIT
Connector Type	NH28FY-EX

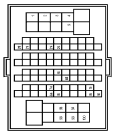
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
25	SB	INFLATOR,AS–
26	V	INFLATOR,AS+
27	B	GND
29	G	INFLATOR,DR–
30	Y	INFLATOR,DR+
31	P	ECZS–
36	BG	CUT OFF SW(DEACT)
37	R	CUT OFF SW(ACT)
39	SHIELD	GND
41	L	ECZS+
45	P	CAN–L
46	L	CAN–H
47	GR	TELLTALE OFF
48	W	TELLTALE ON
49	BG	ACL [For curtain air bag module]
49	BR	ACL [Except for curtain air bag module]
50	R	IGN

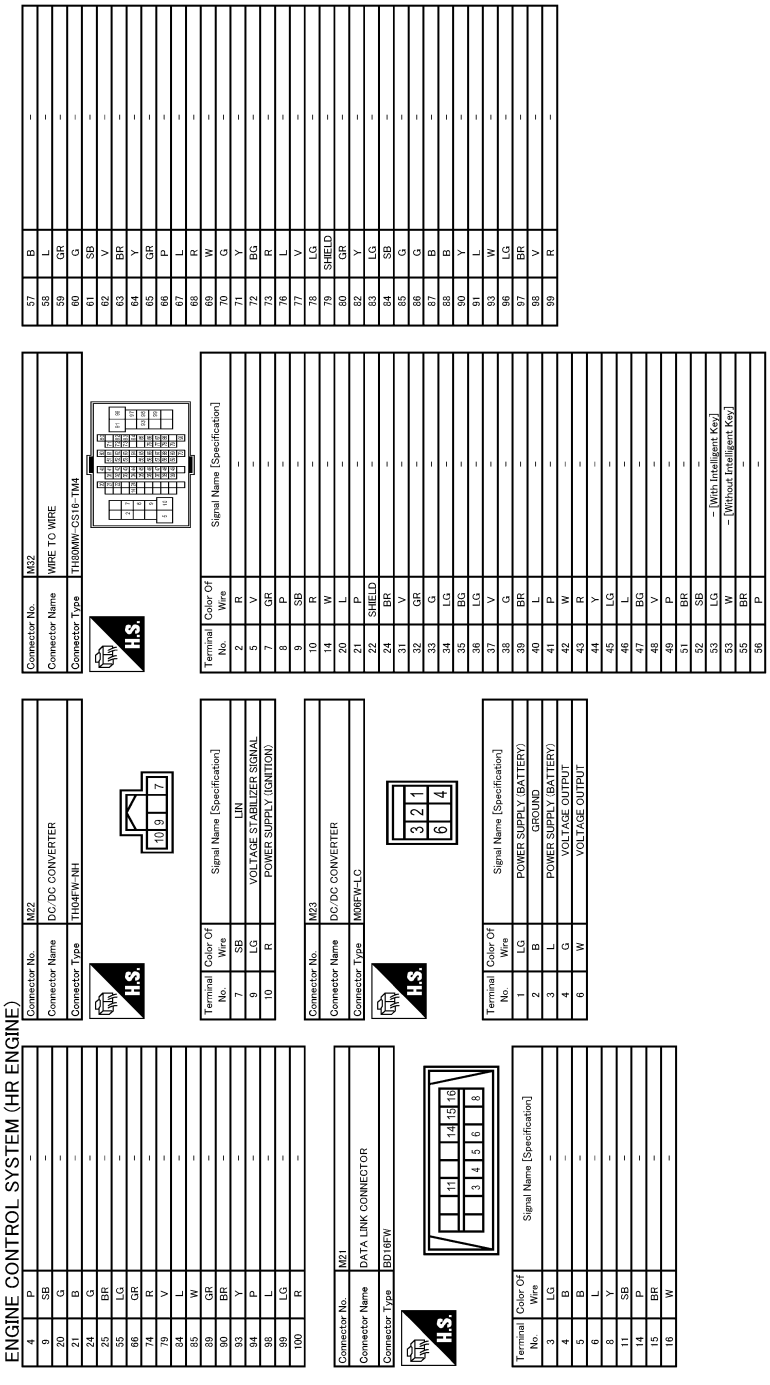
Connector No.	M16
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-CS16-TM4

H.S.



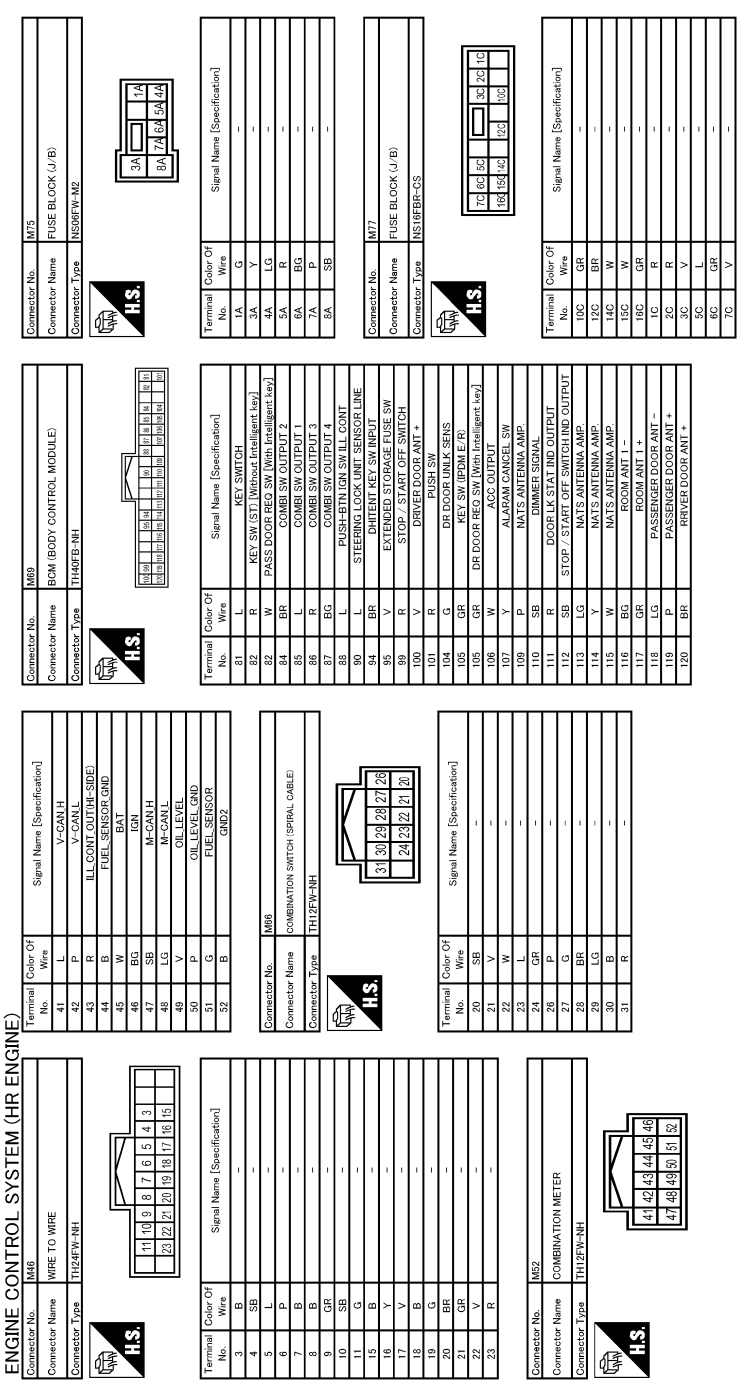
Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	–
2	P	–
3	SB	–

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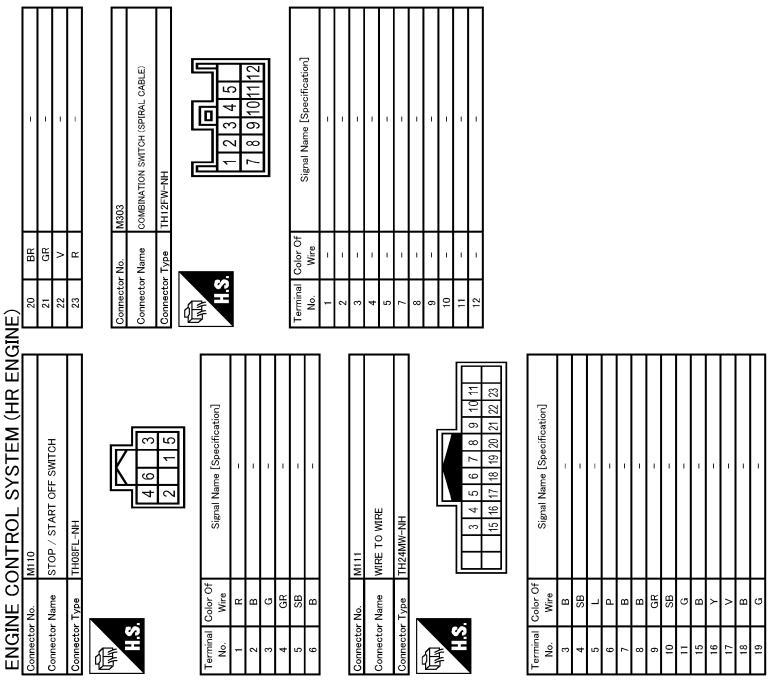


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ENGINE CONTROL SYSTEM (HR ENGINE)



JRBWC6091GB



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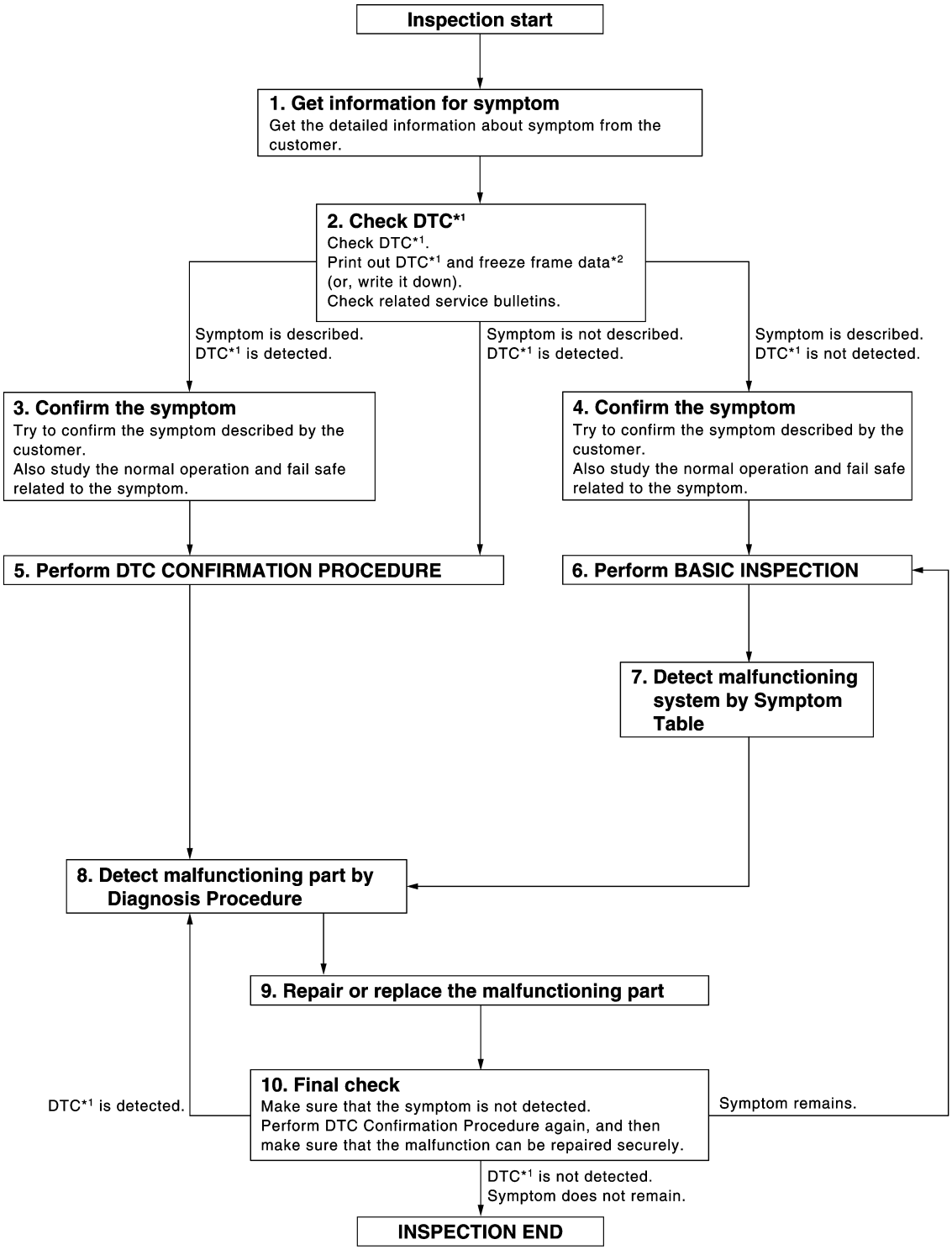
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000010379040

OVERALL SEQUENCE



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

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DETAILED FLOW

1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the “Diagnostic Work Sheet”. (Refer to ECH-98, "Diagnostic Work Sheet".)

>> GO TO 2.

2.CHECK DTC

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

- Record DTC and freeze frame data. (Print them out with CONSULT or GST.)
- Erase DTC.
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to ECH-303, "Symptom Table".)

3. Check related service bulletins for information.

Is any symptom described and is any DTC detected?

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

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).
Diagnostic Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
Diagnostic Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

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

NOTE:

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

Is DTC detected?

YES >> GO TO 10.
NO >> Check according to GI-41, "Intermittent Incident".

6.PERFORM BASIC INSPECTION

Perform basic inspection. Perform ECH-100, "Work Procedure".

>> GO TO 7.

7.DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to ECH-303, "Symptom Table" 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 the voltage of related ECM terminals using CONSULT. Refer to ECH-59, "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.

>> 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:0000000010379041

DESCRIPTION

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about an incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the WORKSHEET SAMPLE below in order to organize all the information for troubleshooting.
Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:
Vehicle ran out of fuel, which caused the engine to misfire.

KEY POINTS

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

SEF907L

WORKSHEET SAMPLE

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

MTBL0017

BASIC INSPECTION

Work Procedure

INFOID:0000000010379042

1.INSPECTION START

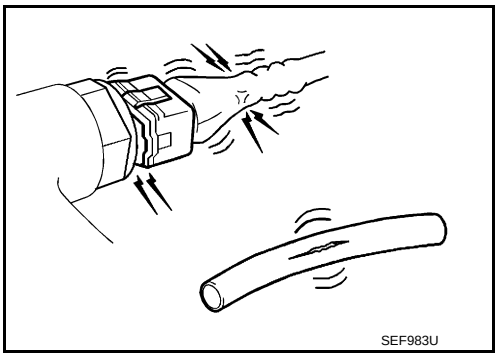
1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:

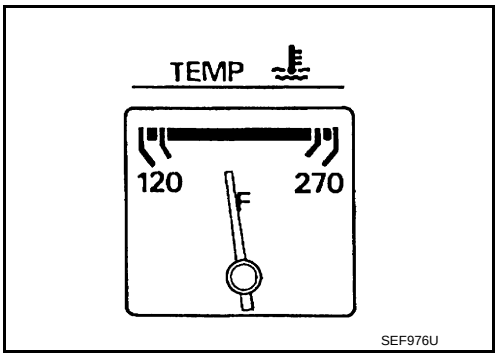
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket

3. Confirm that electrical or mechanical loads are not applied.

- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.

4. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.
   Ensure engine stays below 1,000 rpm.

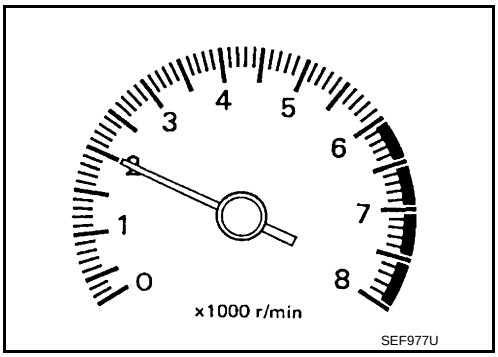




5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT.

Is any DTC detected?

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



2.REPAIR OR REPLACE

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

>> GO TO 3

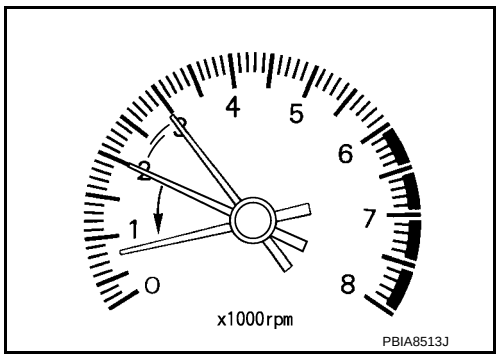
3.CHECK TARGET IDLE SPEED

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

2. Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
3. Check idle speed.
   Check idle speed in “DATA MONITOR” mode with CONSULT.
   For specification, refer to ECH-316, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 4.



4. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform throttle valve closed position learning. Refer to ECH-103, "Work Procedure".

>> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the crankshaft position sensor and circuit. Refer to ECH-206, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace. Then GO TO 4.

6. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization and registration of all NATS ignition key IDs. Refer to SEC-19, "NISSAN ANTI-THEFT SYSTEM : System Description".

>> GO TO 4.

7. INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, perform ECH-103, "Work Procedure".

>> INSPECTION END

SERVICE AFTER REPLACING OR REMOVING ENGINE PARTS

Special Repair Requirement List

INFOID:0000000010502688

×:Applicable

Part name	Service performed		Required service	Reference
	Replace-ment	Removal		
ECM	×	—	Additional service when replacing ECM	ECH-103
Electric throttle control actuator	×	×*1	Electric throttle control actuator data initialization	ECH-106
			Throttle valve closed position learning	ECH-105
Turbocharger	×	—	Turbocharger data initialization	ECH-116
Turbocharger wastegate control solenoid valve	×	—	Turbocharger wastegate control solenoid valve data initialization	ECH-117
Clutch pedal position switch	×	×*1	Clutch pedal data initialization	ECH-119
Clutch interlock switch	×	×*1		
Exhaust valve timing control solenoid valve	×	×*1	Exhaust valve timing control learning	ECH-115
Exhaust valve timing control position sensor	×	×*1	Exhaust valve timing control position sensor data initialization	ECH-113
Camshaft position sensor	×	×*1	Camshaft data initialization	ECH-111
Intake valve timing control solenoid valve	×	×*1	Intake valve timing control solenoid valve learning	ECH-114
Crankshaft position sensor	×	×*1	Crankshaft data initialization	ECH-112
Fuel injector	×	—	Injector data initialization	ECH-108
Starter motor	×	—	Starter motor operating counter clear	ECH-118
High pressure fuel pump	×	—	High pressure fuel pump data initialization	ECH-110
Fuel rail pressure sensor	×	×*1	Fuel rail pressure sensor data initialization	ECH-109

*1:Harness connector disconnection included.

ADDITIONAL SERVICE WHEN REPLACING ECM

Description

INFOID:0000000010379043

When replacing ECM, the following procedure must be performed. (For details, refer to ECH-103, "Work Procedure".)

Work Procedure

INFOID:0000000010379044

1. SAVE ECM DATA

1. Turn ignition switch OFF and wait at least 12 minutes.
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 6.

2. REPLACE ECM

1. Turn ignition switch OFF and wait at least 12 minutes.
2. Replace ECM. Refer to ECH-313, "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. 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 8.
NO >> GO TO 9.

6. REPLACE ECM

1. Turn ignition switch OFF and wait at least 12 minutes.
2. Replace ECM. Refer to ECH-313, "Removal and Installation".

>> GO TO 7.

7. PERFORM PROGRAMMING

Refer to “CONSULT Operation Manual”.

>> GO TO 8.

8. PERFORM ECM KEY ID REGISTRATION

Refer to “CONSULT Operation Manual NATS-IVIS/NVIS”.

>> GO TO 9.

9. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECH-105, "Work Procedure".

>> GO TO 10.

10. PERFORM FLYWHEEL LEARNING

Refer to ECH-107, "Work Procedure".

>> GO TO 11.

11. PERFORM IDLE SPEED

Check idle speed.
Check idle speed in “DATA MONITOR” mode with CONSULT.
For specification, refer to ECH-316, "Idle Speed".

>> END

THROTTLE VALVE CLOSED POSITION LEARNING

Description

INFOID:0000000010379047

Throttle Valve Closed Position Learning is an operation to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed under the following conditions:

- Electric throttle control actuator is removed.
- Electric throttle control actuator is replaced.
- ECM is replaced.
- Battery is replaced.

Work Procedure

INFOID:0000000010379048

1.PRECONDITIONING

Make sure that all of the following conditions are satisfied.
Learning will be cancelled if any of the following conditions are missed for even a moment.

- Make sure that no DTC is displayed with CONSULT.
- Engine stopped
- Accelerator pedal: Fully released
- Battery voltage: More than 10 V
- Intake air temperature: 5 - 90°C (41 - 194°F)
- Vehicle speed: Stopped

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

1. Turn ignition switch ON and wait at least 5 seconds. Make sure that throttle valve moves during above 5 seconds by confirming the operating sound.
2. Turn ignition switch OFF and wait at least 12 minutes.

>> END

ELECTRIC THROTTLE CONTROL ACTUATOR DATA INITIALIZATION

Description

INFOID:0000000010708813

Electric throttle control actuator data should be initialized when electric throttle control actuator is replaced.

Work Procedure

INFOID:0000000010708814

1.PERFORM ELECTRIC THROTTLE CONTROL ACTUATOR DATA INITIALIZATION

With CONSULT

1. Turn ignition switch OFF and wait at least 12 minutes.
2. Turn ignition switch ON.
3. Perform “AFTR ELECTRIC THRTTL CNTRL ACTUATOR RPLCMNT” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.

>> END

FLYWHEEL LEARNING

Description

INFOID:0000000010379049

Engine speed and cylinder identification are detected by the crankshaft position (CKP) sensor. To detect the flywheel teeth. This learning is performed. Therefore this learning should be carried out before diagnosis of misfire (P0300, P0301, P0302, P0303, P0304, P0313). It must be performed under the following conditions:

- Electric throttle control actuator is replaced.
- ECM is replaced.
- When removing battery terminal.

Work Procedure

INFOID:0000000010379050

1.PRECONDITIONING

Make sure that all of the following conditions are satisfied.
Learning will be cancelled if any of the following conditions are missed for even a moment.

- Engine coolant temperature: More than 5°C (41°F)

>> GO TO 2.

2.PERFORM FLYWHEEL LEARNING

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle for at least 3 consecutive seconds under the following conditions.
   CAUTION:
   Always drive vehicle at a safe speed.

Engine speed	3,000 - 3,500 rpm
Gear position	3rd

3. Drive the vehicle for at least 10 consecutive seconds under the following conditions.
   CAUTION:
   Always drive vehicle at a safe speed.

Engine speed	1,400 - 1,800 rpm
Gear position	3rd

4. Stop the vehicle and shift the selector lever to Neutral position,
5. Make sure that accelerator pedal, brake pedal and clutch pedal are fully released.

Do you have CONSULT?

YES >> END
NO >> GO TO 3.

3.PERFORM FLYWHEEL LEARNING

Check “LEARN H/TURN DEFULT STAT” in “DATA MONITOR” mode with CONSULT.

Is “LEARN” displayed on CONSULT screen?

YES >> GO TO 4.
NO >> END

4.DETECT MALFUNCTIONING PART

Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.

>> END

INJECTOR DATA INITIALIZATION

Description

INFOID:0000000010707909

Fuel injector data should be initialized when fuel injector is replaced.

Work Procedure

INFOID:0000000010707910

1.PERFORM FUEL INJECTOR DATA INITIALIZATION

With CONSULT
1. Turn ignition switch OFF and wait at least 12 minutes.
2. Turn ignition switch ON.
3. Perform “AFTER FUEL INJECTOR REPLACEMENT” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.

