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PRECAUTION

PRECAUTIONS

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

INFOID:0000000013607893

Risk of injury

There is a risk of injury caused by parts becoming projectiles if uncontrolled deployment of air bag or seat belt pre-tensioner occurs, or by storing air bag with the deployment side facing downwards. When scrapping air bag or seat belt pre-tensioner by means of controlled deployment, there is also a danger present if a sufficiently safe distance is not maintained, or if opening using cutting torches or other cutting tools, or due to smelting or if parts that are not yet triggered are exposed to a blaze or a smoldering fire at landfills.

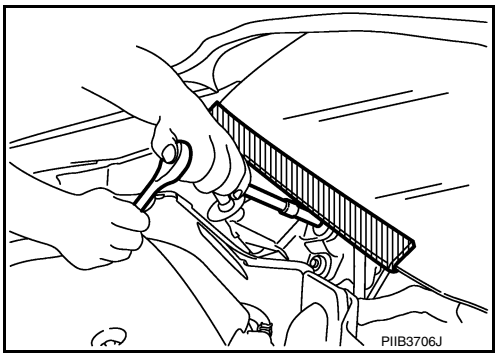
Safety instructions/precautions

- Removed air bag must always be stored with deployment side facing up.
- Acquisition, transportation, storage, testing and assembly work should only be performed or supervised by properly trained personnel.
- Install air bag or seat belt pre-tensioner immediately following retrieval from storage.
- Air bag and seat belt pre-tensioner must be protected from flying sparks, open fires and temperature exceeding 100°C (212°F).
- Never transport air bag and seat belt pre-tensioner in the passenger compartment. Store them securely in the luggage room of the vehicle in their original replacement part packaging and secure them so that they cannot slip around.
- Never allow air bag and seat belt pre-tensioner to come into contact with grease, oil, or cleaning agents.
- Perform system tests using approved testing equipment only, and only when the units are properly installed and the vehicle is unoccupied.
- Before the initial hookup of the battery or an external power supply, the ignition must be switched on and the vehicle unoccupied.
- Air bag and seat belt pre-tensioner that fall from a height of more than 0.5 m must be replaced.
- When scrapping by means of controlled deployment of air bag and seat belt pre-tensioner, a safe distance of at least 10 m must be maintained.
- Before starting work on air bag and seat belt pre-tensioner and work on components that are connected to air bag and seat belt pre-tensioner or require and intervention in their electric circuit (e.g. when removing the steering wheel):
- Disconnect any external power sources (e.g. charger).
- Disconnect and insulate ground line of battery
- Before starting bodywork in combination with welding or retrofitting, during which work is performed on uninsulated, current-carrying lines or require an intervention in their electric circuit (e.g. when removing the steering wheel):
- Disconnect any external power sources (e.g. charger).
- Disconnect and insulate ground line of battery.
- During welding, disconnect plug connection and from control unit of air bag.
- When the air bag deploys, the pyrofuse activates and the power source from the battery is disconnected. This prevents possible fires caused by electric leakage after an accident occurs.

Precaution for Procedure without Cowl Top Cover

INFOID:0000000013607894

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

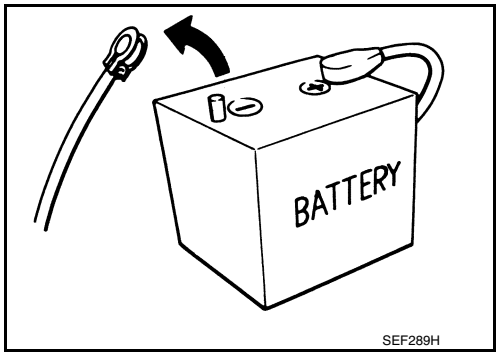


Precautions for Removing Battery Terminal

INFOID:0000000013607895

When disconnecting the battery terminal, pay attention to the following.
- Always use a 12V battery as power source.
- Never disconnect battery terminal while engine is running.
- When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.
- For vehicles with the engine listed below, remove the battery terminal after a lapse of the specified time:

BR08DE	: 4 minutes	YD25DDTi	: 2 minutes
D4D engine	: 20 minutes	YS23DDT	: 4 minutes
HRA2DDT	: 12 minutes	YS23DDTT	: 4 minutes
K9K engine	: 4 minutes	ZD30DDTi	: 60 seconds
M9R engine	: 4 minutes	ZD30DDTT	: 60 seconds
R9M engine	: 4 minutes		
V9X engine	: 4 minutes		



NOTE:
ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.
- After high-load driving, if the vehicle is equipped with the V9X engine, turn the ignition switch OFF and wait for at least 15 minutes to remove the battery terminal.

NOTE:
- Turbocharger cooling pump may operate in a few minutes after the ignition switch is turned OFF.
- Example of high-load driving
  - Driving for 30 minutes or more at 140 km/h (86 MPH) or more.
  - Driving for 30 minutes or more on a steep slope.
- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.

NOTE:
If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.
- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.

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

Precaution for Risk of Explosion and Injury

INFOID:0000000013607896

FUEL SYSTEM

Risk of Explosion, Poisoning and Injury
- When working on the fuel injection system (e.g. fuel injectors, pressure lines, rail, high pressure pump, etc.) when the engine is running, or within 30 seconds after switching the engine OFF, fuel may flow out at a high pressure. When opening the pressurized system, there is a risk of explosion due to very finely sprayed fuel coming into contact with an ignition source.
- Fuels are highly flammable and poisonous when ingested.

Risk of Injury
Highly pressurized fuel may penetrate deep into the skin and destroy the tissue. Fuel can get into blood circulation and can lead blood poisoning.

Safety Instructions/Precautions
- Keep sources of ignition such as sparks, cigarettes or open flames away from fuel.
- Never carry out any work on the system when it is pressurized.
- Wear suitable protective clothing.

IGNITION SYSTEM

Risk of Death Due to High Voltage in Ignition System
Electric ignition systems operate both in the primary circuit as well as in the secondary electric circuit at a dangerous output stage. Contact with such parts can result in burns, heart fibrillation or cardiac arrest.

Safety Instructions/Precautions

- Persons with a cardiac pacemaker may not perform any work on the ignition system.
- Switch OFF ignition before performing work on the ignition system.
- Never touch or dismantle components of ignition system when working on an engine which is running or turning at cranking speed.
- Wear safety shoes (with rubber soles).
- Disconnect female contact from crankshaft position sensor either on the control unit or on the position sensor.
- Never install any electrically conducting, uninsulated adapters or built-in sensors into the ignition cable.

Precaution for Stop/Start System Service

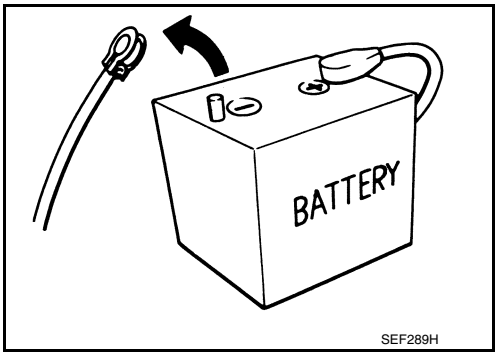
INFOID:0000000013607897

When performing an inspection and its related work with the engine at idle, always turn the stop/start switch OFF or open the hood to release the stop/start system.

General Precautions

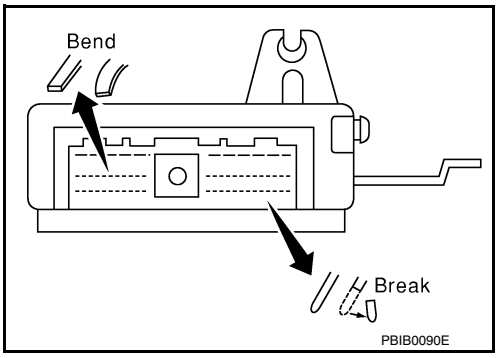
INFOID:0000000013607898

- **Always use a 12 volt battery as power source.**
- **Never attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF 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.**

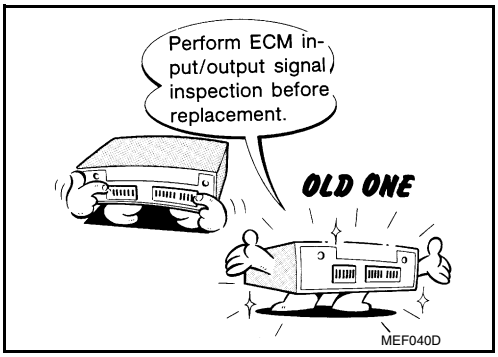


- **Never disassemble ECM.**

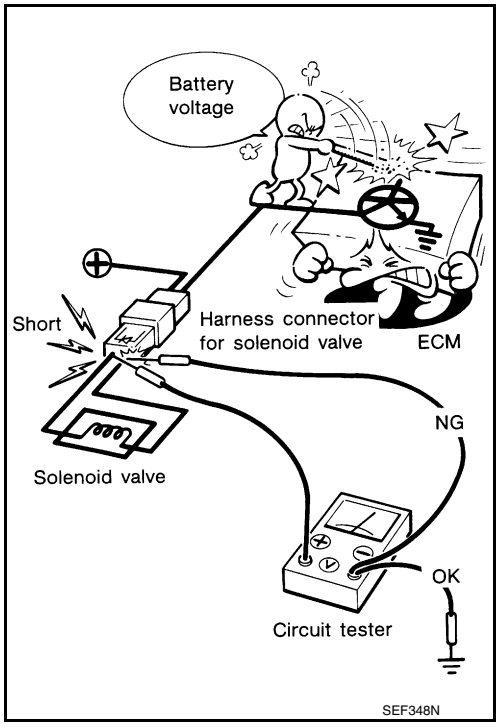
- **When connecting or disconnecting pin connectors into or from ECM, be careful not to damage pin terminals (bend or break).**
  Check that there are not any bends or breaks on ECM pin terminal when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, which cause damage to IC's.
- **Keep engine control system harness at least 10cm (4 in) away from adjacent harness to prevent engine control system malfunctions from receiving external noise, degraded operation of IC's, etc.**
- **Keep engine control system parts and harness dry.**



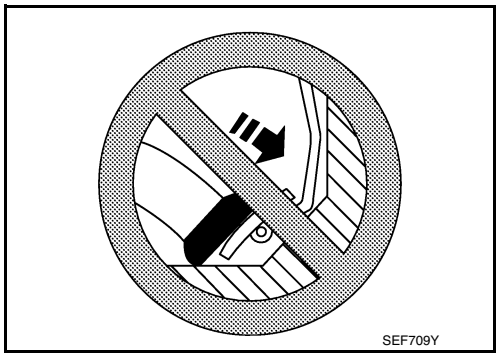
- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and check that ECM functions normally. Refer to EC-119, "Reference Value".**
- **Even a slight leakage in the air intake system can cause serious incidents.**
- **Never shock or jar the camshaft position sensor and crankshaft position sensor.**



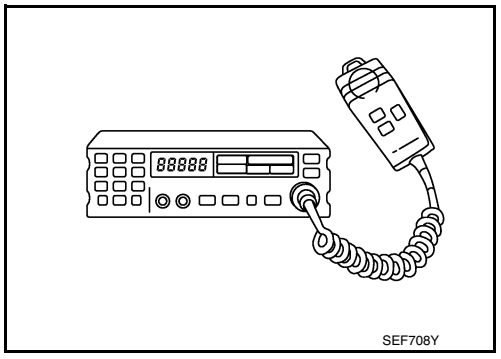
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes cause a short circuit and damage the ECM power transistor.
- **Never disassemble fuel pump.**
  If NG, take proper action.
- **Never disassemble fuel injector.**
  If NG, replace fuel injector.



- **Never depress accelerator pedal when starting.**
- **Immediately after starting, never rev up engine unnecessarily.**
- **Never rev up engine just prior to shutdown.**



- **When installing C.B. ham radio or a mobile phone, always 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.**
  Never let them run parallel for a long distance.
- **Adjust the antenna and feeder line so that the standingwave radio can be kept smaller.**
- **Always ground the radio to vehicle body.**

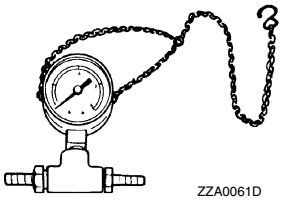
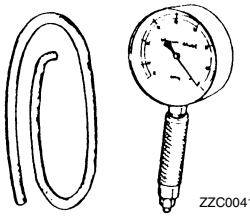


PREPARATION

PREPARATION

Commercial Service Tool

INFOID:0000000013607899

Tool name	Description
Pressure gauge  ZZA0061D	Checking fuel pressure
Vacuum gauge  ZZC0041D	Checking vacuum pressure

SYSTEM DESCRIPTION

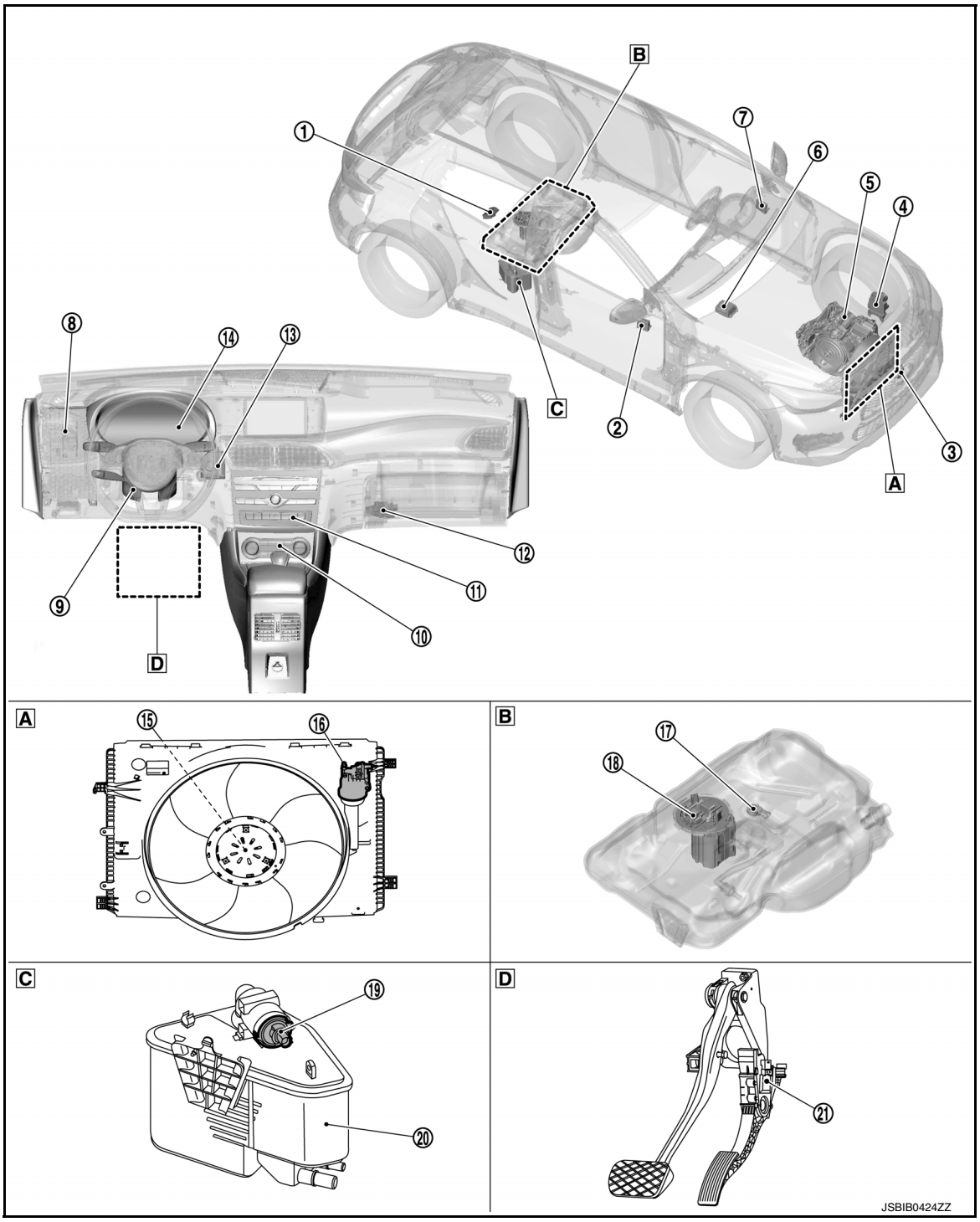
COMPONENT PARTS

Component Parts Location

INFOID:0000000013607906

VEHICLE COMPERTMENT

2WD models



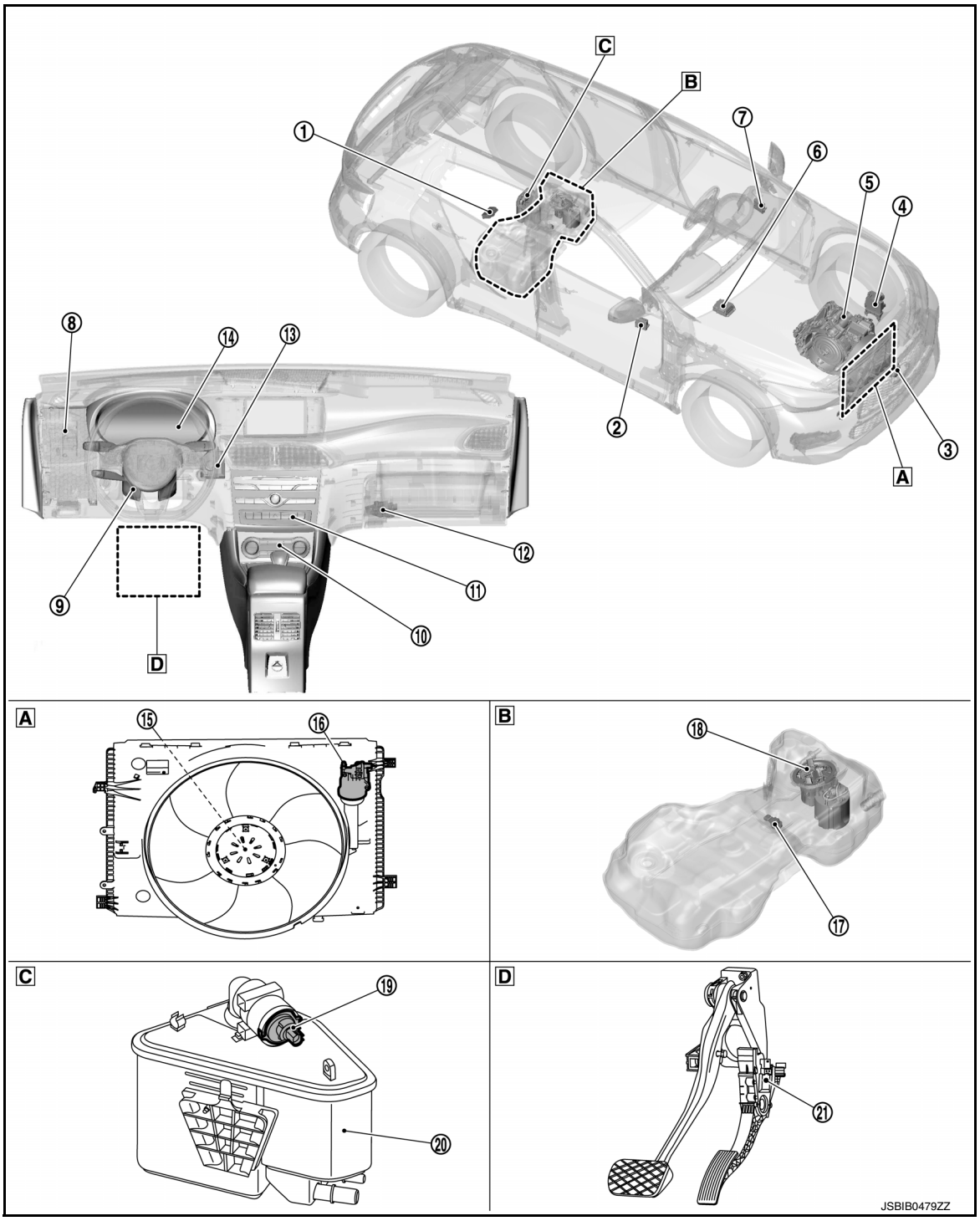
A Radiator assembly
B Fuel tank assembly
C EVAP canister assembly
D Periphery of pedals

No.	Component	Function
①	FPCM	EC-41, "FPCM (Fuel Pump Control Module)"
②	Right front door control unit*	—
③	ICC sensor	Mainly transmits the following signal to ECM via CAN communication. • Engine torque request signal
④	Electronic stability program control unit	Mainly transmits the following signal to ECM via CAN communication. • Brake light switch signal • Cruise control request signal • Wheel speed signal • Engine start request signal • Engine start enable status signal • Engine stop prohibited request signal
⑤	TCM (Transaxle inside)	Mainly transmits the following signal to ECM via CAN communication. • Engine torque request signal • Selector lever position signal Mainly receives the following signal from ECM via CAN communication. • Shift point increase request signal
⑥	Air bag diagnosis sensor unit	Transmits the following signal to ECM via wiring harness. • Crash signal Mainly transmits the following signal to ECM via CAN communication. • Crash signal • Front seat belt buckle switch (driver side) signal
⑦	Left front door control unit	Transmits the following signal to ECM via wiring harness. • Ignition ON signal Mainly transmits the following signal to ECM via CAN communication. • Front door switch (driver side) signal
⑧	BCM	Mainly transmits the following signal to ECM via CAN communication. • Engine hood switch signal • Ignition switch status signal • Outside temperature signal • Stop/start switch signal
⑨	Steering column control module	Mainly transmits the following signal to ECM via CAN communication. • Steering wheel angle signal
⑩	A/C auto amp.	Mainly transmits the following signal to ECM via CAN communication. • Air conditioning status signal
⑪	Upper control panel control unit (with stop/start switch)	Mainly transmits the following signal to BCM via LIN communication. • Stop/start switch signal
⑫	Sub battery relay	The sub battery relay is controlled by BCM and supplies sub battery voltage to on-board electrical system while restart the engine. (stop/start system) For the details of the control, refer to EC-85, "STOP/START SYSTEM : System Description".
⑬	Electronic ignition switch control unit	Mainly transmits the following signal to ECM via CAN communication. • Ignition switch status signal • Starter status signal

No.	Component	Function
⑭	Combination meter	Mainly transmits the following signal to ECM via CAN communication. • Fuel level signal • Vehicle speed signal Mainly receives the following signal from ECM via CAN communication. • Malfunction indicator lamp signal • Glow indicator lamp signal • Stop/start indicator signal
⑮	Cooling fan motor	Cooling fan motor receives PWM signal from ECM. The revolution speed of cooling fan motor is controlled by duty cycle of the voltage.
⑯	Radiator shutter actuator*	—
⑰	Fuel tank pressure sensor	Senses fuel tank pressure.
⑱	Fuel pump	EC-42, "Fuel Level Sensor Unit and Fuel Pump"
⑲	EVAP canister vent control valve	The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components. This solenoid valve is used only for diagnosis, and usually remains opened.
⑳	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.
㉑	Accelerator pedal position sensor	EC-38, "Accelerator Pedal Position Sensor"

*: Not applicable

AWD models



A Radiator assembly
B Fuel tank assembly
C EVAP canister assembly
D Periphery of pedals

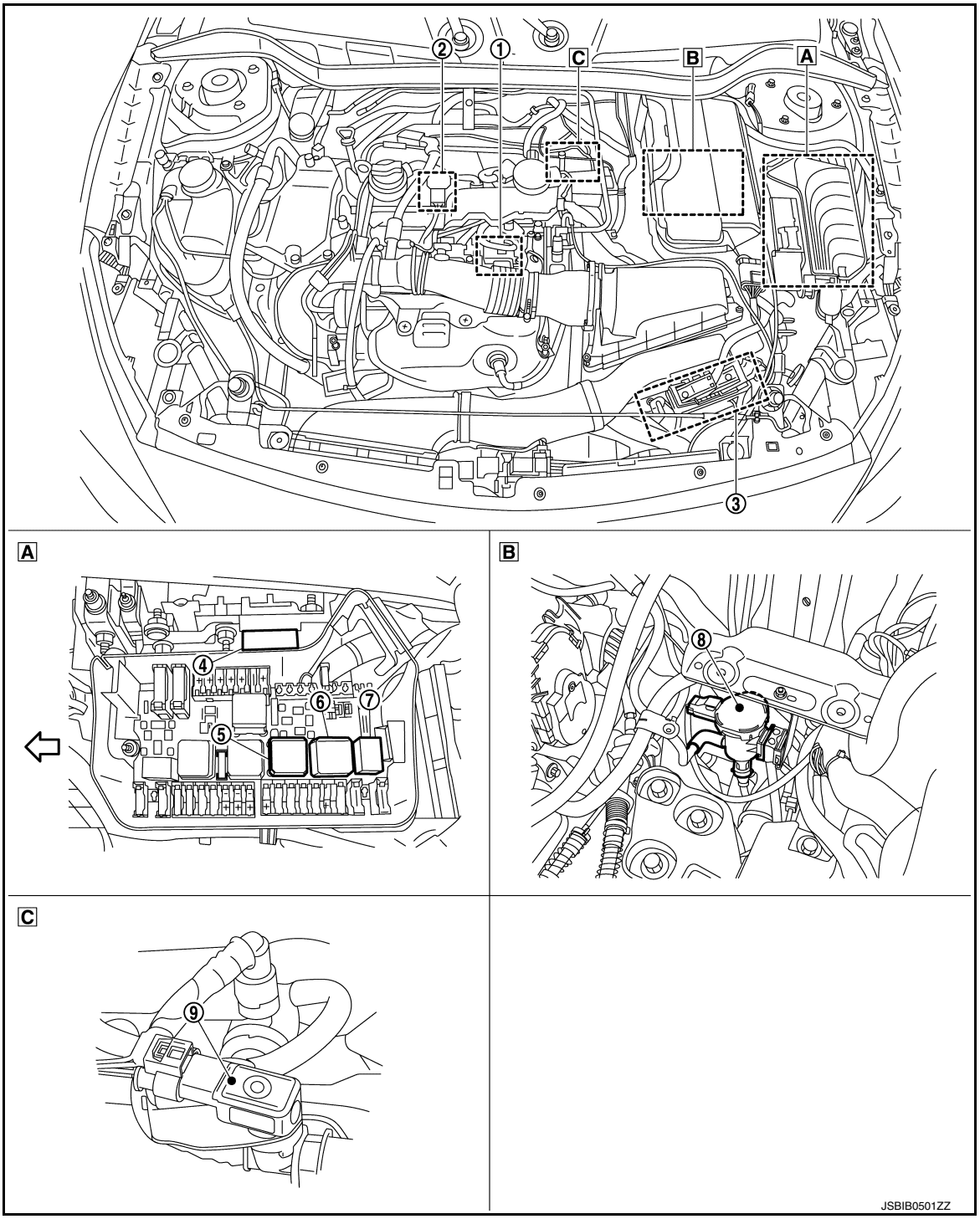
No.	Component	Function
①	FPCM	EC-41, "FPCM (Fuel Pump Control Module)"
②	Right front door control unit*	—
③	ICC sensor	Mainly transmits the following signal to ECM via CAN communication. • Engine torque request signal