>> END

FUEL RAIL PRESSURE SENSOR DATA INITIALIZATION

Description

INFOID:0000000010868429

Fuel rail pressure sensor data should be initialized. When fuel rail pressure sensor is replaced.

Work Procedure

INFOID:0000000010868430

1.PERFORM FUEL RAIL PRESSURE SENSOR DATA INITIALIZATION

With CONSULT
1. Turn ignition switch OFF and wait at least 12 minutes.
2. Turn ignition switch ON.
3. Select “AFTER FUEL RAIL PRESSURE SENSOR REPLACEMENT” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.

>> END

HIGH PRESSURE FUEL PUMP DATA INITIALIZATION

Description

INFOID:0000000010868426

High pressure fuel pump data should be initialized. When high pressure fuel pump is replaced.

Work Procedure

INFOID:0000000010868427

1.PERFORM HIGH PRESSURE FUEL PUMP DATA INITIALIZATION

With CONSULT
1. Turn ignition switch OFF and wait at least 12 minutes.
2. Turn ignition switch ON.
3. Select “AFTER HIGH PRESSURE FUEL PUMP REPLACEMENT” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.

>> END

CAMSHAFT DATA INITIALIZATION

Description

INFOID:0000000010709154

Camshaft data should be initialized when camshaft position sensor is replaced.

Work Procedure

INFOID:0000000010709155

1.PERFORM CAMSHAFT DATA INITIALIZATION

With CONSULT
1. Turn ignition switch OFF and wait at least 12 minutes.
2. Turn ignition switch ON.
3. Perform “AFTER CAMSHAFT POS SENSOR REPLACEMENT” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.

>> END

CRANKSHAFT DATA INITIALIZATION

Description

INFOID:0000000010709156

Crankshaft data should be initialized when crankshaft position sensor is replaced.

Work Procedure

INFOID:0000000010709157

1.PERFORM CAMSHAFT DATA INITIALIZATION

With CONSULT
1. Turn ignition switch OFF and wait at least 12 minutes.
2. Turn ignition switch ON.
3. Perform “AFTER CRANKSHAFT POS SENSOR REPLACEMENT” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.

>> END

EXHAUST VALVE TIMING CONTROL POSITION SENSOR DATA INITIALIZATION

Description

INFOID:0000000010869743

Exhaust valve timing control position sensor data should be initialized. When exhaust valve timing control position sensor is replaced.

Work Procedure

INFOID:0000000010869744

1. PERFORM EXHAUST VALVE TIMING CONTROL POSITION SENSOR DATA INITIALIZATION

With CONSULT
1. Turn ignition switch OFF and wait at least 12 minutes.
2. Turn ignition switch ON.

>> END

INTAKE VALVE TIMING CONTROL SOLENOID VALVE LEARNING

Description

INFOID:0000000010709167

Valve timing should be learned when intake valve timing control solenoid valve is replaced.

Work Procedure

INFOID:0000000010709168

1.PERFORM VALVE TIMING LEARNING

With CONSULT
1. Turn ignition switch OFF and wait at least 12 minutes.
2. Turn ignition switch ON.
3. Erase DTC in ECM.
4. Start the engine and let it idle for at least 60 seconds.
5. Turn ignition switch OFF and wait at least 12 minutes.
6. Check “CAMSHAFT POSI (EEPROM)” in “DATA MONITOR” mode of “ENGINE” using CONSULT.

Is “CORRCT” displayed on CONSULT screen?

YES >> END
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.

>> END

EXHAUST VALVE TIMING CONTROL LEARNING

Description

INFOID:0000000010709169

Valve timing should be learned when exhaust valve timing control solenoid valve is replaced.

Work Procedure

INFOID:0000000010709170

1.PERFORM VALVE TIMING LEARNING

With CONSULT
1. Turn ignition switch OFF and wait at least 12 minutes.
2. Turn ignition switch ON.
3. Erase DTC in ECM.
4. Start the engine and let it idle for at least 60 seconds..
5. Turn ignition switch OFF and wait at least 12 minutes.
6. Check “CAMSHAFT POSI (EEPROM)” in “DATA MONITOR” mode of “ENGINE” using CONSULT.

Is “CORRCT” displayed on CONSULT screen?

YES >> END
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.

>> END

TURBOCHARGER DATA INITIALIZATION

Description

INFOID:0000000010709162

Turbocharger data should be initialized when turbocharger is replaced.

Work Procedure

INFOID:0000000010709163

1.PERFORM CAMSHAFT DATA INITIALIZATION

With CONSULT
1. Turn ignition switch OFF and wait at least 12 minutes.
2. Turn ignition switch ON.
3. Perform “AFTER TURBOCHARGER REPLACEMENT” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.

>> END

TURBOCHARGER WASTEGATE CONTROL SOLENOID VALVE DATA INITIALIZATION

Description

INFOID:0000000010709164

Turbocharger data should be initialized when turbocharger wastegate control solenoid valve is replaced.

Work Procedure

INFOID:0000000010709165

1.PERFORM CAMSHAFT DATA INITIALIZATION

With CONSULT
1. Turn ignition switch OFF and wait at least 12 minutes.
2. Turn ignition switch ON.
3. Perform “AFTER TC SOLENOID VALVE REPLACEMENT” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.

>> END

STARTER OPERATION COUNTER CLEAR

Description

INFOID:0000000010502689

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:0000000010502690

1.ERASE STARTER OPERATION COUNTER

With CONSULT

1. Turn ignition switch ON.
2. Select “RESET STARTER COUNTER” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.
3. Touch “CLEAR” and erase starter operation counter.

>> INSPECTION END

CLUTCH PEDAL DATA INITIALIZATION

Description

INFOID:0000000010709160

Clutch pedal data should be initialized when clutch pedal position switch or clutch interlock switch is replaced.

Work Procedure

INFOID:0000000010709161

1. PERFORM CAMSHAFT DATA INITIALIZATION

With CONSULT
1. Turn ignition switch OFF and wait at least 12 minutes.
2. Turn ignition switch ON.
3. Perform “AFTER CLUCH PEDAL SWITCH REPLACEMENT” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.

>> END

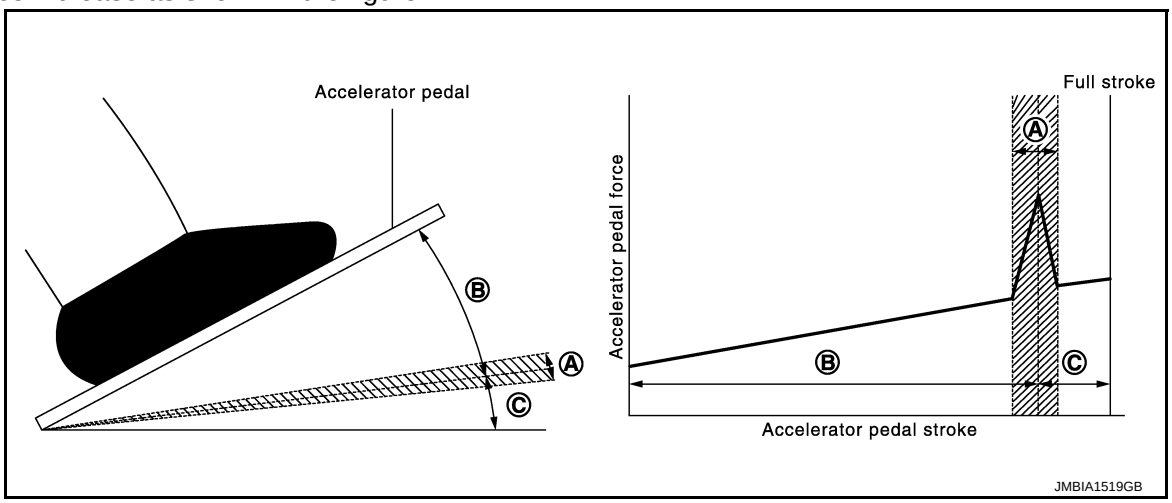
ACCELERATOR PEDAL

Work Procedure

INFOID:0000000010707908

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 >> 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		
E9	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:0000000010379053

FUEL PRESSURE RELEASE

1.FUEL PRESSURE RELEASE

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

>> INSPECTION END

FUEL PRESSURE CHECK

1.FUEL PRESSURE CHECK

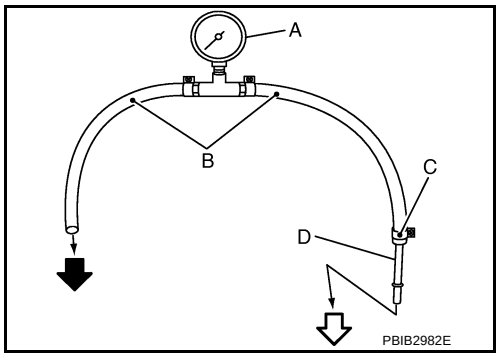
CAUTION:

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

NOTE:

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

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



C : Hose clamp

⇦ **To quick connector**

⬅ **To fuel tube (engine side)**

CAUTION:

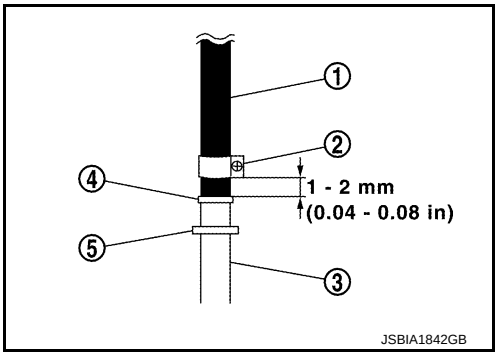
- **Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).**
- **To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.**
- **Do not use the fuel hose for checking fuel pressure with damage or cracks on it.**
-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

3. Remove fuel hose.

CAUTION:

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

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



5 : No.2 spool

CAUTION:

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

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

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

5. Connect fuel tube adapter to quick connector.
6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
7. Turn ignition switch ON and check for fuel leakage.
8. Start engine and check for fuel leakage.
9. Read the indication of fuel pressure gauge.

CAUTION:

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

At idling : Approximately 450 kPa (4.5 bar, 4.59 kg/cm^2, 65.25 psi)

Is the inspection result normal?

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

2. CHECK FUEL HOSE AND FUEL TUBE

If result is unsatisfactory, check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”.
NO >> Repair or replace.

DTC/CIRCUIT DIAGNOSIS

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000010379054

1.INSPECTION START

Start engine.

Is engine running?

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

2.CHECK GROUND CONNECTION-I

1. Turn ignition switch OFF.
2. Check ground connection E4. 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 CIRCUIT-I

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

ECM				Voltage
+		–		
Connector	Terminal	Connector	Terminal	
E9	16	E9	25	Battery voltage
			29	
			32	

Is the inspection result normal?

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

4.DETECT MALFUNCTIONING PART

Check the following.
- 15A fuse (No. 56)
- Harness for open or short between ECM and fuse

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

5.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

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

ECM		Ground	Continuity
Connector	Terminal		
E9	25	Ground	Existed
	29		
	32		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to power in harness or connectors.

6.CHECK ECM POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF and wait at least 12 minutes.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
E9	28	Ground	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0 V.
F17	93		

Is the inspection result normal?

YES >> GO TO 12.
NO-1 >> Battery voltage does not exist: GO TO 7.
NO-2 >> Battery voltage exists for more than a few seconds: GO TO 10.

7.CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF and wait at least 12 minutes.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F18	111	Ground	Battery voltage

Is the inspection result normal?

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

8.CHECK ECM POWER SUPPLY CIRCUIT-IV

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

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E9	28	F90	96	Existed
F17	93		105	Existed

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

Is the inspection result normal?

YES >> GO TO 14.
NO >> GO TO 9.

9.DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E8, F21
- Harness for open or short between ECM and IPDM E/R

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

10.CHECK ECM POWER SUPPLY CIRCUIT-V

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

ECM		IPDM E/R		Continuity
Connector	Terminal (Polarity)	Connector	Terminal (Polarity)	
F18	111	F89	77	Existed

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

Is the inspection result normal?

YES >> GO TO 14.
NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between ECM and IPDM E/R

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

12. CHECK GROUND CONNECTION-II

1. Turn ignition switch OFF.
2. Check ground connection E4. Refer to Ground Inspection in GI-43, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair or replace ground connection.

13. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

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

ECM		Ground	Continuity
Connector	Terminal		
E9	25	Ground	Existed
	29		
	32		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair open circuit or short power in harness or connectors.

14. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident", “INCIDENT SIMULATION TESTS” and “GROUND INSPECTION”.

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-67, "Exploded View".
NO >> Repair open circuit or short to power in harness or connectors.

U0111 LIN COMMUNICATION

DTC Logic

INFOID:0000000010786461

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U0111	Lost communication with battery energy control module “A”	ECM detects LIN communication error.	• Harness and connectors (LIN communication circuit is open or shorted.) • Alternator • ECM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to ECH-126, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010786462

1.CHECK LIN COMMUNICATION CIRCUIT

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

+		–		Continuity
ECM		Alternator		
Connector	Terminal	Connector	Terminal	
F18	123	F54	2	Existed

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

Is the inspection result normal?

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

2.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-28, "HRA2DDT : Removal and Installation".

3.CHECK DTC

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to ECH-126, "DTC Logic".

Is DTC detected again?

YES >> Replace ECM.
NO >> INSPECTION END

U0121 CAN COMMUNICATION

DTC Logic

INFOID:0000000010500803

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
U0121	LOST COMM (ABS) (Lost communication with anti-lock brake system (ABS) control module)	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 >> ECH-127, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500804

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:0000000010500805

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
U0298	COMMUNICATION ERROR (LOST) (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 12 minutes 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 ECH-33, "STOP/START SYSTEM : System Description".
   CAUTION:
   Always drive vehicle at a safe speed.
2. Restart the engine.
3. Check DTC.

Is DTC detected?

YES >> Proceed to ECH-128, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500806

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.
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	F17	56	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 ECH-314, "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 ECH-313, "Removal and Installation".
NO >> Repair or replace error-detected parts.

U0299 LOST COMMUNICATION (DC/DC CONVERTER)

DTC Logic

INFOID:0000000010787426

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U0299	Lost communication (LIN)	• 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 12 minutes 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 ECH-130, "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 ECH-130, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010787427

1.CHECK ENGINE COMMUNICATION LINE

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect DC/DC converter harness connector and alternator 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	
F18	123	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 DC/DC CONVERTER BATTERY POWER SUPPLY CIRCUIT

1. Check the voltage between DC/DC converter harness connector and ground.

+		–	Voltage
DC/DC converter			
Connector	Terminal		
M23	1	Ground	Battery voltage
	3		

2. 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 DC/DC CONVERTER IGNITION POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check the voltage between DC/DC converter harness connector and ground.

+		–	Voltage
DC/DC converter			
Connector	Terminal		
M22	10	Ground	Battery voltage

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 DC/DC CONVERTER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between DC/DC converter harness connector and ground.

+		–	Continuity
DC/DC converter			
Connector	Terminal		
M23	2	Ground	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 INTERMITTENT INCIDENT

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

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to ECH-314, "Removal and Installation".
NO >> Repair or replace error-detected parts.

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

DTC Logic

INFOID:0000000010500809

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)	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 ECH-132, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010500810

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:0000000010500811

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
U0415	ABS CONTROL MODULE (Invalid data received from anti-lock brake system control module)	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 ECH-133, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010500812

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:0000000010500813

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
B1900	DC/DC CONVERTER (DC/DC converter power supply input 1 circuit)	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 12 minutes 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 ECH-134, "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 ECH-33, "STOP/START SYSTEM : System Description".
   CAUTION:
   Always drive vehicle at a safe speed.
2. Restart the engine.
3. Check DTC.

Is DTC detected?

YES >> Proceed to ECH-134, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500814

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 ECH-314, "Removal and Installation".
NO >> Repair or replace error-detected parts.

B1901 DC/DC CONVERTER

DTC Logic

INFOID:0000000010500815

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
B1901	DC/DC CONVERTER (DC/DC converter power supply input 2 circuit)	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 12 minutes 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 ECH-136, "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 ECH-33, "STOP/START SYSTEM : System Description".
   CAUTION:
   Always drive vehicle at a safe speed.
2. Restart the engine.
3. Check DTC.

Is DTC detected?

YES >> Proceed to ECH-136, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500816

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 ECH-314, "Removal and Installation".
NO >> Repair or replace error-detected parts.

B1902 DC/DC CONVERTER

DTC Logic

INFOID:0000000010500817

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
B1902	DC/DC CONVERTER (DC/DC converter power supply output 1 circuit)	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 12 minutes 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 ECH-33, "STOP/START SYSTEM : System Description".
   CAUTION:
   Always drive vehicle at a safe speed.
2. Restart the engine.
3. Check DTC.

Is DTC detected?

YES >> Proceed to ECH-138, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500818

1.CHECK FUSE

Check that the following fuse is not fusing.

Fuse No.	Capacity
#71	10 A
#72	10 A
#73	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 ECH-314, "Removal and Installation".
NO >> Repair or replace error-detected parts.

B1903 DC/DC CONVERTER

DTC Logic

INFOID:0000000010500819

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
B1903	DC/DC CONVERTER (DC/DC converter power supply output 2 circuit)	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 12 minutes 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 ECH-33, "STOP/START SYSTEM : System Description".
   CAUTION:
   Always drive vehicle at a safe speed.
2. Restart the engine.
3. Check DTC.

Is DTC detected?

YES >> Proceed to ECH-140, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500820

1.CHECK FUSE-1

Check that the following fuse is not fusing.

Fuse No.	Capacity
#80	20 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 (BATTERY)

1. Turn ignition switch OFF.
2. Check the voltage between fuse and ground.

+	–	Voltage
Fuse No.		
#80	Ground	Battery voltage

Refer to PG-11, "Wiring Diagram - BATTERY POWER SUPPLY -".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis for battery power supply circuit.

3.CHECK FUSE-2

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 4.

4.CHECK DC/DC CONVERTER POWER SUPPLY OUTPUT 2 (ACCESSORY)

1. Turn ignition switch ON.
2. Check the voltage between fuse and ground.

+	–	Voltage
Fuse No.		
76	Ground	Battery voltage
77		

Refer to PG-49, "Wiring Diagram - ACCESSORY POWER SUPPLY -".

Is the inspection result normal?

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

5.CHECK ACCESSORY RELAY ROUTING CIRCUIT

Check accessory relay routing circuit.

Is the inspection result normal?

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

6.CHECK INTERMITTENT INCIDENT

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

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to ECH-314, "Removal and Installation".
NO >> Repair or replace error-detected parts.

B1904 DC/DC CONVERTER

DTC Logic

INFOID:0000000010500821

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 ECH-134, "DTC Logic" or ECH-136, "DTC Logic".

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
B1904	DC/DC CONVERTER (DC/DC converter abnormality)	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 12 minutes 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 ECH-33, "STOP/START SYSTEM : System Description".
   CAUTION:
   Always drive vehicle at a safe speed.
2. Restart the engine.
3. Check DTC.

Is DTC detected?

YES >> Proceed to ECH-142, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500822

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC Confirmation Procedure. Refer to ECH-142, "DTC Logic".
4. Check DTC.

Is the DTC B1904 displayed again?

YES >> Replace DC/DC converter. Refer to ECH-314, "Removal and Installation".
NO >> INSPECTION END

P0001 HIGH PRESSURE FUEL PUMP

DTC Logic

INFOID:0000000010500328

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0001	FUEL VOLUME REGULATOR (Fuel volume regulator)	• ECM detects a short circuit to ground. • ECM detects a short circuit to battery. • ECM detects a open circuit.	• Harness or connectors (High pressure supply pump circuit is open or shorted.) • High pressure supply pump

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 12 minutes before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 4 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to ECH-143, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500329

1.CHECK HIGH PRESSURE FUEL PUMP HI CIRCUIT FOR OPEN AND SHORT

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

+		-		Continuity
high pressure fuel pump		ECM		
Connector	Terminal	Connector	Terminal	
F23	1	F17	95	Existed

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

Is the inspection result normal?

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

2.CHECK HIGH PRESSURE FUEL PUMP LO CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between high pressure fuel pump harness connector and ECM harness connector.

+		-		Continuity
high pressure fuel pump		ECM		
Connector	Terminal	Connector	Terminal	
F23	2	F17	96	Existed

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

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK HIGH PRESSURE FUEL PUMP

Check high pressure fuel pump. Refer to ECH-144, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace high pressure fuel pump.

4.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.

Component Inspection

INFOID:0000000010828052

1.CHECK HIGH PRESSURE FUEL PUMP

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

High pressure fuel pump		Condition		Resistance
+	–			
Terminal				
1	2	Temperature	–30°C (–22°F)	0.39 Ω
			20°C (68°F)	0.48 Ω
			120°C (248°F)	0.67 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure fuel pump.

P0010 IVT CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000010499882

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0010	CAMSHAFT POS ACTUATOR A B1 (Camshaft position actuator A bank 1)	• ECM detects a short circuit to ground. • ECM detects a short circuit to battery. • ECM detects a open circuit.	• Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) • Intake valve timing control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 12 minutes before conducting the next test.

>> GO TO2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to ECH-145, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010499883

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

1. Turn ignition switch OFF.
2. Disconnect intake valve timing (IVT) control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake valve timing control solenoid valve harness connector and ground.

IVT control solenoid valve		Ground	Voltage
Connector	Terminal		
F93	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

IVT control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F93	1	F17	88	Existed

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

Is the inspection result normal?

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

3. CHECK INTERMITTENT INCIDENT

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

Is the inspection result normal?

YES >> Replace intake valve timing control solenoid valve.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

P0011 IVT CONTROL

DTC Logic

INFOID:0000000010499886

DTC DETECTION LOGIC

NOTE:
If DTC P0011 is displayed with DTC P0010, perform the trouble diagnosis for DTC P0010. Refer to ECH-145, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	Detecting condition	Possible cause
P0011	CAMSHAFT POSITION A B1 ("A" camshaft position - timing over-advanced or system performance bank 1)	• ECM detects incorrectly adjusted Intake valve timing control solenoid valve. • Unable to move the intake valve timing control solenoid valve to the commanded position. • Intake valve timing control solenoid valve performance outside its expected range.	• Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) • Intake valve timing control solenoid valve • Camshaft position sensor (PHASE) • Foreign matter caught in the oil groove for intake valve timing control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 12 minutes before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10 V and 16 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and warm it up to the normal operating temperature.
2. Keep the engine speed at 2,500 rpm for at least 10 seconds.

Is 1st trip DTC detected?

YES >> Proceed to ECH-147, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

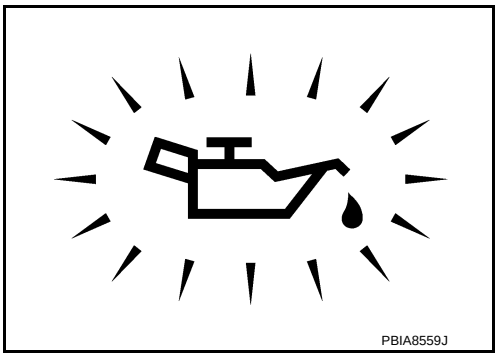
INFOID:0000000010499887

1.CHECK OIL PRESSURE WARNING LAMP

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

Is oil pressure warning lamp illuminated?

YES >> Proceed to LU-8, "Inspection".
NO >> GO TO 2.


PBIA8559J

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect intake valve timing (IVT) control solenoid valve harness connector.

3. Turn ignition switch ON.
4. Check the voltage between intake valve timing control solenoid valve harness connector and ground.

IVT control solenoid valve		Ground	Voltage
Connector	Terminal		
F93	2	Ground	Battery voltage

Is the inspection result normal?

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

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

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

IVT control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F93	1	F17	88	Existed

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

Is the inspection result normal?

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

4.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Check camshaft position sensor (PHASE). Refer to ECH-154, "Component Inspection (Camshaft Position Sensor)".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace camshaft position sensor (PHASE).

5.CHECK CAMSHAFT (INTAKE)

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.

6.CHECK LUBRICATION CIRCUIT

Perform “Inspection of Camshaft Sprocket (INT) Oil Groove”. Refer to EM-81, "Inspection".

Is the inspection result normal?

YES >> Replace intake valve timing control solenoid valve.
NO >> Clean lubrication line.

P0013 EVT CONTROL

DTC Logic

INFOID:0000000010499890

DTC DETECTION LOGIC

NOTE:
If DTC P0013 is displayed with DTC P0657, first perform trouble diagnosis for DTC P0657. Refer to ECH-250, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0013	CAMSHAFT POS ACTUATOR B B1 (Camshaft position actuator B bank1)	• ECM detects a short circuit to ground. • ECM detects a short circuit to battery. • ECM detects a open circuit.	• Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) • Exhaust valve 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 12 minutes before conducting the next test.

>> GO TO2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to ECH-149, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010499891

1.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect exhaust valve timing (EVT) control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust valve timing control solenoid valve harness connector and ground.

EVT control solenoid valve		Ground	Voltage
Connector	Terminal		
F113	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

EVT control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F113	1	F17	40	Existed

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

Is the inspection result normal?

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

3.CHECK INTERMITTENT INCIDENT

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

Is the inspection result normal?

YES >> Replace exhaust valve timing control solenoid valve.
NO >> Repair or replace error-detected parts.

P0014 EVT CONTROL

DTC Logic

INFOID:0000000010499894

DTC DETECTION LOGIC

NOTE:
If DTC P0014 is displayed with DTC P0010, P0013, P0017, P0340 or P0365, perform the trouble diagnosis for DTC P0010, P0013, P0017, P0340 or P0365. Refer to ECH-71, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	Detecting condition	Possible cause
P0014	CAMSHAFT POSITION B B1 (“B” camshaft position - timing over-advanced or system performance bank 1)	• ECM detects incorrectly adjusted exhaust valve timing control solenoid valve. • Unable to move the exhaust valve timing control solenoid valve to the commanded position. • Exhaust valve timing control solenoid valve performance outside its expected range.	• Harness or connectors (Exhaust valve timing control solenoid valve circuit is open or shorted.) • Exhaust valve timing control solenoid valve • Camshaft position sensor (PHASE) • Foreign matter caught in the oil groove for exhaust valve timing control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 12 minutes before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10 V and 16 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and warm it up to the normal operating temperature.
2. Keep the engine speed at 2,500 rpm for at least 10 seconds.

Is 1st trip DTC detected?

YES >> Proceed to ECH-151, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

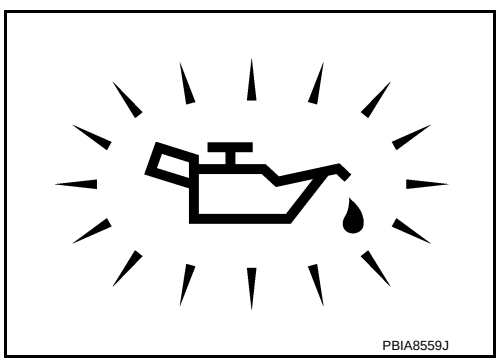
INFOID:0000000010499895

1.CHECK OIL PRESSURE WARNING LAMP

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

Is oil pressure warning lamp illuminated?

YES >> Proceed to LU-8, "Inspection".
NO >> GO TO 2.


PBIA8559J

2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect exhaust valve timing (EVT) control solenoid valve harness connector.

3. Turn ignition switch ON.
4. Check the voltage between exhaust valve timing control solenoid valve harness connector and ground.

EVT control solenoid valve		Ground	Voltage
Connector	Terminal		
F113	2	Ground	Battery voltage

Is the inspection result normal?

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

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

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

EVT control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F113	1	F17	40	Existed

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

Is the inspection result normal?

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

4.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Check camshaft position sensor (PHASE). Refer to ECH-154, "Component Inspection (Camshaft Position Sensor)".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace camshaft position sensor (PHASE).

5.CHECK CAMSHAFT (EXHAUST)

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.

6.CHECK LUBRICATION CIRCUIT

Perform “Inspection of Camshaft Sprocket (EXT) Oil Groove”. Refer to EM-81, "Inspection".

Is the inspection result normal?

YES >> Replace exhaust valve timing control solenoid valve.
NO >> Clean lubrication line.

P0016 CKP - CMP CORRELATION

DTC Logic

INFOID:0000000010499955

DTC DETECTION LOGIC

NOTE:

- **If DTC P0016 is displayed with DTC P0010, P0011, P0315, P0335, P0560, P0641 or P0657, perform the trouble diagnosis for DTC P0010, P0011, P0315, P0335, P0560, P0641 or P0657. Refer to ECH-71, "DTC Index".**

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0016	CKP/S A - CMP/S A CORRELATION B1 (Crankshaft position - camshaft position correlation sensor A bank 1)	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 • Signal plate • Timing chain

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 12 minutes 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 >> ECH-153, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010499956

1.CHECK CKP SENSOR

Check CKP sensor. Refer to ECH-156, "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 ECH-156, "Component Inspection (Exhaust Valve Timing Control 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.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace intake camshaft.

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.

5. CHECK TIMING CHAIN

Check timing chain. Refer to EM-59, "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-59, "Removal and Installation".

Component Inspection (Crankshaft Position Sensor)

INFOID:0000000010499957

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.

Component Inspection (Camshaft Position Sensor)

INFOID:0000000010499958

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.

P0017 CKP-CMP CORRELATION

DTC Logic

INFOID:0000000010499968

DTC DETECTION LOGIC

NOTE:

- **If DTC P0017 is displayed with DTC P0010, P0011, P0315, P0335, P0560 or P0657, perform the trouble diagnosis for DTC P0010, P0011, P0315, P0335, P0560 or P0657. Refer to ECH-71, "DTC Index".**

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0017	CKP/S B - CMP/S B CORRELATION B1 (Crankshaft position - camshaft position correlation sensor B bank 1)	The correlation between crankshaft position sensor signal and exhaust valve timing control position sensor signal is out of the normal range.	• Harness or connectors (CKP sensor circuit is open or shorted.) (Exhaust valve timing control position sensor is open or shorted.) • Crankshaft position sensor • exhaust valve timing control 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 12 minutes 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 >> ECH-155, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010499969

1.CHECK CKP SENSOR

Check CKP sensor. Refer to ECH-156, "Component Inspection (Crankshaft Position Sensor)".

Is the inspection result normal?

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

2.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR

Check exhaust valve timing control position sensor. Refer to ECH-156, "Component Inspection (Exhaust Valve Timing Control Position Sensor)".

Is the inspection result normal?

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

3.CHECK SIGNAL PLATE OF EXHAUST VALVE TIMING CONTROL POSITION SENSOR REAR END

Visually check for chipping signal plate of exhaust valve timing control position sensor rear end.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace exhaust valve timing control position sensor.

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.

5. CHECK TIMING CHAIN

Check timing chain. Refer to EM-59, "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-59, "Removal and Installation".

Component Inspection (Crankshaft Position Sensor)

INFOID:0000000010499970

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.

Component Inspection (Exhaust Valve Timing Control Position Sensor)

INFOID:0000000010499971

1. CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR

1. Turn ignition switch OFF.
2. Disconnect exhaust valve timing control position sensor harness connector.
3. Check the resistance between exhaust valve timing control position sensor terminals.

Exhaust valve timing control position sensor		Resistance
+	–	
Terminal		
1	2	More than 100 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace exhaust valve timing control position sensor.

P0033 TC BYPASS VALVE CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000010499987

DTC DETECTION LOGIC

NOTE:

- **If DTC P0033 is displayed with DTC P0560 or P0657, perform the trouble diagnosis for DTC P0560 or P0657. Refer to ECH-71, "DTC Index".**

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0033	TC/SC BYPASS VALVE A (Turbocharger/supercharger bypass valve A)	ECM detects a voltage of power source for turbocharger bypass valve control solenoid valve is excessively low or high.	• Harness or connectors (Turbocharger bypass valve control solenoid valve is open or shorted) • Turbocharger bypass valve control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 12 minutes.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 12 minutes.

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to ECH-157, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010499988

1.CHECK TURBOCHARGER BYPASS VALVE CONTROL SOLENOID VALVE VISUALLY

Check if foreign matter is caught between the turbocharger bypass valve control solenoid valve.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the turbocharger bypass valve control solenoid valve inside.

2.CHECK TURBOCHARGER BYPASS VALVE CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect turbocharger bypass valve control solenoid valve.
3. Turn ignition switch ON.
4. Check the voltage between turbocharger bypass valve control solenoid valve harness connector and ground.

+		–	Voltage (Approx.)
Turbocharger bypass valve control solenoid valve			
Connector	Terminal		
F101	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform the trouble diagnosis for power supply circuit.

3.CHECK TURBOCHARGER BYPASS VALVE CONTROL SOLENOID VALVE CONTROL CIRCUIT

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

+		–		Continuity
ECM		Turbocharger bypass valve control solenoid valve		
Connector	Terminal	Connector	Terminal	
F17	68	F101	1	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

4.CHECK TURBOCHARGER BYPASS VALVE CONTROL SOLENOID VALVE

Check the turbocharger bypass valve control solenoid valve. Refer to ECH-158, "Component Inspection (Turbocharger Bypass Valve Control Solenoid Valve)".

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 Bypass Valve Control Solenoid Valve)

INFOID:0000000010499989

1.CHECK TURBOCHARGER BYPASS VALVE CONTROL SOLENOID VALVE

1. Turn ignition switch OFF.
2. Disconnect turbocharger bypass valve control solenoid valve harness connector.
3. Check resistance between turbocharger bypass valve control solenoid valve terminals as follows.

Turbocharger bypass valve control solenoid valve		Resistance
+	–	
Terminals		
1	2	Approx. 23.4 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace turbocharger bypass valve control solenoid valve.

P0089 FRP CONTROL

DTC Logic

INFOID:0000000010499991

DTC DETECTION LOGIC

NOTE:

- **If DTC P0087 is displayed with DTC P0001 or P0090, first perform the trouble diagnosis for DTC P0001 or P0090.**

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0087	FUEL PRESSURE REGULATOR 1 (Fuel pressure regulator 1)	ECM detects low fuel pressure when engine started.	Fuel system

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 12 minutes.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 12 minutes.

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and wait at least 5 seconds.
   If engine does not start, crank engine for at least 4 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to ECH-160, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010499992

1.CHECK FUEL LEAKAGE

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

Is the inspection result normal?

YES >> Check that the fuel system has no breakage, bend, and crush. Refer to FL-5, "Inspection".
NO >> Repair or Replace the error-detected parts.

P0090 FRP CONTROL

DTC Logic

INFOID:0000000010499994

DTC DETECTION LOGIC

NOTE:
If DTC P0090 is displayed with DTC P0001, P0201, P0202, P0203 or P0204, first perform the trouble diagnosis for DTC P0001, P0201, P0202, P0203 or P0204. Refer to ECH-71, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0090	FUEL PRESSURE REGULATOR 1 (Fuel pressure regulator 1)	ECM detects high pressure fuel pump did not move up to commanded position.	• Harness or connectors (The high pressure fuel pump circuit is open or shorted.) • High pressure fuel pump

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 12 minutes before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10 V and 16 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and warm it up to the normal operating temperature.
2. Keep the engine speed at idle for at least 5 minutes.

Is 1st trip DTC detected?

YES >> Proceed to ECH-160, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010499995

1.CHECK HIGH PRESSURE FUEL PUMP CIRCUIT

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

High pressure fuel pump		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F23	1	F17	95	Existed
	2		96	

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2.PERFORM THE HIGH PRESSURE FUEL PUMP COMPONENT INSPECTION

Perform the high pressure fuel pump component inspection. Refer to ECH-161, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuel pump.

3.CHECK FUEL LEAKAGE

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

Is the inspection result normal?

YES >> Check that the fuel system has no breakage, bend, and crush. Refer to FL-5, "Inspection".
NO >> Repair or Replace the error-detected parts.

Component Inspection

INFOID:0000000010929256

1.CHECK HIGH PRESSURE FUEL PUMP

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

High pressure fuel pump		Condition		Resistance
+	–			
Terminal				
1	2	Temperature	–30°C (–22°F)	0.39 Ω
			20°C (68°F)	0.48 Ω
			120°C (248°F)	0.67 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure fuel pump.

P0095 IAT SENSOR

DTC Logic

INFOID:0000000010379055

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0095	INTAKE AIR TEMPERATURE 2 B1 (Intake air temperature 2 bank 1)	• Intake air temperature sensor voltage signal above maximum threshold for 1 second or more. • Intake air temperature sensor voltage signal below minimum threshold for 1 second or more.	• Harness or connectors (Intake air temperature sensor circuit is open or shorted.) • Intake air temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> 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 ECH-162, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010379056

1.CHECK ECM HARNESS CONNECTOR CONNECTION

1. Turn ignition switch OFF.
2. Check ECM harness connector connection F17 and F18.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ECM harness connector connection.

2.CHECK INTAKE AIR TEMPERATURE SENSOR HARNESS CONNECTOR CONNECTION

Check intake air temperature sensor harness connector connection F76.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace intake air temperature sensor harness connector connection.

3.CHECK INTAKE AIR TEMPERATURE SENSOR SIGNAL CIRCUIT

1. Disconnect intake air temperature sensor harness connector.
2. Check the continuity between intake air temperature sensor harness connector and ECM harness connector.

+		–		Continuity
Intake air temperature sensor		ECM		
Connector	Terminal	Connector	Terminal	
F76	2	F17	74	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

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

4. CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT

Check the continuity between intake air temperature sensor harness connector and ECM harness connector.

+		–		Continuity
Intake air temperature sensor		ECM		
Connector	Terminal	Connector	Terminal	
F76	1	F18	106	Existed

Is the inspection result normal?

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

5. CHECK INTAKE AIR TEMPERATURE SENSOR

Check intake air temperature sensor. Refer to ECH-163, "Component Inspection".

Is the inspection result normal?

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

Component Inspection

INFOID:0000000010379057

1. CHECK INTAKE AIR TEMPERATURE SENSOR

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

Intake air temperature sensor		Condition		Resistance
+	–			
Terminal				
1	2	Temperature [°C (°F)]	10°C (50°F)	3,656 -± 3,972 Ω
			20°C (68°F)	2,416 -± 2,583 Ω
			30°C (86°F)	1,653 -± 1,760 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace intake air temperature sensor.

P0105 INTAKE MANIFOLD PRESSURE SENSOR

DTC Logic

INFOID:0000000010500090

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0105	ABSOL PRESS SENSOR [P0105] (Manifold absolute pressure/barometric pressure circuit)	• Intake manifold pressure sensor voltage signal above maximum threshold for 1 second or more. • Intake manifold pressure sensor voltage signal below minimum threshold for 1 second or more.	• Harness or connectors (The intake manifold pressure sensor circuit is open or shorted.) • Intake manifold pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> 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 ECH-164, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500091

1.CHECK INTAKE MANIFOLD PRESSURE SENSOR AND ECM HARNESS CONNECTOR CONNECTIONS

Check intake manifold pressure sensor harness connector connection F99 and ECM harness connector connection F18.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace intake manifold pressure sensor or ECM harness connector connection.

2.CHECK INTAKE MANIFOLD PRESSURE SENSOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

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

Intake manifold pressure sensor		Ground	Voltage (V)
Connector	Terminal		
F99	1	Ground	Approx. 5

Is the inspection result normal?

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

3.CHECK INTAKE MANIFOLD PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Intake manifold pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F99	2	F18	114	Existed

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

Is the inspection result normal?

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

4. CHECK INTAKE MANIFOLD PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Intake manifold pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F99	3	F18	102	Existed

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

Is the inspection result normal?

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

5. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake manifold pressure sensor.
NO >> Repair or replace harness or connectors.

P0106 INTAKE MANIFOLD PRESSURE SENSOR

DTC Logic

INFOID:0000000010379058

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0106	MAP/BAROMETRIC PRESS SENSOR (Manifold absolute pressure/barometric pressure circuit range/performance)	ECM detects abnormal voltage signal of intake manifold pressure sensor.	• Harness or connectors (The intake manifold pressure sensor circuit is open or shorted.) • Intake manifold pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

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

Diagnosis Procedure

INFOID:0000000010379059

1.CHECK INTAKE SYSTEM

Check the following for connection.
- Intake manifold pressure sensor
- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold.

Is the inspection result normal?

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

2.CHECK INTAKE MANIFOLD PRESSURE SENSOR AND ECM HARNESS CONNECTOR CONNECTIONS

Check intake manifold pressure sensor harness connector connection F99 and ECM harness connector connection F18.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace intake manifold pressure sensor or ECM harness connector connection.

3.CHECK INTAKE MANIFOLD PRESSURE SENSOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

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

Intake manifold pressure sensor		Ground	Voltage (V)
Connector	Terminal		
F99	1	Ground	Approx. 5

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 INTAKE MANIFOLD PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Intake manifold pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F99	2	F18	114	Existed

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

Is the inspection result normal?

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

5. CHECK INTAKE MANIFOLD PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Intake manifold pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F99	3	F18	102	Existed

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake manifold pressure sensor.
NO >> Repair or replace harness or connectors.

P0115 ECT SENSOR

DTC Logic

INFOID:0000000010379061

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0115	COOLANT TEMP SEN [P0115] (Engine coolant temperature sensor 1 circuit)	• Engine coolant temperature sensor voltage signal above maximum threshold for 1 second or more. • Engine coolant temperature sensor voltage signal below minimum threshold for 1 second or more. • Abnormal coolant temperature gradient for 8 seconds or more.	• Harness or connectors (Engine coolant temperature sensor circuit is open or shorted.) • Engine coolant temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 8 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to ECH-168, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010379062

1.CHECK ECM HARNESS CONNECTOR CONNECTION

1. Turn ignition switch OFF.
2. Check ECM connector connection.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ECM connector connection.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR HARNESS CONNECTOR CONNECTION

Check engine coolant temperature sensor harness connector connection.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace engine coolant temperature sensor harness connector connection.

3.CHECK ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity engine coolant temperature sensor circuit.

ECM			Continuity
Connector	Terminal	Terminal	
F17	75	81	Existed

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 4.

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR SIGNAL CIRCUIT

1. Disconnect engine coolant temperature sensor harness connector.
2. Check the continuity between engine coolant temperature sensor harness connector and ECM harness connector.

Engine coolant temperature sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F72	2	F17	75	Existed

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

Is the inspection result normal?

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

5. CHECK ENGINE COOLANT TEMPERATURE SENSOR GROUND CIRCUIT

1. Check the continuity between engine coolant temperature sensor harness connector and ECM harness connector.

Engine coolant temperature sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F72	1	F17	81	Existed

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK INTERMITTENT INCIDENT

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

Is the inspection result normal?

YES >> Replace engine coolant temperature sensor.
NO >> Repair or replace error-detected parts.

P0120 TP SENSOR

DTC Logic

INFOID:0000000010379064

DTC DETECTION LOGIC

NOTE:
If DTC P0120 is displayed with DTC P0641 or P0651, first perform the trouble diagnosis for DTC P0641 or P0651. Refer to ECH-71, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0120	THROTTLE POSI SEN [P0120] [Throttle position sensor (P0120)]	Implausible TP sensor position for 0.19 second or more.	• Harness or connectors (Throttle position sensor circuit is open or shorted.) • Throttle position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 12 minutes.
2. Check DTC.

Is DTC detected?

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

Diagnosis Procedure

INFOID:0000000010379065

1.CHECK ECM HARNESS CONNECTOR CONNECTION

1. Turn ignition switch OFF.
2. Check ECM connector connection F17.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ECM connector connection.

2.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR HARNESS CONNECTOR CONNECTION

Check electric throttle control actuator harness connector connection F46.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace electric throttle control actuator harness connector connection.

3.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F46	5	F17	65	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

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

4. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR SIGNAL CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F46	4	F17	82	Existed
	6		87	

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

Is the inspection result normal?

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

5. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR GROUND CIRCUIT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F46	3	F17	90	Existed

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK INTERMITTENT INCIDENT

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

Is the inspection result normal?

YES >> Replace electric throttle control actuator.
NO >> Repair or replace error-detected parts.

P012A TC BOOST SENSOR

DTC Logic

INFOID:0000000010500164

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P012A	TC/SC INLET PRESSURE SENSOR (Turbocharger/supercharger inlet pressure sensor circuit)	• Turbocharger boost sensor voltage signal above maximum threshold for 1 second or more. • Turbocharger boost sensor voltage signal below minimum threshold for 1 second or more.	• Harness or connectors (Turbocharger boost sensor circuit is open or shorted.) • Turbocharger boost sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 12 minutes.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 12 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to ECH-172, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500165

1.CHECK ECM HARNESS CONNECTOR CONNECTION

1. Turn ignition switch OFF.
2. Check ECM connector connection F18.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ECM connector connection.

2.CHECK TURBOCHARGER BOOST SENSOR HARNESS CONNECTOR CONNECTION

Check turbocharger boost sensor harness connector connection F76.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace turbocharger boost sensor harness connector connection.

3.CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY

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

+		–	Voltage (Approx.)
Turbocharger boost sensor			
Connector	Terminal		
F76	3	Ground	5 V

Is the inspection result normal?

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

4. CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
Turbocharger boost sensor		ECM		
Connector	Terminal	Connector	Terminal	
F76	3	F18	137	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

5. CHECK TURBOCHARGER BOOST SENSOR GROUND CIRCUIT

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

+		–		Continuity
Turbocharger boost sensor		ECM		
Connector	Terminal	Connector	Terminal	
F76	1	F18	106	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

6. CHECK TURBOCHARGER BOOST SENSOR INPUT SIGNAL CIRCUIT

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

+		–		Continuity
Turbocharger boost sensor		ECM		
Connector	Terminal	Connector	Terminal	
F76	4	F18	97	Existed

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

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. CHECK INTERMITTENT INCIDENT

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

Is the inspection result normal?

YES >> Replace turbocharger boost sensor.
NO >> Repair or replace error-detected parts.

P0130 HO2S1

DTC Logic

INFOID:0000000010379067

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0130	O2 SENSOR 1 B1 (O2 sensor circuit bank 1 sensor 1)	• Heated oxygen sensor 1 voltage to ECM is 0.02 V or less for 10 seconds or more. • Heated oxygen sensor 1 voltage to ECM is 1.395 V or more 0.01 seconds or more. • ECM detects heated oxygen sensor 1 voltage between 0.25 V to 0.445 V during 0.2 seconds. • When minimum period duration of heated oxygen sensor 1 is abnormal duration.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Maintain the following conditions for at least 11 consecutive minutes.

Selector lever	Suitable position
Vehicle speed	1 km/h (0.6 MPH) or more
Engine speed	1,215 - 3,750 rpm

CAUTION:
Always drive vehicle at safe speed.

3. Check DTC.

Is DTC is detected?

YES >> Go to ECH-175, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010379068

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

Check ECM connector connection F18.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ECM connector connection.

2.CHECK HEATED OXYGEN SENSOR 1 HARNESS CONNECTOR CONNECTION

Check heated oxygen sensor 1 harness connector connection F48.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace heated oxygen sensor 1 harness connector.

3.CHECK GROUND CONNECTION

Check ground connection E4. Refer to Ground Inspection in GI-43, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace ground connection.

4.CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F48	1	F18	122	existed

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

Is the inspection result normal?

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

5.CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F48	2	F18	99	existed

2. Check harness continuity between HO2S1 harness connector or ECM harness connector and ground.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F48	2	F18	99	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace heated oxygen sensor 1.
NO >> Repair or replace error-detected parts.

P0135 HO2S1 HEATER

DTC Logic

INFOID:0000000010379070

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0135	O2 SENSOR 1 HEATER B1 (O2 sensor heater circuit bank 1 sensor 1)	• ECM detects open circuit of Heated oxygen sensor 1 heater circuit for 2.5 second or more. • ECM detects short circuit to power of Heated oxygen sensor 1 heater circuit for 2.5 second or more. • ECM detects short circuit to ground of Heated oxygen sensor 1 heater circuit for 2.5 second or more.	• Harness or connectors (The heated oxygen sensor 1 heater circuit is open or shorted.) • Heated oxygen sensor 1 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> 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 >> Go to ECH-177, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010379071

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

Check ECM connector connection F17.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ECM connector connection.