No.	Component	Function
④	Electronic stability program control unit	Mainly transmits the following signal to ECM via CAN communication. • Brake light switch signal • Cruise control request signal • Wheel speed signal • Engine start request signal • Engine start enable status signal • Engine stop prohibited request signal
⑤	TCM (Transaxle inside)	Mainly transmits the following signal to ECM via CAN communication. • Engine torque request signal • Selector lever position signal Mainly receives the following signal from ECM via CAN communication. • Shift point increase request signal
⑥	Air bag diagnosis sensor unit	Transmits the following signal to ECM via wiring harness. • Crash signal Mainly transmits the following signal to ECM via CAN communication. • Crash signal • Front seat belt buckle switch (driver side) signal
⑦	Left front door control unit	Transmits the following signal to ECM via wiring harness. • Ignition ON signal Mainly transmits the following signal to ECM via CAN communication. • Front door switch (driver side) signal
⑧	BCM	Mainly transmits the following signal to ECM via CAN communication. • Engine hood switch signal • Ignition switch status signal • Outside temperature signal • Stop/start switch signal
⑨	Steering column control module	Mainly transmits the following signal to ECM via CAN communication. • Steering wheel angle signal
⑩	A/C auto amp.	Mainly transmits the following signal to ECM via CAN communication. • Air conditioning status signal
⑪	Upper control panel control unit (with stop/start switch)	Mainly transmits the following signal to BCM via LIN communication. • Stop/start switch signal
⑫	Sub battery relay	The sub battery relay is controlled by BCM and supplies sub battery voltage to on-board electrical system while restart the engine. (stop/start system) For the details of the control, refer to EC-85, "STOP/START SYSTEM : System Description".
⑬	Electronic ignition switch control unit	Mainly transmits the following signal to ECM via CAN communication. • Ignition switch status signal • Starter status signal
⑭	Combination meter	Mainly transmits the following signal to ECM via CAN communication. • Fuel level signal • Vehicle speed signal Mainly receives the following signal from ECM via CAN communication. • Malfunction indicator lamp signal • Glow indicator lamp signal • Stop/start indicator signal

No.	Component	Function
⑮	Cooling fan motor	Cooling fan motor receives PWM signal from ECM. The revolution speed of cooling fan motor is controlled by duty cycle of the voltage.
⑯	Radiator shutter actuator*	—
⑰	Fuel tank pressure sensor	Senses fuel tank pressure.
⑱	Fuel pump	EC-42, "Fuel Level Sensor Unit and Fuel Pump"
⑲	EVAP canister vent control valve	The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components. This solenoid valve is used only for diagnosis, and usually remains opened.
⑳	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.
㉑	Accelerator pedal position sensor	EC-38, "Accelerator Pedal Position Sensor"

*: Not applicable

ENGINE ROOM COMPARTMENT



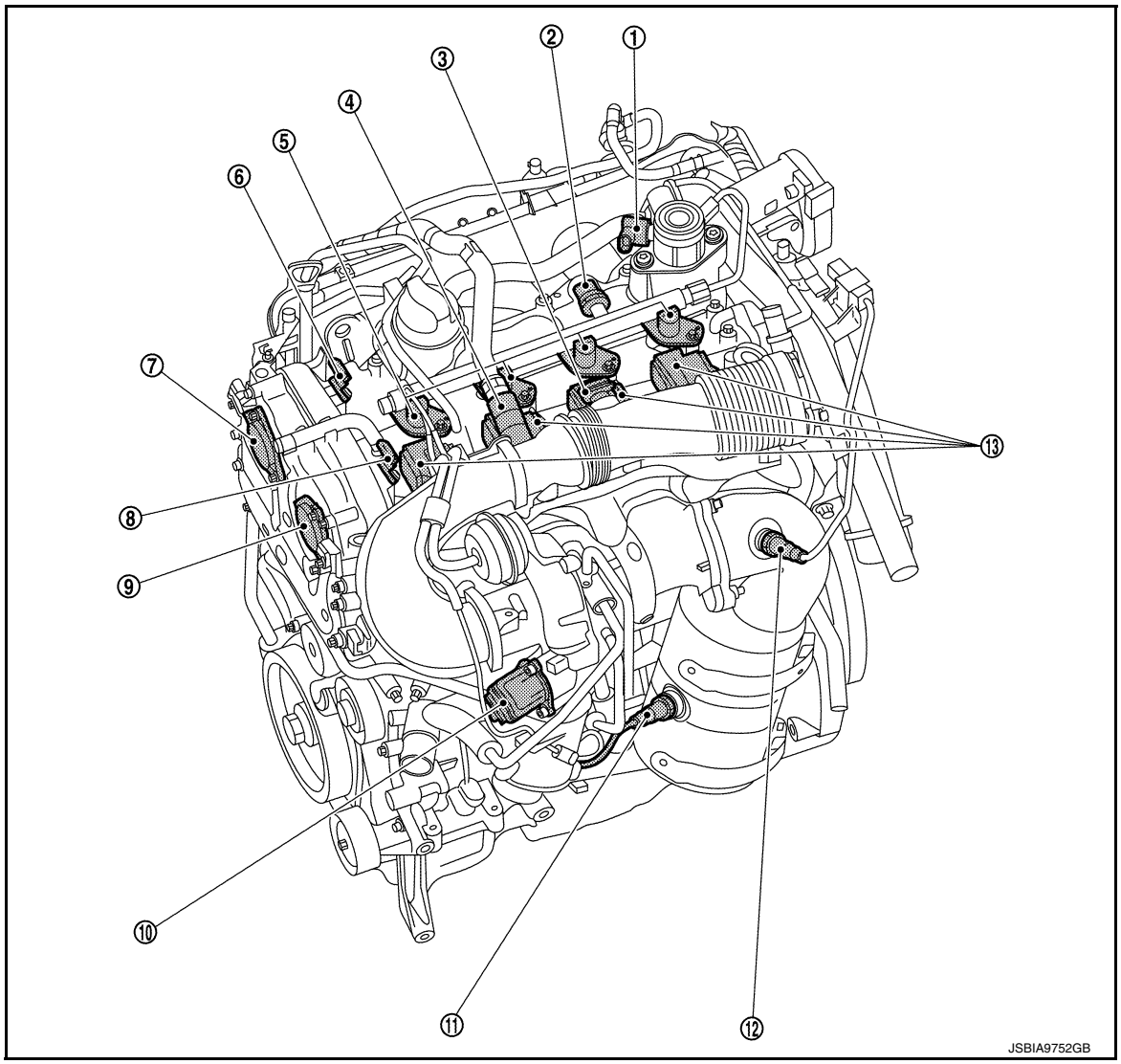
A Fuse and fusible link block 1 B Battery under side C Engine room center

⇦ : Vehicle front

No.	Component	Function
①	Pressure sensor downstream of air filter	EC-45, "Pressure Sensor Downstream of Throttle Valve"
②	Intake camshaft valve lift switchover	EC-44, "Intake Camshaft Valve Lift Switchover"
③	ECM	EC-40, "ECM"

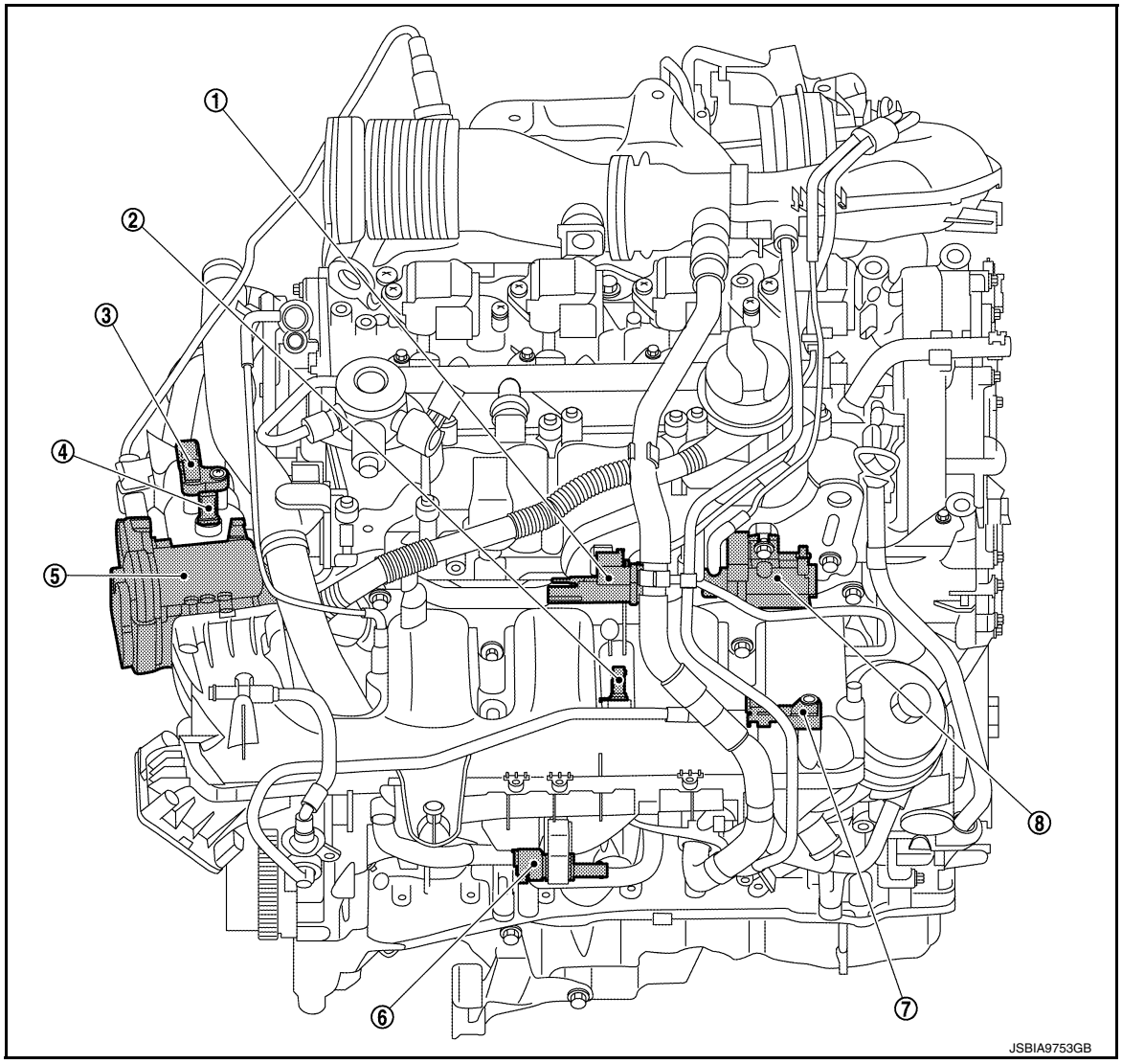
No.	Component	Function
④	Decoupling relay	The decoupling relay is controlled by BCM and changes power supply circuit of on-board electrical system while restart the engine. (stop/start system) For the details of the control, refer to EC-85, "STOP/START SYSTEM : System Description".
⑤	Starter relay	The decoupling relay is controlled by ECM and supplies battery voltage to starter motor. For the details of control, refer to EC-56, "ENGINE START CONTROL : System Description".
⑥	Motor relay	The motor relay is controlled by ECM and supplies battery voltage to ECU, actuator, sensor, and etc.
⑦	Water pump relay	The water pump relay is controlled by ECM and supplies battery voltage to water pump. For the details of the control.
⑧	EVAP purge control valve	EC-40, "EVAP Purge Control Valve"
⑨	EVAP control system pressure sensor	The EVAP control system pressure sensor detects pressure in the purge line.

ENGINE COMPARTMENT (FRONT VIEW)



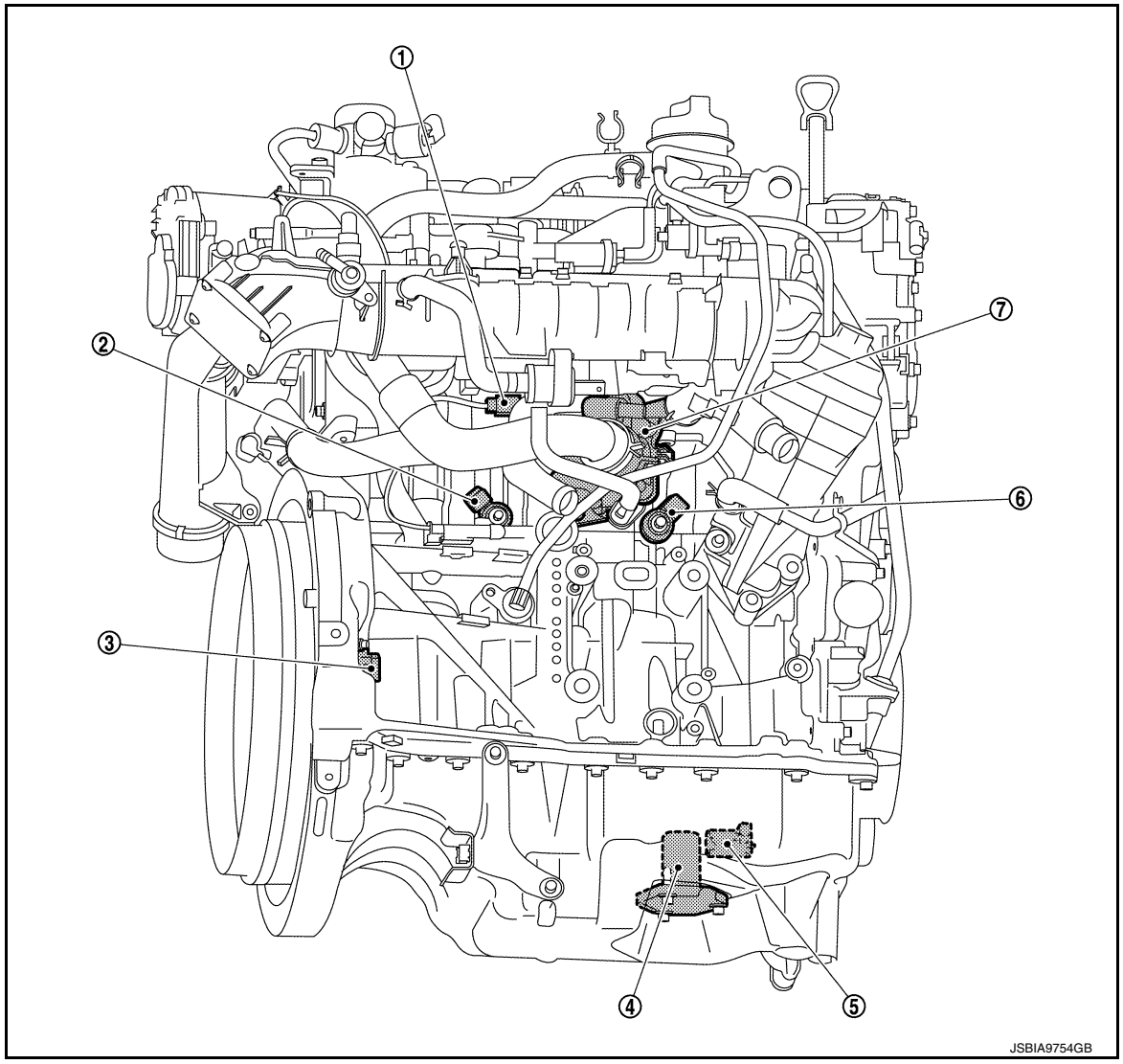
No.	Component	Function
①	Quantity control valve	EC-45, "Quantity Control Valve"
②	Fuel pressure and temperature sensor	EC-42, "Fuel Pressure and Temperature Sensor"
③	Pressure sensor downstream of air filter	The pressure sensor downstream of air filter is located on intake air duct and detects intake air pressure downstream of the air filter.
④	Full-load operation vent line heater element	EC-43, "Full-load Operation Vent Line Heater Element"
⑤	Fuel injector	EC-42, "Fuel Injector"
⑥	Intake camshaft position sensor	EC-44, "Intake Camshaft Position Sensor"
⑦	Intake camshaft actuator	EC-44, "Intake Camshaft Actuator"
⑧	Exhaust camshaft position sensor	EC-41, "Exhaust Camshaft Position Sensor"
⑨	Exhaust camshaft actuator	EC-41, "Exhaust Camshaft Actuator"
⑩	Divert air switchover valve	EC-40, "Divert air switchover valve"
⑪	Heated oxygen sensor	EC-43, "Heated Oxygen Sensor"
⑫	Air fuel ratio (A/F) sensor	EC-38, "Air-Fuel Ratio (A/F) Sensor"
⑬	Ignition coil	EC-61, "IGNITION SYSTEM CONTROL : System Description"

ENGINE COMPARTMENT (TOP VIEW)



No.	Component	Function
①	Coolant pump switchover valve	EC-39, "Coolant Pump Switchover Valve"
②	Charge air temperature sensor downstream of throttle valve	EC-38, "Charge Air Temperature Sensor Downstream of Throttle Valve"
③	Pressure sensor upstream of throttle valve	EC-45, "Pressure Sensor Upstream of Throttle Valve"
④	Charge air temperature sensor upstream of throttle valve	EC-39, "Charge Air Temperature Sensor Upstream of Throttle Valve"
⑤	Throttle valve actuator	EC-45, "Throttle Valve Actuator"
⑥	Partial load operation crankcase ventilation valve	The partial load operation crankcase ventilation valve is usually open, and blow-by gas is sucked into the boost air distributor pipe from the oil separator. During deceleration, the partial load operation crankcase ventilation valve is closed according to a signal from ECM. This stops blow-by gas flown from crankcase to intake air system and reduces noise.
⑦	Pressure sensor downstream of throttle valve	EC-45, "Pressure Sensor Downstream of Throttle Valve"
⑧	Boost pressure control vacuum transducer	EC-38, "Boost Pressure Control Vacuum Transducer"

ENGINE COMPERTMENT (BACK VIEW)

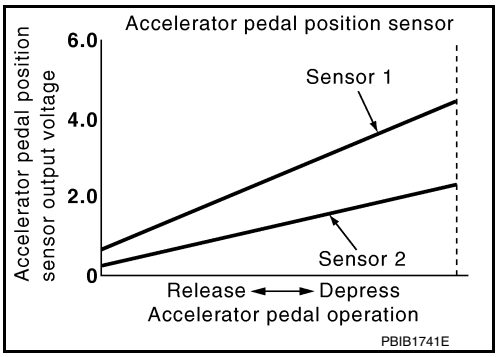


No.	Component	Function
①	Engine coolant temperature sensor	EC-40, "Engine Coolant Temperature Sensor"
②	Knock sensor 2	EC-44, "Knock Sensor"
③	Crankshaft position sensor	EC-39, "Crankshaft Position Sensor"
④	Engine oil level switch	The oil level check switch is located on engine oil pan and detect the engine oil has been reached to minimum level.
⑤	Engine oil pump valve	The engine oil pressure is regulated via the engine oil pump valve in order to ensure an adequate oil supply and to lower the oil pressure if necessary (a saving on fuel).
⑥	Knock sensor 1	EC-44, "Knock Sensor"
⑦	Coolant thermostat heater element	EC-39, "Coolant Thermostat Heater Element"

Accelerator Pedal Position Sensor

INFOID:0000000013607907

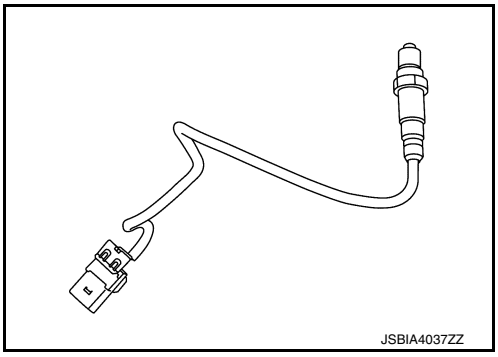
The accelerator pedal position (APP) sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and transmits a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.



Air-Fuel Ratio (A/F) Sensor

INFOID:0000000013607908

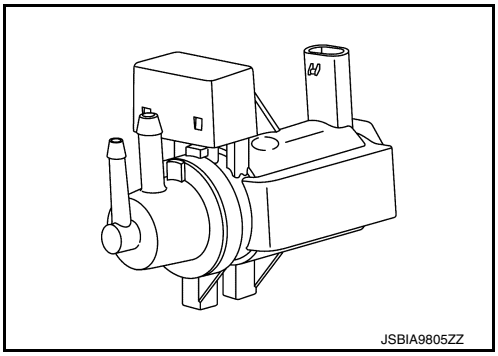
Air fuel ratio (A/F) sensor is installed on the upstream of catalyst converter. A/F sensor measures the oxygen level in the exhaust gas and converts it into a voltage signal. A/F sensor transmits the signal to ECM. Based on the signal from A/F sensor, ECM calculates the air fuel mixture ratio.
A heater is integrated in A/F sensor to ensure the required operating temperature.



Boost Pressure Control Vacuum Transducer

INFOID:0000000013607909

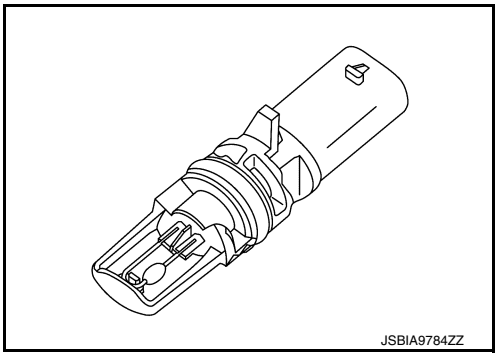
The charge air control is performed by the electropneumatic boost pressure control vacuum transducer. ECM controls the boost pressure control vacuum transducer and adjusts negative pressure placed on the boost pressure control flap vacuum actuator. ECM adjusts boost pressure by controlling the boost pressure control vacuum transducer according to the characteristics map and negative pressure.



Charge Air Temperature Sensor Downstream of Throttle Valve

INFOID:0000000013607910

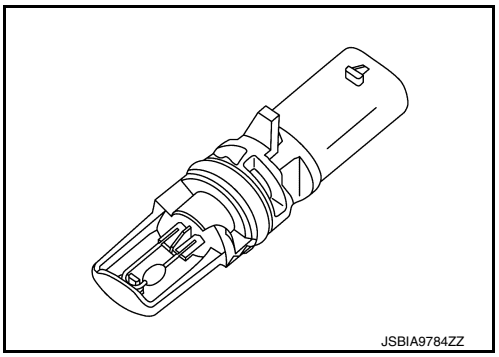
The charge air temperature sensor downstream of throttle valve is located on charge air manifold and senses a charge air temperature downstream of throttle valve



Charge Air Temperature Sensor Upstream of Throttle Valve

INFOID:0000000013607911

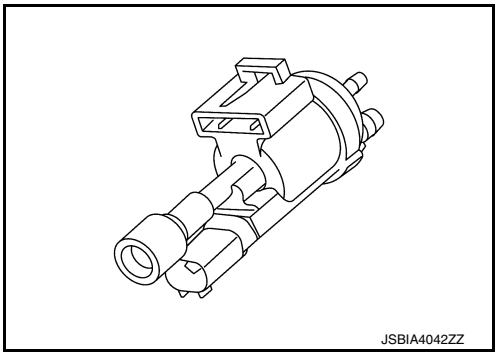
The charge air temperature sensor upstream of throttle valve is located on charge air manifold and senses a charge air temperature upstream of throttle valve



Coolant Pump Switchover Valve

INFOID:0000000013607913

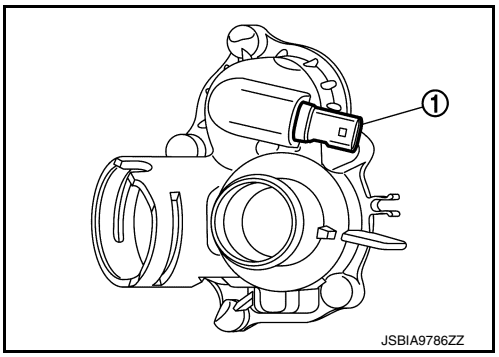
The coolant pump is used to allow the coolant to circulate in the circuit. To ensure that an active intervention in the thermal management is possible, the coolant feed is lockable by means of a slide. The actuation is performed via the coolant pump switchover valve using a vacuum. ECM takes on the actuation of the switchover valve.



Coolant Thermostat Heater Element

INFOID:0000000013607914

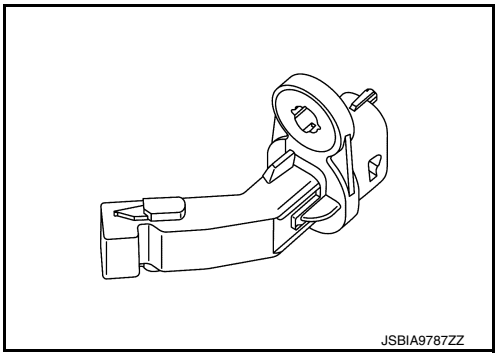
The coolant thermostat heater element ① is located on the thermostat housing.



Crankshaft Position Sensor

INFOID:0000000013607915

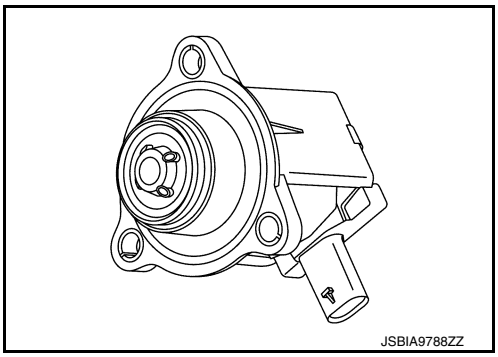
The crankshaft position sensor is the hall principle sensor.
Since the crankshaft position sensor is installed opposed to the multi-pulse wheel, pulse signals of 5 V and 0 V are generated during the rotation of crankshaft. ECM transmits a short-resistant engine speed signal via CAN communication based on a signal of crankshaft position sensor.
NOTE:
When ECM can not receive the crankshaft position sensor signal, commute the intake camshaft position sensor signal and exhaust camshaft position sensor signal to enable driving.



Divert air switchover valve

INFOID:0000000013607916

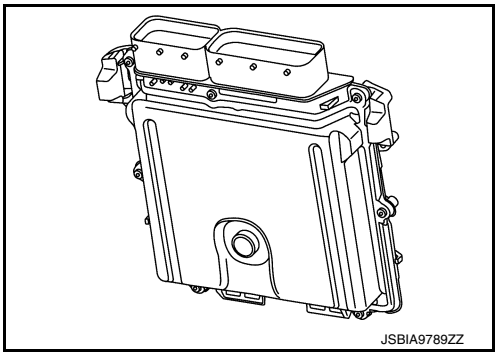
Divert air switchover valve is installed on the compressor side of the turbocharger.
ECM controls the divert air switchover valve to release surplus pressure to the upstream of turbocharger.


JSBIA9788ZZ

ECM

INFOID:0000000013607917

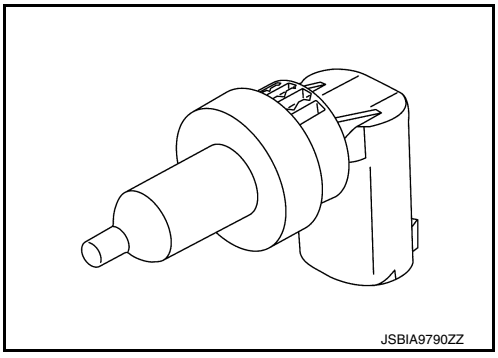
ECM controls the engine in a comprehensive manner according to signals from various sensors and ECUs.
ECM has a gateway function for the drivetrain and other CAN communications. The function enables an ECU performing drivetrain CAN communication and an ECU performing CAN communication to communicate.
In addition, ECM contains the altitude pressure sensor.