2.CHECK HEATED OXYGEN SENSOR 1 HARNESS CONNECTOR CONNECTION

Check heated oxygen sensor 1 harness connector connection F48.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace heated oxygen sensor 1 harness connector.

3.CHECK GROUND CONNECTION

Check ground connection E4. Refer to Ground Inspection in GI-43, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace ground connection.

4.CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between HO2S1 sensor 1 harness connector and ground.

HO2S1		Ground	Voltage
Connector	Terminal		
F48	4	Ground	Battery voltage

Is the inspection result normal?

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

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between heated oxygen sensor 1 and fuse

>> Repair or replace harness or connectors.

6. CHECK HO2S1 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F48	3	F17	91	Existed

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

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

YES >> Replace heated oxygen sensor 1.
NO >> Repair or replace harness or connectors.

P0136 HO2S2

DTC Logic

INFOID:0000000010379073

DTC DETECTION LOGIC

NOTE:
If DTC P0136 is display with DTC P0014, P0095, P0105 or P0155, first perform the trouble diagnosis for DTC DTC P0014, P0095, P0105 or P0155. Refer to ECH-71, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0136	O2 SENSOR 2 B1 (O2 sensor circuit bank 1 sensor 2)	• Heated oxygen sensor 2 voltage to ECM is 0.02 V or less for 30 seconds. • Heated oxygen sensor 2 voltage to ECM is 1.395 V or more for 0.01 second. • Heated oxygen sensor 2 voltage to ECM is 0.275 V or more after more than 10s of injection cut-off for 1.001 seconds.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to ECH-179, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010379074

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

Check ECM connector connection F18.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ECM connector connection.

2.CHECK HEATED OXYGEN SENSOR 2 HARNESS CONNECTOR CONNECTION

Check heated oxygen sensor 2 harness connector connection F10.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace heated oxygen sensor 2 harness connector.

3.CHECK GROUND CONNECTION

Check ground connection E4. Refer to Ground Inspection in GI-43, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace ground connection.

4.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F10	1	F18	100	Existed

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

Is the inspection result normal?

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

5.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F10	2	F18	112	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F10	2	F18	112	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

YES >> Replace heated oxygen sensor 2.
NO >> Repair or replace error-detected parts.

P0141 HO2S2 HEATER

DTC Logic

INFOID:0000000010379076

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0141	O2 SENSOR 2 HEATER B1 (O2 sensor heater circuit bank 1 sensor 2)	• ECM detects open circuit of Heated oxygen sensor 2 heater circuit for 1 second or more. • ECM detects short circuit to power of Heated oxygen sensor 2 heater circuit for 1 second or more. • ECM detects short circuit to ground of Heated oxygen sensor 2 heater circuit for 1 second or more.	• Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) • Heated oxygen sensor 2 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> 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 >> Go to ECH-181, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010379077

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Disconnect 15 A fuse (No. 55) from IPDM E/R.
3. Check 15 A fuse for blown.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace 15 A fuse.

2.CHECK ECM HARNESS CONNECTOR CONNECTIONS

Check ECM connector connection F17.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace ECM connector connection.

3.CHECK HEATED OXYGEN SENSOR 2 HARNESS CONNECTOR CONNECTION

Check heated oxygen sensor 2 harness connector connection F10.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace heated oxygen sensor 2 harness connector.

4.CHECK GROUND CONNECTION

Check ground connection E4. Refer to Ground Inspection in GI-43, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace ground connection.

5.CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Reconnect 15 A fuse (No. 55) from IPDM E/R.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between HO2S2 harness connector and ground.

HO2S2		Ground	Voltage
Connector	Terminal		
F10	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F10	3	F17	92	Existed

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

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

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

>> INSPECTION END

P0170 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000010500212

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

NOTE:
If DTC P0170 is display with DTC P025A or P0627, first perform the trouble diagnosis for DTC P025A or P0627. Refer to ECH-71, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0170	FUEL TRIM B1 (Fuel trim bank 1)	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	• Heated oxygen sensor 1 • Fuel injector • Fuel system

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 12 minutes before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10 V and 16 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and warm it up to the normal operating temperature.
2. Keep the engine speed at 2,500 rpm for at least 10 seconds.

Is 1st trip DTC detected?

YES >> Proceed to ECH-183, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500213

1.CHECK FUEL LEAKAGE

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

Is the inspection result normal?

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

2.CHECK FUEL PRESSURE

Check fuel pressure. Refer to ECH-121, "Work Procedure".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or Replace the error-detected parts.

3. CHECK HEATED OXYGEN SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect corresponding heated oxygen sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between heated oxygen sensor 1 harness connector and ECM harness connector.

+		–		Continuity
Heated oxygen sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F48	2	F18	99	Existed

5. Check the continuity between heated oxygen sensor 1 harness connector and ground, or ECM harness connector and ground.

+		–	Continuity
Heated oxygen sensor 1			
Connector	Terminal		
F48	2	Ground	Not existed

+		–	Continuity
ECM			
Connector	Terminal		
F18	99	Ground	Not existed

6. Also check harness for short to power.

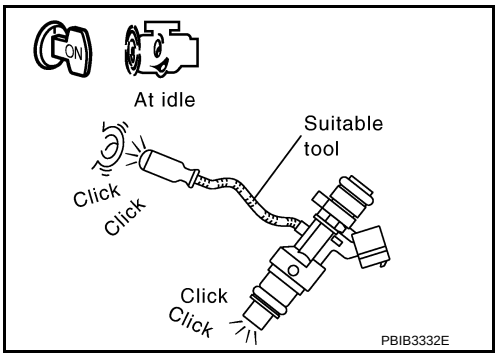
Is the inspection result normal?

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

4. CHECK FUNCTION OF FUEL INJECTOR

1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



Is the inspection result normal?

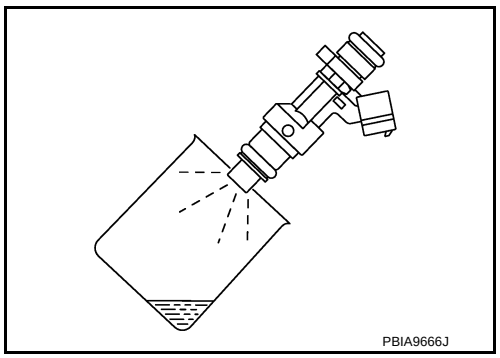
YES >> GO TO 5.
NO >> Perform trouble diagnosis for “FUEL INJECTOR”.

5. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all fuel injector harness connectors.
4. Remove fuel tube assembly.
   Keep fuel hose and all fuel injectors connected to fuel tube.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each fuel injector.

7. Crank engine for about 3 seconds.

Fuel should be sprayed evenly for each fuel injector.



Is the inspection result normal?

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

NO >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones.

P0190 FRP SENSOR

DTC Logic

INFOID:0000000010500215

DTC DETECTION LOGIC

NOTE:
If DTC P0190 is display with DTC P0089 or P0697, first perform the trouble diagnosis for DTC P0089 or P0697. Refer to ECH-71, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0190	FUEL RAIL PRESSURE SENSOR A (Fuel rail pressure sensor “A” circuit)	Signal voltage from the fuel rail pressure sensor remains at more than 4.5 V / less than 0.2 V for 3 seconds or more.	• Harness or connectors (Fuel rail pressure sensor circuit is open or shorted.) • Fuel rail pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 12 minutes.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 12 minutes.

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle for 3 seconds or more.
2. Check DTC or 1st trip DTC.

Is DTC or 1st trip DTC detected?

YES >> Proceed to ECH-186, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500216

1.CHECK FUEL RAIL PRESSURE (FRP) SENSOR POWER SUPPLY-I

1. Turn ignition switch OFF.
2. Disconnect FRP sensor connector.
3. Turn ignition switch ON.
4. Check the voltage between FRP sensor harness connector terminals.

FRP sensor			Voltage (Approx.)
Connector	+	–	
	terminal		
F97	3	2	5 V

Inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK FRP SENSOR POWER SUPPLY-II

Check the voltage between FRP sensor harness connector and the ground.

+		–	Voltage (Approx.)
FRP sensor			
Connector	Terminal		
F97	3	Ground	5 V

Is inspection result normal?

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

3.CHECK FRP SENSOR GROUND CIRCUIT

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

+		–		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F97	2	F17	62	Existed

4. Also check harness for short to power.

Is inspection result normal?

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

4.CHECK FRP SENSOR SIGNAL CIRCUIT

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

+		–		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F97	1	F17	63	Existed

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

Is inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

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

Is inspection result normal?

YES >> Replace FRP sensor.
NO >> Repair or replace error-detected parts.

P0201, P0202, P0203, P0204 FUEL INJECTOR

DTC Logic

INFOID:0000000010379079

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0201	INJECTOR CIRC-CYL1 [P0201] (Injector circuit open - cylinder 1)	• ECM detects No. 1 injector circuit is open for 1.5 seconds or more. • ECM detects No. 1 injector circuit is short to ground for 1.5 seconds or more. • ECM detects No. 1 injector circuit is short to power for 1.5 seconds or more.	• Harness or connectors (The fuel injector circuit is open or shorted.) • Fuel injector
P0202	INJECTOR CIRC-CYL2 [P0202] (Injector circuit open - cylinder 2)	• ECM detects No. 2 injector circuit is open for 1.5 seconds or more. • ECM detects No. 2 injector circuit is short to ground for 1.5 seconds or more. • ECM detects No. 2 injector circuit is short to power for 1.5 seconds or more.	
P0203	INJECTOR CIRC-CYL3 [P0203] (Injector circuit open - cylinder 3)	• ECM detects No. 3 injector circuit is open for 1.5 seconds or more. • ECM detects No. 3 injector circuit is short to ground for 1.5 seconds or more. • ECM detects No. 3 injector circuit is short to power for 1.5 seconds or more.	
P0204	INJECTOR CIRC-CYL4 [P0204] (Injector circuit open - cylinder 4)	• ECM detects No. 4 injector circuit is open for 1.5 seconds or more. • ECM detects No. 4 injector circuit is short to ground for 1.5 seconds or more. • ECM detects No. 4 injector circuit is short to power for 1.5 seconds or more.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

TESTING CONDITION:

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

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

Diagnosis Procedure

INFOID:0000000010379080

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM connector connection F18.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ECM connector connection.

2.CHECK FUEL INJECTOR HARNESS CONNECTOR CONNECTIONS

Check fuel injector harness connector connection F167, F168, F169, F170.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace fuel injector harness connector connection.

3.CHECK FUEL INJECTOR OUTPUT CIRCUIT FOR OPEN AND SHORT

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

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F167	2	F18	157	Existed
2	F168			159	
3	F169			158	
4	F170			160	

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

Is the inspection result normal?

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

4.CHECK FUEL INJECTOR POWER SUPPLY

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

+			–	Voltage (Approx.)
ECM				
Cylinder	Connector	Terminal		
1	F18	153	Ground	12 V
2		155		
3		154		
4		156		

Is the inspection result normal?

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

5.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

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

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F167	1	F18	153	Existed
2	F168			155	
3	F169			154	
4	F170			156	

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

Is the inspection result normal?

YES >> Replace malfunctioning fuel injector.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

Component Inspection

INFOID:0000000010788020

1. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as follows.

Terminals	Resistance (Ω)
1 and 2	1.94 ± 0.2 Ω [at 20°C (68°F)]
	2.7 Ω [at 120°C (248°F)]

Is the inspection result normal?

YES >> INSPECTION END
>> Replace malfunctioning fuel injector. Refer to EM-42, "Removal and Installation".

P0217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000010379082

DTC DETECTION LOGIC

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.
NOTE:
If DTC P0217 is display with DTC P0115 or P0597, first perform the trouble diagnosis for DTC P0115 or P0597. Refer to ECH-71, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0217	ENG COOLANT TEMP (Engine coolant over temperature condition)	Engine coolant over temperature becomes too high for 1 second or more.	• Harness or connectors (The cooling fan circuit is open or shorted.) • Cooling fan motor • Radiator hose • Radiator • Radiator cap • Water pump • Thermostat • Engine coolant temperature sensor

CAUTION:
When a malfunction is indicated, be sure to replace the coolant. Refer to CO-11, "Draining" and CO-11, "Refilling". Also, replace the engine oil. Refer to LU-9, "Draining" and LU-9, "Refilling".
1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-61, "Engine Coolant Mixture Ratio".**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to ECH-191, "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 ECH-192, "Diagnosis Procedure".

Component Function Check

INFOID:0000000010379083

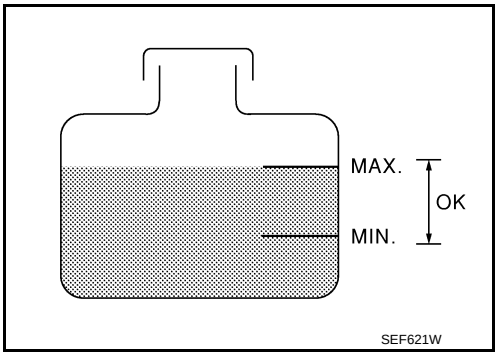
1.PERFORM COMPONENT FUNCTION CHECK-1

WARNING:
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

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 ECH-192, "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 ECH-192, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-3

Without CONSULT
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 ECH-192, "Diagnosis Procedure".

4.PERFORM COMPONENT FUNCTION CHECK-4

Without CONSULT
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 ECH-192, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010379084

1.CHECK COOLING SYSTEM FOR LEAK-1

Check cooling system for leak.

Is leakage detected?

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

2.CHECK COOLING SYSTEM FOR LEAK-2

Check the following for leak.
- Hose
- Radiator (Refer to CO-19, "Inspection".)
- Water pump (Refer to CO-23, "Inspection".)

>> Repair or replace malfunctioning part.

3.CHECK RADIATOR CAP

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

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace radiator cap.

4. CHECK THERMOSTAT

Check thermostat. Refer to CO-26, "Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace thermostat. Refer to CO-25, "Removal and Installation".

5. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to ECH-282, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace engine coolant temperature sensor.

6. OVERHEATING CAUSE ANALYSIS

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

>> INSPECTION END

P0220 TP SENSOR

DTC Logic

INFOID:0000000010379085

DTC DETECTION LOGIC

NOTE:
If DTC P0220 is displayed with DTC P0641 or P0651, first perform the trouble diagnosis for DTC P0641 or P0651. Refer to ECH-71, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0220	THROTTLE/PEDAL POSI SEN/SW B (Throttle/pedal position sensor/switch “B” circuit)	When TP sensor 1 position is abnormal position for 0.19 second or more.	• Harness or connectors (Throttle position sensor circuit is open or shorted.) • Throttle position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> 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 ECH-194, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010379086

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM connector connection F17.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ECM connector connection.

2.CHECK THROTTLE POSITION SENSOR HARNESS CONNECTOR CONNECTIONS

Check electric throttle control actuator harness connector connection F46.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace electric throttle control actuator harness connector connection.

3.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F46	5	F17	65	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

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

4. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F46	3	F17	90	Existed

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

Is the inspection result normal?

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

5. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F46	6	F17	87	Existed
	4		82	

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK INTERMITTENT INCIDENT

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

Is the inspection result normal?

YES >> Replace electric throttle control actuator.
NO >> Repair or replace error-detected parts.

P0225 APP SENSOR

DTC Logic

INFOID:0000000010379088

DTC DETECTION LOGIC

NOTE:
If DTC P0225 is displayed with DTC P0641, first perform trouble diagnosis for DTC P0641. Refer to ECH-246, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0225	THROTTLE/PEDAL POSI SEN/SW C (Throttle/pedal position sensor/switch “C” circuit)	Signal voltage from the APP sensor 1 remains at more than 0.97 V / less than 0.07 V for 0.25 seconds or more.	• Harness or connectors (APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor 1 • Accelerator pedal

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> 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 ECH-196, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010379089

1.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Check the voltage between accelerator pedal position sensor connector as follows.

Accelerator pedal position sensor				Voltage
Sensor	Connector	Terminal		
		+	–	
1	E20	4	2	Approx. 5V
2		5	1	

Is the inspection result normal?

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

2.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.
4. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E20	4	E9	27	Existed
2		5		23	

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

Is the inspection result normal?

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

3.CHECK ACCELERATOR PEDAL POSITION SENSOR GROUND CIRCUIT

1. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E20	2	E9	30	Existed
2		1		21	

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

Is the inspection result normal?

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

4.CHECK INTERMITTENT INCIDENT

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

Is the inspection result normal?

YES >> Replace accelerator pedal position sensor.
NO >> Repair or replace error-detected parts.

P0226 APP SENSOR

DTC Logic

INFOID:0000000010379091

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	Possible cause
P0226	THROTTLE/PEDAL POSI SEN/SW C (Throttle/pedal position sensor/switch “C” circuit range/performance)	• 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 • Accelerator pedal

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 12 minutes 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 ECH-198, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010379092

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

1. Check the voltage between accelerator pedal position sensor connector as follows.

Accelerator pedal position sensor				Voltage
Sensor	Connector	Terminal		
		+	–	
1	E20	4	2	Approx. 5V
2		5	1	

Is the inspection result normal?

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

3.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.
4. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E20	4	E9	27	Existed
2		5		23	

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

Is the inspection result normal?

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

4. CHECK ACCELERATOR PEDAL POSITION SENSOR GROUND CIRCUIT

1. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E20	2	E9	30	Existed
2		1		21	

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

Is the inspection result normal?

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

5. CHECK INTERMITTENT INCIDENT

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

Is the inspection result normal?

YES >> Replace accelerator pedal position sensor.
NO >> Repair or replace error-detected parts.

P0243 TC WASTEGATE CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000010500310

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0243	TC/SC WASTEGATE SOLENOID A (Turbocharger/supercharger wastegate solenoid “A”)	• ECM detects the turbocharger wastegate control solenoid valve circuit is open. • ECM detects the turbocharger wastegate control solenoid valve circuit is short to ground. • ECM detects the turbocharger wastegate control solenoid valve circuit is short to power.	• Harness or connectors (Turbocharger wastegate control solenoid valve circuit is open or shorted.) • Turbocharger wastegate control solenoid valve

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11 V at ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to ECH-200, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500311

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 TURBOCHARGER WASTEGATE CONTROL SOLENOID VALVE HARNESS CONNECTOR CONNECTION

Check turbocharger wastegate control solenoid valve harness connector connection.

Is the inspection result normal?

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

3.CHECK TURBOCHARGER WASTEGATE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect turbocharger wastegate control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between turbocharger wastegate control solenoid valve harness connector and ground.

+		–	Voltage
Turbocharger wastegate control solenoid valve			
Connector	Terminal		
F108	2	Ground	Battery voltage

Is the inspection result normal?

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

4. CHECK TURBOCHARGER WASTEGATE CONTROL SOLENOID VALVE CIRCUIT

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

+		–		Continuity
Turbocharger wastegate control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F108	1	F17	48	Existed

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

Is the inspection result normal?

YES >> Replace turbocharger wastegate control solenoid valve.
NO >> Repair or replace error-detected parts.

P025A FUEL PUMP

DTC Logic

INFOID:0000000010379133

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P025A	FUEL PUMP MODULE A (Fuel pump module control circuit/open)	• ECM detects the fuel pump relay control circuit is open. • ECM detects the fuel pump relay control circuit is short to ground. • ECM detects the fuel pump relay control circuit is short to power.	• Harness or connectors (The fuel pump relay control circuit is open or shorted.) • Fuel pump relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

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

Diagnosis Procedure

INFOID:0000000010379134

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E4. 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-1

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

ECM				Voltage
+		–		
Connector	Terminal	Connector	Terminal	
F18	115	E9	29	Battery voltage

Is the inspection result normal?

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

3.CHECK FUEL PUMP RELAY CIRCUIT-2

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

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F18	115	F90	106	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.

4.CHECK FUSE

1. Disconnect 20A fuse (No. 61) from IPDM E/R.
2. Check the fuse.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace the fuse.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

P0300, P0301, P0302, P0303, P0304, P0313 MISFIRE

DTC Logic

INFOID:0000000010379094

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0300	MULTI CYL MISFIRE [P0300] (Random/multiple cylinder misfire detected)	Multiple cylinder misfire.	• Improper spark plug • Ignition coil • Fuel pump • Fuel injector • The fuel injector circuit is open or shorted
P0301	CYL 1 MISFIRE [P0301] (Cylinder 1 misfire detected)	No. 1 cylinder misfires.	
P0302	CYL 2 MISFIRE [P0302] (Cylinder 2 misfire detected)	No. 2 cylinder misfires.	
P0303	CYL 3 MISFIRE [P0303] (Cylinder 3 misfire detected)	No. 3 cylinder misfires.	
P0304	CYL 4 MISFIRE [P0304] (Cylinder 4 misfire detected)	No. 4 cylinder misfires.	
P0313	MISFIRE DETECTED (Misfire Detected with Low Fuel)	When misfire detected in cylinders more than one with low fuel level in tank.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and let it idle for about 10 minutes.
2. Check DTC.

Is DTC detected?

YES >> Proceed to ECH-204, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010379095

1.CHECK IGNITION COIL CIRCUIT

1. Turn ignition switch OFF, wait at least 20 minutes and then turn it ON.
2. Check ignition coil circuit. Refer to ECH-215, "Diagnosis Procedure".

Is the inspection result normal?

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

2.CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to ECH-121, "Work Procedure".
3. Install fuel pressure gauge and check fuel pressure. Refer to ECH-121, "Work Procedure".

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly (main)”.
NO >> Repair or replace.

4. CHECK FUEL PUMP CIRCUIT

Check fuel pump circuit.

Is the inspection result normal?

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

5. CHECK FUEL INJECTOR CIRCUIT

Check fuel injector circuit. Refer to ECH-188, "Diagnosis Procedure".

Is the inspection result normal?

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

6. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM section.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

P0315 CKP SENSOR (POS)

DTC Logic

INFOID:0000000010379096

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0315	CRANKSHAFT POSITION SYSTEM (Crankshaft position system variation not learned)	Abnormal value for crankshaft target variation learning.	• Harness or connectors (The sensor circuit is open or shorted.) • Crankshaft position sensor (POS) • Signal plate

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Rev engine from idle to 3,500 rpm.
2. Check DTC.

Is DTC detected?

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

Diagnosis Procedure

INFOID:0000000010379097

1.CHECK CKP SENSOR (POS) HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check crankshaft position (CKP) sensor (POS) harness connector connection.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace crankshaft position (CKP) sensor (POS) harness connector connection.

2.CHECK CKP SENSOR (POS) CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity CKP sensor (POS) circuit.

ECM			Continuity
Connector	Terminal	Terminal	
F17	35	37	Existed

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

Is the inspection result normal?

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

3.CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F8	3	F17	35	Existed

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

Is the inspection result normal?

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

4. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F8	2	F17	37	Existed

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

Is the inspection result normal?

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

5. CHECK GEAR TOOTH

Visually check for chipping flywheel gear tooth.

Is the inspection result normal?

YES >> Replace crankshaft position sensor (POS).
NO >> Replace signal plate.

P0325 KNOCK SENSOR (KS)

DTC Logic

INFOID:0000000010379099

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detected condition	Possible cause
P0325	KNOCK SENSOR [P0325] (Knock sensor 1 circuit)	Abnormal knock sensor signal too low for 10 seconds or more.	• Harness or connectors (Knock sensor circuit is open or shorted.) • Knock sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.
TESTING CONDITION:
Before performing the following procedure, confirm that engine coolant temperature is more than 70°C (158°F).

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and rev engine more than 3,500 rpm at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to ECH-208, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010379100

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.

2.CHECK KNOCK SENSOR HARNESS CONNECTOR CONNECTION

Check knock sensor harness connector connection.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace knock sensor harness connector connection.

3.CHECK KNOCK SENSOR CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity knock sensor circuit.

ECM			Continuity
Connector	Terminal		
	+	–	
F17	38	42	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. CHECK KNOCK SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
Knock sensor		ECM		
Connector	Terminal	Connector	Terminal	
F33	2	F17	38	Existed

3. 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 KNOCK SENSOR GROUND CIRCUIT

Check the continuity between knock sensor harness connector and ECM harness connector.

+		–		Continuity
Knock sensor		ECM		
Connector	Terminal	Connector	Terminal	
F33	1	F17	42	Existed

Is the inspection result normal?

YES >> Replace knock sensor.
NO >> Repair or replace error-detected parts.

P0335 CKP SENSOR (POS)

DTC Logic

INFOID:0000000010379102

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0335	CRANK POS SEN (OBD) [P0335] (Crankshaft position sensor “A” circuit)	• The crankshaft position (CKP) sensor signal is not detected by the ECM during the first few seconds of engine cranking. • Crankshaft position (CKP) sensor signal is not in the normal pattern when engine started for 1 second or more. • ECM cannot detect crankshaft position sensor signal when engine started. • Crankshaft position sensor signal is noisy.	• Harness or connectors (The sensor circuit is open or shorted.) • Crankshaft position sensor (POS) • Signal plate

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

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

Diagnosis Procedure

INFOID:0000000010379103

1.CHECK CKP SENSOR (POS) HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check crankshaft position (CKP) sensor (POS) harness connector connection.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace crankshaft position (CKP) sensor (POS) harness connector connection.

2.CHECK CKP SENSOR (POS) CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity CKP sensor (POS) circuit.

ECM			Continuity
Connector	Terminal	Terminal	
F17	35	37	Existed

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

Is the inspection result normal?

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

3.CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F8	3	F17	35	Existed

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

Is the inspection result normal?

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

4. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F8	2	F17	37	Existed

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

Is the inspection result normal?

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

5. CHECK GEAR TOOTH

Visually check for chipping flywheel gear tooth.

Is the inspection result normal?

YES >> Replace crankshaft position sensor (POS).
NO >> Replace signal plate.

P0340 CMP SENSOR (PHASE)

DTC Logic

INFOID:0000000010500336

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0340	CAMSHAFT POSI SEN [P0340] (Camshaft position sensor “A” circuit bank 1)	• The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. • The cylinder No. signal is not sent to ECM during engine running. • The cylinder No. signal is not in the normal pattern during engine running.	• Harness or connectors (Camshaft position sensor circuit is open or shorted) • Camshaft position sensor • Camshaft (Intake)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Rev engine from idle to 4,000 rpm.
2. Check DTC.

Is DTC detected?

YES >> Proceed to ECH-212, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500337

1.CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

YES >> GO TO 2.
NO >> Check starting system.

2.CHECK CAMSHAFT POSITION (CMP) SENSOR POWER SUPPLY

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

+		–	Voltage (Approx.)
CMP sensor			
Connector	Terminal		
F111	1	Ground	5 V

Is the inspection result normal?

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

3.CHECK CAMSHAFT POSITION (CMP) SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
CMP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F111	1	F18	133	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

4.CHECK CMP SENSOR GROUND CIRCUIT

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

+		–		Continuity
CMP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F111	2	F18	134	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK CMP SENSOR INPUT SIGNAL CIRCUIT

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

+		–		Continuity
CMP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F111	3	F18	135	Existed

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

Is the inspection result normal?

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

6.CHECK CAMSHAFT POSITION SENSOR

Check the camshaft position sensor. Refer to ECH-214, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace camshaft position sensor.

7.CHECK CAMSHAFT (INT)

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

Is the inspection result normal?

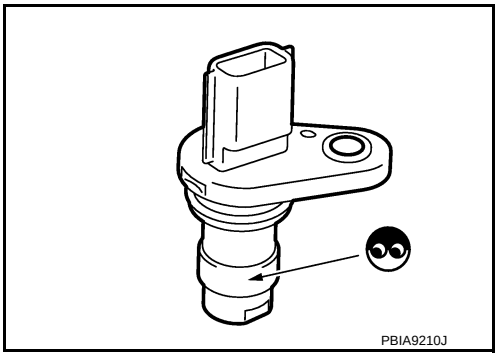
YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.

Component Inspection

INFOID:0000000010500338

1. CHECK CAMSHAFT POSITION SENSOR-I

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



Is the inspection result normal?

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

2. CHECK CAMSHAFT POSITION SENSOR-II

Check the resistance camshaft position sensor terminals as per the following.

Camshaft position sensor		Resistance
+	–	
Terminals (Polarity)		
1	2	More than 100 kΩ
2	3	More than 200 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace camshaft position sensor.

P0351, P0352, P0353, P0354 IGNITION COIL

DTC Logic

INFOID:0000000010500388

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0351	IGNITION COIL A (Ignition coil “A” primary/secondary circuit)	• ECM detects the ignition coil circuit is open. • ECM detects the ignition coil circuit is short to ground. • ECM detects the ignition coil circuit is short to power.	• Ignition signal circuit is open or shorted • Ignition coil
P0352	IGNITION COIL B (Ignition coil “” primary/secondary circuit)		
P0353	IGNITION COIL C (Ignition coil “C” primary/secondary circuit)		
P0354	IGNITION COIL D (Ignition coil “D” primary/secondary circuit)		

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to ECH-215, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500389

1.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-1

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

+		-	Voltage
Condenser			
Connector	Terminal		
F200	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-2

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

IPDM E/R		Condenser		Continuity
Connector	Terminal	Connector	Terminal	
F90	96	F200	1	Existed

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

Is the inspection result normal?

YES >> Proceed to ECH-123, "Diagnosis Procedure".
NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between IPDM E/R and condenser

>> Repair or replace error-detected parts.

4. CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

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

+		-	Continuity
Condenser			
Connector	Terminal		
F200	2	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

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

5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-4

1. Reconnect all harness connectors disconnected.
2. Disconnect ignition coil harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ignition coil harness connector and ground.

+			-	Voltage
Ignition coil				
Cylinder	Connector	Terminal		
1	F24	3	Ground	Battery voltage
2	F25	3		
3	F26	3		
4	F27	3		

Is the inspection result normal?

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

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between ignition coil and harness connector

>> Repair or replace error-detected parts.

7. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Check the continuity between ignition coil harness connector and ground.

+			-	Continuity
Ignition coil				
Cylinder	Connector	Terminal		
1	F24	2	Ground	Existed
2	F25	2		
3	F26	2		
4	F27	2		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Ignition coil			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F24	1	F17	72	Existed
2	F25	1		76	
3	F26	1		79	
4	F27	1		80	

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK IGNITION COIL WITH POWER TRANSISTOR

Check ignition coil with power transistor. Refer to ECH-217, "Component Inspection (Ignition Coil)".

Is the inspection result normal?

YES >> Replace condenser.
NO >> Repair or replace error-detected parts.

Component Inspection (Ignition Coil)

INFOID:0000000010506429

1. CHECK IGNITION COIL WITH POWER TRANSISTOR-1

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

Ignition coil		Resistance
+	–	
Terminals		
1	2	470 ± 5 Ω
1	3	
2	3	

Is the inspection result normal?

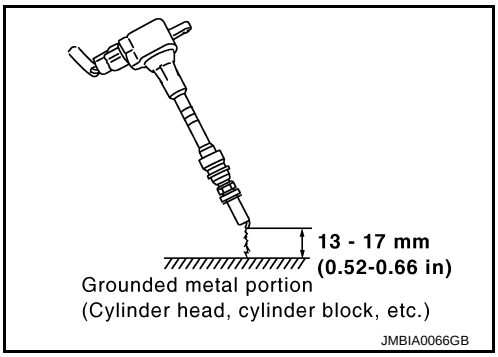
YES >> GO TO 2.
NO >> Replace malfunctioning ignition coil with power transistor.

2.CHECK IGNITION COIL WITH POWER TRANSISTOR-2

CAUTION:

Perform the following procedure in a place where with no combustible objects and good ventilation.

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



Spark should be generated.

CAUTION:

- **Never place the spark plug and the ignition coil within 50 cm (19.7 in) each other. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.**
- **It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made.**

NOTE:

When the gap is less than 13 mm (0.52 in), spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning ignition coil with power transistor.

P0365 EXHAUST VALVE TIMING CONTROL POSITION SENSOR

DTC Logic

INFOID:0000000010502881

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0365	CAMSHAFT POSITION SENSOR B B1 (Camshaft position sensor “B” circuit bank 1)	• The exhaust valve timing control position sensor signal is not detected by the ECM during the first few seconds of engine cranking. • The exhaust valve timing control position sensor signal is not send to ECM during engine running. • The exhaust valve timing control position sensor signal is not in the normal pattern during engine running.	• Harness or connectors (The sensor circuit is open or shorted.) • Exhaust valve timing control position sensor • Signal plate

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle at least 5 second.
2. Rev engine from idle to 4,000 rpm.
3. Check DTC.

Is DTC detected?

YES >> Proceed to ECH-219, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010502882

1.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check exhaust valve timing control position sensor harness connector connection.

Is the inspection result normal?

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

2.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT-1

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

ECM			Voltage (Approx.)
Connector	+	–	
	Terminal	Terminal	
F18	121	126	5 V

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

Is the inspection result normal?

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

3.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect exhaust valve timing control position sensor harness connector.
3. Check the continuity between exhaust valve timing control position sensor harness connector and ECM harness connector.

Exhaust valve timing control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	3	F18	127	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 CAMSHAFT (EXT)

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

Is the inspection result normal?

YES >> Replace exhaust valve timing control position sensor.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.

5.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT-2

1. Turn ignition switch OFF.
2. Disconnect exhaust valve timing control position sensor harness connector.
3. Check the continuity between exhaust valve timing control position sensor harness connector and ECM harness connector.

Exhaust valve timing control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F18	121	Existed

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

Is the inspection result normal?

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

6.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR GROUND CIRCUIT

1. Check the continuity between exhaust valve timing control position sensor harness connector and ECM harness connector.

Exhaust valve timing control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	2	F18	126	Existed

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

Is the inspection result normal?

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

P0420 THREE WAY CATALYST FUNCTION

DTC Logic

INFOID:0000000010379105

DTC DETECTION LOGIC

NOTE:
If DTC P0420 is displayed with DTC P0095, P0115, P0130, P0135, P0136, P0141, P0170, P0190, P0200, P0201, P0202, P0203, P0204, P0300, P0301, P0302, P0303, P0304, P0313, P0335, P0443, P1130, P1131, P1351, P1352, P1544, P1620, P2031, P2243, P2244, P2626 or P2A06, first perform the trouble diagnosis for DTC without P0420. Refer to ECH-71, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0420	CATALYST SYSTEM (Catalyst system efficiency below threshold bank 1)	Difference between raw and filtered lambda sensor signals anomaly high when submitted to richness pulses for 25 seconds.	• Three way catalyst (manifold) • Thermal ageing • Absent catalytic converter

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

NOTE:
DTC P0420 can not duplicate.

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

Component Function Check

INFOID:0000000010379106

1.PERFORM COMPONENT FUNCTION CHECK

Without CONSULT
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 12 minutes.
3. Restart engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Open engine hood.
6. Check the voltage between ECM harness connector terminals under the following condition.

ECM			Condition	Voltage (V)
Connector	+	–		
	Terminal	Terminal		
F18	112	100	Keeping engine speed at 3,000 rpm constant under no load	The voltage fluctuation cycle takes more than 5 seconds. • 1 cycle: 0.6 - 1.0 → 0 - 0.3 → 0.6 - 1.0

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to ECH-221, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010379107

1.CHECK HEATED OXYGEN SENSOR 2

Refer to ECH-179, "Diagnosis Procedure".

Is the inspection result normal?

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

2.PERFORM FLYWHEEL LEARNING

1. Refer to ECH-107, "Work Procedure".
2. Check the engine flywheel target's learning.

Is "DONE" displayed on CONSULT screen?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> GO TO 3.

3. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

>> INSPECTION END

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000010379108

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0443	CANISTER PURGE VALVE (Evaporative emission system purge control valve circuit)	• ECM detects the EVAP canister purge volume control solenoid valve circuit is open. • ECM detects the EVAP canister purge volume control solenoid valve circuit is short to ground. • ECM detects the EVAP canister purge volume control solenoid valve circuit is short to power.	• Harness or connectors (EVAP canister purge volume control solenoid valve circuit is open or shorted.) • EVAP canister purge volume control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.
TESTING CONDITION:
Before performing the following procedure, confirm battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to ECH-223, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010379109

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 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE HARNESS CONNECTOR CONNECTION

Check EVAP canister purge volume control solenoid valve harness connector connection.

Is the inspection result normal?

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

3.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

+		–	Voltage
EVAP canister purge volume control solenoid valve			
Connector	Terminal		
F183	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE CIRCUIT

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

+		–		Continuity
EVAP canister purge volume control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F183	2	F17	44	Existed

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

Is the inspection result normal?

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

5.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Check EVAP canister purge volume control solenoid valve. Refer to ECH-224, "Component Inspection".

Is the inspection result normal?

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

Component Inspection

INFOID:0000000010379110

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Check the resistance between EVAP canister purge volume control solenoid valve terminals as per the following conditions.

EVAP canister purge volume control solenoid valve		Condition		Resistance
+	–			
Terminal				
1	2	Temperature	23°C (73°F)	26 ± 4 Ω
			–40°C (–40°F)	20 ± 3 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP canister purge volume control solenoid valve.

P0530 REFRIGERANT PRESSURE SENSOR

DTC Logic

INFOID:0000000010379117

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0530	A/C REFRIGERANT PRESSURE SEN A (A/c refrigerant pressure sensor “A” circuit)	• Refrigerant pressure sensor signal voltage is more than 4.8 V. • Refrigerant pressure sensor signal voltage is 0 V. • More than 4.8 V are input to ground circuit.	• Harness or connectors (Refrigerant pressure sensor circuit is open or shorted.) • Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

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

Diagnosis Procedure

INFOID:0000000010379118

1.CHECK REFRIGERANT PRESSURE SENSOR INSTALLATION

Check the status of the refrigerant pressure sensor installation and gas leakage.

Is the inspection result normal?

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

2.CHECK ECM HARNESS CONNECTOR CONNECTION

1. Turn ignition switch OFF.
2. Check ECM harness connector connection.

Is the inspection result normal?

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

3.CHECK REFRIGERANT PRESSURE SENSOR HARNESS CONNECTOR CONNECTION

Check refrigerant pressure sensor harness connector connection.

Is the inspection result normal?

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

4.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY-1

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between refrigerant pressure sensor harness connector terminals.

Refrigerant pressure sensor			Voltage (Approx.)
Connector	Terminal		
	+	–	
E41	3	1	5.0 V

Is the inspection result normal?

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

5. CHECK REFRIGERANT PRESSURE SENSOR SIGNAL CIRCUIT

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

+		–		Continuity
Refrigerant pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
E41	2	F17	78	Existed

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

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.
NO >> Repair or replace error-detected parts.

6. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY-2

Check the voltage between refrigerant pressure sensor harness connector and ground.

+		–	Voltage (Approx.)
Refrigerant pressure sensor			
Connector	Terminal		
E41	3	Ground	5.0 V

Is the inspection result normal?

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

7. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT

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

+		–		Continuity
Refrigerant pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
E41	1	F17	77	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

8. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

+		–		Continuity
Refrigerant pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
E41	3	F17	57	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

P0560 BATTERY VOLTAGE

DTC Logic

INFOID:0000000010379119

DTC DETECTION LOGIC

NOTE:
If DTC P0560 is displayed with DTC P060A, first perform trouble diagnosis for DTC P060A. Refer to ECH-237, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0560	BATTERY VOLTAGE (System Voltage)	• ECM detect DTC P060A for 0.04 seconds or more. • Battery voltage remains 16V or more for 2.5 seconds or more. • Battery voltage remains 9V or less for 10 seconds or more.	• Harness connectors (ECM power supply circuit is open or shorted.) • Battery • Battery terminal • Alternator • IPDM E/R

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 15 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to ECH-228, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010379120

1.CHECK BATTERY VOLTAGE

1. Start the engine.
2. Check battery voltage.

Voltage: More than 9 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 >> GO TO 4.
NO >> Replace with a proper one.

4. CHECK ECM POWER SUPPLY CIRCUIT-1

Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F17	93	Ground	Battery voltage

Is the inspection result normal?

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

5. CHECK ECM POWER SUPPLY CIRCUIT-2

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	
F17	93	F90	105	Existed

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

Is the inspection result normal?

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

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors
- Harness for open or short between ECM and IPDM E/R

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

7. CHECK FUSE

1. Disconnect 15A fuse (No. 55) from IPDM E/R.
2. Check the fuse.

Is the inspection result normal?

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

P0564 ASCD STEERING SWITCH

DTC Logic

INFOID:0000000010502887

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0564	CRUISE CONTROL (Cruise control multi-function input “A” circuit)	• 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 12 minutes before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 12 minutes.
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 >> Proceed to ECH-230, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010502888

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			
E9	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 >> Refer to GI-41, "Intermittent Incident".
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	E9	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	E9	15	Existed

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

Is the inspection result normal?

YES >> Replace ASCD steering switch.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

P0575 ASCD STEERING SWITCH

DTC Logic

INFOID:0000000010502842

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0575	CRUISE CONTROL (Cruise control input circuit)	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 12 minutes 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 ECH-232, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010502843

1.CHECK ASCD STEERING SWITCH SIGNAL

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

+		–	Condition	Voltage (Approx.)
ECM				
Connector	Terminal			
E9	3	Ground	• ASCD MAIN switch: NOT pressed • Speed Limiter MAIN switch: NOT pressed	0 V
	10			
	3	Ground	• ASCD MAIN switch: Pressed • Speed Limiter MAIN switch: NOT pressed	Battery Voltage
	10			0 V
	3	Ground	• 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 POWER SUPPLY

Check the voltage between ASCD steering switch harness connector and ground.

+		–	Voltage
Combination switch (spiral cable)			
Connector	Terminal		
M66	22	Ground	Battery voltage

Is the inspection result normal?

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

3. CHECK COMBINATION SWITCH (SPIRAL CABLE) CIRCUIT-1

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.

+		–		Continuity
Combination switch (spiral cable)				
Connector	Terminal	Connector	Terminal	
M66	22	M303	3	Existed
M303	2	M66	21	
M303	1	M66	20	

Is the inspection result normal?

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

4. CHECK ASCD STEERING SWITCH CIRCUIT

Check the continuity between combination switch (spiral cable) harness connector terminals.

+		–		Condition		Continuity
Combination switch (spiral cable)						
Connector	Terminal	Connector	Terminal			
M303	3	M303	2	Speed limiter main (ON/OFF)	Pressed	Existed
					NOT pressed	Not existed
			1	ASCD main (ON/OFF)	Pressed	Existed
					NOT pressed	Not existed

Is the inspection result normal?

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

5. CHECK COMBINATION SWITCH (SPIRAL CABLE) CIRCUIT-2

1. Disconnect ECM harness connector.
2. Check the continuity between combination switch (spiral cable) harness connector and ECM harness connector.

+		–		Continuity
Combination switch (spiral cable)		ECM		
Connector	Terminal	Connector	Terminal	
M66	21	E9	10	Existed
	20		3	

Is the inspection result normal?

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

P0597 THERMOSTAT HEATER CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000010502844

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0597	THERMOSTAT (Thermostat heater control circuit/open)	• ECM detects the thermostat heater control solenoid valve circuit is open. • ECM detects the thermostat heater control solenoid valve circuit is short to ground. • ECM detects the thermostat heater control solenoid valve circuit is short to power.	• Harness or connectors (Thermostat heater control solenoid valve circuit is open or shorted.) • Thermostat heater control solenoid valve

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.
TESTING CONDITION:
Before performing the following procedure, confirm battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to ECH-234, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010502845

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 THERMOSTAT HEATER CONTROL SOLENOID VALVE HARNESS CONNECTOR CONNECTION

Check thermostat heater control solenoid valve harness connector connection.

Is the inspection result normal?

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

3.CHECK THERMOSTAT HEATER CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect thermostat heater control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between thermostat heater control solenoid valve harness connector and ground.

+		–	Voltage
Thermostat heater control solenoid valve			
Connector	Terminal		
F171	1	Ground	Battery voltage

Is the inspection result normal?

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

4. CHECK THERMOSTAT HEATER CONTROL SOLENOID VALVE CIRCUIT

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

+		–		Continuity
Thermostat heater control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F171	2	F17	52	Existed

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

Is the inspection result normal?

YES >> Replace thermostat heater control solenoid valve.
NO >> Repair or replace error-detected parts.

P0606 ECM

DTC Logic

INFOID:0000000010379125

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0606	CONTROL MODULE (Control module processor)	ECM calculation function is malfunctioning for 0.1 seconds or more.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

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

Diagnosis Procedure

INFOID:0000000010379126

1.REPLACE ECM

1. Replace ECM. Refer to ECH-313, "Removal and Installation".
2. Proceed to ECH-103, "Work Procedure".

>> INSPECTION END

P060A ECM

DTC Logic

INFOID:0000000010379127

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P060A	INTERNAL CONTROL MODULE (Internal control module monitoring processor performance)	ECM calculation function is malfunctioning for 0.04 seconds or more.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> 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 ECH-237, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010379128

1.REPLACE ECM

1. Replace ECM. Refer to ECH-313, "Removal and Installation".
2. Proceed to ECH-103, "Work Procedure".

>> INSPECTION END

P060B ECM

DTC Logic

INFOID:0000000010379129

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P060B	INTERNAL CONTROL MODULE (Internal control module A/D processing performance)	ECM calculation function is malfunctioning for 0.4 seconds or more.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

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

Diagnosis Procedure

INFOID:0000000010379130

1.REPLACE ECM

1. Replace ECM. Refer to ECH-313, "Removal and Installation".
2. Proceed to ECH-103, "Work Procedure".

>> INSPECTION END

P061A ECM

DTC Logic

INFOID:0000000010379131

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P061A	INTERNAL CONTROL MODULE (Internal control module torque performance)	• ECM detects failure of torque structure for 1 second or more. • When while ECM computes torque, ECM detects failure for 1 second or more. • Throttle low/high is not executed correctly for 1 second.	ECM

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

NOTE:
DTC P061A can not duplicate.

>> Proceed to ECH-239, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010379132

1.REPLACE ECM

1. Replace ECM. Refer to ECH-313, "Removal and Installation".
2. Proceed to ECH-103, "Work Procedure".

>> INSPECTION END

P062D ECM

DTC Logic

INFOID:0000000010500537

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P062D	FUEL INJECTOR DRIVER B1 (Fuel injector driver circuit performance bank 1)	ECM calculation function is malfunctioning.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> 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 ECH-240, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500538

1.REPLACE ECM

1. Replace ECM. Refer to ECH-313, "Exploded View".
2. Proceed to ECH-103, "Work Procedure".

>> INSPECTION END

P062E ECM

DTC Logic

INFOID:0000000010500535

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P062E	FUEL INJECTOR DRIVER B2 (Fuel injector driver circuit performance bank 2)	ECM calculation function is malfunctioning.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> 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 ECH-241, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500536

1.REPLACE ECM

1. Replace ECM. Refer to ECH-313, "Exploded View".
2. Proceed to ECH-103, "Work Procedure".

>> INSPECTION END

P0638 ELECTRIC THROTTLE CONTROL ACTUATOR FUNCTION

DTC Logic

INFOID:0000000010379135

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0638	THROTTLE ACTUATOR B1 (Throttle actuator control range/performance bank 1)	The value of electric throttle control actuator does not change.	Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and run engine at idle speed for at least 10 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to ECH-242, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010379136

1.CHECK ECM HARNESS CONNECTOR CONNECTION

1. Turn ignition switch OFF.
2. Check ECM 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

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 POWER SUPPLY CIRCUIT-1

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.
3. Check the voltage between electric throttle control actuator harness connector terminals.

Electric throttle control actuator			Voltage (Approx.)
Connector	+	-	
	Terminal	Terminal	
F46	5	3	5.0 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 8.

4.CHECK THROTTLE POSITION SENSOR CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Sensor	Electric throttle control actuator		ECM		Continuity
	Connector	Terminal	Connector	Terminal	
Sensor 1	F46	6	F17	87	Existed
Sensor 2	F46	4	F17	82	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 THROTTLE POSITION SENSOR

Refer to ECH-244, "Component Inspection (Throttle Position Sensor)".