JSBIA9789ZZ

Engine Coolant Temperature Sensor

INFOID:0000000013607918

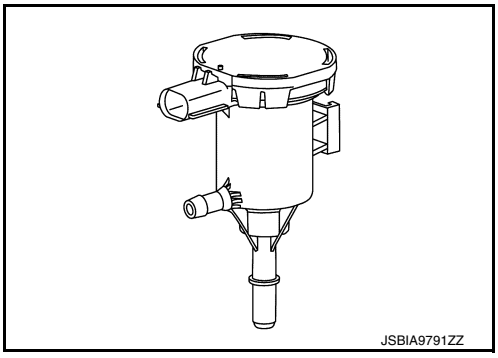
The engine coolant temperature sensor is installed on the upstream cylinder block, and senses a engine coolant temperature.


JSBIA9790ZZ

EVAP Purge Control Valve

INFOID:0000000013607919

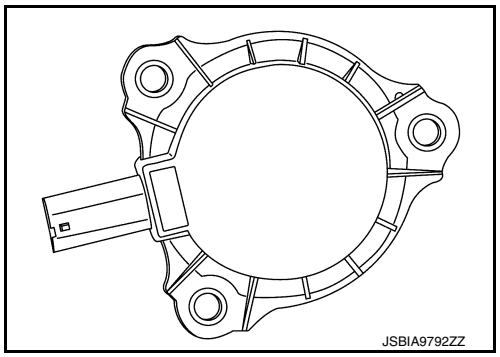
ECM controls the engine in a comprehensive manner according to signals from various sensors and ECUs.
ECM has a gateway function for the drivetrain and other CAN communications. The function enables an ECU performing drivetrain CAN communication and an ECU performing CAN communication to communicate.
In addition, ECM contains the altitude pressure sensor.


JSBIA9791ZZ

Exhaust Camshaft Actuator

INFOID:0000000013607920

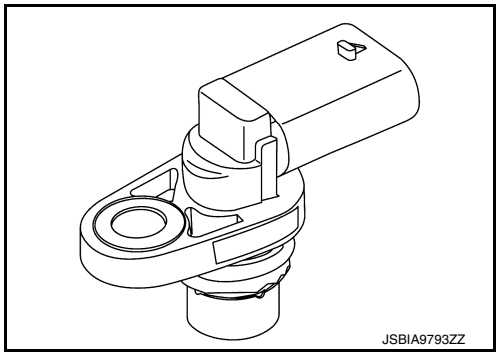
ECM adjusts camshaft position by controlling exhaust camshaft actuator, for details, refer to EC-64, "CAMSHAFT ADJUSTMENT FUNCTION : System Description".



Exhaust Camshaft Position Sensor

INFOID:0000000013607921

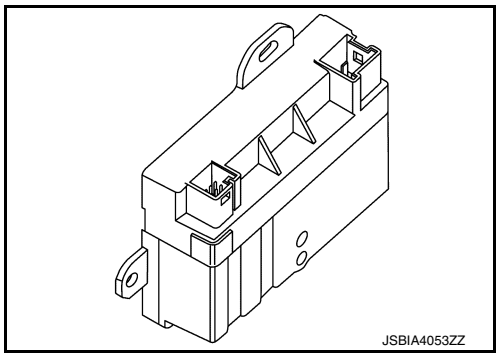
The exhaust camshaft position sensor is the Hall principle sensor. Distinct characteristic is the output signal in the form of a square-wave on the induction principle. It is thus already conditioned and directly and qualitatively usable for the control unit.



FPCM (Fuel Pump Control Module)

INFOID:0000000013607922

FPCM (Fuel Pump Control Module) controls fuel pump discharge rate according to the actual fuel requirements of the engine and, as a result, the idling power of the electric fuel pump is significantly reduced.
This control unit consists of a control and power electronics unit. FPCM is connected to the fuel pump, the fuel pressure sensor, and drivetrain CAN communication line.
FPCM regulates the fuel pump as required and transmits information on the current fuel pressure to ECM.
The fuel pump is switched ON when a fuel pump ON signal is received by the FPCM. The signal is transmitted by ECM as a CAN signal via the drivetrain CAN communication line and as a ground signal.

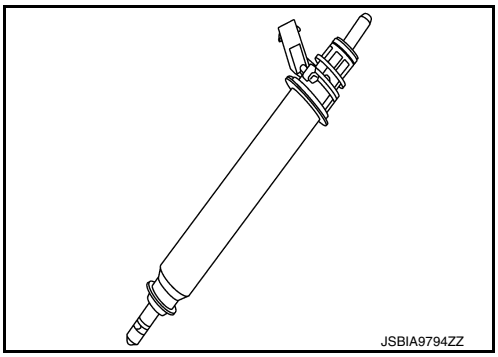


FPCM additionally receives the fuel requirements signal from ECM via drivetrain CAN communication. FPCM registers the current fuel pressure via a voltage signal from the fuel pressure sensor and transmits this information via the drivetrain CAN to ECM.
FPCM evaluates the current fuel pressure, compares it to the specified fuel pressure, and actuates the fuel pump with a PWM signal so that the actual value corresponds to the specified value.
NOTE:
The vehicle and engine variants are stored in FPCM. After replacing FPCM, it is necessary to perform the variant coding registration.

Fuel Injector

INFOID:0000000013607923

Fuel injector actuator contains piezo element. The special property of the piezo ceramics is that the structure (length) changes within a microsecond under electrical voltage.
The distinctive feature of this injector is its inverse actuation. Inverse means that the injection nozzle opens when a voltage drop is performed at the injector. For this reason, the electrical injector connector may never be disconnected or switched to ground when the engine is running. An uncontrolled injection would be triggered by this.

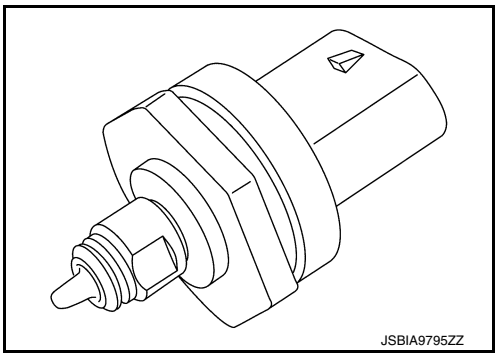


WARNING:
During operation, 200 V of high voltage are present at the injector. This is to be noted during testing and repair work at the vehicle.

Fuel Pressure and Temperature Sensor

INFOID:0000000013607924

Fuel pressure and temperature sensor is integrated with fuel rail. Senses a fuel pressure and fuel temperature in fuel rail.



Fuel Level Sensor Unit and Fuel Pump

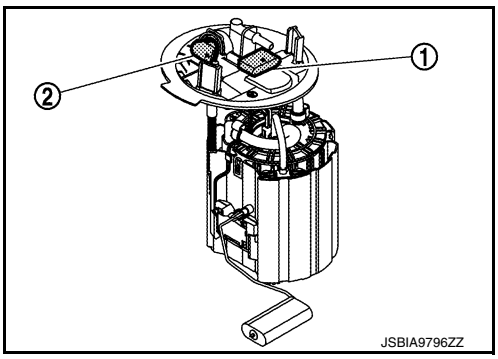
INFOID:0000000013607925

2WD

Fuel Pump

Fuel pump ① is integrated with a fuel pressure regulator and a fuel filter. This pump is built into the fuel tank.
ECM controls the fuel pressure via FPCM.

② : Fuel pressure sensor



Fuel Pressure Sensor

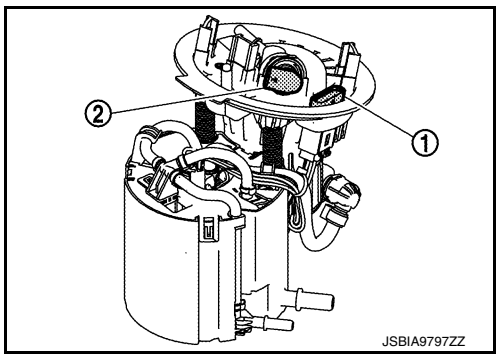
The fuel pressure sensor detects the fuel pressure (actual pressure) of the fuel pump.
The fuel pressure measured by a measuring capacitor coupled with the fuel pressure sensor.
When fuel pressure increase, the gap between the capacitor electrodes decreases. The capacitance, and therefore the signal voltage, thus increase in proportion to the fuel pressure.
The signal voltage serves the FPCM as information about the fuel pressure.

AWD

Fuel Pump

Fuel pump ① is integrated with a fuel pressure regulator and a fuel filter. This pump is built into the fuel tank.
ECM controls the fuel pressure via FPCM.

② : Fuel pressure sensor

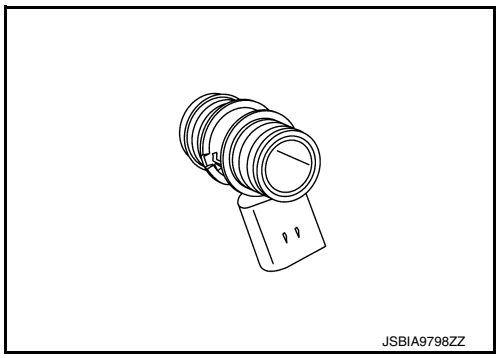


Fuel Pressure Sensor
The fuel pressure sensor detects the fuel pressure (actual pressure) of the fuel pump.
The fuel pressure measured by a measuring capacitor coupled with the fuel pressure sensor.
When fuel pressure increase, the gap between the capacitor electrodes decreases. The capacitance, and therefore the signal voltage, thus increase in proportion to the fuel pressure.
The signal voltage serves the FPCM as information about the fuel pressure.

Full-load Operation Vent Line Heater Element

INFOID:0000000013607926

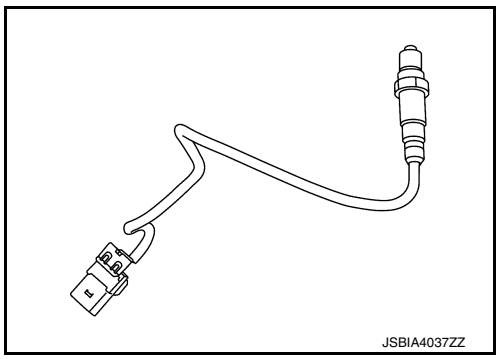
The vent line heater element is installed at blow-by gas introducing port on air duct in order to prevent damage to the crankcase ventilation system from freezing and cold temperature condition.



Heated Oxygen Sensor

INFOID:0000000013607927

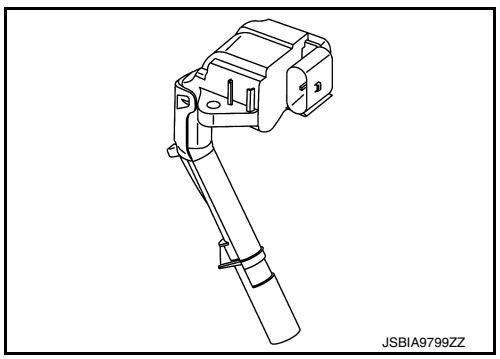
Heated oxygen sensor is installed on the downstream of catalyst converter. Heated oxygen sensor measures the oxygen level in the exhaust gas and converts it into a voltage signal. Heated oxygen sensor transmits the signal to ECM.
A heater is integrated in Heated oxygen sensor to ensure the required operating temperature.



Ignition Coil

INFOID:0000000013607928

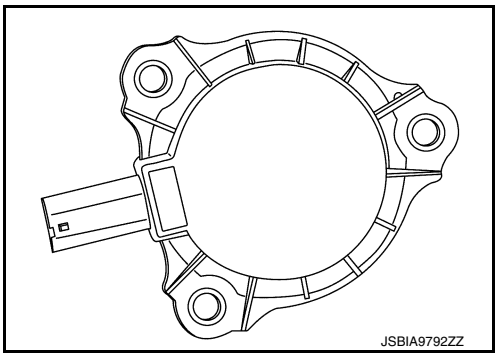
The ignition coils are designed as single spark ignition coils with integrated ignition output stage and are connected directly to the spark plugs via short ignition lines. The ignition coils are actuated separately via a control line by the ECM. In addition, diagnosis information from the ignition output stages can be passed on to the ECM via this control line.



Intake Camshaft Actuator

INFOID:0000000013607929

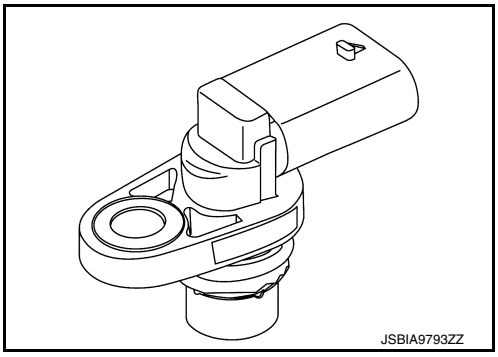
ECM adjusts camshaft position by controlling intake camshaft actuator, for details, refer to EC-64, "CAMSHAFT ADJUSTMENT FUNCTION : System Description".



Intake Camshaft Position Sensor

INFOID:0000000013607930

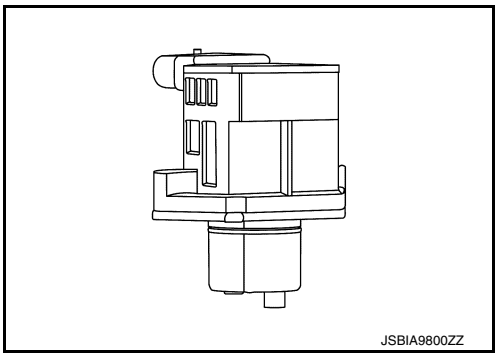
The intake camshaft position sensor is the Hall principle sensor. Distinct characteristic is the output signal in the form of a square-wave on the induction principle. It is thus already conditioned and directly and qualitatively usable for the control unit.



Intake Camshaft Valve Lift Switchover

INFOID:0000000013607931

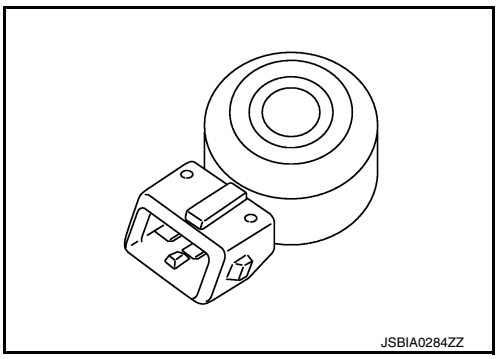
The camtronic system comprises a carrier shaft with cam pieces which can be shifted axially, as well as an electromagnetically actuated lift solenoid with two tappets which enable a forward and backward movement. A position sensor element monitors the positions of the tappets.



Knock Sensor

INFOID:0000000013607932

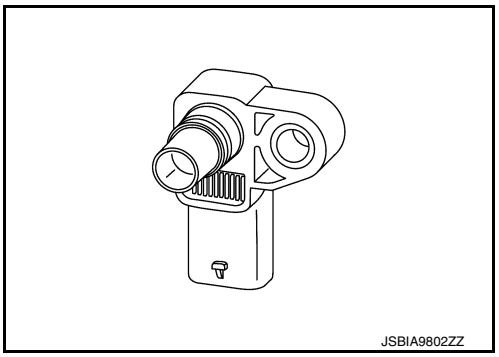
This engine has two knock sensors. The knock sensors are located on left side on crankcase. The knock sensors detect the vibrations on the crankcase which occur due to injection and associated combustion in the individual cylinders.
The vibrations on the crankcase are transmitted over a seismic mass on an inner piezo element and are converted into electrical voltage pulses.



Pressure Sensor Downstream of Throttle Valve

INFOID:0000000013607934

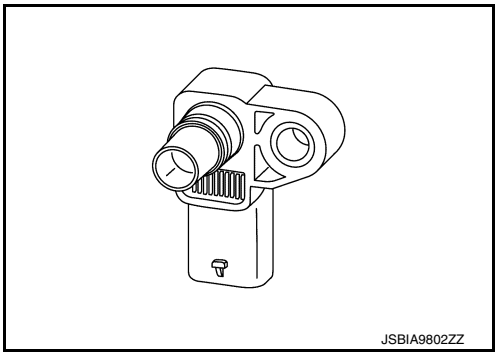
The pressure sensor downstream of throttle valve is located on charge air manifold and detects intake air pressure downstream of the throttle valve.



Pressure Sensor Upstream of Throttle Valve

INFOID:0000000013607935

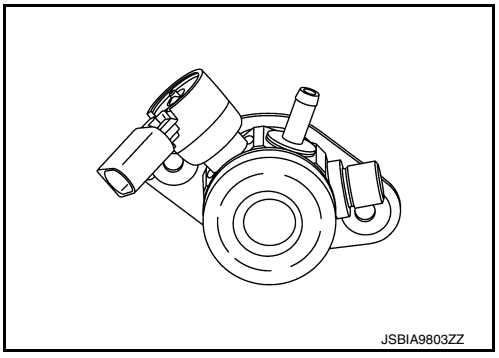
The pressure sensor upstream of throttle valve is located on intake air duct and detects intake air pressure upstream of the air filter.



Quantity Control Valve

INFOID:0000000013607936

The quantity control valve regulates the rail pressure (high pressure control loop) together with the pressure regulating valve. ECM regulates the fuel quantity to be fed to the pump elements of the high pressure pump according to a PWM signal, according to the demand. Therefore, in comparison to an uncontrolled high pressure pump, the high fuel temperature (in the fuel return side) to be reduced. Through the reduction of the fuel quantity, which has to be compressed by the high pressure pump, the power consumption of the high pressure pump is also decreased.



Throttle Valve Actuator

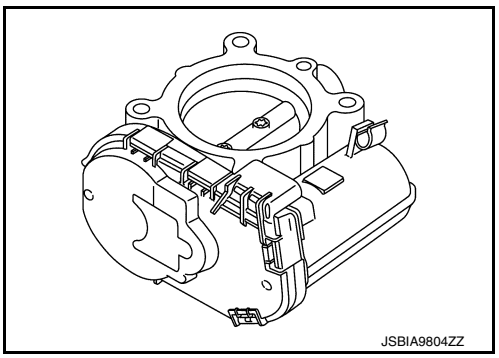
INFOID:0000000013607938

THROTTLE VALVE ACTUATOR

Throttle valve actuator consists of throttle valve motor, throttle position sensor, etc. The throttle valve motor is operated by the ECM and it opens and closes the throttle valve. The throttle position sensor detects the throttle valve position and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle properly in response to driving condition via the throttle valve motor.

NOTE:

When detecting a electrical malfunction in throttle valve actuator, ECM stops the throttle valve control. Consequently, the throttle valve angle is fixed at 10% by the spring force, enabling emergency driving.



When detecting a mechanical malfunction in throttle valve actuator according to the throttle position sensor 1 and 2 signals, ECM limits the fuel injector operation to control the engine speeds as follows.

- At idling: 1,400 rpm
- At driving: 1,800 rpm
- Fixes engine speed at an idling standard value when the brake pedal is depressed

THROTTOLE 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 signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle properly in response to driving condition via the throttle valve motor.

NOTE:

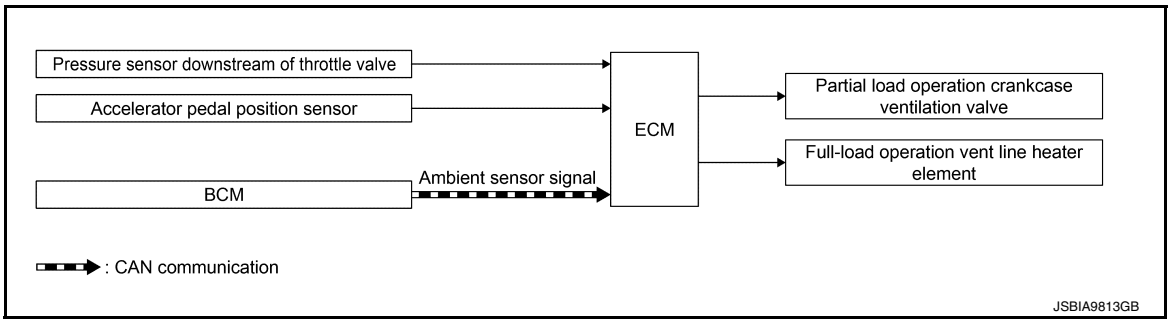
When one of the accelerator pedal position sensors has a malfunction, ECM uses a signal from another accelerator pedal position sensor. Furthermore, ECM monitors the amount of intake air and corrects throttle position. When both position sensors have a malfunction, ECM stops the throttle valve control. Consequently, the throttle valve angle is fixed at 10% by the spring force, enabling emergency driving.

STRUCTURE AND OPERATION

Crankcase Ventilation System

INFOID:0000000013607939

SYSTEM DIAGRAM

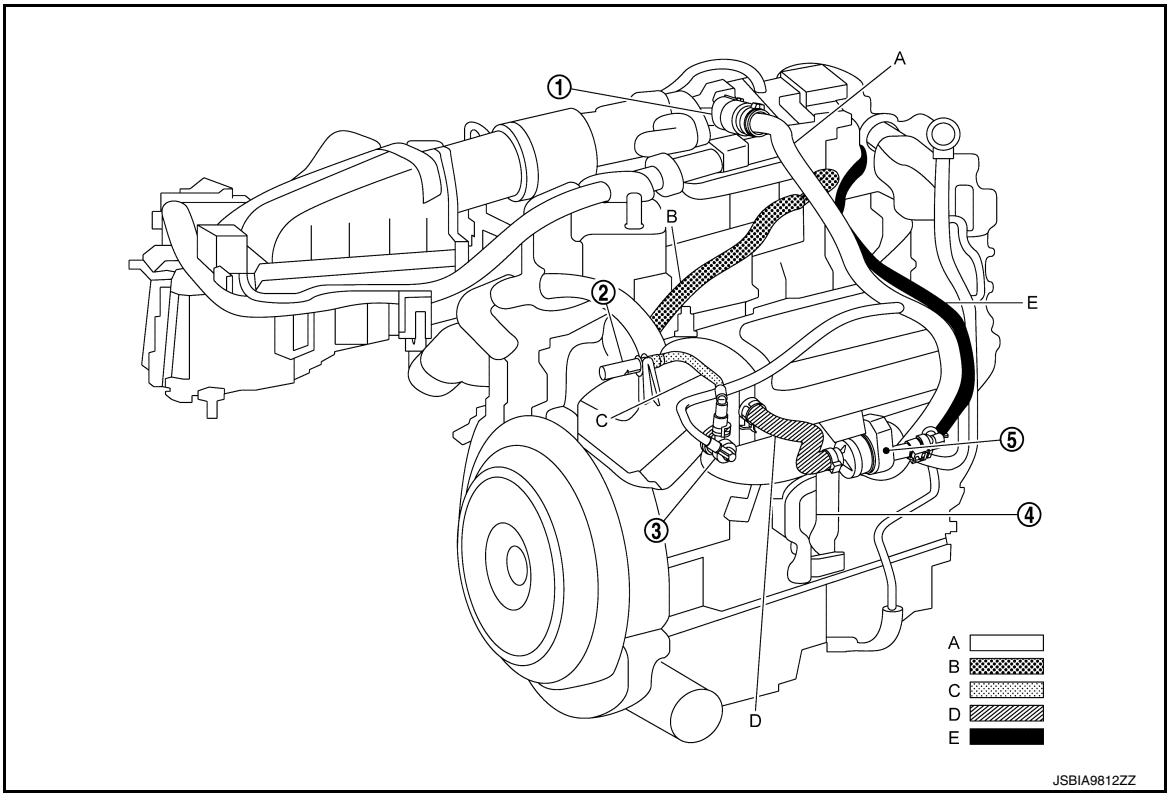


SYSTEM DESCRIPTION

Description

The crankcase ventilation system allows the discharging of excess pressure and excessive gas sent from the crankcase, feeding them back to the engine through the induction system, and combusting them under any engine operating condition.

- Pressure sensor downstream of throttle valve (Engine load)
- Accelerator pedal position sensor (Accelerator pedal position)
- BCM (Ambient temperature)



① Full-load operation vent line heater element	② Fuel tank ventilation connector	③ Vent valve
④ Oil separator	⑤ Partial load operation crankcase ventilation valve	
A Partial load bleed line	B Vent line for oil separator	C Purge line
D Wide open throttle bleed line	E Engine ventilation line	

Crankcase Ventilation Description of Function

The crankcase ventilation has functions as follows:
- Normal mode crankcase ventilation function
- Full-load mode crankcase ventilation function

NORMAL MODE CRANKCASE VENTILATION FUNCTION

The partial load operation crankcase ventilation valve is usually open, and blow-by gas is sucked into the boost air distributor pipe from the oil separator.
During deceleration, the partial load operation crankcase ventilation valve is closed according to a signal from ECM. This stops blow-by gas flown from crankcase to intake air system and reduces noise.

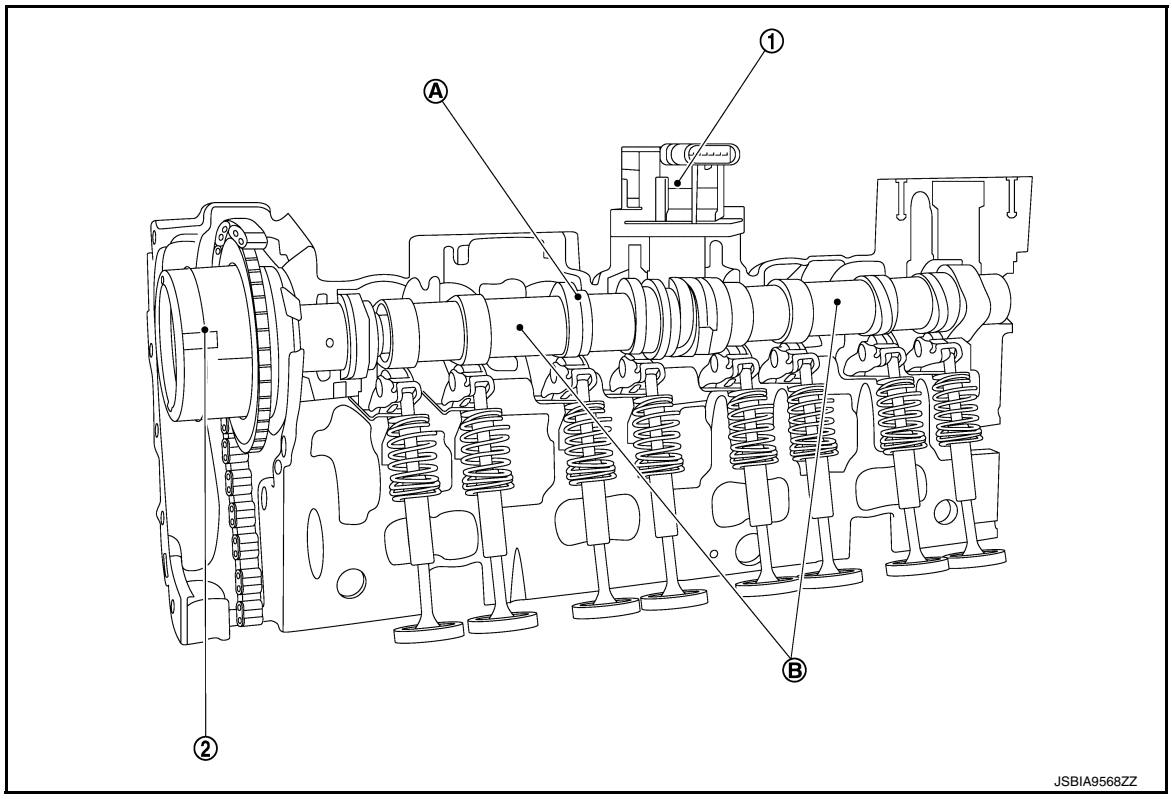
FULL-LOAD MODE CRANKCASE VENTILATION FUNCTION

Blow-by gas is sucked into the air intake pipe from the oil separator.
The full-load operation vent line heater element is installed to the ventilation line connected to the air filter downstream and heats excessive gas according to a signal from ECM when ambient air temperature becomes less than 7°C (44.6°F).
This prevents damage to engine caused by frozen excessive gas.