Is the inspection result normal?

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

6. CHECK THROTTLE CONTROL MOTOR CIRCUIT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F46	1	F18	132	Existed
F46	2	F18	136	Existed

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

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. CHECK THROTTLE CONTROL MOTOR

Refer to ECH-244, "Component Inspection (Throttle Control Motor)".

Is the inspection result normal?

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

8. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR POWER SUPPLY CIRCUIT-2

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F46	5	F17	65	Existed

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

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR GROUND CIRCUIT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F46	3	F17	90	Existed

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

Is the inspection result normal?

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

Component Inspection (Throttle Position Sensor)

INFOID:0000000010379137

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform ECH-105, "Work Procedure".
4. Turn ignition switch ON.
5. Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F17	87 (TP sensor 1)	90	Accelerator pedal: Fully released	0.425 V
			Accelerator pedal: Fully depressed	4.760 V
	82 (TP sensor 2)		Accelerator pedal: Fully released	0.425 V
			Accelerator pedal: Fully depressed	4.760 V

Is the inspection result normal?

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

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Proceed to ECH-105, "Work Procedure".

>> INSPECTION END

Component Inspection (Throttle Control Motor)

INFOID:0000000010379138

1.CHECK THROTTLE CONTROL MOTOR

1. Reconnect all harness connectors disconnected.
2. Check resistance between electric throttle control actuator harness connectors terminals under the following conditions.

Terminal	Resistance
1 and 2	Approx. 1 - 1.5 Ω

Is the inspection result normal?

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

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform ECH-105, "Work Procedure".

>> INSPECTION END

P0641 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000010379139

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0641	SENSOR REFERENCE VOLTAGE A (Sensor reference voltage "A" circuit/open)	• ECM detects that the voltage of power source for sensor remains at more than 5.5 V for 0.15 second or more. • ECM detects that the voltage of power source for sensor remains at less than 4.5 V for 0.15 second or more.	• Harness or connectors (The APP sensor 2 power supply circuit) (Intake manifold pressure sensor power supply circuit) (Refrigerant pressure sensor power supply circuit) (Crankshaft position sensor power supply circuit) • Accelerator pedal position sensor 2 • Intake manifold pressure sensor • Refrigerant pressure sensor • Crankshaft position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

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

Diagnosis Procedure

INFOID:0000000010379140

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		
E9	23	Ground	5.0 V
F18	117		
F17	57		
F17	41		

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

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E9	23	Accelerator pedal position sensor 2	E20	1
F18	117	Intake manifold pressure sensor	F99	1
F17	57	Refrigerant pressure sensor	E41	3
F17	41	Crankshaft position sensor	F8	1

Is the inspection result normal?

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

3.CHECK COMPONENTS

Check the following.
- Accelerator pedal position sensor 2. Proceed to ECH-196, "Diagnosis Procedure".
- Intake manifold pressure sensor. Proceed to ECH-164, "Diagnosis Procedure".
- Refrigerant pressure sensor. Proceed to ECH-225, "Diagnosis Procedure".
- Crankshaft position sensor. Proceed to ECH-206, "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:0000000010379141

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0651	SENSOR REFERENCE VOLTAGE B (Sensor reference voltage "B" circuit/open)	• ECM detects that the voltage of power source for sensor remains at more than 5.5 V for 0.15 second or more. • ECM detects that the voltage of power source for sensor remains at less than 4.5 V for 0.15 second or more.	• Harness or connectors (The APP sensor 1 power supply circuit) (Throttle position sensor power supply circuit) • Accelerator pedal position sensor 1 • Throttle position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to ECH-248, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010379142

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		
E9	27	Ground	5.0 V
F17	65		

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

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E9	27	Accelerator pedal position sensor 1	E20	4
F17	65	Throttle position sensor	F46	5

Is the inspection result normal?

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

3.CHECK COMPONENTS

Check the following.
- Accelerator pedal position sensor 1. Proceed to ECH-196, "Diagnosis Procedure".
- Throttle position sensor. Proceed to ECH-170, "Diagnosis Procedure".

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:0000000010379143

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0657	ACTUATORS SUPPLY VOLTAGE A (Actuator supply voltage “A” circuit/open)	ECM detection of ECM relay always ON.	• Harness or connectors (The ECM relay circuit is open or shorted.) • IPDM E/R (ECM relay) • Fuse (No. 52) • Fuse (No. 55)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> 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 ECH-250, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010379144

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E4. 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 ECM RELAY CIRCUIT-1

1. Turn ignition switch OFF.
2. Check the voltage between ECM harness connector and ground.

ECM				Voltage
+		–		
Connector	Terminal	Connector	Terminal	
F17	93	E9	29	Battery voltage
E9	28	E9	29	Battery voltage

Is the inspection result normal?

YES >> Perform intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> GO TO 3.

3.CHECK ECM 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	
F17	93	F90	105	Existed
E9	28	F90	96	Existed

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

Is the inspection result normal?

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

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness for short to ground between ECM and IPDM E/R
- ECM relay

>> Repair or replace error-detected parts.

5. CHECK 15A FUSE

1. Disconnect 15A fuse (No. 52) from IPDM E/R.
2. Disconnect 15A fuse (No. 55) from IPDM E/R.
3. Check the fuse.

Is the inspection result normal?

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

P0697 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000010500702

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0697	SENSOR REFERENCE VOLTAGE C (Sensor reference voltage “C” circuit/open)	• ECM detects that the voltage of power source for sensor remains at more than 5.5 V for 0.15 second or more. • ECM detects that the voltage of power source for sensor remains at less than 4.5 V for 0.15 second or more.	• Harness or connectors (The camshaft position sensor power supply circuit) (The exhaust valve timing control position sensor power supply circuit) • Camshaft position sensor • Exhaust valve timing control position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to ECH-252, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500703

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		
F18	133	Ground	5.0 V
F18	121		

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

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F18	133	Camshaft position sensor	F111	1
F18	121	Exhaust valve timing control position sensor	F12	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.
- Camshaft position sensor. Proceed to ECH-214, "Component Inspection".
- Exhaust valve timing control position sensor. Proceed to ECH-219, "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:0000000010379149

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0833	CLUTCH PEDAL SWITCH B (Clutch pedal switch “B” circuit)	Correlation of two clutch pedal position switch signal is inconsistency.	• Harness or connectors (Clutch pedal position switch circuit is shorted.) (Clutch interlock switch circuit is shorted.) • Clutch pedal position switch • Clutch interlock switch

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle.
2. Depress the clutch pedal.
3. Release the clutch pedal.
4. Repeat step 2 and 3 for 10 times.
5. Check DTC.

Is DTC detected?

YES >> Proceed to ECH-254, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010379150

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 CLUTCH PEDAL POSITION SWITCH HARNESS AND CLUTCH INTERLOCK SWITCH CONNECTOR CONNECTION

Check clutch pedal position switch and clutch interlock switch harness connector connection.

Is the inspection result normal?

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

3.CHECK CLUTCH PEDAL POSITION SWITCH POWER SUPPLY

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

Clutch pedal position switch		–	Voltage
+			
Connector	Terminal		
E2	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 6.

4. CHECK CLUTCH PEDAL POSITION SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between clutch pedal position switch harness connector and ground.

Clutch pedal position switch		Ground	Continuity
Connector	Terminal		
E2	2	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

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

5. CHECK CLUTCH PEDAL POSITION SWITCH

Refer to ECH-256, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

6. CHECK CLUTCH PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between clutch pedal position switch harness connector and ECM harness connector.

Clutch pedal position switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E2	1	E9	9	Existed

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

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. CHECK CLUTCH INTERLOCK SWITCH POWER SUPPLY

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

+		–	Voltage
Connector	Terminal		
E52	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for power supply circuit.

8.CHECK CLUTCH INTERLOCK SWITCH INPUT SIGNAL CIRCUIT

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

Clutch interlock switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E52	2	E9	6	Existed

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9.CHECK CLUTCH INTERLOCK SWITCH

Refer to ECH-256, "Component Inspection".

Is the inspection result normal?

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

Component Inspection

INFOID:0000000010379151

CLUTCH PEDAL POSITION SWITCH

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
Terminals				
1	2	Clutch pedal	Fully released	Existed
			Fully depressed	Not existed

Is the inspection result normal?

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

2.CHECK CLUTCH PEDAL POSITION SWITCH-2

1. Adjust clutch pedal position switch installation.
2. Check the continuity between clutch pedal position switch terminals under the following conditions.

Clutch pedal position switch		Condition		Continuity
Connector	Terminals			
1	2	Clutch pedal	Fully released	Existed
			Fully depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace clutch pedal position switch.

CLUTCH INTERLOCK SWITCH

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
Terminals				
1	2	Clutch pedal	Fully released	Not existed
			Fully depressed	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
Connector	Terminals			
1	2	Clutch pedal	Fully released	Not existed
			Fully depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace clutch interlock switch.

P10AA ECM

DTC Logic

INFOID:0000000010500704

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P10AA	CONTROL MODULE (Control module)	ECM calculation function is malfunctioning.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

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

Diagnosis Procedure

INFOID:0000000010500705

1.REPLACE ECM

1. Replace ECM. Refer to ECH-313, "Removal and Installation".
2. Proceed to ECH-103, "Work Procedure".

>> INSPECTION END

P1512 STARTER MOTOR

Description

INFOID:0000000010500706

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

DTC Logic

INFOID:0000000010500707

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1512	STARTER MOTOR (Starter motor)	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 12 minutes 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 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to ECH-259, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500708

1.REPLACE STARTER MOTOR

Replace starter motor. Refer to STR-24, "HRA2DDT : Removal and Installation".

>> INSPECTION END

P1525 ASCD SYSTEM

DTC Logic

INFOID:0000000010500712

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	CRUISE CONTROL/ SPEED LIMITER (Cruise control/speed limiter)	Other DTC that illuminates MIL is detected while ASCD is operating.	• Harness or connectors • Others systems • ECM

Diagnosis Procedure

INFOID:0000000010500713

1.CHECK DTC

Perform “All DTC Reading” with CONSULT.

Is any DTC detected?

YES >> Perform trouble diagnosis for DTC indicated.
NO >> Erase the DTC.

P1589 PARK/NEUTRAL POSITION SWITCH

DTC Logic

INFOID:0000000010500719

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1589	NEUTRAL SWITCH (Neutral switch)	Neutral position switch signal remains ON for a long driving distance.	• Harness and connectors (Neutral position switch circuit is shorted.) • Reverse/neutral position switch

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

NOTE:
Use Component Function Check the overall function of the neutral position switch circuit. During this check, the DTC might not be confirmed.

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connectors as per the following conditions.

+		–	Condition		Voltage (Approx.)
ECM					
Connector	Terminal				
F18	143	Ground	Shift lever	Neutral	Battery voltage
				Except above	0 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to ECH-261, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010500720

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. 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	F18	143	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 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.

P158A CPP SWITCH

DTC Logic

INFOID:0000000010500722

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P158A	CLUTCH SWITCH (Clutch switch)	Correlation of two clutch pedal position switch signal is inconsistency.	• Harness or connectors (Clutch pedal position switch circuit is shorted.) (Clutch interlock switch circuit is shorted.) • Clutch pedal position switch • Clutch interlock switch

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle.
2. Depress the clutch pedal.
3. Release the clutch pedal.
4. Repeat step 2 and 3 for 10 times.
5. Check DTC.

Is DTC detected?

YES >> Proceed to ECH-263, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500723

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 CLUTCH PEDAL POSITION SWITCH HARNESS AND CLUTCH INTERLOCK SWITCH CONNECTOR CONNECTION

Check clutch pedal position switch and clutch interlock switch harness connector connection.

Is the inspection result normal?

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

3.CHECK CLUTCH PEDAL POSITION SWITCH POWER SUPPLY

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

Clutch pedal position switch		–	Voltage
+			
Connector	Terminal		
E2	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 6.

4. CHECK CLUTCH PEDAL POSITION SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between clutch pedal position switch harness connector and ground.

Clutch pedal position switch		Ground	Continuity
Connector	Terminal		
E2	2	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

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

5. CHECK CLUTCH PEDAL POSITION SWITCH

Refer to ECH-265, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

6. CHECK CLUTCH PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between clutch pedal position switch harness connector and ECM harness connector.

Clutch pedal position switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E2	1	E9	9	Existed

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

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. CHECK CLUTCH INTERLOCK SWITCH POWER SUPPLY

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

+		–	Voltage
Connector	Terminal		
E52	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for power supply circuit.

8.CHECK CLUTCH PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT

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

Clutch interlock switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E52	2	E9	6	Existed

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9.CHECK CLUTCH INTERLOCK SWITCH

Refer to ECH-265, "Component Inspection".

Is the inspection result normal?

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

Component Inspection

INFOID:0000000010500724

CLUTCH PEDAL POSITION SWITCH

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
Terminals				
1	2	Clutch pedal	Fully released	Existed
			Fully depressed	Not existed

Is the inspection result normal?

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

2.CHECK CLUTCH PEDAL POSITION SWITCH-2

1. Adjust clutch pedal position switch installation.
2. Check the continuity between clutch pedal position switch terminals under the following conditions.

Clutch pedal position switch		Condition		Continuity
Connector	Terminals			
1	2	Clutch pedal	Fully released	Existed
			Fully depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace clutch pedal position switch.

CLUTCH INTERLOCK SWITCH

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
Terminals				
1	2	Clutch pedal	Fully released	Not existed
			Fully depressed	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
Connector	Terminals			
1	2	Clutch pedal	Fully released	Not existed
			Fully depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace clutch interlock switch.

P160C ECM

DTC Logic

INFOID:0000000010379157

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P160C	CONTROL MODULE (Control module)	ECM function is malfunctioning.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

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

Diagnosis Procedure

INFOID:0000000010379158

1.CHECK BATTERY TERMINALS

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 12 minutes.
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 P0130, P0136, P0217, P0226, P0420 or P2263?

YES >> Perform the trouble diagnosis for DTC P0130, P0136, P0217, P0226, P0420 or P2263 and GO TO 3. Refer to ECH-71, "DTC Index".
NO >> GO TO 3.

3.CHECK DTC

1. Turn ignition switch OFF and wait at least 12 minutes.
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. Refer to ECH-313, "Removal and Installation".
2. Proceed to ECH-103, "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 DTC P160C displayed with P0130, P0136, P0217, P0226, P0420 or P2263?

YES >> Perform the trouble diagnosis for DTC P0130, P0136, P0217, P0226, P0420 or P2263 and GO TO 3. Refer to ECH-71, "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 P0130, P0136, P0217, P0226, P0420 or P2263 and GO TO 3. Refer to ECH-71, "DTC Index".
NO >> INSPECTION END

P1650 STARTER MOTOR RELAY 2

DTC Logic

INFOID:0000000010796370

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition		Possible cause
P1650	STR MTR RELAY 2 (Engine restart relay circuit)	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 12 minutes or more to start this procedure.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Turn ignition switch OFF and wait at least 12 minutes.
2. Turn ignition switch ON and wait at least 30 seconds
3. Turn ignition switch OFF, wait at least 12 minutes and then turn ON.
4. Check DTC.

Is DTC detected?

YES >> Proceed to ECH-269, "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 ECH-33, "STOP/START SYSTEM : System Description".

CAUTION:
Always drive vehicle at a safe speed.

Is stop/start system activated normal?

YES >> INSPECTION END
NO >> Proceed to ECH-269, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010500726

1.CHECK ENGINE RESTART RELAY POWER SUPPLY

1. Turn ignition switch OFF.
2. Remove engine restart relay.
3. Turn ignition switch ON.
4. 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. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. 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

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

Is the inspection result normal?

YES >> Replace 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	F17	39	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 ECH-271, "Component Inspection".

Is the inspection result normal?

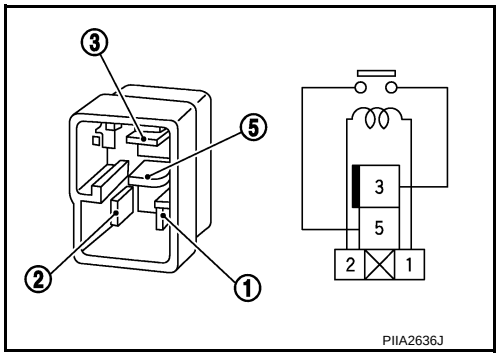
YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace engine restart relay.

Component Inspection

INFOID:0000000010500727

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:0000000010500732

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1655	— —	At an engine restart by stop/start system, the voltage drop is not allowable less than Approx. 0.1 V when the engine restart by-pass 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 DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 12 minutes.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 12 minutes.

>> With consult: GO TO 2.
>> Without consult: GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

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.
7. Check “ENG RESTART B/R STK CNT” in “DATA MONITOR” mode of CONSULT to see if engagement counts are counted.

Are engagement counts counted?

YES >> Proceed to ECH-272, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE-2

Without CONSULT

1. Activate the stop/start system. Stop the engine. Restart the engine. Refer to ECH-33, "STOP/START SYSTEM : System Description".
2. Repeat Step 1 four times.

CAUTION:
Always drive vehicle at a safe speed.

Is the DTC P1655 displayed again?

YES >> Proceed to ECH-272, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500733

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that there is no blowout in the following fuse.

Location	Fuse No.	Capacity
Fuse block (J/B)	7	20A

Is the inspection result normal?

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

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	F17	83	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	
E98	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 ECH-274, "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 ECH-274, "Component Inspection (Engine Restart Bypass Relay)".

Is the inspection result normal?

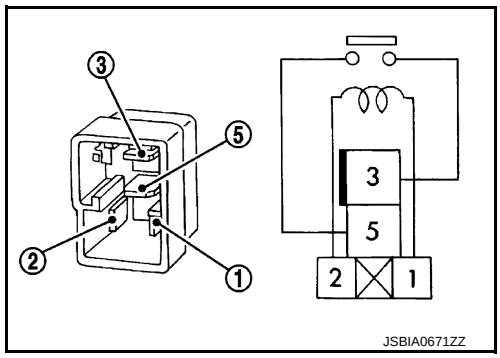
YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (Engine Restart Bypass Control Relay)

INFOID:0000000010500734

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?

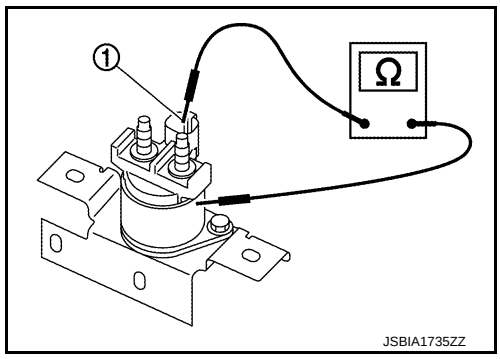
YES >> INSPECTION END
NO >> Replace engine restart bypass control relay.

Component Inspection (Engine Restart Bypass Relay)

INFOID:0000000010500735

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.
4. Check the continuity between engine restart bypass relay terminal and engine restart bypass relay body.



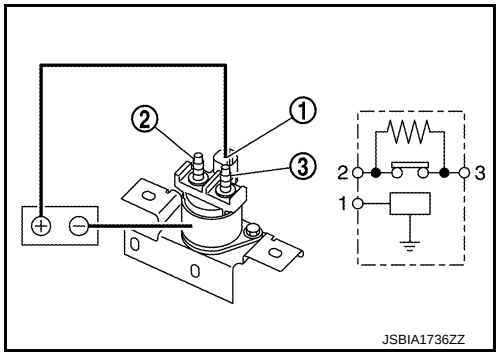
+		
Engine restart bypass relay	–	Continuity
Terminal		
1	Body	Existed

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine restart bypass relay.

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.

P1656 ENGINE RESTART BYPASS RELAY

DTC Logic

INFOID:0000000010796391

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1656	ENGINE RESTART BY-PASS RELAY (Engine restart bypass relay remains closed) • 1.DEF: INVALID SOURCE COMPUTER MULTIPLEX SIGNALS • 2.DEF: INVALID SOURCE COMPUTER MULTIPLEX SIGNALS • 3.DEF: IMPLAUSIBLE SIGNAL	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 ECH-33, "STOP/START SYSTEM : System Description".
2. Repeat Step 1 four times.

CAUTION:
Always drive vehicle at a safe speed.

Is DTC detected?

YES >> Proceed to ECH-276, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010500737

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that there is no blowout in the following fuse.

Location	Fuse No.	Capacity
Fuse block (J/B)	7	20A

Is the inspection result normal?

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

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	F17	83	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	
E98	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 ECH-274, "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 ECH-274, "Component Inspection (Engine Restart Bypass Relay)".

Is the inspection result normal?

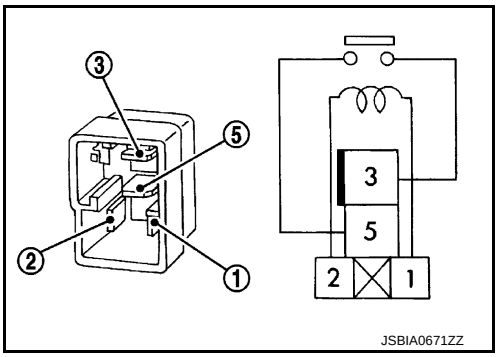
YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace error-detected parts.

Component Inspection (Engine Restart Bypass Control Relay)

INFOID:0000000010500738

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?

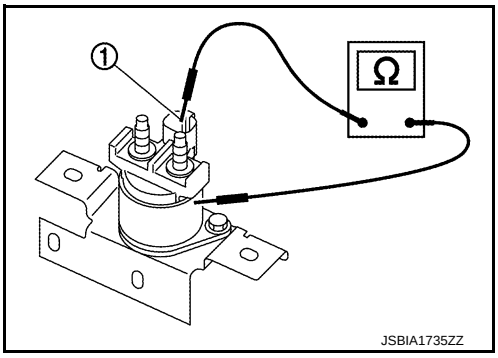
YES >> INSPECTION END
NO >> Replace engine restart bypass control relay.

Component Inspection (Engine Restart Bypass Relay)

INFOID:0000000010500739

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.
4. Check the continuity between engine restart bypass relay terminal and engine restart bypass relay body.



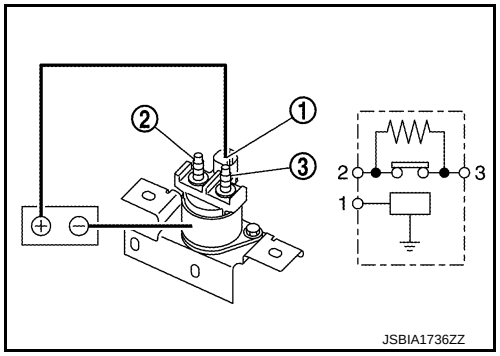
+	–	Continuity
Engine restart bypass relay		
Terminal		
1	Body	Existed

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine restart bypass relay.

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.

P1675 ENGINE COOLANT TEMPERATURE

DTC Logic

INFOID:0000000010500750

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.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1675	Engine overheating	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-1

NOTE:

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

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.

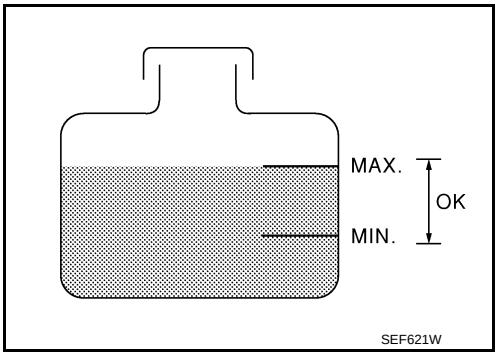
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

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 ECH-281, "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 ECH-281, "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 ECH-281, "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 ECH-281, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010500751

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.

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 ECH-168, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Perform overheating cause analysis. Refer to CO-9, "Troubleshooting Chart".
NO >> Replace engine coolant temperature sensor.

Component Inspection

INFOID:0000000010500752

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance between engine coolant temperature sensor terminals 2 and 3 under the following conditions.

Terminal	Condition	Resistance
1 and 2	25°C (77°F)	2252 ± 112.16 Ω
	50°C (122°F)	810 ± 39 Ω
	80°C (176°F)	283 ± 8 Ω

Is the inspection result normal?

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

P2100 ELECTRIC THROTTLE CONTROL FUNCTION

DTC Logic

INFOID:0000000010379162

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2100	THROTTLE ACTUATOR A (Throttle actuator “A” control motor circuit/open)	• An excessively low voltage from the TP sensor is sent to ECM. • An excessively high current from the TP sensor is sent to ECM. • TP sensor becomes over temperature.	• Harness or connectors (Electric throttle control motor circuit is open or shorted) • Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.
TESTING CONDITION:
Before performing the following procedure, confirm battery voltage is more than 10 V at idle.

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

Diagnosis Procedure

INFOID:0000000010379163

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM 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

1. Disconnect electric throttle control actuator and ECM harness connector.
2. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F46	1	F18	132	Existed
	2		136	
	3	F17	90	
	4		82	
	5		65	
	6		87	

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

Is the inspection result normal?

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

4. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to ECH-284, "Component Inspection (Throttle Control Motor)".

Is the inspection result normal?

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

Component Inspection (Throttle Control Motor)

INFOID:0000000010379164

1. CHECK THROTTLE CONTROL MOTOR

1. Reconnect all harness connectors disconnected.
2. Check resistance between electric throttle control actuator harness connectors terminals under the following conditions.

Terminal	Resistance
1 and 2	Approx. 1 - 1.5 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace electric throttle control actuator.

P2119 ELECTRIC THROTTLE CONTROL FUNCTION

DTC Logic

INFOID:0000000010379165

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2119	THROTTLE ACTUATOR A (Throttle actuator control throttle body range/performance)	ECM detects abnormally closed position of throttle control valve.	• Harness or connectors (Electric throttle control motor circuit is open or shorted) • Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF and wait at least 20 minutes.
3. Turn ignition switch ON and wait at least 1 second.
4. Check DTC.

Is DTC detected?

YES >> Proceed to ECH-285, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010379166

1.CHECK ECM HARNESS CONNECTOR CONNECTIONS

1. Turn ignition switch OFF.
2. Check ECM 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 VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the electric throttle control actuator and the housing.

Is the inspection result normal?

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

4.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR FITTING CONDITION

Check electric throttle control actuator fitting condition.

Is the inspection result normal?

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

5.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR MOVING CONDITION

Check electric throttle control actuator moving condition.

Is the inspection result normal?

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

6.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform throttle valve closed position learning for two times. Refer to ECH-105, "Work Procedure".

>> GO TO 7.

7.CHECK THROTTLE POSITION SENSOR INPUT SIGNAL

1. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” with CONSULT.
2. Select “THL POS TK 1” and “THL POS TK 2”.
3. Start engine and warm it up to normal operating temperature.
4. Drive and accelerate vehicle.
   CAUTION:
   Always drive vehicle at a safe speed.
5. Check the indication.

Is the indication fluctuation normal?

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

8.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT

1. Disconnect electric throttle control actuator and ECM harness connector.
2. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F46	1	F18	132	Existed
	2		136	
	3	F17	90	
	4		82	
	5		65	
	6		87	

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to ECH-284, "Component Inspection (Throttle Control Motor)".

Is the inspection result normal?

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

Component Inspection (Throttle Control Motor)

INFOID:0000000010379167

1.CHECK THROTTLE CONTROL MOTOR

1. Reconnect all harness connectors disconnected.
2. Check resistance between electric throttle control actuator harness connectors terminals under the following conditions.

Terminal	Resistance
1 and 2	Approx. 1 - 1.5 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace electric throttle control actuator.

P2120 APP SENSOR

DTC Logic

INFOID:0000000010379168

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2120	THROTTLE/PEDAL POSI SEN/SW D (Throttle/pedal position sensor/switch “D” circuit)	Signal voltage from the APP sensor 2 remains at more than 0.7 V / less than 0.05 V for 0.25 seconds or more. And then ECM does not detect DTC P0641.	• Harness or connectors (APP sensor 2 circuit is open or shorted.) • Accelerator pedal position sensor 2 • Accelerator pedal

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

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

Diagnosis Procedure

INFOID:0000000010379169

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E4.

Is the inspection result normal?

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

2.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY CIRCUIT-1

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

Accelerator pedal position sensor			Ground	Voltage
Sensor	Connector	Terminal		
1	E20	4	Ground	Approx. 5V
2	E20	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 6.

3.CHECK ACCELERATOR PEDAL POSITION SENSOR GROUND CIRCUIT

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

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E20	2	E9	30	Existed
2	E20	1	E9	21	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 ACCELERATOR PEDAL POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E20	3	E9	31	Existed
2	E20	6	E9	22	Existed

2. 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 ACCELERATOR PEDAL POSITION SENSOR

Refer to ECH-289, "Component Inspection".

Is the inspection result normal?

YES >> Perform intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace accelerator pedal.

6.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY CIRCUIT

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

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E20	4	E9	27	Existed
2	E20	5	E9	23	Existed

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

Is the inspection result normal?

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

Component Inspection

INFOID:0000000010379170

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage ECM harness connector terminals under the following conditions.

ECM			Condition		Voltage
Connector	+	–			
	Terminal	Terminal			
E9	31 (APP sensor 1)	30	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	22 (APP sensor 2)	22		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.

P2135 TP SENSOR

DTC Logic

INFOID:0000000010379171

DTC DETECTION LOGIC

NOTE:
If DTC P2135 is displayed with DTC P0120, P0220, or P0651, first perform the trouble diagnosis for DTC P0120, P0220, or P0651. Refer to ECH-71, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2135	THRTL/PDL POS SEN/SW A/B CRL TN (Throttle/pedal position sensor/switch “A”/“ B” voltage correlation)	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	• Harness or connector (TP sensor 1 and 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 12 minutes.

>> 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 ECH-291, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010379172

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 ELECTRIC THROTTLE CONTROL ACTUATOR HARNESS CONNECTOR CONNECTION

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 THROTTLE POSITION SENSOR CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Sensor	+		–		Continuity
	Electric throttle actuator		ECM		
	Connector	Terminal	Connector	Terminal	
1	F46	6	F17	87	Existed
2		4		82	

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 THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to ECH-292, "Component Inspection (Throttle Position Sensor)".

Is the inspection result normal?

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

Component Inspection (Throttle Position Sensor)

INFOID:0000000010379173

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform ECH-105, "Work Procedure".
4. Turn ignition switch ON.
5. Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F17	87 (TP sensor 1)	90	Accelerator pedal: Fully released	0.425 V
			Accelerator pedal: Fully depressed	4.760 V
	82 (TP sensor 2)		Accelerator pedal: Fully released	0.425 V
			Accelerator pedal: Fully depressed	4.760 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace electric throttle control actuator.

P2263 TC SYSTEM

DTC Logic

INFOID:0000000010500763

DTC DETECTION LOGIC

NOTE:
If DTC P2263 is displayed with following DTC, first perform the trouble diagnosis for following DTC. Refer to ECH-71, "DTC Index".

- **P0001, P0002, P0045, P0105, P0106, P0115, P0180, 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	TC/SC BOOST SYSTEM (Turbocharger/supercharger boost system performance)	• 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) • Vacuum air circuit • Air filter • Turbocharger • Intake air leaks • Exhaust gas leaks • Fuel flow actuator • Turbocharger boost control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:
DTC P2263 can not be duplicate.

>> Proceed to ECH-293, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010500764

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.

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.

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

P2504 CHARGING SYSTEM VOLTAGE

DTC Logic

INFOID:0000000010500767

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2504	CHARGING SYSTEM (Charging system voltage 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 12 minutes 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 ECH-295, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010929829

1.CHECK DRIVE BELT

Check drive belt. Refer to EM-16, "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.

STOP LAMP SWITCH

Component Function Check

INFOID:0000000010500793

1.CHECK STOP LAMP SWITCH FUNCTION

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

ECM			Condition		Voltage (Approx.)
Connector	+	–			
	Terminal				
E9	17	29	Brake pedal	Fully released	Battery voltage
				Slightly depressed	0 V

Is the inspection result normal?

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

Diagnosis Procedure

INFOID:0000000010500794

1.CHECK STOP LAMP SWITCH FUNCTION

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

ECM			Condition		Voltage (Approx.)
Connector	+	–			
	Terminal				
E9	17	29	Brake pedal	Fully released	Battery voltage
				Slightly depressed	0 V

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO-1 (Fixed at 0 V)>>GO TO 2.
NO-2 (Fixed at battery voltage)>>GO TO 4.

2.CHECK STOP LAMP SWITCH POWER SUPPLY

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

+		–	Voltage
Stop lamp switch			
Connector	Terminal		
E50	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis for power supply circuit.

3.CHECK STOP LAMP SWITCH SIGNAL CIRCUIT

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

+		–		Continuity
Stop lamp switch		ECM		
Connector	Terminal	Connector	Terminal	
E50	4	E9	17	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

4.CHECK STOP LAMP SWITCH

Check stop lamp switch. Refer to ECH-297, "Component Inspection".

Is the inspection result normal?

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

Component Inspection

INFOID:0000000010500795

1.CHECK STOP LAMP SWITCH-1

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch		Condition		Continuity
+	–			
Terminal				
3	4	Brake pedal	Depressed	Not existed
			Released	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-18, "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
+	–			
Terminal				
3	4	Brake pedal	Depressed	Not existed
			Released	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch.

HOOD SWITCH

Component Function Check

INFOID:0000000010500796

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 ECH-298, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000010500797

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.

Is the inspection result normal?

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

Component Inspection

INFOID:0000000010500798

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	Not existed
			Depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace hood switch.

STOP/START OFF SWITCH

Component Function Check

INFOID:0000000010500799

1.CHECK STOP/START OFF SWITCH FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Select “STOP START SW” in “DATA MONITOR” mode of “BCM” using CONSULT.
3. Check “STOP START SW” indication as per the following condition.

Monitor item	Condition		Indication
STOP START SW	Stop/start OFF switch	ON	On
		OFF	Off

Is the inspection result normal?

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

Diagnosis Procedure

INFOID:0000000010500800

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 ECH-301, "Component Inspection".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop/start OFF switch.

Component Inspection

INFOID:0000000010500801

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:0000000010379190

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Low pressure fuel pump circuit	x	x	x	x	x		x	x			x		x	ECH-202
	Fuel pressure regulator system	x	x	x	x	x	x	x	x	x		x			ECH-121
	Fuel injector circuit	x	x	x	x	x		x	x			x			ECH-188
	Evaporative emission system	x	x	x	x	x	x	x	x	x		x			ECH-311
	Fuel rail pressure sensor circuit	x	x	x	x	x		x	x			x			ECH-186
	High pressure fuel pump circuit			x		x									ECH-143
Air	Positive crankcase ventilation system	x	x	x	x	x	x	x	x	x		x	x		—
	Incorrect idle speed adjustment						x	x	x	x		x			—
	Electric throttle control actuator	x	x	x	x	x	x	x	x	x		x		x	ECH-283 ECH-285
Ignition	Ignition circuit	x	x	x	x	x		x	x			x			ECH-215
Main power supply and ground circuit		x	x	x	x	x		x	x		x	x			ECH-123
Turbocharger boost control solenoid valve circuit				x		x									—
Turbocharger boost sensor circuit				x		x									ECH-172
Intake air temperature sensor			x	x				x	x			x			ECH-162
Throttle position sensor circuit							x			x					ECH-170 ECH-194 ECH-291
Intake manifold pressure sensor				x	x	x		x							ECH-164 ECH-166

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Turbocharger wastegate control actuator					x									—
Turbocharger wastegate control solenoid valve					x									ECH-200 ECH-117
Heated oxygen sensor 1 circuit			x		x		x	x			x			ECH-175 ECH-177
Heated oxygen sensor 2 circuit														ECH-179 ECH-181
Camshaft position sensor circuit	x	x	x	x			x	x						ECH-212
Intake valve timing control solenoid valve circuit		x	x		x	x	x	x	x		x			ECH-145 ECH-147
Exhaust valve timing control solenoid valve circuit		x	x		x	x	x	x	x		x			ECH-149 ECH-151
Exhaust valve timing control position sensor circuit	x	x	x	x	x		x	x			x			ECH-219
Knock sensor circuit			x								x			ECH-208
Crankshaft position sensor circuit	x	x	x	x		x	x							ECH-206 ECH-210
Thermostat heater control solenoid valve circuit										x				ECH-234
Engine coolant bypass valve control solenoid valve circuit										x	x			—
Engine coolant temperature sensor circuit				x		x			x					ECH-168
Engine oil pressure control solenoid valve circuit														—
ECM	x	x	x	x	x	x	x	x	x	x	x			ECH-236 ECH-237 ECH-238 ECH-239 ECH-240 ECH-241 ECH-258 ECH-267
Accelerator pedal position sensor circuit	x		x	x	x									ECH-196 ECH-198 ECH-288
Stop lamp switch circuit	x													ECH-296

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Clutch interlock switch circuit	x													ECH-254 ECH-263
Refrigerant pressure sensor circuit		x				x			x		x			ECH-225
Reverse / neutral position switch circuit			x		x		x	x			x			ECH-261
Vehicle speed signal circuit		x	x		x						x			ECH-132
Cooling fan control circuit	x	x	x	x	x		x	x	x	x	x			—
Starter relay circuit	x													—
Starter control relay circuit	x													—
Electrical load signal circuit		x	x				x						x	—
Air conditioner circuit	x	x	x	x	x	x	x	x	x		x		x	HAC-68 HAC-182
ABS actuator and electric unit (control unit)	x		x											BRC-60

(continued on next table)

SYSTEM — ENGINE MECHANICAL & OTHER

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	x	x												FL-12
	Fuel piping			x	x	x		x	x			x			FL-5
	Vapor lock														—
	Valve deposit	x		x	x	x		x	x			x			—
	Poor fuel (Heavy weight gasoline, Low octane)			x	x							x			—
Air	Air duct		x	x		x		x	x			x			EM-24
	Air cleaner														
	Air leakage from air duct	x			x		x			x					
	Electric throttle control actuator		x	x			x	x	x						EM-25
	Air leakage from intake manifold/Collector/Gasket														EM-25
Cranking	Battery	x	x	x		x		x	x			x		x	PG-138 PG-143
	Generator circuit											x		x	CHG-15 CHG-46
	Starter circuit	x													STR-18
	Signal plate	x	x	x					x						—
	Reverse / neutral position signal	x													TM-15
Engine	Cylinder head	x	x	x	x	x		x	x			x			EM-74
	Cylinder head gasket										x		x		EM-69
	Cylinder block	x	x	x	x	x		x	x			x	x		EM-102
	Piston														
	Piston ring												x		
	Connecting rod														
	Bearing												x		
	Crankshaft														

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Valve mechanism	Timing chain	x	x	x	x	x		x	x			x			EM-67
	Camshaft							x	x						EM-81 EM-84
	Intake valve timing control					x	x	x	x						EM-67
	Exhaust valve timing control					x	x	x	x						
	Intake valve												x		EM-74
	Exhaust valve					x									
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	x	x	x	x	x		x	x			x			EM-37 EX-5
	Three way catalyst					x									EM-31
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	x	x	x	x	x		x	x			x			EM-48 EM-92 LU-12 LU-10 LU-3 LU-14
	Oil level (Low) /Filthy oil					x							x		LU-8
Cooling	Radiator/Hose/Radiator filler cap	x	x	x	x	x		x	x		x	x			CO-16 CO-15
	Thermostat									x					CO-26
	Water pump									x	x				CO-23
	Water gallery									x					CO-8
	Cooling fan									x	x				CO-21
	Coolant level (Low) /Contaminated coolant										x				CO-11
NATS (Nissan Anti-theft System)		x	x												SEC-77 SEC-231

STOP/START SYSTEM

Diagnosis Procedure

INFOID:0000000010713097

1.CHECK STOP/START SYSTEM FUNCTION-1

Activate stop/start system. Refer to ECH-33, "STOP/START SYSTEM : System Description".

Is the stop/start system activated?

YES >> GO TO 2.
NO >> Proceed to ECH-309, "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 ECH-33, "STOP/START SYSTEM : System Description".

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 ECH-303, "Symptom Table".
NO >> Perform the trouble diagnosis for starting system. Refer to STR-18, "Work Flow".

STOP/START SYSTEM NOT ACTIVATED

Diagnosis Procedure

INFOID:0000000010713098

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 8.
NO >> GO TO 4.

4.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 5.
NO >> Replace starter motor. Refer to STR-24, "HRA2DDT : Removal and Installation".

5.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 9.
NO >> GO TO 6.

6.CHECK CUMULATIVE BATTERY DISCHARGE CURRENT

WITH CONSULT
1. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Check that the “CML B/DCHG CRNT” indication.

Monitor item	Indication
BAT DISCHAGE COUNT	Less than 65,000

Is the indication less than 65,000?

YES >> GO TO 7.
NO >> Replace battery designed for the stop/start system. Refer to PG-155, "Removal and Installation".

7. 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 8.

8. 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 9.
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).

9. CHECK STOP/START OFF SWITCH

Check the stop/start OFF switch. Refer to ECH-300, "Component Function Check".

Is the inspection normal?

YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

10. CHECK HOOD SWITCH

Check the hood switch. Refer to ECH-298, "Component Function Check".

Is the inspection normal?

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

11. CHECK STOP/START SYSTEM OPERATION CONDITION

Check the stop/start system operation condition. Refer to ECH-33, "STOP/START SYSTEM : System Description".

>> INSPECTION END

PERIODIC MAINTENANCE

EVAPORATIVE EMISSION SYSTEM

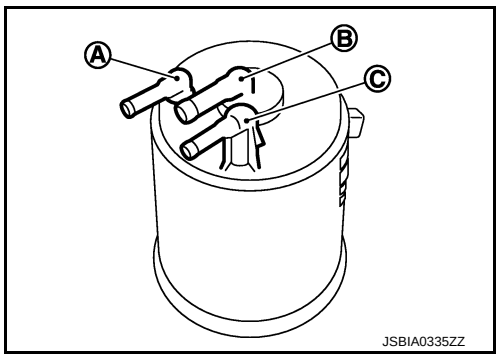
Inspection

INFOID:0000000010379191

1. Visually inspect EVAP vapor lines for improper attachment and for cracks, damage, loose connections, chafing and deterioration.
2. Check EVAP canister as follows:

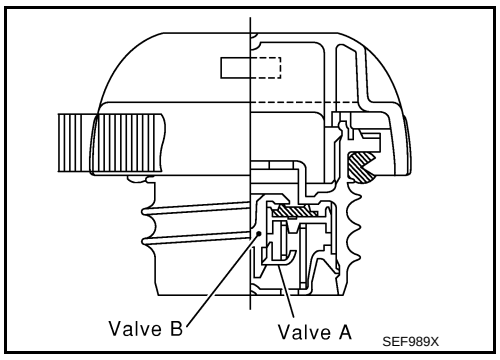
a. Block port (A). Orally blow air through port (B). Check that air flows freely through port (C).

b. Block port (B). Orally blow air through port (A). Check that air flows freely through port (C).



3. Inspect fuel tank filler cap vacuum relief valve for clogging, sticking, etc.

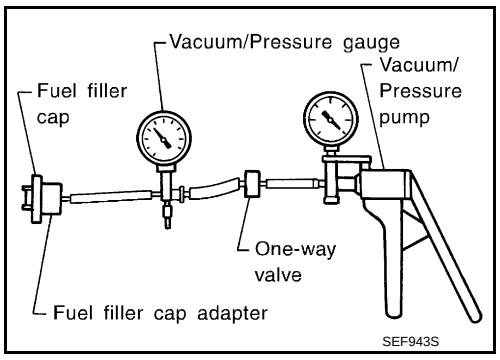
a. Wipe clean valve housing.



b. Check valve opening pressure and vacuum.

Pressure:	15.3 - 20.0 kPa (0.153 - 0.200 bar, 0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:	–6.0 to –3.4 kPa (–0.06 bar to –-0.034bar, –0.061 to –0.035 kg/cm^2, –0.87 to –0.49 psi)

c. If out of specification, replace fuel filler cap as an assembly. Refer to FL-10, "Exploded View".

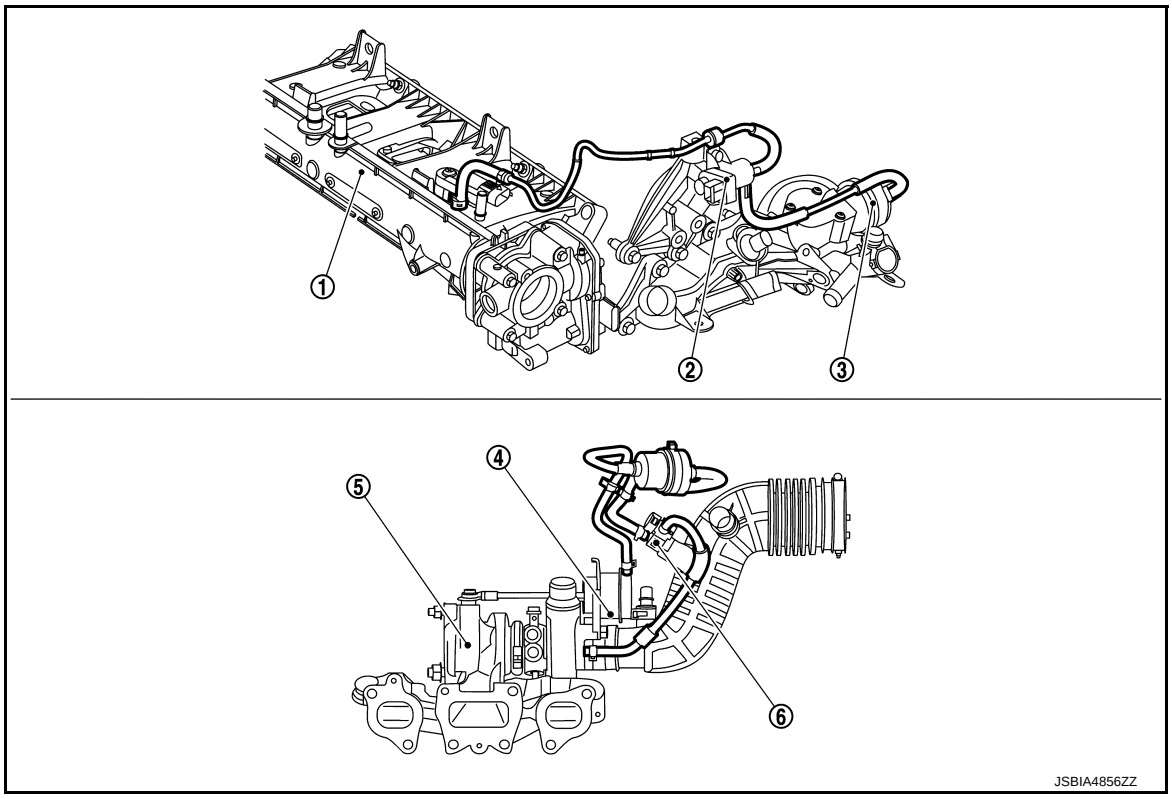


REMOVAL AND INSTALLATION

VACUUM LINES

Vacuum Layout

INFOID:0000000010501191



1. Intake manifold
2. Engine coolant bypass valve control solenoid valve
3. Engine coolant bypass valve control actuator
4. TC wastegate control actuator
5. Turbocharger
6. TC wastegate control solenoid valve

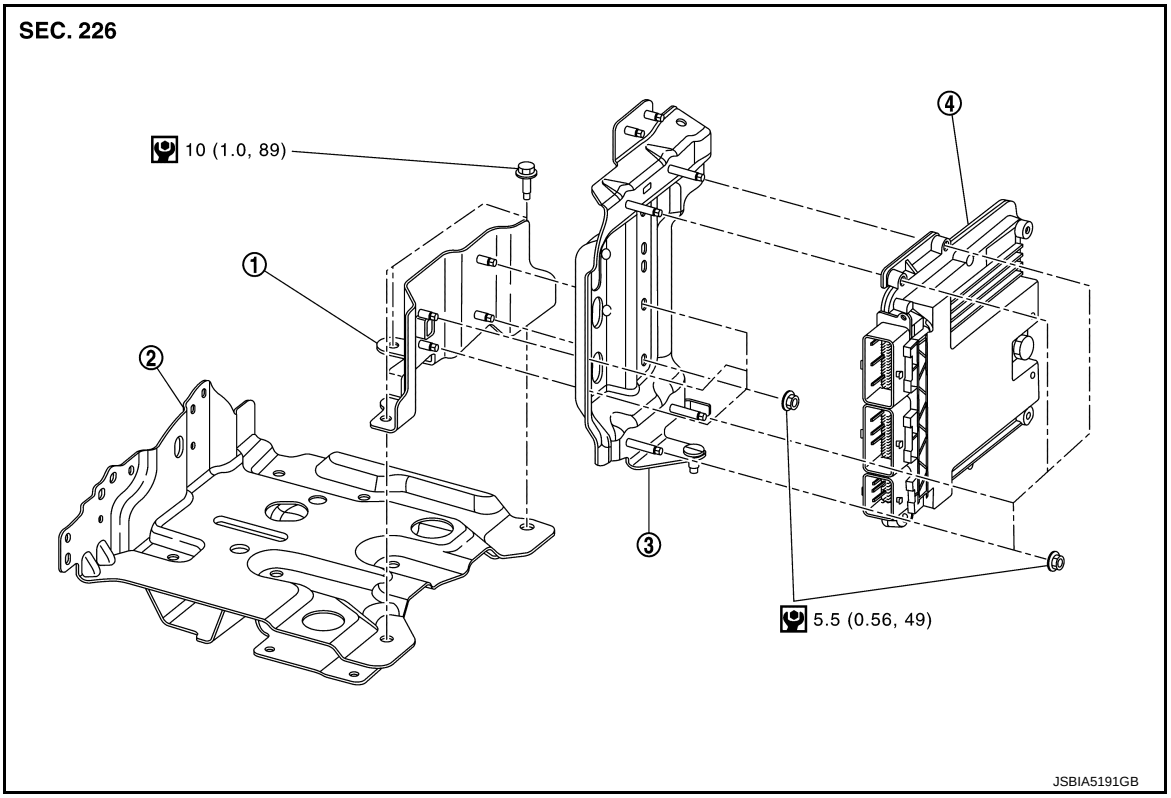
CAUTION:

Do not use soapy water or any type of solvent while installing vacuum hose.