CAMTRONIC System

INFOID:0000000013607940

SYSTEM DESCRIPTION

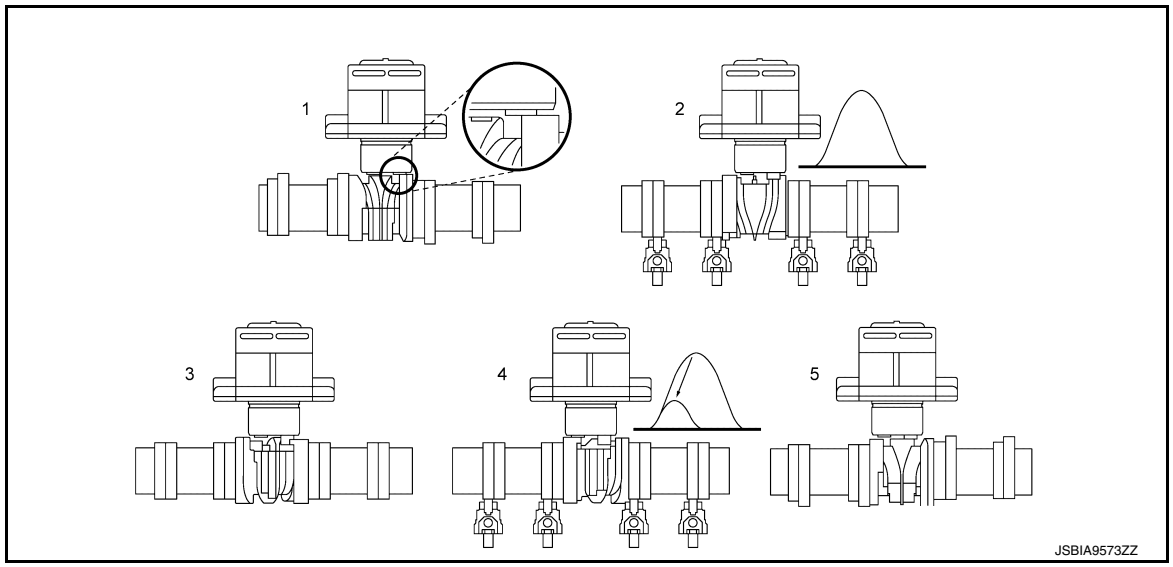


① Intake camshaft valve lift switchover actuator
② Intake camshaft actuator
Ⓐ Double cams with different cams
Ⓑ Vent line for oil separator

Description

The system comprises a carrier shaft with cam pieces which can be shifted axially, as well as an electromagnetically actuated lift solenoid with two tappets which enable a forward and backward movement. A position sensor element monitors the positions of the tappets. The cam pieces are displaced by a tappet entering the curved path of the cam piece. The shape of the curved track causes a lateral force to be exerted on the cam piece so that the cam piece is moved axially. The second plunger of the lift solenoid is responsible for the backward movement. The plungers are engaged only during the respective adjustment operation. An elevation in the curved track causes the tappet to return to its default position. The cam piece is set to its basic position mechanically by the shape of the curved track. The mechanical lift adjustment is effective up to an engine speed of 4,000 rpm.

CAMTRONIC lift positions

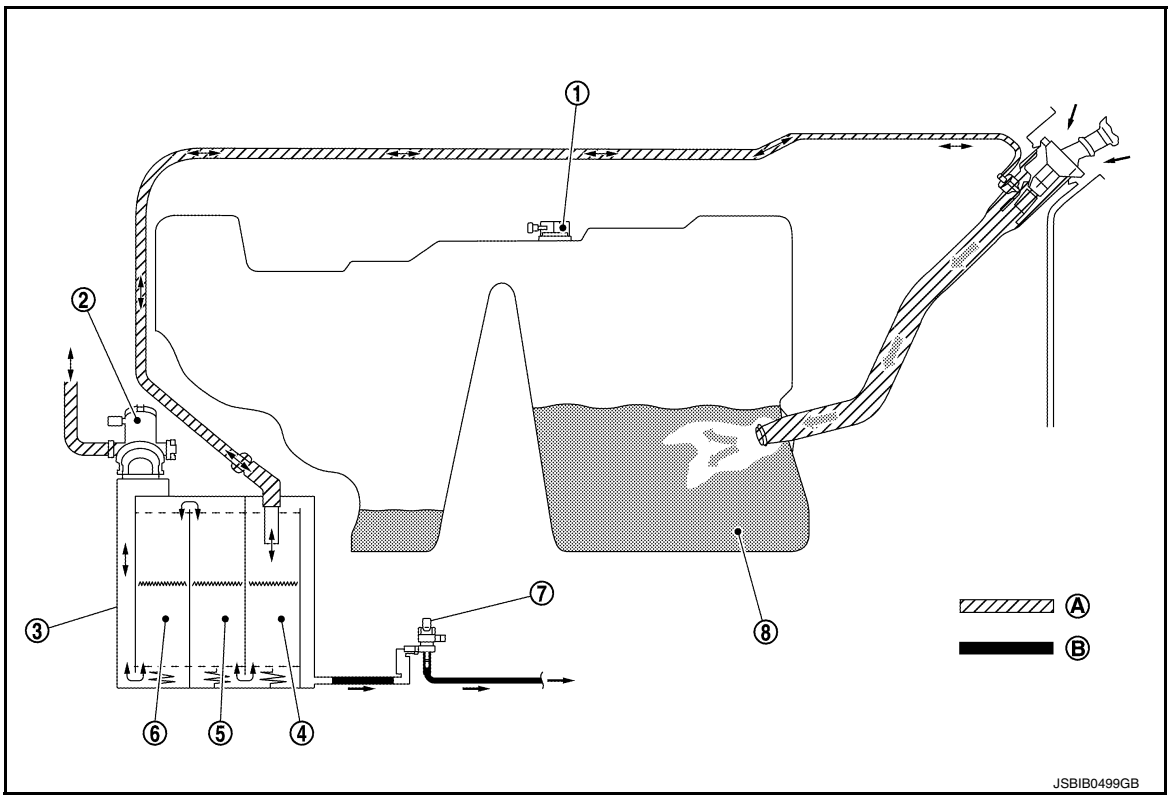


Number	1	2	3	4	5
Position	Actuator pin makes contact with the contact segment	Actuator pin engages in the shift gate (large valve lift)	Camshaft bush 1 is moved	Camshaft bush 2 is moved (small valve lift)	Actuator pin is pushed out

On Board Refueling Vapor Recovery (ORVR)

INFOID:0000000013705839

SYSTEM DESCRIPTION



① Fuel tank pressure sensor
② EVAP canister vent control valve
③ EVAP canister
④ Activated EVAP canister chamber 1
⑤ Activated EVAP canister chamber 2
⑥ Activated EVAP canister chamber 3
⑦ EVAP purge control valve
⑧ Fuel tank
Ⓐ Aeration and vent line
Ⓑ Purge line

ON-BOARD REFUELING VAPOR RECOVERY FUNCTION

On-Board Refueling Vapor Recovery, General Points

The law requires, that the refueling gases in the vehicle are collected (On-board Refueling Vapor Recovery). Fuel and refueling vapors must be separated in order to prevent fuel from flowing into the activated EVAP canister due to any inappropriate refueling or a defective nozzle.

Function Sequence for On-Board Refueling Vapor Recovery

Owing to its form, the filler neck functions as a suction jet pump.The fuel out from nozzle thus accelerates in the filler neck and the air around the nozzle is suctioned into the fuel tank. As a result of this air intake. The refueling vapor are not able to gather at the filler neck and are able to escape.The fuel vapors flow through The aeration/vent valves and aeration/vent lines to the activated EVAP canister, where they are stored. The fueling, pressure limiting valve and the vent valve also prevent any overfilling by closing off the aeration/vent line.Rollover valves are integrated at the top of the aeration/vent valves. If fuel gets into aeration/vent valves, they close off the aeration/vent lines to the activated EVAP canister, thus preventing fuel from flowing into the activated EVAP canister. The aeration/vent valves can also close briefly if there is sudden braking or acceleration, or when cornering.

WARNING:

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

- **Put a "CAUTION: FLAMMABLE" sign in workshop.**
- **Never smoke while servicing fuel system. Keep open flames and sparks away from work area.**
- **Always furnish the workshop with a CO_2 fire extinguisher.**

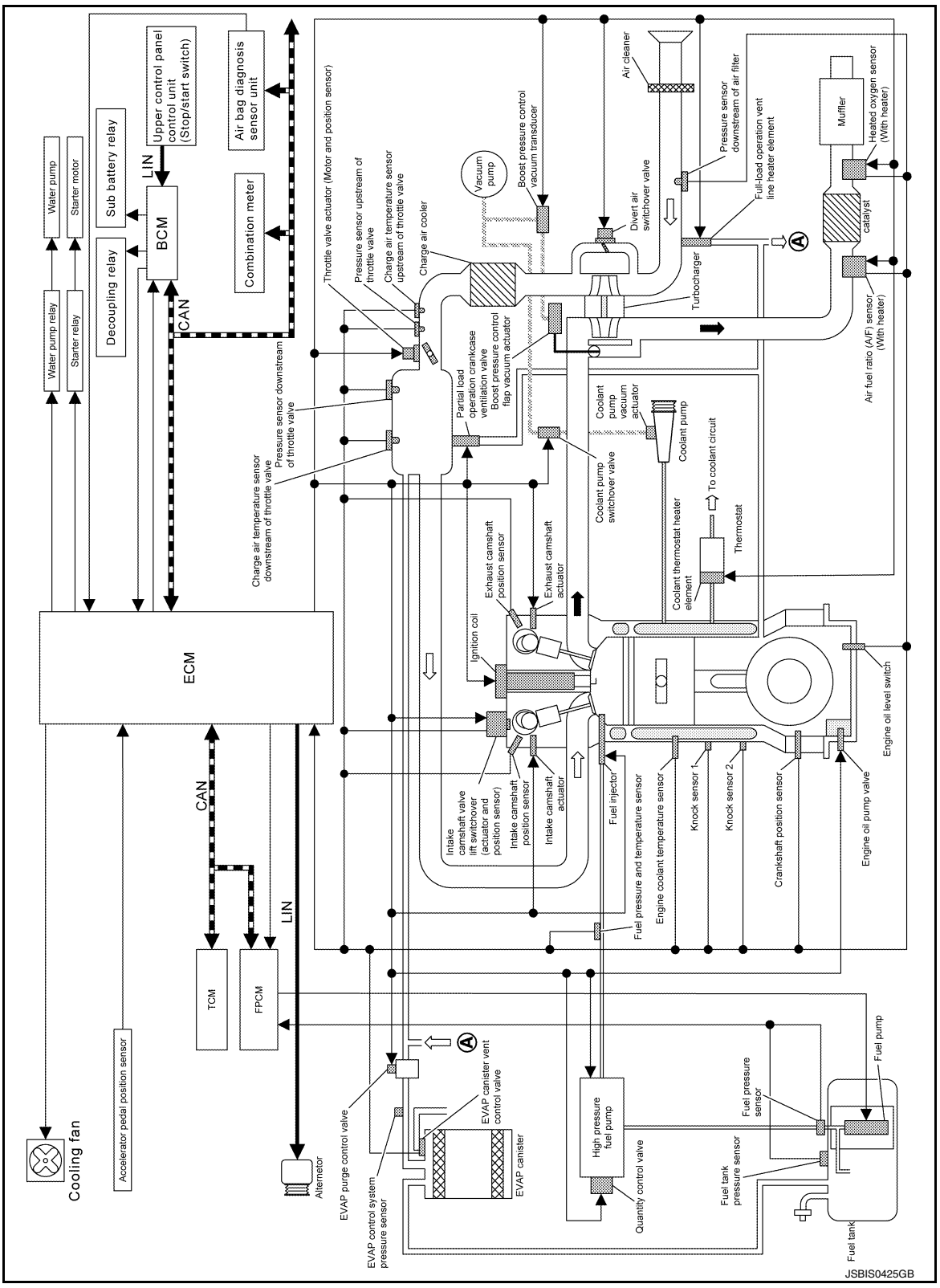
CAUTION:

- **Before removing fuel line parts, carry out the following procedures:**
  - **Put drained fuel in an explosion-proof container and put lid on securely.**
  - **Release fuel pressure from fuel line. Refer to FL-9, "Removal and Installation".**
  - **Disconnect battery ground cable.**
- **Always replace O-ring when the fuel gauge retainer is removed.**
- **Never kink or twist hose and tube when they are installed.**
- **Never tighten hose and clamps excessively to avoid damaging hoses.**
- **After installation, run engine and check for fuel leaks at connections.**
- **Never attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.**

SYSTEM
ENGINE CONTROL SYSTEM
ENGINE CONTROL SYSTEM : System Description

INFOID:0000000013607941

SYSTEM DIAGRAM

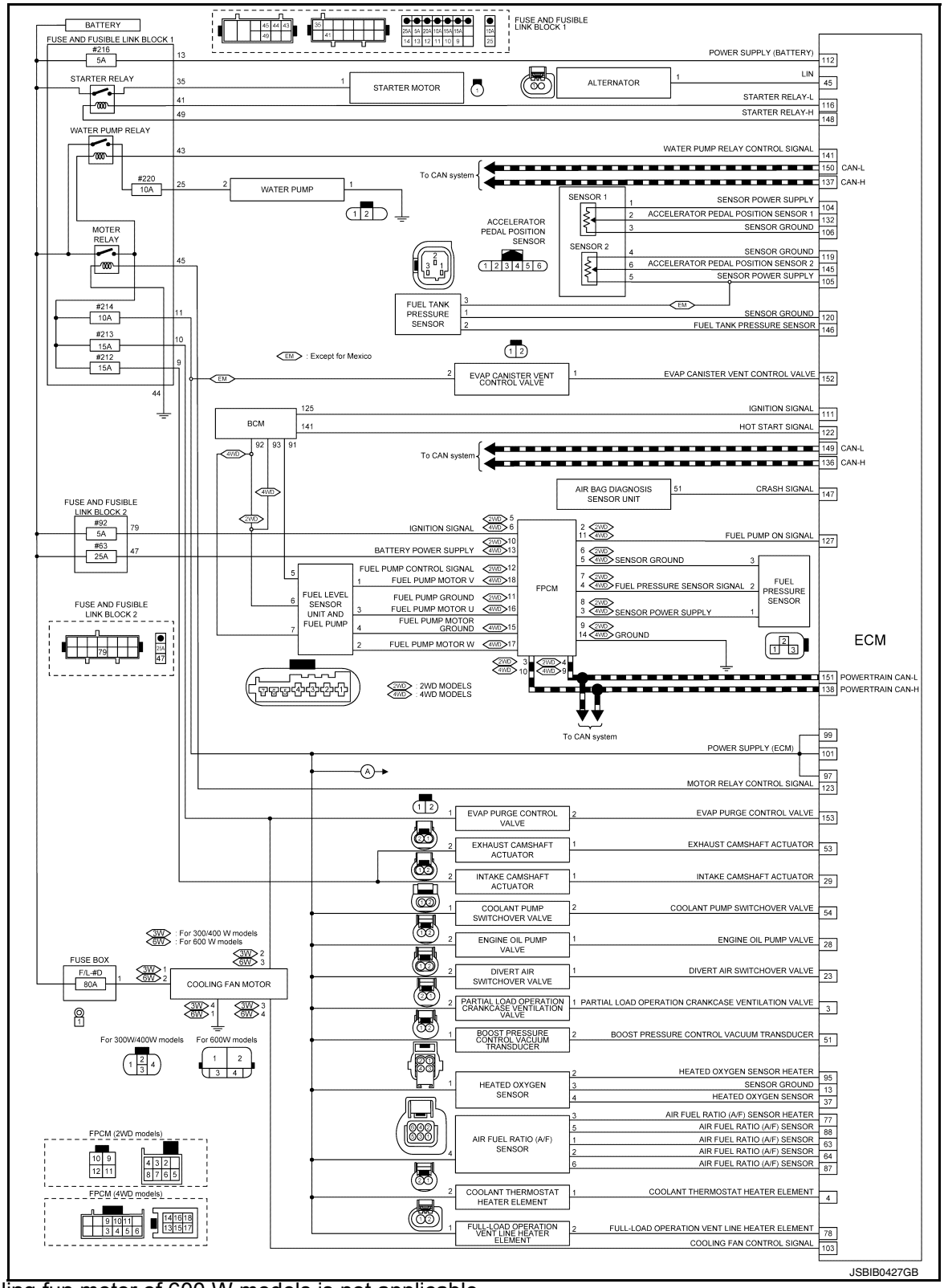


SYSTEM DESCRIPTION

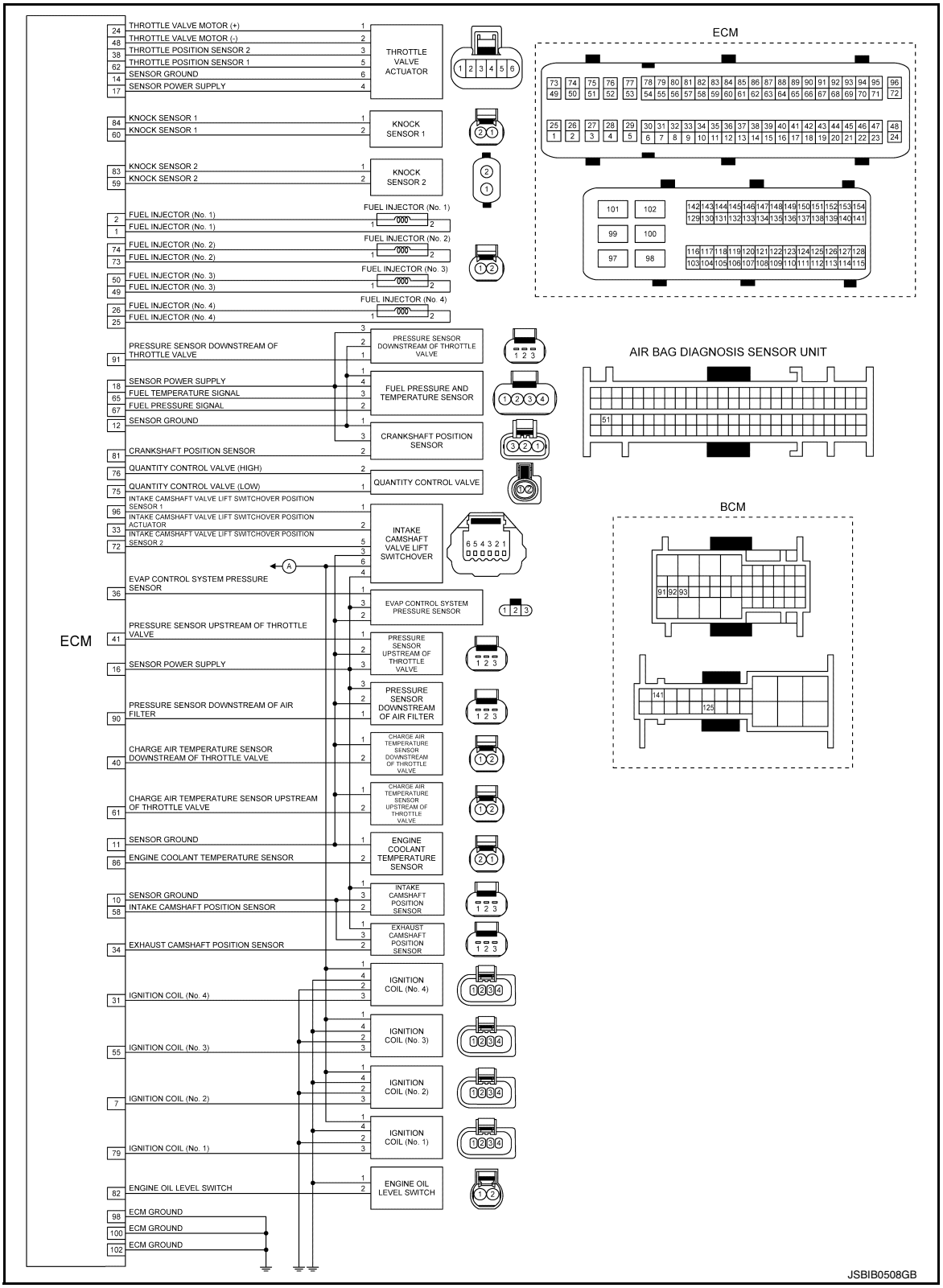
Function	Reference
Ignition ON control	EC-55, "IGNITION ON CONTROL : System Description"
Engine start control	EC-56, "ENGINE START CONTROL : System Description"
RPM control	EC-57, "RPM CONTROL : System Description"
Smooth running control	EC-58, "SMOOTH RUNNING CONTROL : System Description"
Injection regulation control	EC-60, "INJECTION REGULATION CONTROL : System Description"
Ignition system control	EC-61, "IGNITION SYSTEM CONTROL : System Description"
Synchronize fuel injection and ignition order function	EC-62, "SYNCHRONIZE FUEL INJECTION AND IGNITION ORDER FUNCTION : System Description"
Camshaft adjustment function	EC-64, "CAMSHAFT ADJUSTMENT FUNCTION : System Description"
Torque control	EC-65, "TORQUE CONTROL : System Description"
Knock control	EC-66, "KNOCK CONTROL : System Description"
Air-fuel mixture ratio control	EC-67, "AIR-FUEL MIXTURE RATIO CONTROL : System Description"
Cold start mixture enrichment control	EC-69, "COLD START MIXTURE ENRICHMENT CONTROL : System Description"
Deceleration fuel shutoff function	EC-71, "DECELERATION FUEL SHUTOFF CONTROL : System Description"
Charge air control	EC-72, "CHARGE AIR CONTROL : System Description"
Ignition OFF control	EC-74, "IGNITION OFF CONTROL : System Description"
Fuel supply control	EC-75, "FUEL SUPPLY CONTROL : System Description"
Thermal management control	EC-78, "THERMAL MANAGEMENT CONTROL : System Description"
Exhaust treatment function	EC-81, "EXHAUST TREATMENT FUNCTION : System Description"
Evaporative emission system	EC-82, "EVAPORATIVE EMISSION SYSTEM : System Description"
Stop/Start system	EC-85, "STOP/START SYSTEM : System Description"
Electronic accelerator function	EC-90, "ELECTRONIC ACCELERATOR FUNCTION : System Description"
Warning/indicator	EC-91, "WARNING/INDICATOR/CHIME LIST : Warning lamps/Indicator lamps", EC-91, "WARNING/INDICATOR/CHIME LIST : Warning/Indicator (On Information Display)"
CAN communication	EC-91, "CAN COMMUNICATION : System Description"

ENGINE CONTROL SYSTEM : Circuit Diagram

INFOID:0000000013607942



*: Cooling fun motor of 600 W models is not applicable.