ECM

Exploded View

INFOID:0000000010501192



1. Battery mounting bracket
2. Bracket A
3. Bracket B
4. ECM

: N·m (kg-m, in-lb)

Removal and Installation

INFOID:0000000010501193

CAUTION:
Perform ADDITIONAL SERVICE WHEN REPLACING ECM. Refer to ECH-103, "Work Procedure".

REMOVAL

1. Disconnect battery negative terminal.
2. Remove air duct (inlet). Refer to EM-23, "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

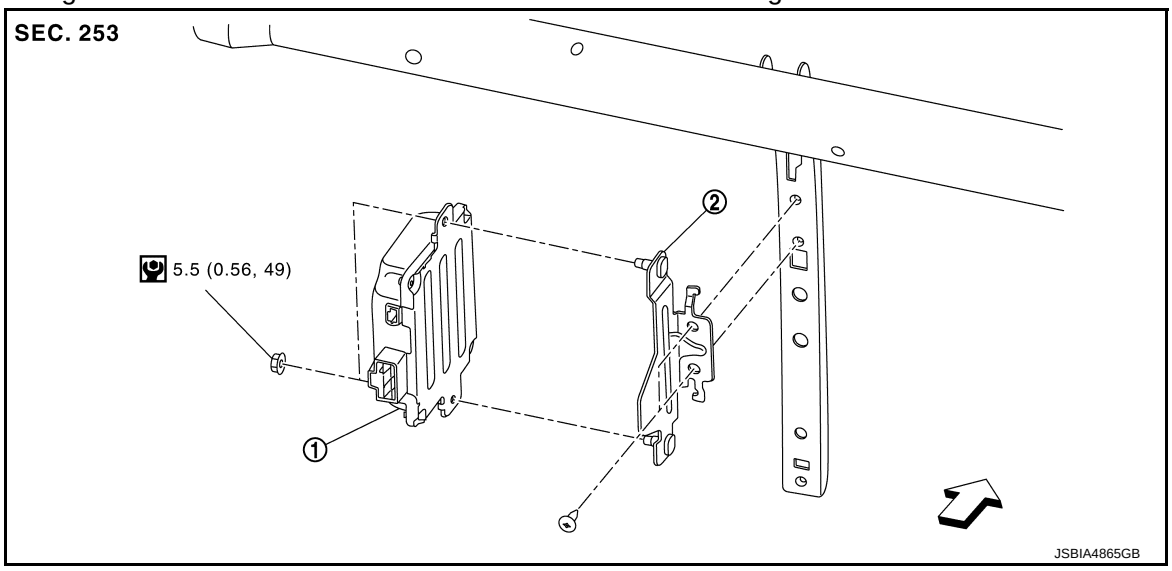
Install in the reverse order of removal.

DC/DC CONVERTER

Exploded View

INFOID:0000000010501198

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:0000000010501199

REMOVAL

1. Disconnect battery negative terminal. Refer to ECH-7, "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.

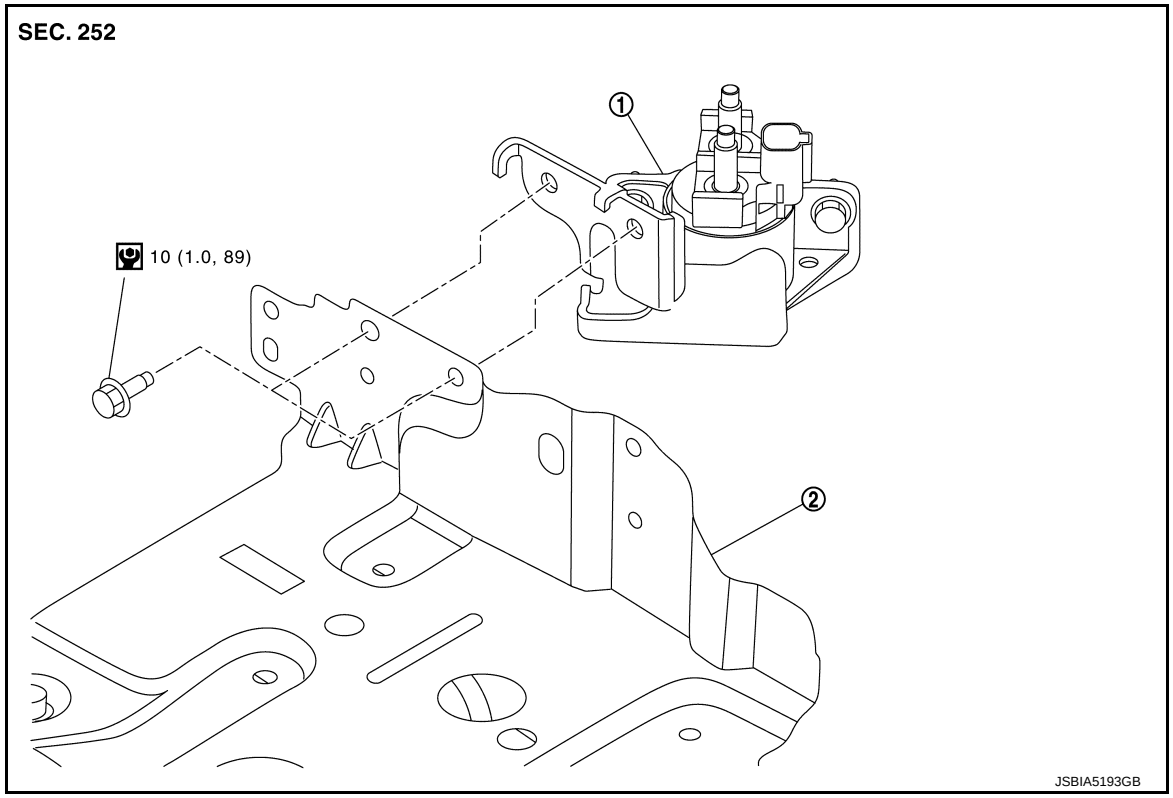
INSTALLATION

Install in the reverse order of removal.

ENGINE RESTART BYPASS RELAY

Exploded View

INFOID:0000000010501200



1. Engine restart bypass relay
2. Battery mounting bracket

: N·m (kg-m, in-lb)

Removal and Installation

INFOID:0000000010501201

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.

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:0000000010379194

Condition	Specification
No load* (in Neutral position)	750 ± 50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

PERIODIC MAINTENANCE

EVAPORATIVE EMISSION SYSTEM

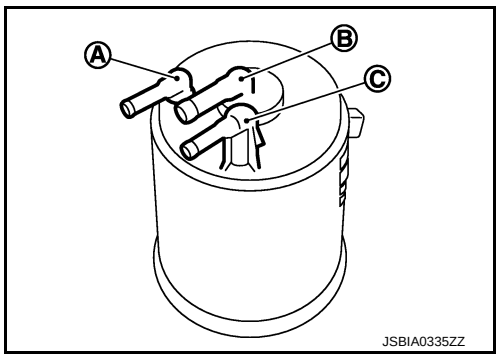
Inspection

INFOID:0000000010379191

1. Visually inspect EVAP vapor lines for improper attachment and for cracks, damage, loose connections, chafing and deterioration.
2. Check EVAP canister as follows:

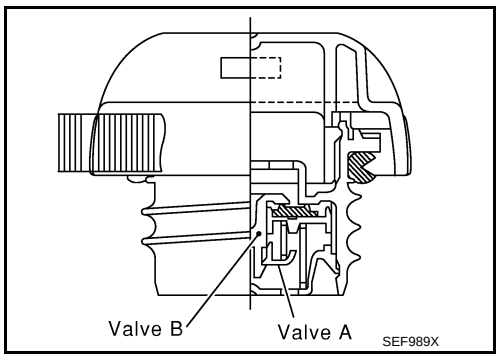
a. Block port (A). Orally blow air through port (B). Check that air flows freely through port (C).

b. Block port (B). Orally blow air through port (A). Check that air flows freely through port (C).



3. Inspect fuel tank filler cap vacuum relief valve for clogging, sticking, etc.

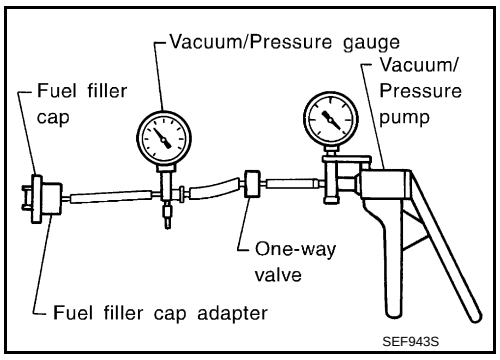
a. Wipe clean valve housing.



b. Check valve opening pressure and vacuum.

Pressure:	15.3 - 20.0 kPa (0.153 - 0.200 bar, 0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:	–6.0 to –3.4 kPa (–0.06 bar to –-0.034bar, –0.061 to –0.035 kg/cm^2, –0.87 to –0.49 psi)

c. If out of specification, replace fuel filler cap as an assembly. Refer to FL-10, "Exploded View".

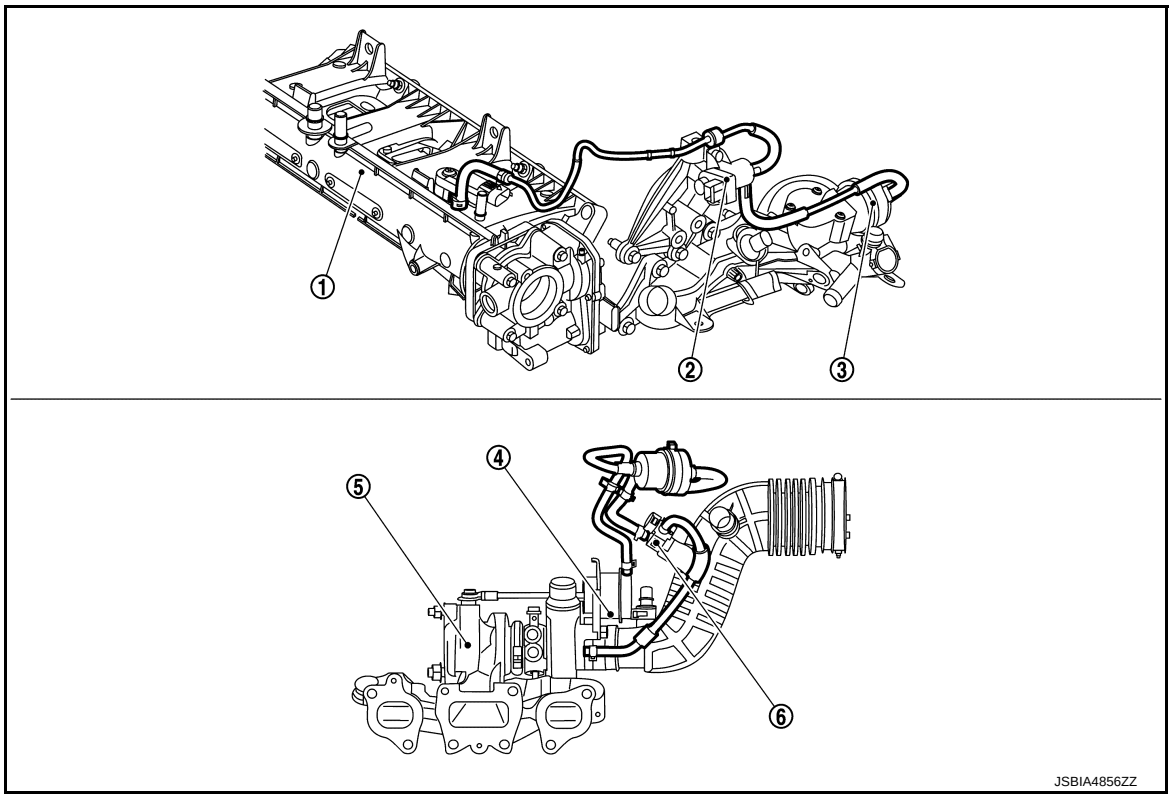


REMOVAL AND INSTALLATION

VACUUM LINES

Vacuum Layout

INFOID:0000000010501191



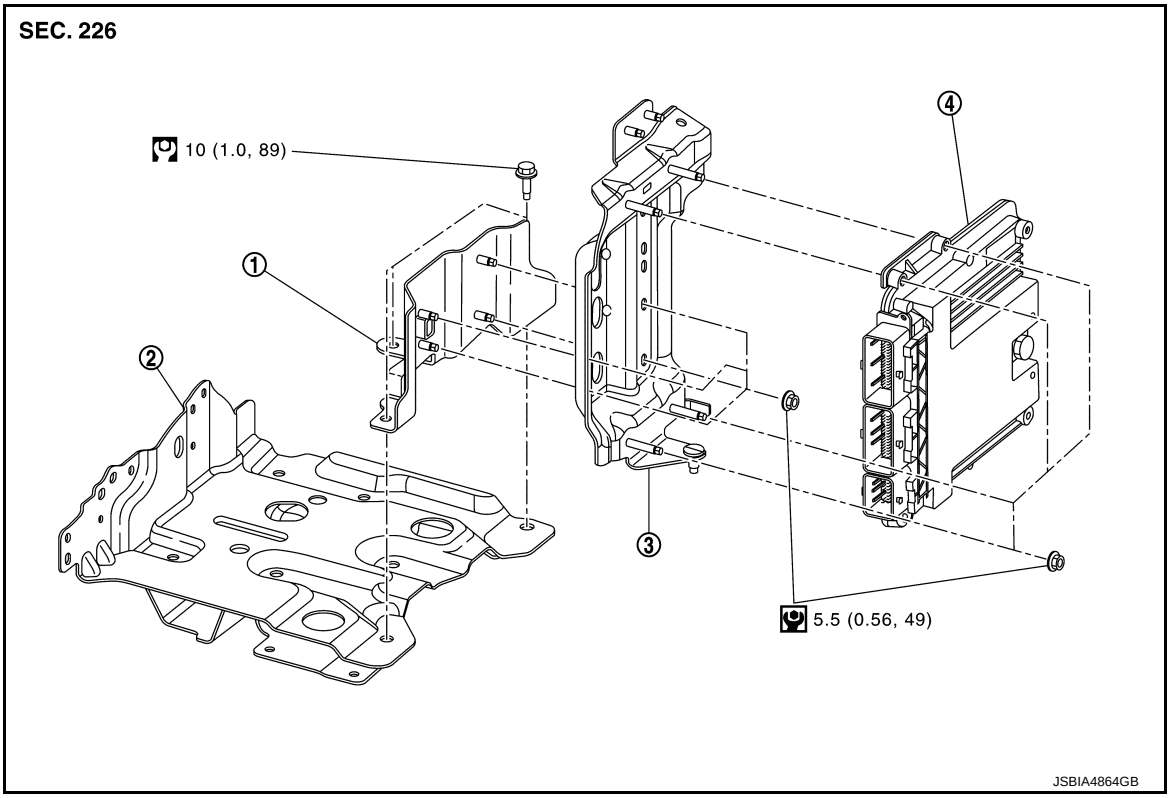
1. Intake manifold
2. Engine coolant bypass valve control solenoid valve
3. Engine coolant bypass valve control actuator
4. TC wastegate control actuator
5. Turbocharger
6. TC wastegate control solenoid valve

CAUTION:
Do not use soapy water or any type of solvent while installing vacuum hose.

ECM

Exploded View

INFOID:0000000010501192



1. Battery mounting bracket
2. Bracket A
3. Bracket B
4. ECM

: N·m (kg-m, ft-lb)

: N·m (kg-m, in-lb)

Removal and Installation

INFOID:0000000010501193

CAUTION:

Perform ADDITIONAL SERVICE WHEN REPLACING ECM. Refer to EC9-142, "Work Procedure".

REMOVAL

1. Disconnect battery negative terminal.
2. Remove air duct (inlet). Refer to EM-243, "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.

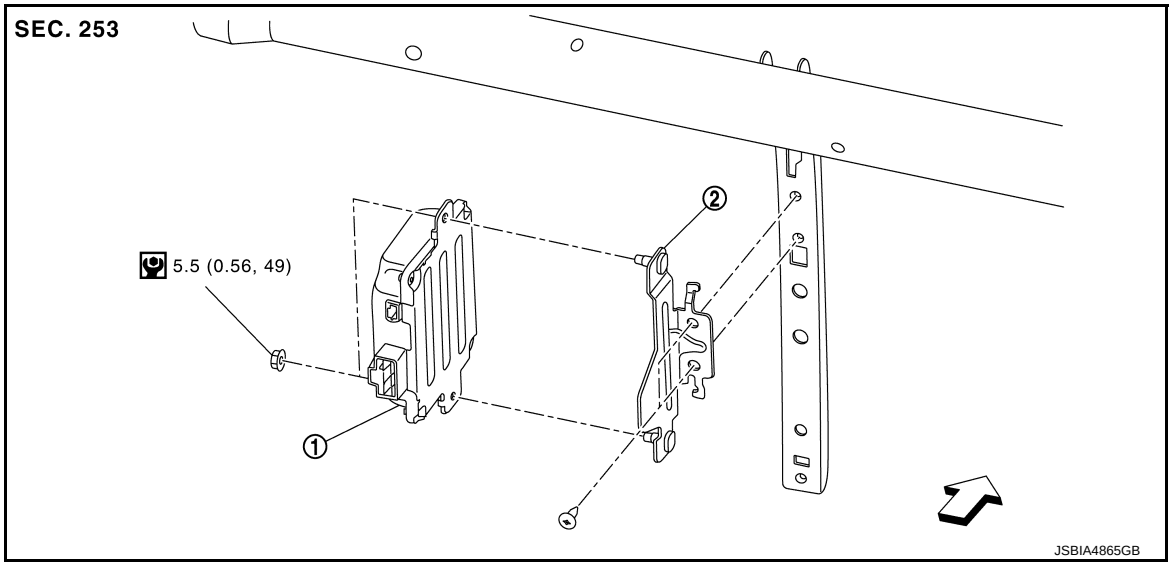
INSTALLATION

Install in the reverse order of removal.

DC/DC CONVERTER

Exploded View

INFOID:0000000010501198



1. DC/DC converter
2. Bracket

: N·m (kg-m, in-lb)

Removal and Installation

INFOID:0000000010501199

REMOVAL

1. Disconnect battery negative terminal.
2. Remove glove box cover. Refer to IP-12, "Exploded View".
3. Remove bracket with DC/DC converter.
4. Disconnect DC/DC converter harness connectors.

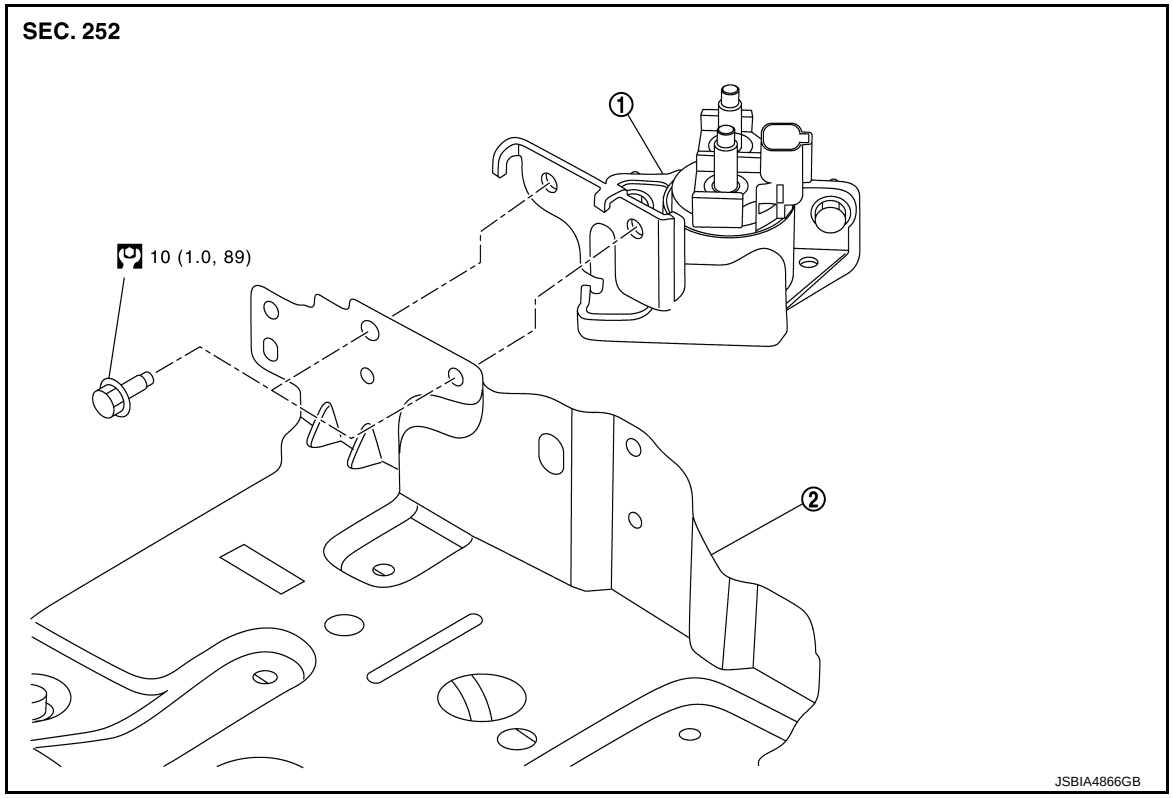
INSTALLATION

Install in the reverse order of removal.

ENGINE RESTART BYPASS RELAY

Exploded View

INFOID:0000000010501200



1. Engine restart bypass relay
2. Battery mounting bracket

: N·m (kg-m, ft-lb)

Removal and Installation

INFOID:0000000010501201

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.

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:0000000010379194

Condition	Specification
No load* (in Neutral position)	750 ± 50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position