ECM
THROTTLE VALVE MOTOR (+)
THROTTLE VALVE MOTOR (-)
THROTTLE POSITION SENSOR 2
THROTTLE POSITION SENSOR 1
SENSOR GROUND
SENSOR POWER SUPPLY
THROTTLE VALVE ACTUATOR
KNOCK SENSOR 1
KNOCK SENSOR 2
FUEL INJECTOR (No. 1)
FUEL INJECTOR (No. 2)
FUEL INJECTOR (No. 3)
FUEL INJECTOR (No. 4)
PRESSURE SENSOR DOWNSTREAM OF THROTTLE VALVE
FUEL TEMPERATURE SIGNAL
FUEL PRESSURE SIGNAL
FUEL PRESSURE AND TEMPERATURE SENSOR
CRANKSHAFT POSITION SENSOR
QUANTITY CONTROL VALVE (HIGH)
QUANTITY CONTROL VALVE (LOW)
QUANTITY CONTROL VALVE
INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 1
INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION ACTUATOR
INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 2
INTAKE CAMSHAFT VALVE LIFT SWITCHOVER
EVAP CONTROL SYSTEM PRESSURE SENSOR
PRESSURE SENSOR UPSTREAM OF THROTTLE VALVE
PRESSURE SENSOR DOWNSTREAM OF AIR FILTER
CHARGE AIR TEMPERATURE SENSOR DOWNSTREAM OF THROTTLE VALVE
CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE
ENGINE COOLANT TEMPERATURE SENSOR
INTAKE CAMSHAFT POSITION SENSOR
EXHAUST CAMSHAFT POSITION SENSOR
IGNITION COIL (No. 4)
IGNITION COIL (No. 3)
IGNITION COIL (No. 2)
IGNITION COIL (No. 1)
ENGINE OIL LEVEL SWITCH
ECM GROUND
AIR BAG DIAGNOSIS SENSOR UNIT
BCM
JSBIB0508GB

ENGINE CONTROL SYSTEM : Fail-safe (FPCM AWD)

INFOID:0000000013992377

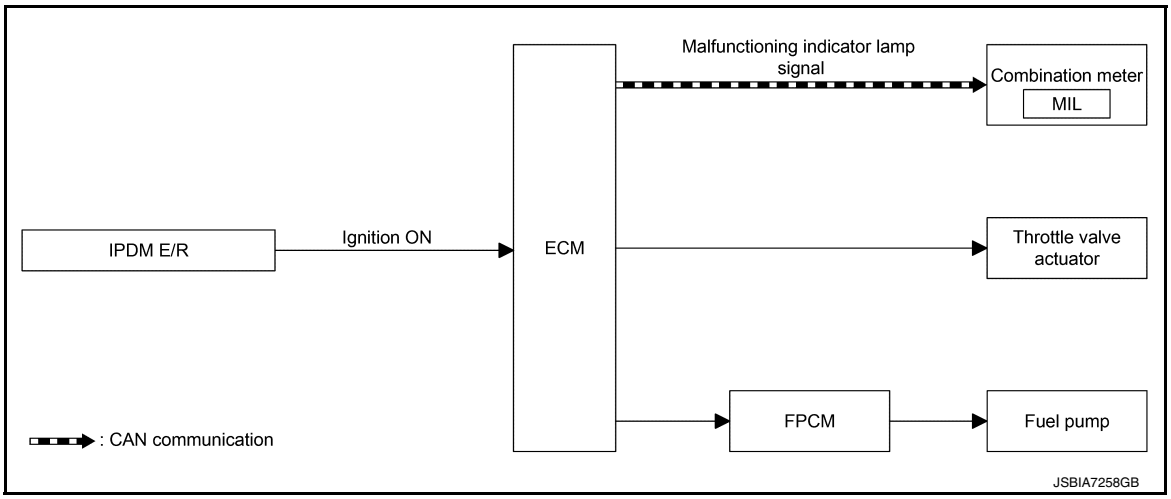
DTC No.	Operating condition in fail-safe mode
U0100 U0168	Pressure control on substitute value
P2539 P2540 P2541 P2542	Open loop pressure control

IGNITION ON CONTROL

IGNITION ON CONTROL : System Description

INFOID:0000000013607944

SYSTEM DIAGRAM



SYSTEM DIAGRAM

When ignition switch is turned ON, ECM performs the following functions:

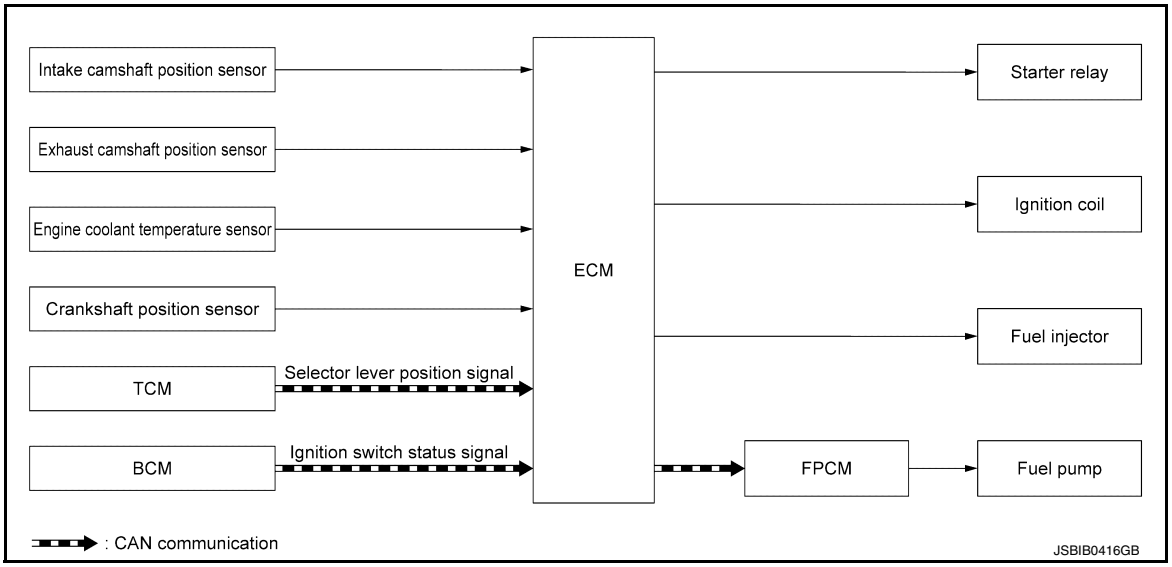
- To ensure full flow, the fuel pump is actuated via the FPCM (only at first time ignition ON after unlocking the vehicle).
- MIL (Malfunction Indicator Lamp) is actuated for the lamp check by the ECM via CAN communication.
- Malfunction memory in the ECM can be read out and deleted via the diagnosis tool.
- The throttle valve actuator checks its return spring (by the position of the throttle valve) and adapts the position of the actuator, if necessary.
- Data are exchanged with the electronic ignition lock control unit via CAN communication line.

ENGINE START CONTROL

ENGINE START CONTROL : System Description

INFOID:0000000013607945

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

ECM reads in all attached components as of ignition relay. The data will also be used if it is plausible at this point in time.

ECM controls engine speeds according to the following sensors and signals.

- Intake camshaft position sensor (Intake camshaft setting for ignition circuit detection)
- Exhaust camshaft position sensor (Exhaust camshaft setting for ignition circuit detection)
- Engine coolant temperature sensor
- Crankshaft position sensor (Engine speeds)

ECM actuates the following components to start the engine.

- Starter
- Ignition coils
- Fuel injectors
- Fuel pump (via FPCM)

The ECM coordinates the injection sequence when it start to use signals from the crankshaft position sensor and camshaft position sensor. The engine start control in the ECM takes on actuation and cutout of the starter. The engine start control has functions and control items as follows.

- Function sequence for start begin
- Function sequence for start end

FUNCTION SEQUENCE FOR START BEGIN

When ignition switch is turned to the START position, the ECM receives the start signal (ignition switch status signal) from BCM and actuates the starter relay. Furthermore the starter relay actuates the starter front-end relay. It take is to prevent a drop in the battery voltage below a defined voltage value during the starting procedure of the engine. this is realized through limitation of the starter current some of the time.Note here during the starting procedure. Before and after the start the starter-plus line must be free of tension otherwise the voltage dip limiter is defective.

FUNCTION SEQUENCE FOR START END

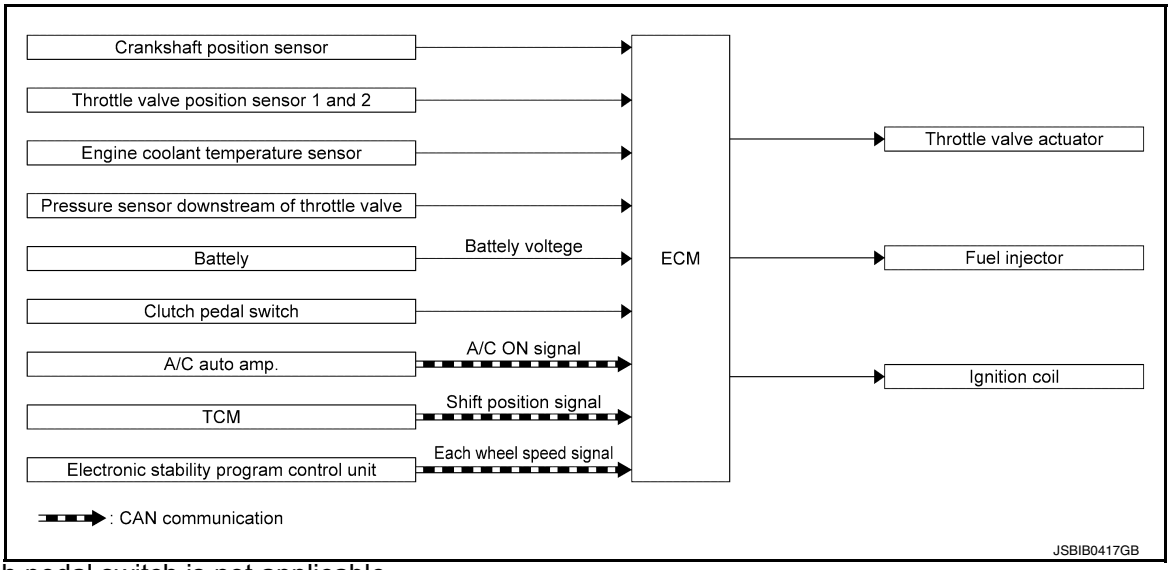
With automatic transmission, when the engine cranking speed reaches 400 to 700 rpm, or it takes 5 to 40 seconds to start (depending on coolant temperature), the ECM interrupts the negative activation of the starter relay and thus terminates the starting procedure.

RPM CONTROL

RPM CONTROL : System Description

INFOID:0000000013607946

SYSTEM DIAGRAM



*: Clutch pedal switch is not applicable.

SYSTEM DESCRIPTION

ECM stabilizes idle speeds to protect the engine, drivetrain, and vehicle and limits engine speeds.
ECM controls engine speeds according to the following sensors and signals.

- Crankshaft position sensor (Engine speeds)
- Throttle position sensor 1 and 2 (Throttle valve position)
- TCM (Shift position)
- Electronic stability program control unit (Each wheel speed)

In addition, conditions for the following control items and functions are added:

- Throttle control
- Ignition timing control
- Fuel shut-off function
- Adaptation of the injection time of the fuel injectors (Idle speeds control)

The ENGINE SPEEDS CONTROL has functions and control items as follows.

- Malfunction in throttle valve actuator
- Speeds limiting function
- Maximum speed limiting function
- Configuration function
- Idle speeds control

MALFUNCTION IN THROTTLE VALVE ACTUATOR

For details, refer to SHUT-OFF FUNCTION in FUEL SUPPLY CONTROL, Refer to EC-75, "FUEL SUPPLY CONTROL : System Description".

SPEEDS LIMITING FUNCTION

ECM detects driving condition of the vehicle according to each wheel speed signal transmitted from the ABS actuator and electric unit (control unit). While driving the vehicle, engine speed is limited to 6,000 rpm or less to protect the engine.

MAXIMUM SPEED LIMITING FUNCTION

When vehicle speed reaches 250 km/h (155 MPH), ECM immediately decreases the throttle valve angle and fuel injection time to reduce engine torque. Vehicle speed is limited through this method.

CONFIGURATION FUNCTION

If “Configuration” is not performed on CONSULT, maximum engine speed is limited to 2,400 rpm.

IDLE SPEEDS CONTROL

Idling is maintained steady by controlling idle speed according to the operating condition of the engine and engine load when the accelerator pedal is not depressed.
ECM controls idle speeds according to the following sensors and signals.

- Engine coolant temperature sensor
- Pressure sensor downstream of throttle valve (Engine load)
- Battery voltage
- A/C auto amp. (air conditioner activation status)

ECM adjusts idle speed through the throttle valve control and determines fuel injection time according to the amount of intake air. In addition, ECM can adjust the ignition timing up to 20 degrees in retard or advance direction to stabilize idle speed.

NOTE:

The ignition timing control responds faster than the throttle valve control. ECM controls idle speed according to the following operating conditions and engine load.

- During warm-up
- Shifting to D or R range
- Turning on air conditioner compressor
- Purge

During Warm-up

During warm-up, ECM controls idle speed according to coolant temperature to quickly increase the catalyst temperature to the operating temperature after engine start.

Prerequisites for warm-up stage

- Engine coolant temperature is 40°C (104°F) or less
- N or P range

ECM increases idle speed to approximately 1,100 – 1,300 rpm for approximately 20 seconds after engine start. After this, if coolant temperature is less than 70°C (158°F), ECM increases idle speed 50 – 100 rpm more than the standard idle speed additionally for approximately 50 seconds.

Shifting to D or R Range

ECM receives a shift position signal from TCM via drivetrain CAN communication, and when the shift position is in D or R range, ECM decreases idle speed to reduce creeping of the vehicle.

Turning on Air Conditioner Compressor

To prevent engine speed from decreasing due to the activation of air conditioner compressor during idling, the A/C auto amplifier transmits an A/C status signal to ECM before turning ON the air conditioner compressor. ECM controls idle speed according to the signal.

Purge

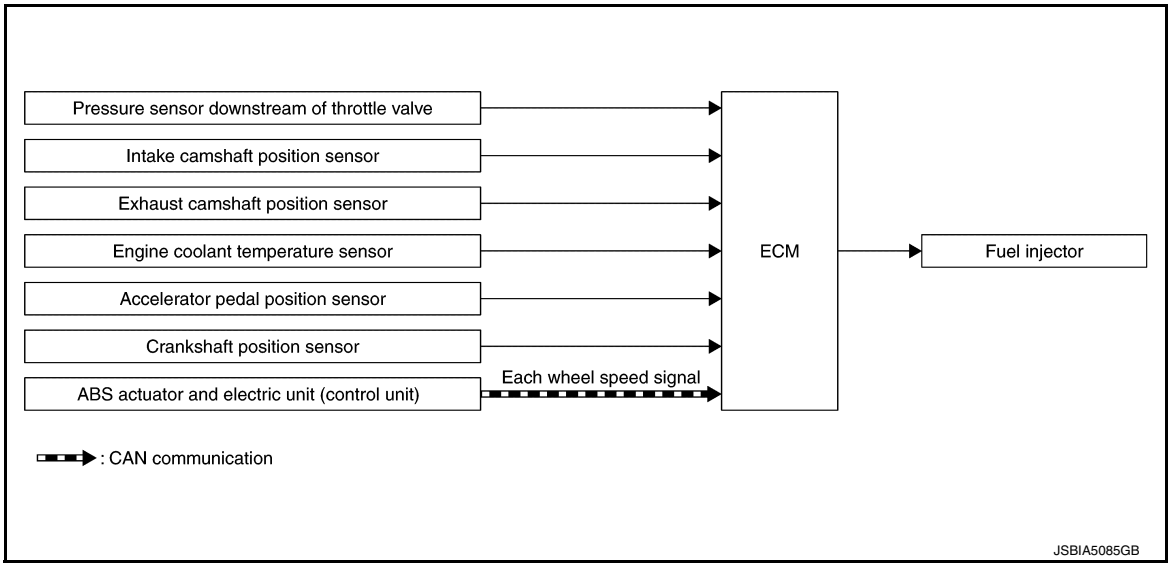
The idle speed control reduces speed fluctuation resulting from purge.

SMOOTH RUNNING CONTROL

SMOOTH RUNNING CONTROL : System Description

INFOID:0000000013607947

SYSTEM DIAGRAM



Description

ECM constantly monitors engine speed to protect the catalyst from excessive heat load resulting from an misfire.
ECM performs smooth running control according to the following sensors and signals.
- Pressure sensor downstream of throttle valve (Engine load)
- Intake camshaft position sensor (Intake camshaft position)
- Exhaust camshaft position sensor (Exhaust camshaft position)
- Engine coolant temperature sensor
- Accelerator pedal position sensor (Accelerator pedal position)
- Crankshaft position sensor (Engine speeds)
- ABS actuator and electric unit (control unit) (Each wheel speed signal)

The smooth running control has functions as follows.
- Misfire detecting function
- Misfire counting function
- Factors of smooth running control

MISFIRE DETECTING FUNCTION

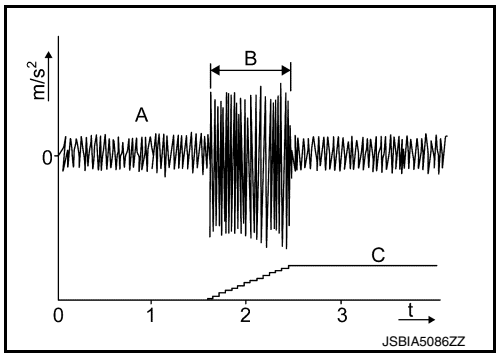
For the smooth running control, ECM monitors a crankshaft position sensor signal to check that the signal synchronizes exactly with the combustion timing of each cylinder. For the crankshaft position sensor signal, distinctive acceleration must be generated at the combustion process of each cylinder. Regarding misfire, each signal has different acceleration. This allows ECM to detect an misfire. If the number of occurrences of misfire exceeds the specified value, ECM deactivates the fuel indicator. Up to two fuel indicators can be deactivated simultaneously.

MISFIRE COUNTING FUNCTION

ECM memorizes misfire counts by categorizing types of misfire as shown below.
- “Cylinder-specific” combustion misfires
- “Emission limit” combustion misfires
- “Catalyst damage” combustion misfires

Smooth Running Signal

m/s^2	: Acceleration
t	: Time
A	: Engine running without combustion misfiring → Acceleration values within tolerance range
B	: Engine running with combustion misfiring → acceleration values too high
C	: Misfire counter → starts with misfire detection



Main factors of misfire occurrence
- Ignition system
- Injection system
- Mechanical engine components (e.g. valve seats, valve springs, air suction)
- Fuel starvation

FACTORS FOR SMOOTH RUNNING CONTROL

Factors affecting the smooth running control:
- Engine speeds and engine load
- Engine coolant temperature
- Detection of rough roads
- Synchronization of injection and ignition order
- Crankshaft position sensor adjustment

Engine Speeds And Engine Load

ECM sets a standard value of the time between two combustions, according to engine speed and engine load.

Engine Coolant Temperature

Since the cold start permits more misfires compared with warm-up, ECM measures engine coolant temperature.

Detection of Rough Roads

Vibrations from the drive train resulting from rough roads adversely affect the revolution under the specific engine speed and engine load. Therefore, it is required to extend the tolerance of smooth running control

when driving on rough roads. ECM receives a wheel speed signal (detecting rotational differences among wheels) from the ABS actuator and electric unit (control unit) unit via CAN communication.

Synchronization of Injection and Ignition Order
ECM monitors misfire in each cylinder according to signals from crankshaft position sensor, intake camshaft position sensor, and exhaust camshaft position sensor.

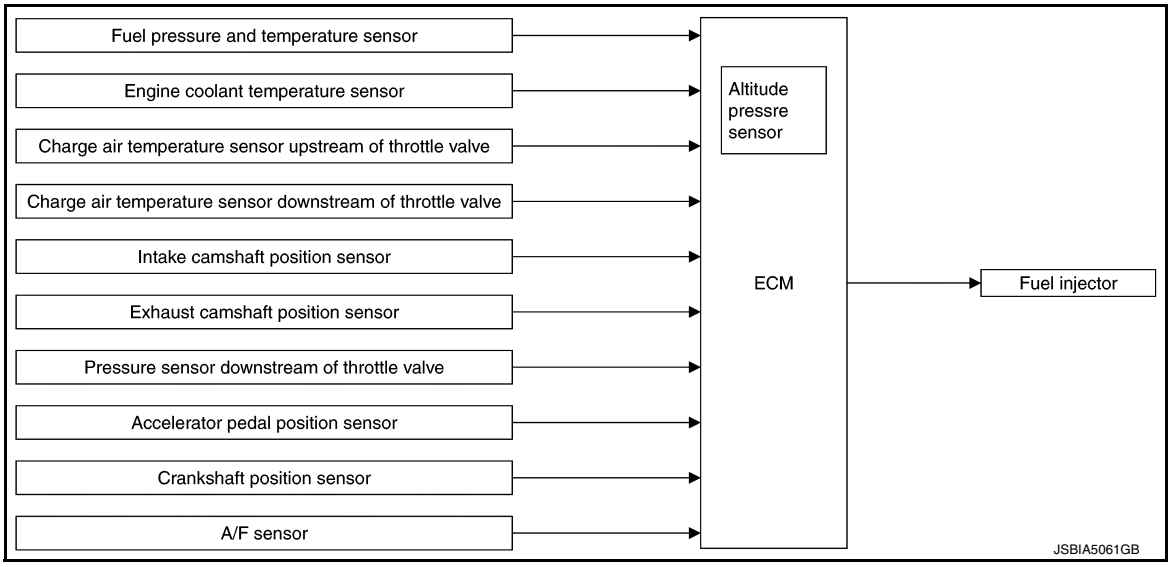
Crankshaft Position Sensor Adjustment
The tolerance of the smooth running control is decreased after the completion of crankshaft position sensor adjustment. This allows the smooth running control to be adapted to rough idle of engine. ECM memorizes normal engine speeds of the deceleration timing (accelerator pedal not depressed) and uses the memorized speeds as comparison data for misfire detection.

INJECTION REGULATION CONTROL

INJECTION REGULATION CONTROL : System Description

INFOID:0000000013607948

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

Description
The fuel injection control determines injection time and pressure according to the ECM characteristics map.
ECM controls the fuel injection according to the following sensors and signals.
- Fuel pressure and temperature sensor
- Engine coolant temperature sensor
- Charge air temperature sensor upstream of throttle valve
- Charge air temperature sensor downstream of throttle valve
- Intake camshaft position sensor (Intake camshaft position)
- Exhaust camshaft position sensor (Exhaust camshaft position)
- Pressure sensor downstream of throttle valve (Engine load)
- Accelerator pedal position sensor 1 and 2 [engine load request from the driver, accelerator pedal position, and accelerator pedal operation (fast or slow) (acceleration)]
- Crankshaft position sensor (Engine speed)
- A/F sensor

Fuel injection control has following controls:
- Normal mode control
- Full-load mode control
- Acceleration control

NORMAL MODE CONTROL

ECM controls injection time of fuel injector according to the following items.
- Air fuel ratio
- Fuel pressure in the fuel rail
- Requested engine torque

NOTE:
Normal mode means the accelerator pedal effort range of approximately 10–90%.

FULL-LOAD MODE CONTROL

When in full load mode, ECM extends the injection time and increases fuel injection pressure to achieve the maximum engine torque.

NOTE:
Full load mode means the accelerator pedal effort range of approximately 90% or more.

ACCELERATION CONTROL

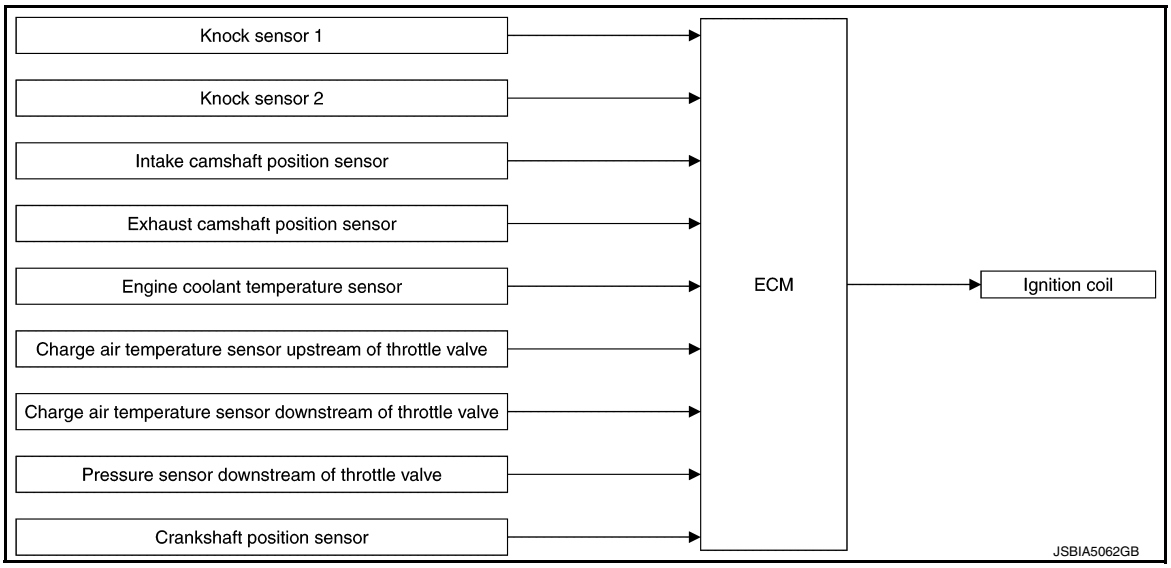
When rapidly operating the accelerator pedal, the throttle valve also opens/closes rapidly. When this happens, air-fuel mixture temporarily becomes lean/rich. To prevent this from occurring, ECM changes the fuel injector control time to adjust the air-fuel mixture according to the characteristics map. This prevents vibrations during rapid acceleration.

IGNITION SYSTEM CONTROL

IGNITION SYSTEM CONTROL : System Description

INFOID:0000000013607949

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

ECM controls ignition coils inserted into each cylinder, according to the following sensors and signals.

- Knock sensor 1
- Knock sensor 2
- Intake camshaft position sensor (Intake camshaft position)
- Exhaust camshaft position sensor (Exhaust camshaft position)
- Engine coolant temperature sensor
- Charge air temperature sensor upstream of throttle valve
- Charge air temperature sensor downstream of throttle valve
- Pressure sensor downstream of throttle valve (Engine load)
- Crankshaft position sensor (Engine speed)

In addition, conditions of the torque adjustment function are added.
Under the following conditions, ECM adjusts the ignition timing in the retard or advance angle direction.

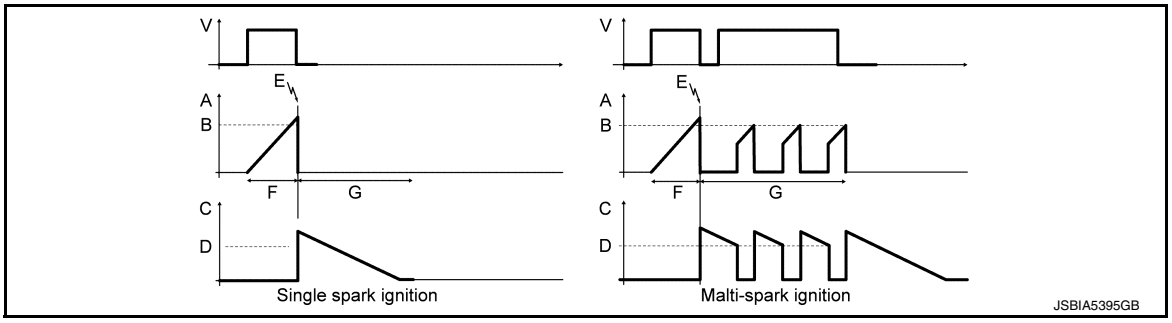
- Idle speed control
- Deceleration shut off
- Overload protection of the transmission
- Torque control

NOTE:
The ignition timing is 1 →3 → 4 → 2.

THE OPERATING MODE OF IGNITION COIL

The operating mode of ignition is as follows.

- Single spark -single spark ignition
- Multi-spark - multi-spark ignition



A	Primary charging current	B	Recharging threshold	C	Secondary charging current
D	Discharging threshold	E	Ignition timing	F	Dwell time
G	Spark duration	V	Operating voltage		

Single Spark -single spark ignition
The ignition coil is normally charged one time per ignition process when the engine is warm, and ignition sparks are emitted. Even when performing a cold start, the high-energy ignition coil is used for securely igniting air-fuel mixture, achieving a long spark combustion time.

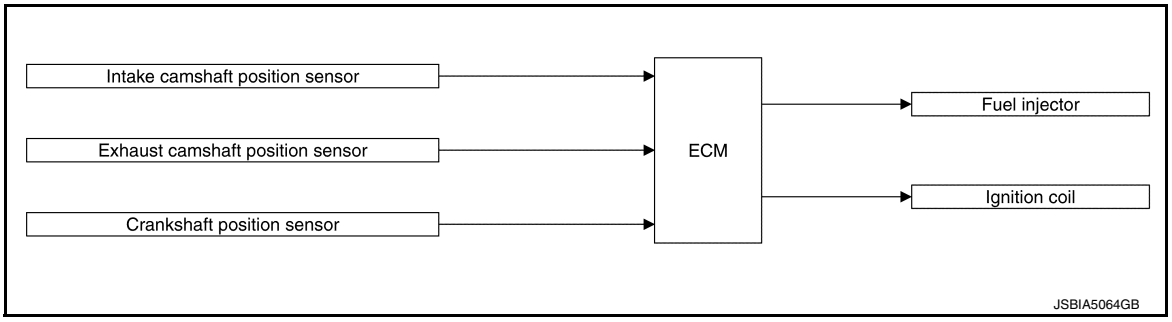
Multi-spark - multi-spark ignition
Unlike the single spark mode that sparks occur only one time, the multi-spark mode allows multiple times of ignition. At this time, only necessary sparks are emitted plural times, not continuous large sparks.
The multi-spark ignition enables the passing of a charge current again after the charge current is cut off and ignition sparks are emitted at ignition timing. When ECM measures this primary current and judges that primary current limit is reached, charge current is cut off and ignition sparks are emitted. Multiple ignitions are performed by repeating the above.

SYNCHRONIZE FUEL INJECTION AND IGNITION ORDER FUNCTION

SYNCHRONIZE FUEL INJECTION AND IGNITION ORDER FUNCTION : System Description

INFOID:0000000013607950

SYSTEM DIAGRAM

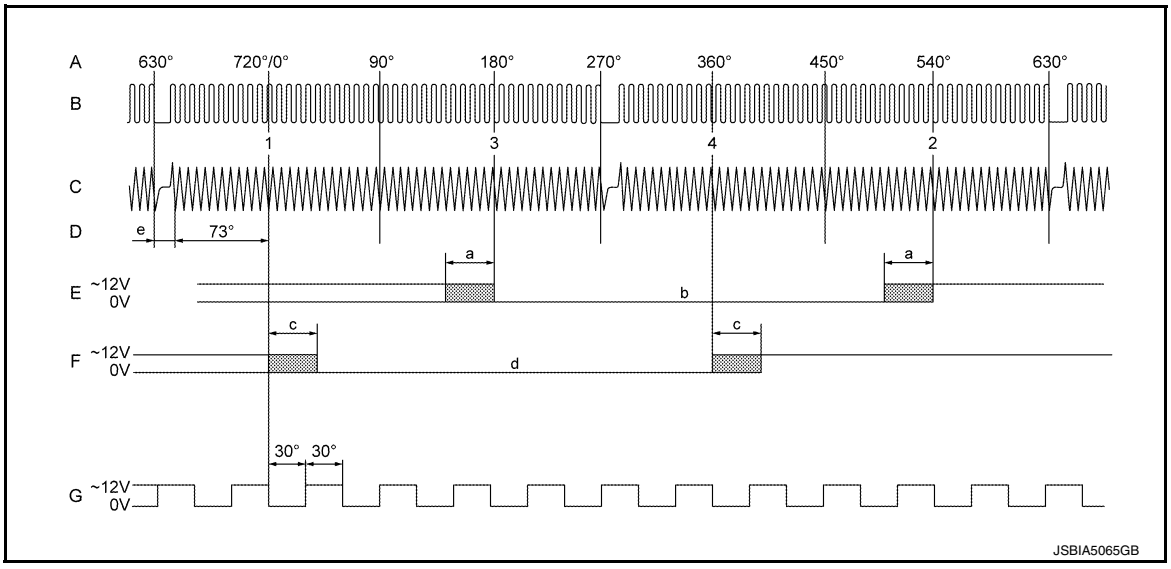


SYSTEM DESCRIPTION

Description
ECM controls ignition coil and fuel injector and synchronizes the order of fuel injection with that of ignition.The synchronization is necessary for the knock control and the fuel shut-off control for each cylinder.
ECM synchronizes injection timing with ignition order according to the following sensors and signals.
- Intake camshaft position sensor (Intake camshaft position)
- Exhaust camshaft position sensor (Exhaust camshaft position)
- Crankshaft position sensor (Engine speeds, crankshaft position)

Synchronization for the injection and ignition order has control items and functions as follows.
- Synchronization function for the injection and ignition order
- Engine speed signal control

SYNCHRONIZATION OF THE INJECTION AND IGNITION ORDER



1	Top dead center of cylinder 1	2	Top dead center of cylinder 2	3	Top dead center of cylinder 3
4	Top dead center of cylinder 4				
A	Crank angle	B	Multi-pulse wheel	C	Crankshaft position sensor signal
D	Cylinder 1 discriminate signal	E	Intake camshaft position sensor signal	F	Exhaust camshaft position sensor signal
G	Engine speed signal				
a	Intake camshaft adjustment range	b	Intake camshaft position sensor (low signal)	c	Exhaust camshaft adjustment range
d	Exhaust camshaft position sensor (low signal)	e	Polarities at intervals of crank angle 18°		

Synchronization of The Injection and Ignition Order

ECM reads voltage signals of intake camshaft position sensor, exhaust camshaft position sensor, and crankshaft position sensor to synchronize the order of fuel injections with that of ignitions when starting the engine. ECM detects the top dead center of Cylinder 1 according to a signal of crankshaft position sensor.

Engine Speed Signal Control

Multi-pulse wheels with different polarities are installed to the crankshaft at intervals of crank angle 6°.Since the crankshaft position sensor is installed opposed to the multi-pulse wheel, pulse signals of 5 V and 0 V are generated during the rotation of crankshaft. In addition, the multi-pulse wheels have polarities at intervals of crank angle 18° to completely match the crank position.

ECM transmits a short-resistant engine speed signal via CAN communication based on a signal of crankshaft position sensor.

NOTE:

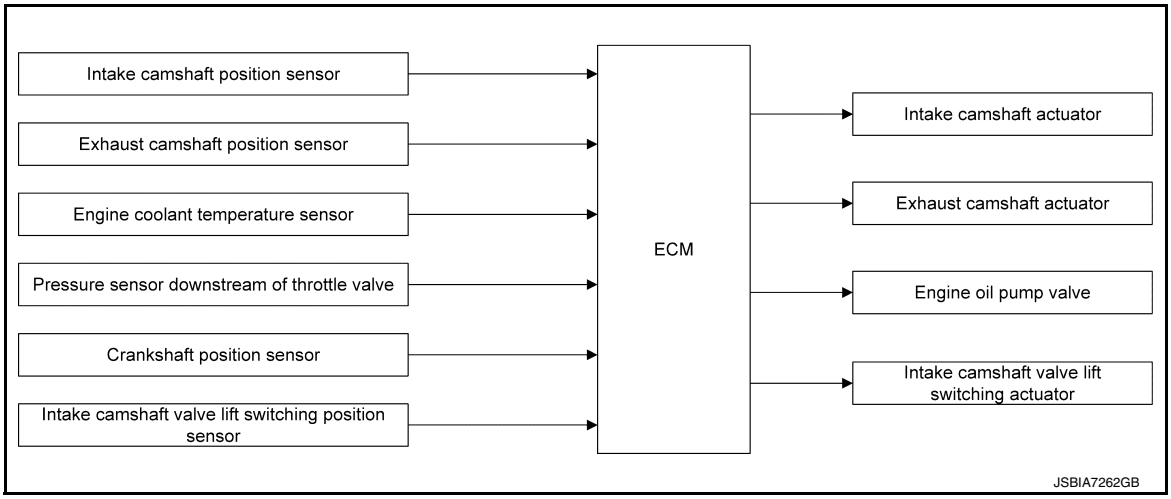
- Detection of rotation direction: When the engine stops or temporarily rotates in the opposite direction immediately before stopping, a pulse signal of the crankshaft position sensor changes. Since ECM detects the change in rotation direction through the above mechanism, crankshaft angle position can be accurately detected any time. This information is required, in particular, when quickly starting the engine in the stop/start system.
- When ECM cannot receive a crankshaft position sensor signal, ECM uses an intake camshaft position sensor signal or exhaust camshaft position sensor signal to enable the vehicle to be driven. When ECM cannot receive an intake camshaft position sensor signal, ECM uses an exhaust camshaft position sensor signal to detect the position of the top dead center of Cylinder 1. When both camshaft position sensor signals cannot be received, ECM performs ignition and injection to execute an emergency start after detecting crank angle 360°.

CAMSHAFT ADJUSTMENT FUNCTION

CAMSHAFT ADJUSTMENT FUNCTION : System Description

INFOID:0000000013607951

SYSTEM DIAGRAM



DESCRIPTION

ECM controls camshaft adjustment according to the following sensors and signals.

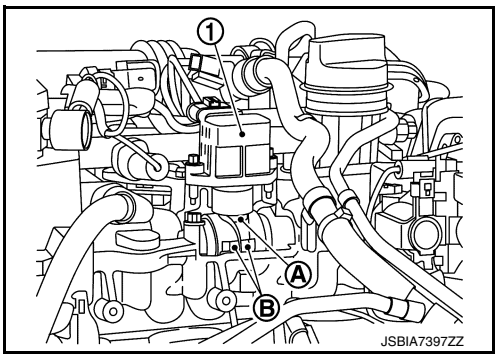
- Intake camshaft position sensor
- Exhaust camshaft position sensor
- Engine coolant temperature sensor
- Pressure sensor downstream of throttle valve (Engine load)
- Crankshaft position sensor (Engine speeds)

ECM adjusts camshaft position by controlling intake camshaft actuator and exhaust camshaft actuator according to a PWM signal. ECM continuously adjusts the duty ratio of signal according to the characteristics map consistent with engine load. The control piston of camshaft actuator moves as the magnetic force increases. This allows engine oil to flow into the control plunger. Accordingly, the control plunger moves rearward (axial direction) and rotates each camshaft in the camshaft rotation direction via helical gear. The camshaft position is detected by the intake camshaft position sensor and the exhaust camshaft position sensor and transmitted to ECM as a voltage signal.

ENGINE OIL PRESSURE REGULATION

The engine oil pressure is regulated via the engine oil pump valve in order to ensure an adequate oil supply and to lower the oil pressure if necessary (a saving on fuel)

CAMTRONIC SYSTEM



With the intake camshaft valve lift switchover ①, two-stage switchover of the cams occurs on the intake camshaft depending on the characteristics map. The intake valves close earlier due to the switchover of the camshaft to a shorter stroke. This leads to optimization of the throttle lift-off in partial load range. The valve lift switchover to the smaller cam stroke is performed in an rpm range of 1,000 to 4,000 rpm. The intake camshaft valve lift switchover actuator is actuated by the ECM by means of a pulse width modulated signal. A coil in the actuator is energized here and a tappet moves in a corresponding curved track on the camshaft. With the turning of the camshaft and the forming of the curved track, the camshaft is moved axially and the smaller cam affects the intake valves. A bump in the curved track has the effect of bringing the tappet back to the default position. To reset the camshaft to the long stroke, a second tappet moves in a corresponding curved track and the reset occurs in the same manner. The position finding of the tappets is over the intake camshaft valve lift switchover position sensor that sends a signal to the ECM for valve lift switchover. For structure and operation, refer to EC-48, "CAMTRONIC System".

Ⓐ : Tappet

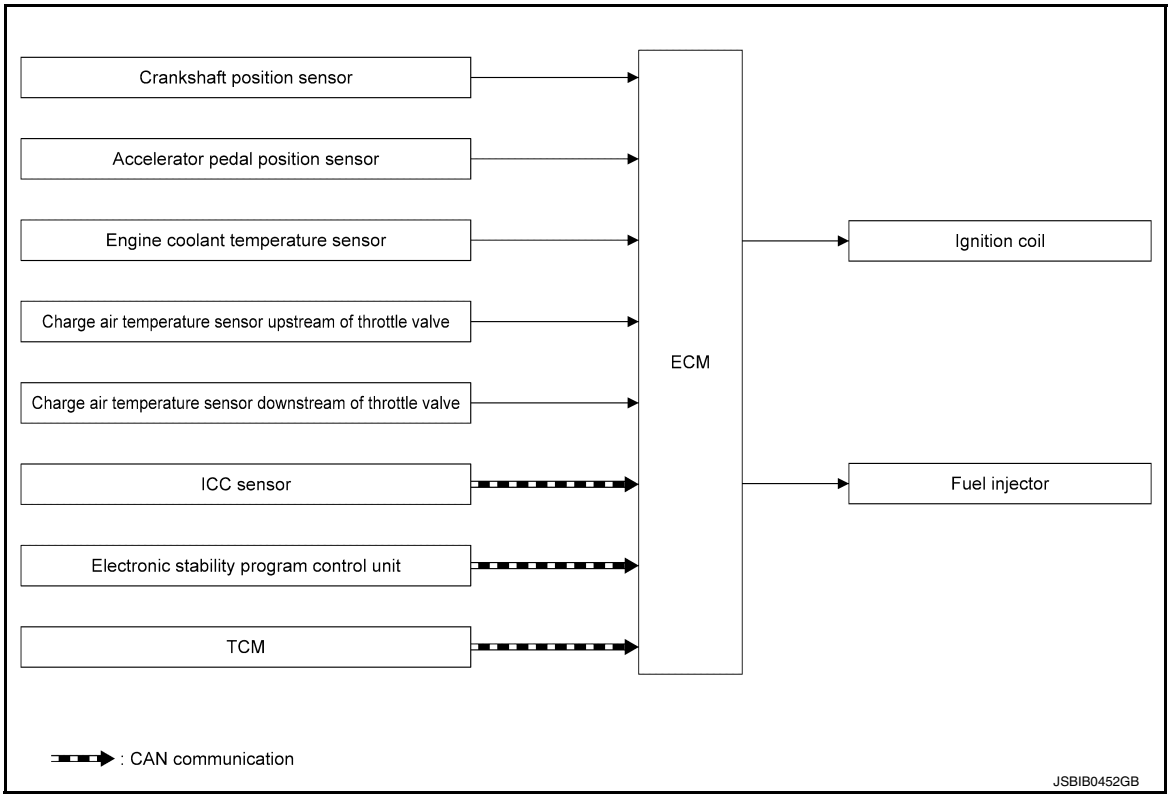
Ⓑ : Curved tracks

TORQUE CONTROL

TORQUE CONTROL : System Description

INFOID:0000000013607952

SYSTEM DIAGRAM



DESCRIPTION

ECM prioritizes requests from all systems performing engine torque request and adjusts torque (according to drivability and specified priorities). In addition, ECM determines the method of satisfying each request and adjusting torque.

ECM controls torque according to the following items.

- Accelerator pedal position sensor (Accelerator pedal effort)
- Electronic stability program control unit
- ICC sensor (ICC control)
- TCM (Transaxle control)
- Engine speed limit
- Vehicle speed limit
- Max torque limit

ECM adjusts torque according to the following controls.

- Injection time adjustment: for details, refer to EC-60, "INJECTION REGULATION CONTROL : System Description".
- Advance/retard angle of ignition timing adjustment (Torque varies quickly.): For details, refer to EC-64, "CAMSHAFT ADJUSTMENT FUNCTION : System Description".
- Synchronization of the injection and ignition order: For details, refer to EC-75, "FUEL SUPPLY CONTROL : System Description".

NOTE:

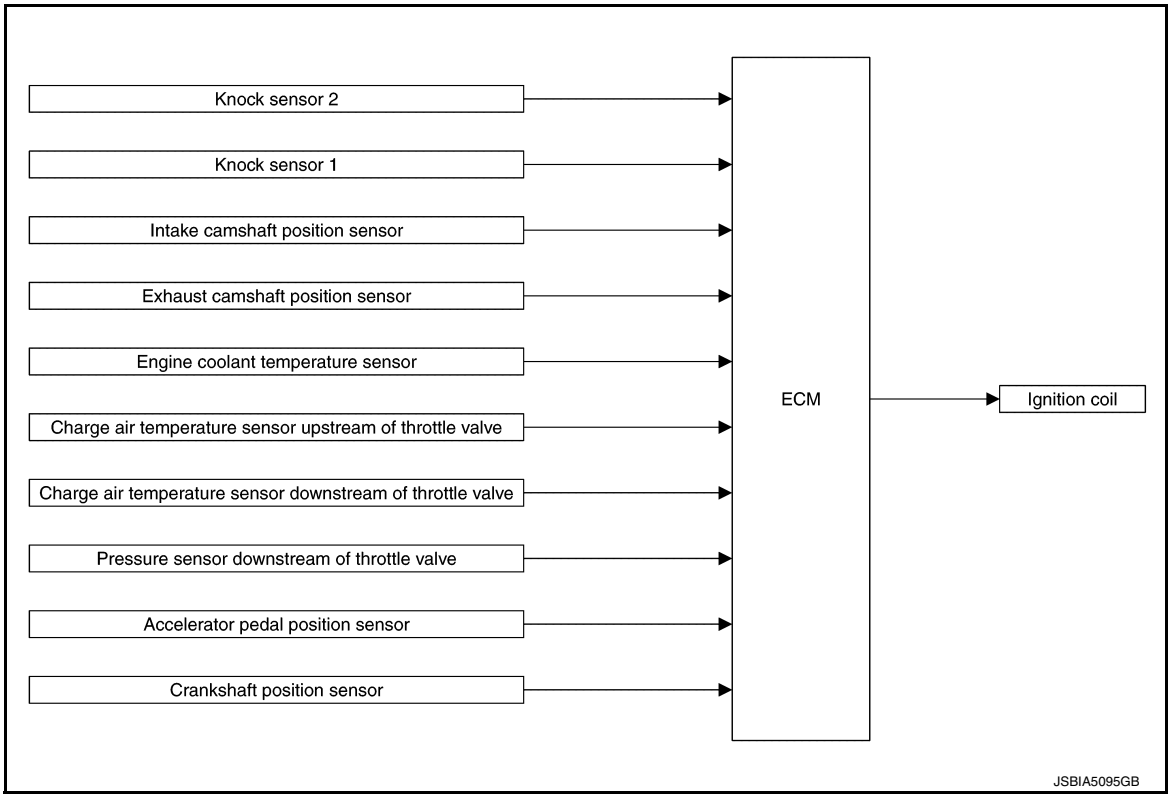
A torque reserve is achieved by extending the injection period, while simultaneously adjusting the ignition angle to retarded. This enriches the fuel/air mixture while also preventing any premature increase in torque through retarding the ignition timing of the ignition angle. Finally, any required increase in engine torque is achieved if necessary by timing advance of the ignition angle. This enables a fast and comfortable increase in torque.

KNOCK CONTROL

KNOCK CONTROL : System Description

INFOID:0000000013607953

SYSTEM DIAGRAM



DESCRIPTION

The knock control prevents the occurrence of knock caused by fuel quality and operating conditions and securely starts the engine. When knock occurs, the ignition timing of applicable cylinder is adjusted in retard direction.

ECM performs the knock control according to the following sensors and signals.

- Knock sensor 1 and 2
- Intake camshaft position sensor (intake camshaft position)
- Exhaust camshaft position sensor (exhaust camshaft position)
- Engine coolant temperature sensor
- Charge air temperature sensor upstream of throttle valve
- Charge air temperature sensor downstream of throttle valve
- Pressure sensor downstream of throttle valve (Engine load)
- Accelerator pedal position sensor (Load requirement from the driver)
- Crankshaft position sensor (Engine speeds and crankshaft position)

In addition, torque control conditions are added.

Knock control has control items and functions as follows.

- Ignition timing adjustment
- Knock control adjustment
- Functions for knock sensors malfunction

IGNITION TIMING ADJUSTMENT

If knock continues to occur, ignition timing is adjusted in retard direction until it reaches the maximum adjustment value. When knock stops occurring, the retard adjustment is returned in stages until normal characteristics map value is satisfied.

ECM adjusts ignition timing by cylinder according to input signals. When the knock sensor detects knock in the cylinders, the ignition timing of the applicable cylinder is adjusted in retard direction (according to engine speed), starting from consequent ignition.

If knock continues to occur relatively long, ECM decreases engine output to protect the engine.

KNOCK CONTROL ADJUSTMENT

The adjustment function of the knock control operates at coolant temperature 75°C (167°F) or more. Correction values of Ignition timing necessary at the occurrence of knock are continuously recorded by cylinder

together with data containing various engine operating conditions (engine load and engine speed).The optimum ignition timing can be immediately determined for each cylinder, based on the recorded data.

FUNCTIONS FOR KNOCK SENSORS MALFUNCTION

When there is no knock sensor signal, the ignition timing of all cylinders is adjusted in retard direction up to 15° (crankshaft angle) according to coolant temperature and engine speed. ECM deactivates the knock control and records malfunctions.

NOTE:

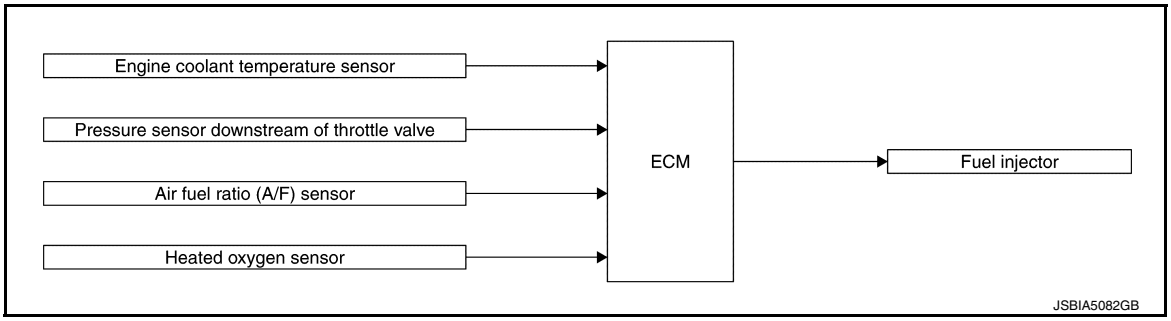
Ignition timing correction of the temperature management control and the knock control are controlled according to the characteristics map.

AIR-FUEL MIXTURE RATIO CONTROL

AIR-FUEL MIXTURE RATIO CONTROL : System Description

INFOID:0000000013607954

SYSTEM DIAGRAM



DESCRIPTION

The air-fuel mixture ratio control is performed when the following conditions are satisfied.

- During the engine is running
- Engine coolant temperature: Changes according to driving condition.
- Operating temperature of A/F sensor must be satisfied.
- The deceleration fuel shut-off function must be deactivated.

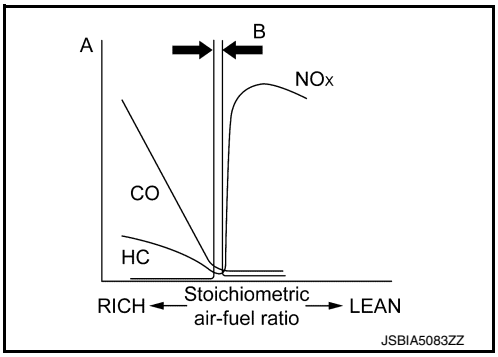
ECM performs control for satisfying the theoretical air-fuel ratio as much as possible to allow the catalyst to effectively purge exhaust gas.

ECM controls the air-fuel mixture ratio corrections according to the following sensors.

- Engine coolant temperature sensor
- Pressure sensor downstream of throttle valve (Engine load)
- Air fuel ratio (A/F) sensor
- Heated oxygen sensor

Effective purge of exhaust gas in the three way catalyst

A	: Content in exhaust gas
B	: Theoretical air-fuel ratio control range (near the catalyst)
CO	: Carbon monoxide
HC	: Hydrocarbon
NOx	: Nitrogen oxides



The air-fuel mixture ratio control has functions as follows.

- Air-fuel mixture ratio corrections closed-loop control
- A/F sensor control
- Sensor heater control
- Air-fuel mixture ratio corrections adjustment control
- Catalyst monitoring function

AIR-FUEL MIXTURE RATIO CORRECTIONS CLOSED-LOOP CONTROL

The air-fuel ratio sensor reacts to oxygen content in exhaust gas and transmits a signal corresponding to the oxygen content to ECM.

When air-fuel mixture is richer than the theoretical air-fuel ratio, the oxygen content in exhaust gas is low, and the A/F sensor transmits a rich signal to ECM. ECM controls the fuel injector to decrease fuel injection amount

and controls air-fuel mixture to the rich side. This allows the oxygen content in exhaust gas to increase and air-fuel ratio to approach the theoretical air-fuel ratio.
When air-fuel mixture is leaner than the theoretical air-fuel ratio, oxygen content in exhaust gas is high, and A/F sensor transmits a lean signal to ECM. ECM controls the fuel injector to increase fuel injection amount and controls air-fuel mixture to the rich side. This allows the oxygen content in exhaust gas to decrease and air-fuel ratio to approach the theoretical air-fuel ratio.
This process is constantly repeated (Loop Control). ECM slowly changes air-fuel ratio to prevent engine surge from occurring.

AIR FUEL RATIO SENSOR CONTROL

ECM monitors the function of A/F sensor and the performance of catalyst.
ECM controls the A/F sensor according to the following sensors.
- A/F sensor (Oxygen level in the upstream of the catalyst)
- Heated oxygen sensor (Oxygen level in the downstream of the catalyst)

ECM determines the mean value of air-fuel ratio corrections according to a signal from the heated oxygen sensor and compares the determined value with the ECM-stored theoretical air-fuel ratio for optimal exhaust gas. If the multiple measurements deviate from the theoretical air-fuel ratio, a correction value for air-fuel mixture ratio control is determined. With the use of the correction value (the value of a new A/F sensor: approximately 0), the deterioration in A/F sensor can be corrected within a specified limit. Correction values are influenced by the characteristics map and the fuel injection time controlled by ECM.
Possible malfunctions occurring during the generation of air-fuel mixture are as follows.
- Air suction in the exhaust system due to leakage from the upstream of the heated oxygen sensor.
- Fuel injector wear or carbon accumulation
- Malfunction in A/F sensor/heated oxygen sensor
- Malfunction in EVAP purge control valve
- Malfunction in partial load operation crankcase ventilation valve
- Engine-related wear (e.g. worn-out valve)

If a correction value is outside the specified limit or an A/F sensor/heated oxygen sensor signal is inappropriate, ECM transmits a malfunction indicator lamp (MIL) signal to the combination meter via CAN communication.

Sensor heater control

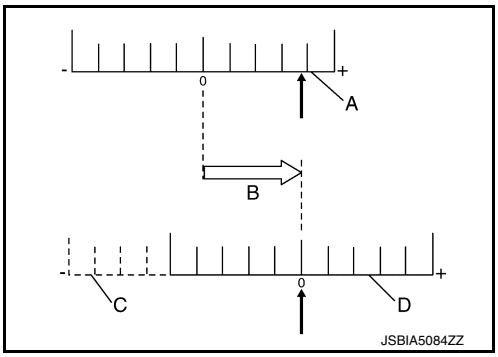
The A/F sensor heater and the heated oxygen sensor heater allow the sensors to reach the operating temperature faster. In addition, damage to the sensor ceramic part can be prevented by controlling the heat of sensor heaters. When the inside of exhaust pipe is extremely cold (e.g. due to the adhesion of water droplets), the sensor heaters turn OFF to prevent damage (heat shock) to sensors.

AIR-FUEL MIXTURE RATIO CORRECTIONS ADJUSTMENT CONTROL

Through the use of catalyst with the control function, the injection time is determined accurately by the air-fuel ratio correction control. This maintains the theoretical air-fuel ratio under any driving conditions.

SHIFTING OF THE AIR-FUEL MIXTURE RATIO CHARACTERISTICS MAP

A	: Control range of the air-fuel mixture ratio corrections factor
B	: Shifting of the air-fuel mixture ratio characteristics map
C	: Unadjusted air-fuel mixture ratio characteristics map
D	: Adjusted air-fuel mixture ratio characteristics map



When air-fuel mixture deviates from the control range all the time, ECM shifts the air-fuel mixture ratio characteristics map under the specified operating conditions until the air-fuel mixture ratio control factor becomes 0% again.

Catalyst monitoring function

Description
The catalyst stores oxygen when air-fuel mixture is lean (during air-fuel ratio correction loop control) and emits oxygen again for the HC conversion when air-fuel mixture becomes rich.
The catalyst oxygen storage capacity decreases due to aged deterioration, resulting in the decrease in conversion performance. For this reason, it is necessary to always monitor the catalyst deterioration status.

To monitor the oxygen storage capacity, ECM controls air-fuel mixture to the rich side until the value of the heated oxygen sensor reaches the maximum value. This removes most of the oxygen in the catalyst. After this, ECM controls air-fuel mixture to the lean side and measures the length of time required for the heated oxygen sensor value to reach the specified minimum value.
If the measured time is shorter than the stored specific time, ECM judges that the stored oxygen amount is insufficient and records it as an error.

COLD START MIXTURE ENRICHMENT CONTROL

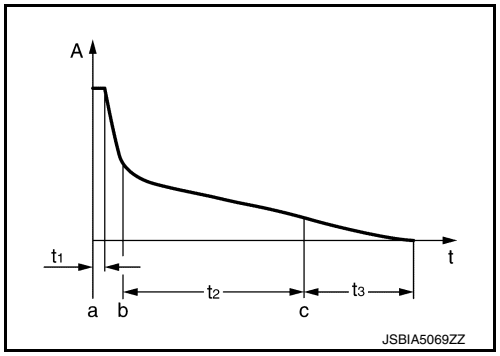
COLD START MIXTURE ENRICHMENT CONTROL : System Description

INFOID:0000000013607955

DESCRIPTION

ECM controls fuel-air mixture to the rich side to achieve quiet and stable engine revolution.

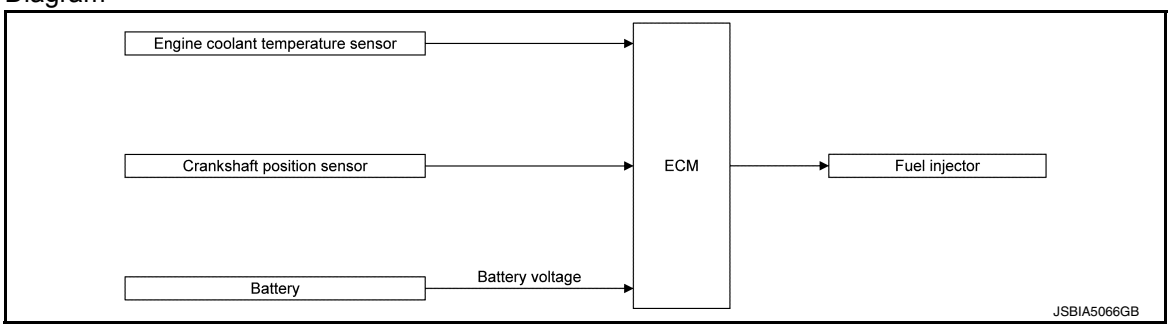
A	Enrichment rate
a	Start
b	Start of post-start enrichment
c	Start of warm-up enrichment
t	Time
t1	Starting mixture enrichment (Duration: 2 seconds)
t2	Post-start enrichment control [Duration e.g. 15 seconds at coolant temperature of 15°C (59°F)]
t3	Warm-up enrichment control (Duration depends on the coolant temperature)



Cold starting mixture enrichment control has functions as follows.
- Starting mixture enrichment control
- Post-start enrichment control
- Warm-up enrichment control

STARTING MIXTURE ENRICHMENT CONTROL

System Diagram



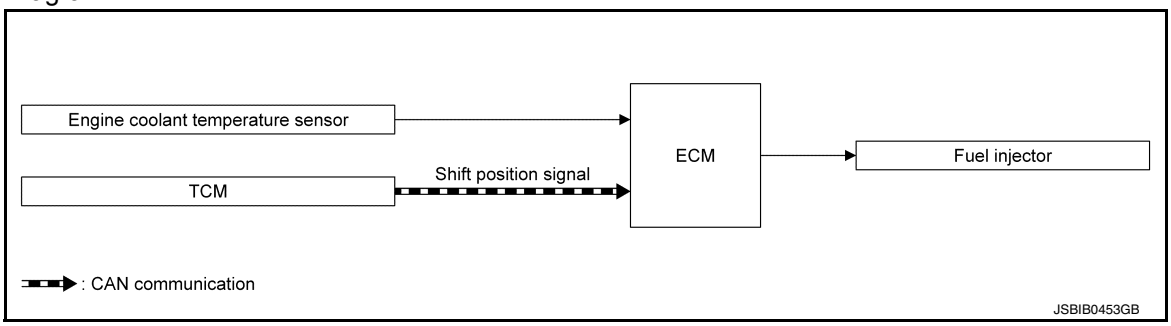
System Diagram

During cold start, ECM enables the injection of more fuel than normal start to perform a smooth engine start.
ECM calculates the injection time of the starting mixture enrichment control, based on the following sensors and signals.
- Engine coolant temperature sensor
- Crankshaft position sensor (Engine speeds, Crankshaft position)
- Battery (Battery voltage)

The starting mixture enrichment control continues operating until coolant temperature and engine speed exceed the specified value. Fuel injection time calculated by ECM decreases as the coolant temperature rises.In addition, fuel injection time changes, depending on battery voltage. ECM extends fuel injection time to achieve sufficient fuel injection when the battery voltage is low.

POST-START ENRICHMENT CONTROL

System Diagram



System Diagram

After a cold start, ECM adjusts air-fuel mixture to the rich side for smooth engine revolution. At this time, fuel condensed on the cold piston sliding surface vapors according to the rise in temperature.

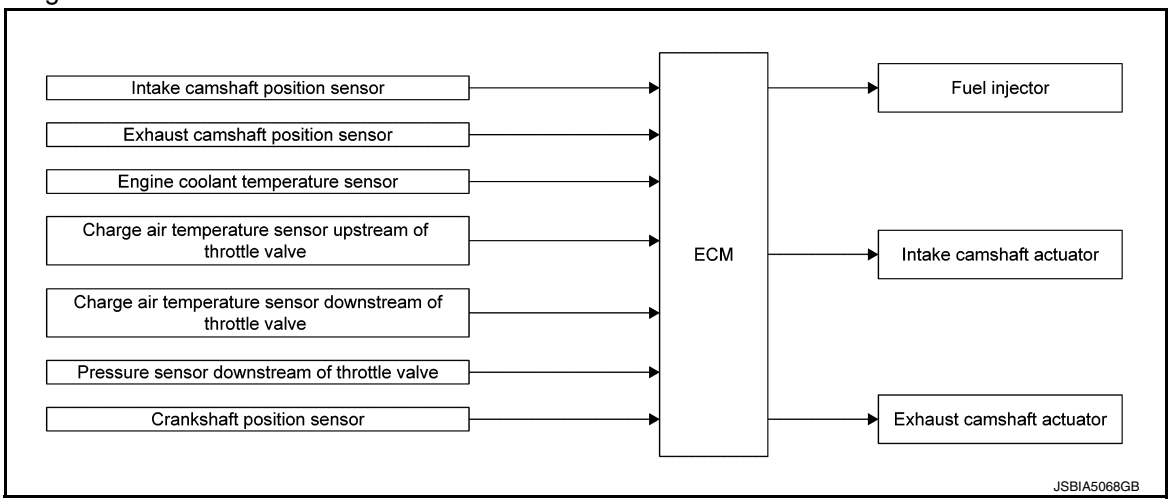
ECM calculates the injection time of the post-start enrichment control according to the following sensors and signals.

- Engine coolant temperature sensor
- TCM (Shift position)

ECM extends fuel injection time for injecting more fuel according to the characteristics map.

WARM-UP ENRICHMENT CONTROL

System Diagram



System Diagram

After the starting mixture enrichment control and the post-start enrichment control, air-fuel mixture continues being adjusted to the rich side by the warm-up enrichment control. Further increase in temperature evaporates fuel still-condensed on the piston sliding surface.

ECM calculates the injection time of the warm-up enrichment control according to the following sensors and signals.

- Intake camshaft position sensor (Intake camshaft position)
- Exhaust camshaft position sensor (Exhaust camshaft position)
- Engine coolant temperature sensor
- Charge air temperature sensor upstream of throttle valve
- Charge air temperature sensor downstream of throttle valve
- Pressure sensor downstream of throttle valve (Engine load)
- Crankshaft position sensor (Engine speeds, crankshaft position)

ECM extends fuel injection time for injecting more fuel according to the characteristics map. At this time, ignition timing is controlled according to the dedicated characteristics map. ECM allows exhaust gas to flow from the exhaust valve to the combustion chamber by controlling the intake camshaft actuator and the exhaust camshaft actuator for performing valve overlap. Accordingly, hot exhaust gas heats up the combustion chamber, and fuel evaporation is accelerated. This reduces increasing amount of fuel.

In the range of idle speed, fuel injection time is influenced mainly by coolant temperature at a startup. During low/medium load, fuel injection time is influenced by engine load.

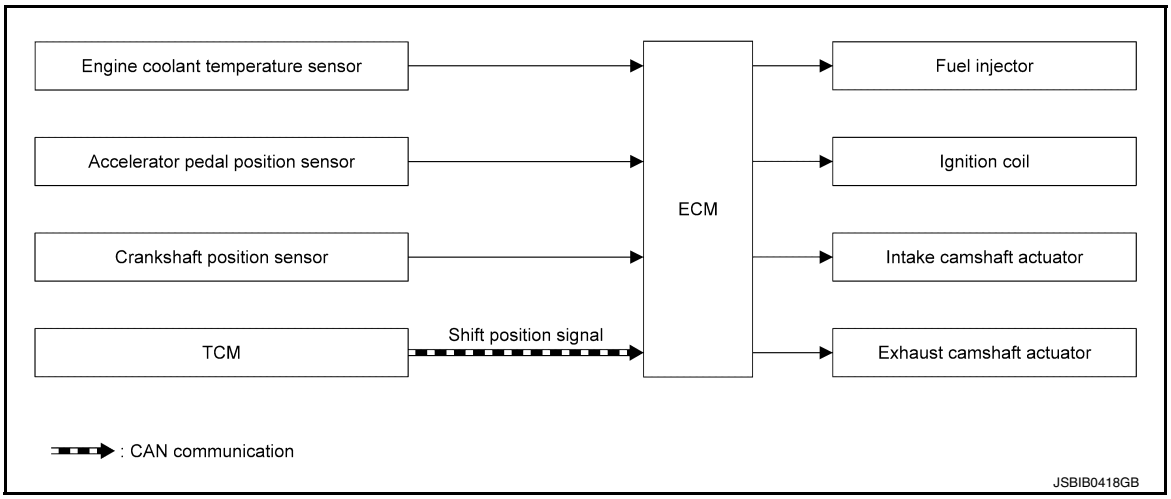
At the completion of the cold starting mixture enrichment control, the control is switched to the air-fuel ratio control to adjust fuel injection time.

DECELERATION FUEL SHUTOFF CONTROL

DECELERATION FUEL SHUTOFF CONTROL : System Description

INFOID:0000000013607956

SYSTEM DIAGRAM



DESCRIPTION

Deceleration fuel shut-off control is performed when the following conditions are satisfied.

- Engine is running
- Driving the vehicle
- When accelerator pedal is not depressed
- Selector lever is in D or R range
- ASCD mode: OFF
- Exhaust gas temperature: within specified value

Deceleration fuel shut-off control has advantages as follows.

- Improving engine brake effort
- Improving fuel efficiency
- Reduction in toxic exhaust gas

ECM controls the deceleration fuel shut-off according to the following sensors and signals.

- Engine coolant temperature sensor
- Accelerator pedal position sensor (Accelerator pedal position)
- Crankshaft position sensor (Engine speeds)
- TCM (Shift position)

When decelerating with the accelerator pedal not depressed, ECM turns OFF the fuel injector according to coolant temperature, shift position, and engine speed. In addition, ECM adjusts valve overlap to the minimum via intake camshaft actuator and exhaust camshaft actuator. This reduces toxic exhaust gas. After deceleration fuel shutoff control, ECM extends the injection time and temporarily controls air-fuel mixture to the rich side to remove excess oxygen from the catalyst addition, ECM adjusts ignition timing in retard direction to prevent a rapid torque increase when the combustion is restarted.

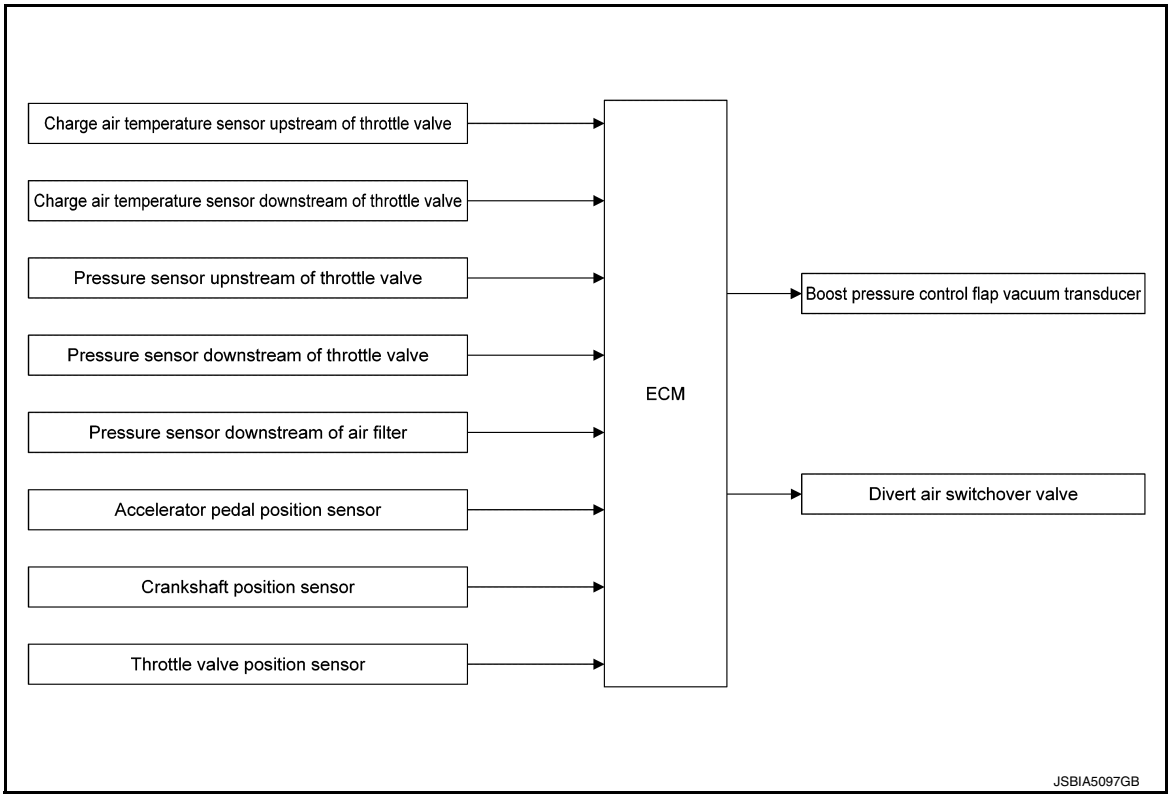
If exhaust gas has high oxygen content during deceleration, the catalyst may overheat due to accelerated oxidation of carbon monoxide and carbon hydrate. For this reason, ECM does not perform deceleration fuel shutoff control when exhaust gas temperature is too high.

CHARGE AIR CONTROL

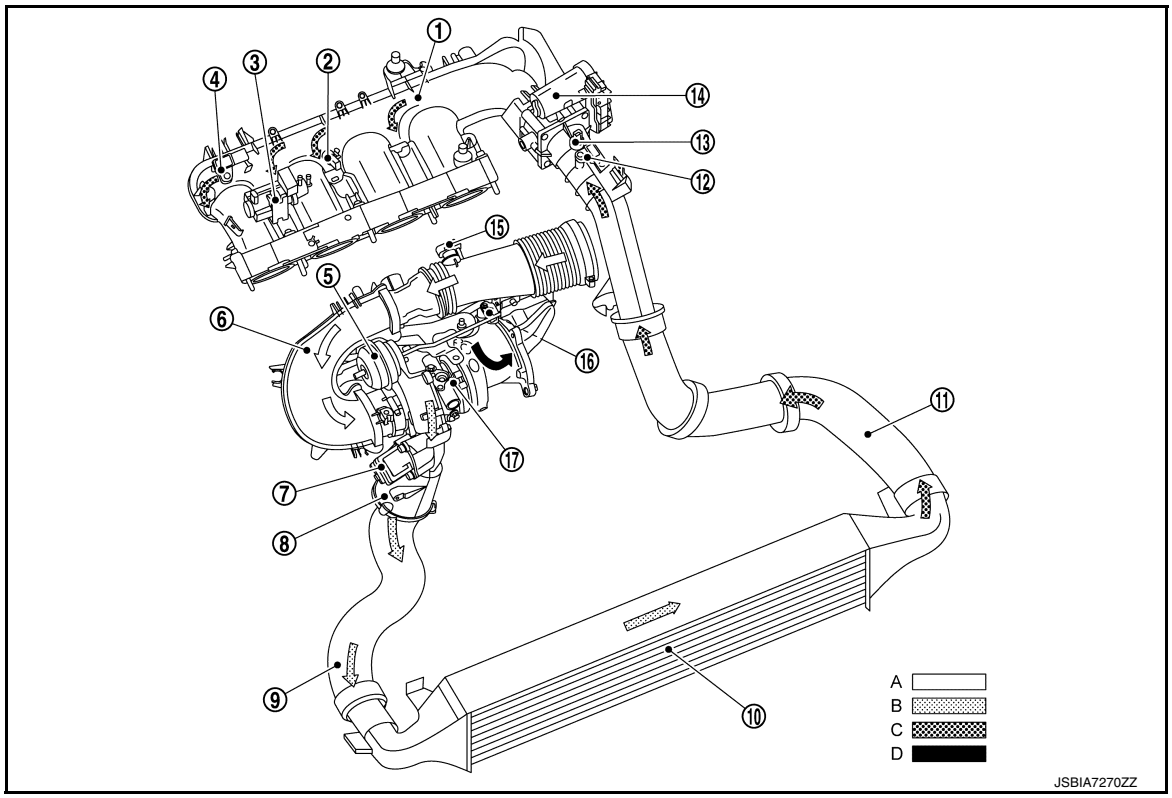
CHARGE AIR CONTROL : System Description

INFOID:0000000013607957

SYSTEM DIAGRAM



DESCRIPTION



① Charge air manifold	② Charge air temperature sensor downstream of throttle valve	③ Boost pressure vacuum transducer
④ Pressure sensor downstream of throttle valve	⑤ Boost pressure control flap vacuum actuator	⑥ Air duct
⑦ Divert air switchover valve	⑧ Noise damper	⑨ Charge air hose
⑩ Charge air cooler	⑪ Charge air hose	⑫ Pressure sensor upstream of throttle valve
⑬ Charge air temperature sensor upstream of throttle valve	⑭ Throttle valve actuator	⑮ Pressure sensor downstream of air filter
⑯ Boost pressure control flap	⑰ Turbocharger	
A Intake air	B Charge air (Uncooled)	C Charge air (Cooled)
D Exhaust gas		

The charge air control improves the maximum torque and maximum output by improving the efficiency of suction performed by supercharge. The turbocharger takes in ambient air through air cleaner by using the pressure energy of exhaust gas and rotating the turbine of turbocharger and sends the ambient air to the charge air manifold. When turbine speed increases and air flow grows, air in the pipe located upstream of the inter cooler is compressed and sent to the intercooler. Since the maximum boost pressure becomes 60 – 150 kPa (0.6 – 1.5 bar, 0.612 – 1.53 kg/cm^2, 8.7 – 21.75 psi) at this time according to the engine status and temperature rises, charge air is cooled by the intercooler to send to the boost distributor pipe.
The noise insulator reduces boost pressure variation and flow noise caused by sudden change in engine speed.
The charge air control has control items as follows.
- Charge air control
- Bypass air control

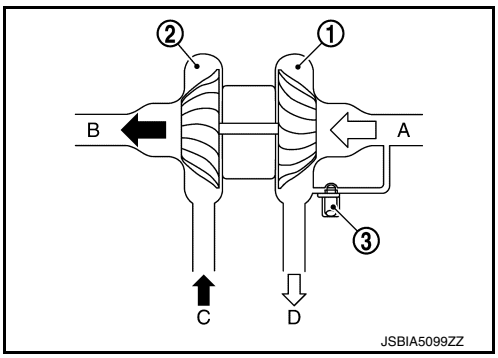
CHARGE AIR CONTROL

The charge air control is performed by the electropneumatic boost pressure control vacuum transducer. ECM controls the boost pressure control vacuum transducer and adjusts negative pressure placed on the boost pressure control flap vacuum actuator. ECM adjusts boost pressure by controlling the boost pressure control vacuum transducer according to the characteristics map and negative pressure.
ECM performs the charge air control, according to the following sensors, signals and control items.
- Charge air temperature sensor upstream of throttle valve
- Charge air temperature sensor downstream of throttle valve
- Pressure sensor upstream of throttle valve (boost pressure)
- Pressure sensor downstream of throttle valve (boost pressure)
- Pressure sensor downstream of air filter (intake air pressure)
- Accelerator pedal position sensor (load requirement from the driver)
- Crankshaft position sensor (engine speeds)
- Knock control
- transmission overload protective function
- Overheat protective function

Under the full load condition, the maximum boost pressure is formed. ECM controls the boost pressure control vacuum transducer to decrease the boost pressure. The transducer activates the boost pressure control flap vacuum actuator by using negative pressure of the vacuum pump and opens the boost pressure control flap via linkage.
Through this process, exhaust gas pressure placed on the turbocharger turbine is released to the catalyst, and consequently, turbine speed is reduced and boost pressure is weakened. As a result, boost pressure of 60 – 150 kPa (0.6 – 1.5 bar, 0.612 – 1.53 kg/cm^2, 8.7 – 21.75 psi) is controlled to a current engine load request, according to the engine condition.

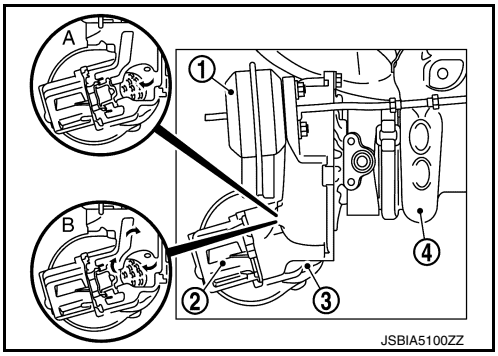
BYPASS AIR CONTROL

When in deceleration mode, the turbocharger rotates additionally due to the inertial mass of shaft, compressor, and turbine wheel ②. When the throttle valve quickly closes, the throttle valve upstream condition becomes low discharge rate and high charge rate, resulting in backflow of extra pressure to pressurized air. This places counter-rotating force on compressor wheel ①. (Brief beat noise and mechanical stress.) To prevent this pumping, ECM opens the divert air switchover valve ③ to release surplus pressure to the upstream of turbocharger.



A Intake air
B Exhaust gas
C From exhaust manifold
D To Throttle valve

When the engine is not running, the divert air switchover valve is closed because the diaphragm is pushed back by the spring built in divert air switchover valve ②. When in engine load mode, the divert air switchover valve is kept closed by the boost pressure- placed diaphragm. When the throttle valve is closed and ECM detects deceleration mode, ECM controls the divert air switchover valve. The diaphragm is turned down against spring force and boost pressure, and the divert air switchover valve is opened to release surplus pressure.
When the engine mode is switched from deceleration mode to load mode, the divert air switchover valve is not controlled anymore. The diaphragm is pushed back by the spring and boost pressure, and the bypass switchover valve is closed again.



① Boost pressure control flap vacuum actuator
③ Noise damper
④ Turbocharger
A Status: Closed
B Status: Opened

IGNITION OFF CONTROL

IGNITION OFF CONTROL : System Description

INFOID:0000000013607958

DESCRIPTION

First, turn the ignition OFF and then the engine stops and ECM is switched OFF.

FUNCTION SEQUENCE FOR IGNITION OFF

When ECM receives ignition switch OFF signal (i.e. cut off the ignition power supply), the following components is switched off and the processor power-down is started:
- Fuel injectors
- Ignition coil
- Fuel pump over the FPCM (Fuel Pump Control Module)

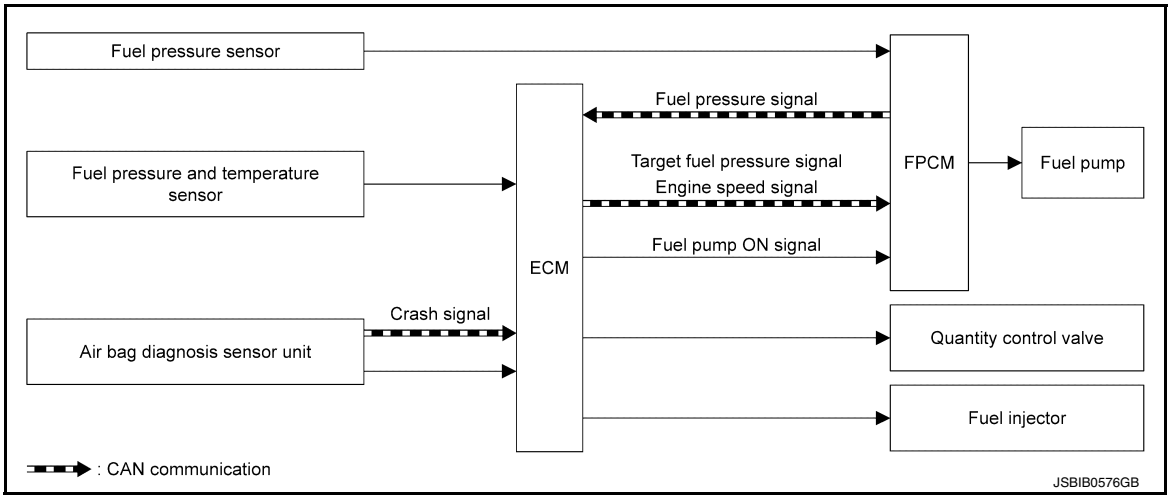
Processor power-down is determined by ECM and performed for approximately four seconds. Processor power-down may continue for a few minutes depending on a function, such as on-board diagnosis system and thermal management.
During processor power-down, System Test is performed by ECM and Malfunctioning Memory is updated.

FUEL SUPPLY CONTROL

FUEL SUPPLY CONTROL : System Description

INFOID:0000000013607959

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

The FUEL SUPPLY CONTROL includes circuits and functions as follow.

- Low pressure fuel circuit
- High pressure fuel circuit
- Fuel-shut off function

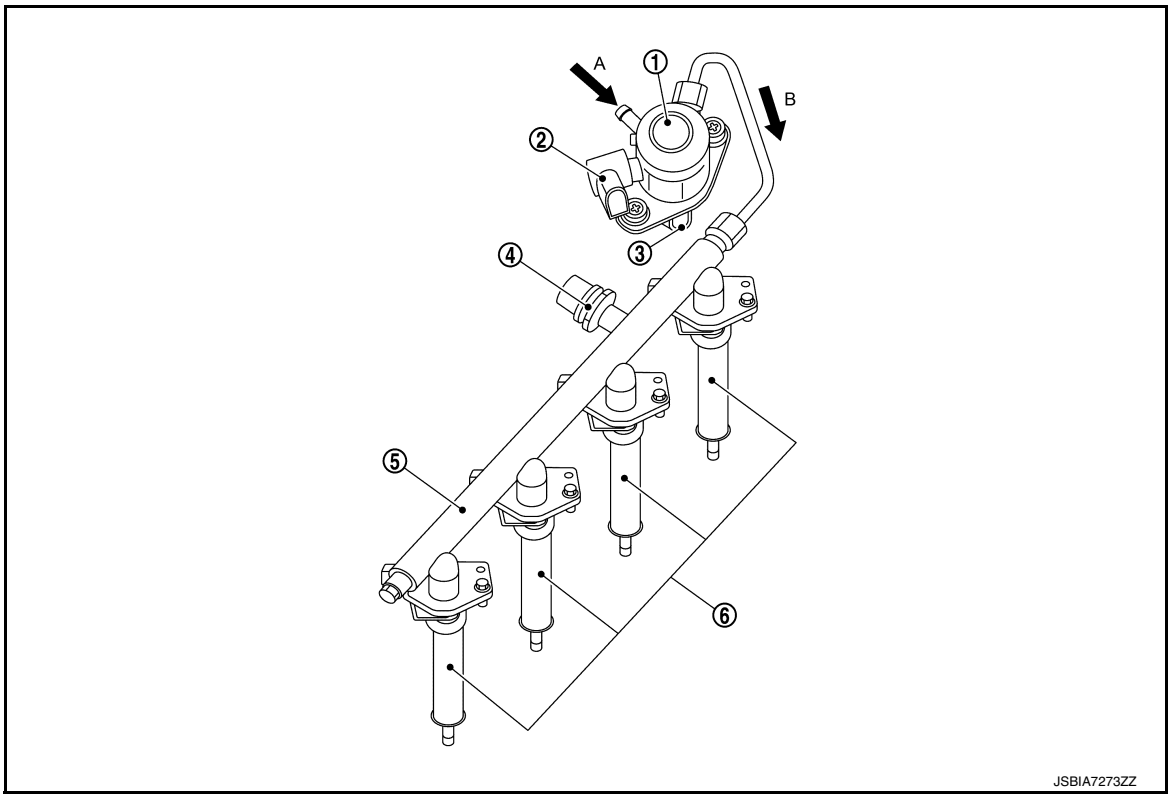
LOW PRESSURE FUEL CIRCUIT

The low pressure fuel circuit pumps fuel of pressure approximately 450 – 670 kPa (4.5 – 6.7 bar, 4.59 – 6.834 kg/cm^2, 65.25 – 97.15 psi) to the high pressure fuel pump from the fuel tank through the fuel filter under any conditions.The fuel pump control module (FPCM) controls fuel pump according to the following sensors and signals.

- Fuel pressure sensor (Fuel pressure in the low pressure fuel circuit)
- ECM (Target fuel pressure)

The fuel pump is activated when the fuel pump control module (FPCM) receives a fuel pump ON signal from ECM. FPCM evaluates current fuel pressure according to a voltage signal from the fuel pressure sensor and sends the information to ECM via drivetrain CAN communication. ECM calculates a target fuel pressure based on fuel pressure and load requirement and transmits a target fuel pressure signal to FPCM via drivetrain CAN communication. FPCM controls the fuel pump so that the target fuel pressure can be satisfied. The fuel pressure is limited to a maximum of 700 kPa (7 bar, 7.14 kg/cm^2, 101.5 psi) by the fuel pressure regulator.

HIGH PRESSURE FUEL CIRCUIT



①	High pressure fuel pump	②	Quantity control valve	③	Drive plate
④	Fuel pressure and temperature sensor	⑤	Fuel rail	⑥	Fuel injector
A	Fuel feed from fuel tank (low pressure fuel)	B	Fuel feed to the rail (high pressure fuel)		

ECM controls fuel rail pressure by controlling the quantity control valve according to a signal transmitted from the fuel pressure and temperature sensor and adjusting fuel pressure necessary to the direct injection in the high pressure circuit to approximately 20 MPa (200 bar, 204 kg/cm^2, 2,900 psi).
The high pressure fuel pump pressurizes fuel sent from the fuel pump up to approximately 20 MPa (200 bar, 204 kg/cm^2, 2900 psi) and pumps the pressurized fuel to the fuel rail. In addition, the high pressure fuel pump has a fuel pressure damper to control pressure fluctuation occurring at rapid acceleration, contributing to the reduction in fuel fluctuation. Since the high pressure fuel circuit does not have a return circuit, the pressure increases up to 27 MPa (270 bar, 275.4 kg/cm^2, 3,915 psi) due to temperature rise in the high pressure fuel circuit after engine stop or in deceleration mode. The pressure drops to 13 MPa (130 bar, 132.6 kg/cm^2, 1,885 psi) only at vehicle standstill and for a selector lever position “N” or “P” in order to reduce the noise emissions from the fuel system high pressure pump.In the case of shutting off a vehicle with a hot engine, the fuel pressure can increase up to 25 – 26.7 MPa (250 – 267 bar, 255 – 272.34 kg/cm^2, 3,625 – 2,871.5 psi) in the fuel high pressure circuit. Upon reaching this threshold a valve opens in the fuel system high pressure pump and the pressure is reduced. Upon starting the engine the pressure falls rapidly to the normal operating pressure of about 20 MPa (200 bar, 204 kg/cm^2, 2,900 psi).
During regulation of the fuel high-pressure circuit one differentiates between the following operating conditions.
- Start
- Normal mode
- Low-pressure limp-home mode (fuel high pressure is not reached)
- Stop

Start
- The quantity control valve is energized and closed, so there is full delivery from the fuel system high pressure pump and rapid pressure buildup.
- Fuel pump pressure is approx. 450 – 670 kPa (4.5 – 6.7 bar, 4.59 – 6.834 kg/cm^2, 65.25 – 97.15 psi).

Normal mode
- The quantity control valve regulates the supplied and the required fuel quantity over the duty cycle.
- Fuel pump pressure is dependent on the fuel temperature between approx. 300 – 550 kPa (3 – 5.5 bar, 3.06 – 5.61 kg/cm^2, 43.5 – 79.75 psi).
- The fuel predelivery pressure is dependent on the engine speed and fuel temperature and varies between 450 – 670 kPa (4.5 – 6.7 bar, 4.59 – 6.834 kg/cm^2, 65.25 – 97.15 psi) (absolute).

Low-pressure limp-home mode (fuel high pressure is not reached)
- The quantity control valve is deenergized and therefore opened.
- Fuel pump pressure about 450 – 670 kPa (4.5 – 6.7 bar, 4.59 – 6.834 kg/cm^2, 65.25 – 97.15 psi), fuel flows over the open quantity control valve into the rail.
- Actuation of fuel injectors extended.
- Reduced performance, max. speed approx. 70 km/h (43.49 MPH).

Stop
- Quantity control valve is deenergized and opened.
- Fuel pump not actuated.

THE FUEL-SHUT OFF FUNCTION

The fuel-shut off function secures occupant's safety.
ECM or FPCM controls the fuel-shut off function according to the following sensors and signals.
- Throttle position sensor 1 and 2 (Throttle valve position)
- ECM (Engine speed)
- Supplemental restraint system control unit (direct crash signal)

ECM or FPCM performs the fuel shut-off function when detecting the conditions below.
- Mechanical malfunction in throttle position sensor 1 and 2
- Abnormal engine speed signal
- Crash signal

Mechanical Malfunction in Throttle Valve Actuator
When detecting a mechanical malfunction in the throttle valve according to signals from throttle position sensor 1 and 2, ECM controls the operation of the fuel injector and controls engine speed as follows.
- At idle: 1,400 rpm
- At driving: 1,800 rpm

Abnormal Engine Speed Signal
FPCM controls the operation of the fuel pump when an engine speed signal is not transmitted from ECM.

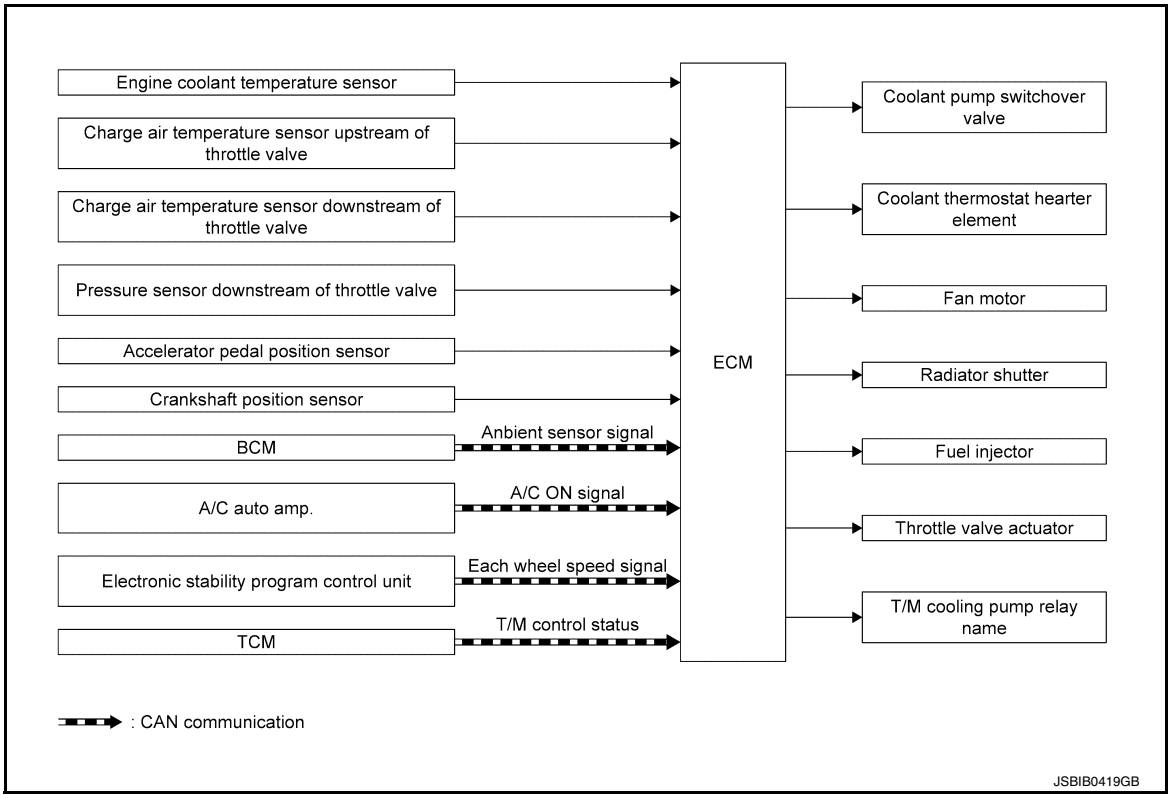
Crash signal
If the ECM receives a crash signal indirectly via the CAN communication or directly from the air bag diagnosis sensor unit, it switches off the fuel pump over the fuel system control unit and the quantity control valve, and briefly actuates the fuel injectors to depressurize the fuel pump. After air bag has deployed, ECM inhibits the engine from starting. To cancel the engine start inhibition, perform "Enabling of engine start after crash event" in Work Support of CONSULT. Refer to EC-199, "Description".

THERMAL MANAGEMENT CONTROL

THERMAL MANAGEMENT CONTROL : System Description

INFOID:0000000013607960

SYSTEM DIAGRAM



DESCRIPTION

ECM controls engine coolant temperature by the thermal management control.
For details of engine coolant circuit, refer to CO-6, "Engine Cooling System Schematic".
The thermal management control has advantages as listed below.
- Enhancing warm-up
- Reducing toxic exhaust gas
- Improving fuel economy
- Increasing comfort of air condition

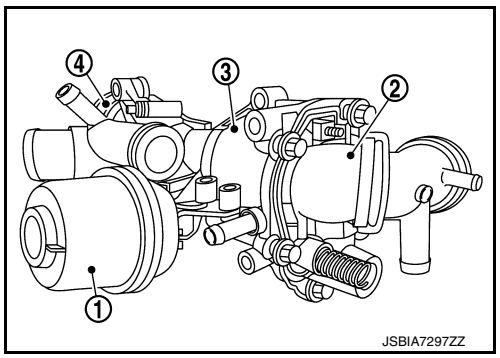
In the partial function “Oil cooling system with gear oil heat exchanger function” the function of the following components is described in more detail:
- Transmission cooling coolant circulation pump relay
- Transmission cooling coolant circulation pump

ECM controls engine coolant temperature according to the following sensors and signals.
- Engine coolant temperature sensor
- Charge air temperature sensor upstream of throttle valve
- Charge air temperature sensor downstream of throttle valve
- Pressure sensor downstream of throttle valve (engine load)
- Accelerator pedal position sensor
- Crankshaft position sensor (engine speeds)
- A/C auto amp. (ambient temperature and A/C status)
- Electronic stability program control unit (each wheel speed)
- TCM (A/T oil temperature status)

The thermal management control has following control items and function.
- Control after start
- Coolant thermostat control
- Overheat protection function
- Cooling fan motor control

CONTROL AFTER START

After engine start, ECM turns ON the coolant pump switchover valve to turn OFF the coolant pump. This stops the coolant circulation.
ECM controls the coolant switchover valve to adjust negative pressure on the vacuum actuator ① installed to the coolant pump. Via the vacuum actuator rod, ball rotary valve ② is closed allowing the coolant flow to be stopped. This stops coolant to flow to the cylinder head.



③ Coolant pump housing
④ Belt pulley

When all of the following conditions are satisfied, ECM performs the cold start control to deactivate the coolant pump.
- Engine coolant temperature: 85°C (185°F) or less
- Charge air temperature: below threshold limit
- Engine speeds: 4,000 rpm or less
- No heater request from A/C auto amp.

When coolant pump stop conditions are not satisfied, ECM turns OFF the coolant pump switchover valve. Negative pressure on the coolant pump switchover valve is ventilated through the air vent. The spring force returns the ball rotary valve in the direction flowing coolant. This turns ON the coolant pump, allowing coolant circulation again.

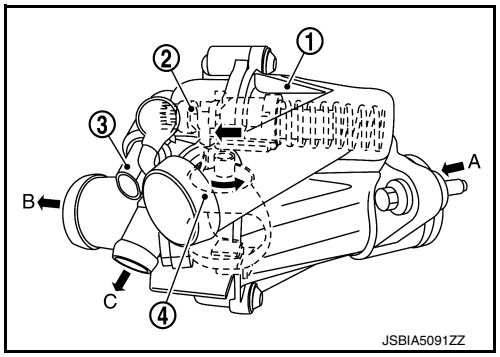
Coolant Thermostat Control

Reacting to coolant temperature, wax in the wax element expands or contracts. This opens and closes the ball rotary valve in the coolant thermostat housing. [Temperature range: approx. 98 – 108°C (208.4 – 226.4°F)] Furthermore, by distributing power to the coolant thermostat heater element, the ball rotary valve is opened and closed according to engine requests. ECM controls the thermostat heater element by closing the circuit according to the operating conditions (characteristics map).The coolant thermostat operates as follows, according to coolant temperature and control performed by ECM.
- Close
- Start opening (mix mode)
- Open (cooler mode)

Close

The ball rotary valve is closed under the following conditions.
- Engine coolant temperature: 95°C (203°F) or less
- Coolant thermostat heater element: No power distribution
- No full load request

In the closed position, coolant circulates in the engine. Coolant flows to the heater core, if necessary, but not to radiator. This increases coolant temperature rapidly and accelerates warm-up, improving fuel economy and reducing toxic exhaust gas.

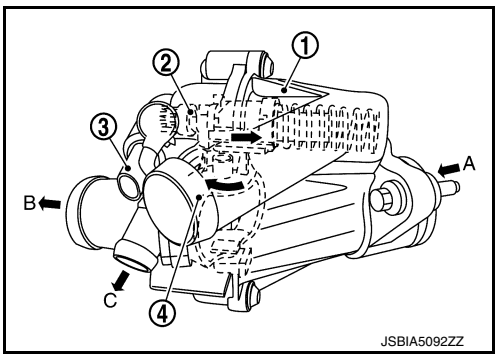


① Coolant thermostat housing
② Wax element
③ Coolant thermostat heater element
④ Ball rotary valve
A From engine
B To radiator
C To heater heat exchanger

Start Opening (Mix mode)

The ball rotary valve opens according to the following conditions.
- Engine coolant temperature after engine start (no full load request): reaches 98°C (208.4°F)
- Coolant thermostat heater element: power distribution

In the range of coolant temperature approximately 98°C – 108°C (208.4°F – 226.4°F), the wax in wax element ② is expanded or the wax element is heated by distributing power to coolant thermostat heater element ③. This opens ball rotary valve ④ and coolant flows to the radiator. The degree of the opening of ball rotary valve changes according to wax temperature or coolant temperature. This adjusts the coolant flow to the radiator.



① Coolant thermostat housing
A From engine
B To radiator
C To heater heat exchanger

Open (Cooler Mode)
When coolant temperature is 108°C (226.4°F) or more, the ball rotary valve opens fully, allowing the maximum amount of coolant to flow to the radiator.
When coolant temperature is 85°C (185°F) or more under the full load request condition, ECM fully opens the ball rotary valve by controlling the thermostat heater element to heat the wax element. Accordingly, the maximum amount of coolant flows to the radiator.
Under the following conditions, coolant temperature is adjusted to prevent it from reaching the hazardous temperature range.
- Intake air temperature: 38°C (100.4°F)
- Engine speeds: 3,000 rpm or more
- Engine load: 30%

ECM circulates coolant to the radiator to lower the coolant temperature by controlling the coolant thermostat heater element and opening the ball rotary valve according to ambient temperature. When ambient temperature is less than 12°C, ECM adjusts coolant temperature at approximately 90°C (194°F). When ambient temperature is 12°C (53.6°F) or more, ECM adjust coolant temperature at approximately 80°C (176°F).

OVERHEAT PROTECTION FUNCTION

The overheat protection function protect the engine and catalyst from damage caused by overload heat.
The overheat protection function performs following controls.
- Characteristics map-dependent ignition timing adjustment towards retard angle direction, as of a coolant temperature at approximately 90°C (194°F) and the ambient temperature at 20°C (68°F)
- Reduced opening of the throttle valve actuator
- Shortening of the injection time of the fuel injectors according to the lower air mass
- Full opening of the ball rotary valve in coolant thermostat

If the coolant temperature is too high, a warning message is shown in the information display on the combination meter. To do this, the ECM sends a corresponding signal via CAN to the electronic ignition lock control unit and CAN to the combination meter.

COOLING FAN MOTOR CONTROL

ECM controls the A/C auto amplifier and cooling fan motor. At this time, the reference revolution of the cooling fan motor is controlled by a PWN signal from ECM.
The cooling fan motor operates according to the duty cycle of PWM signal from ECM as follows.
- 10%: Cooling fan motor OFF
- 20% Cooling fan motor ON (minimum speeds)
- 90%: Cooling fan motor ON (maximum speeds)

When abnormal control occurs, the cooling fan motor operates at the maximum speed.

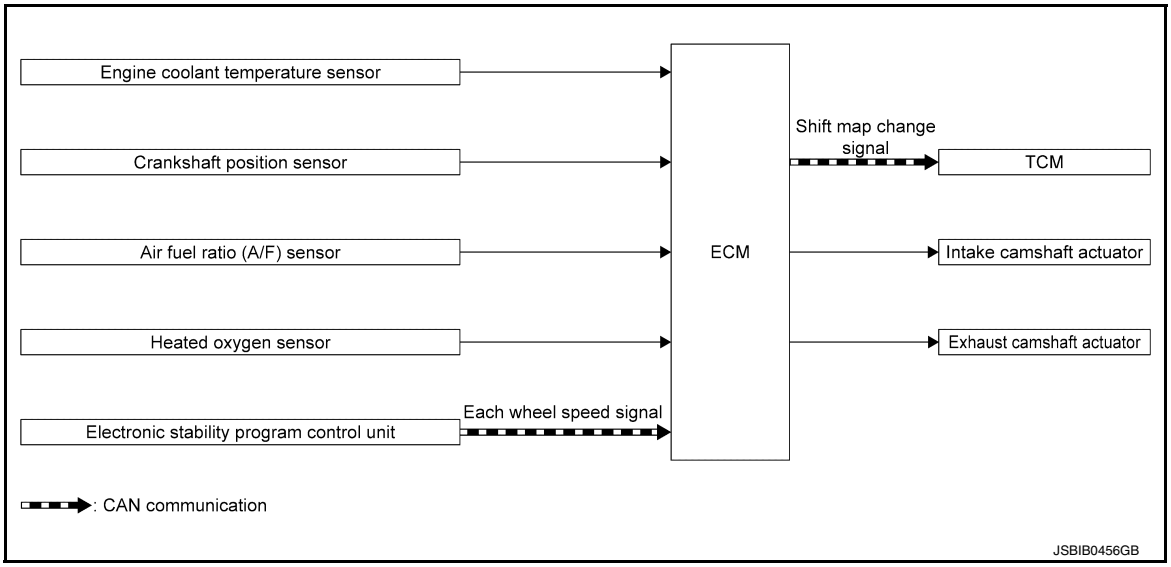
Cooling Fan Operation After Engine Stop
If coolant temperature or engine oil temperature (calculated from reference temperature) is outside the threshold when the key is turned OFF, the fan motor is activated for 5 minutes at the maximum. At this time, the duty cycle of PWM signal is 40% at the maximum. If the battery voltage level is too low, the fan motor is not activated.

EXHAUST TREATMENT FUNCTION

EXHAUST TREATMENT FUNCTION : System Description

INFOID:0000000013607961

SYSTEM DIAGRAM



DESCRIPTION

The exhaust treatment function reduces the following exhaust emissions included in exhaust gas.

- Nitrogen oxide (NOx)
- Carbon hydrate
- Carbon monoxide

To reduce exhaust emissions, it is necessary to quickly raise catalyst temperature to the operating temperature especially when performing cold start.

NOTE:

ECM controls the solenoid actuators of intake camshaft and exhaust camshaft and determines valve overlap. Exhaust gas recirculation rate is controlled by interior EGR.

The exhaust treatment function has a control item and functions as follows.

- Three way catalyst function
- Shift performance curve control
- Catalyst efficiency monitor function

THREE WAY CATALYST FUNCTION

Exhaust emissions emitted from engine cause chemical change (conversion) the most effectively when having the theoretical air-fuel ratio by three-way catalyst. Due to the oxidation, carbon monoxide changes to carbon dioxide and hydrocarbon changes to water and carbon dioxide. Nitrogen oxides changes to nitrogen and carbon dioxide by the reduction.

SHIFT PERFORMANCE CURVE CONTROL

The shift performance curve control performs when the following conditions are satisfied.

- Engine coolant temperature at starting: 50°C (122°F) or less
- Vehicle speed: 53 km/h (32.9 MPH) or less

The shift performance curve control is performed to raise the temperature of catalyst to the operating temperature in a short period of time after engine start.

ECM requests TCM to change shift performance curves according to the following sensor and signal.

- Engine coolant temperature sensor
- Electronic stability program control unit (each wheel speed)

The shift performance curve control works only electrically and operates for 160 seconds at a maximum. ECM requests TCM to change shift performance curves via drivetrain CAN communication. For low or medium load state, gear shifting is performed when engine speed is higher or vehicle speed is faster.

CATALYST EFFICIENCY MONITOR FUNCTION

The catalyst efficiency monitor function is performed when the following conditions are satisfied.

- The three way catalyst temperature is in operating temperature range
- The air-fuel ratio correction control satisfies the operating conditions

The catalyst efficiency monitor function that the air-fuel ratio correction control satisfies the operating conditions monitors the degree of deterioration in catalyst and that of hydrocarbon conversion according to the oxygen adsorption rate of catalyst.
ECM monitors the catalyst efficiency according to the following sensors.
- Crankshaft position sensor (Engine speeds)
- Air-fuel ratio (A/F) sensor
- Heated oxygen sensor

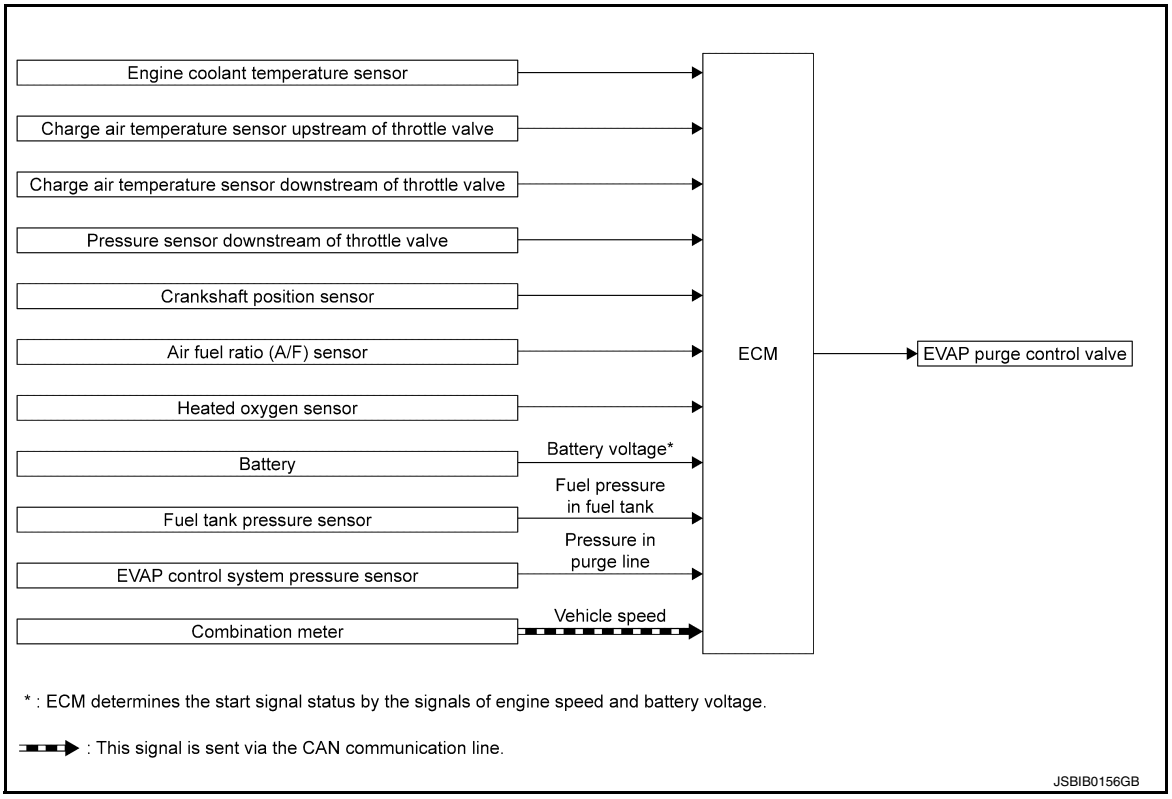
NOTE:
Oxygen of the catalyst is stored when air-fuel mixture is lean and reduced when air-fuel mixture is rich.
Due to high oxygen adsorption amount of the three-way catalyst, exhaust emissions decrease, and accordingly, oxygen content in the downstream of catalyst becomes almost steady. Accordingly, the signal amplitude of the O2 sensor is reduced and almost steady.
When the three-way catalyst reaches the operating temperature and the air-fuel ratio correction starts, the signal amplitude of air-fuel ratio sensor upstream of the three-say catalyst is compared to that of the O2 sensor downstream of the three-way catalyst. When three-way catalyst does not function, the signal amplitude of air-fuel ratio sensor and O2 sensor becomes equal. Multiple measurements are performed in the low load area within the specified engine speeds. ECM compares the measurement results with the characteristics map. When a malfunction is detected in the catalyst based on the comparison, ECM requests the combination meter to turn ON the malfunction indicator lamp (MIL) and records the malfunction.

EVAPORATIVE EMISSION SYSTEM

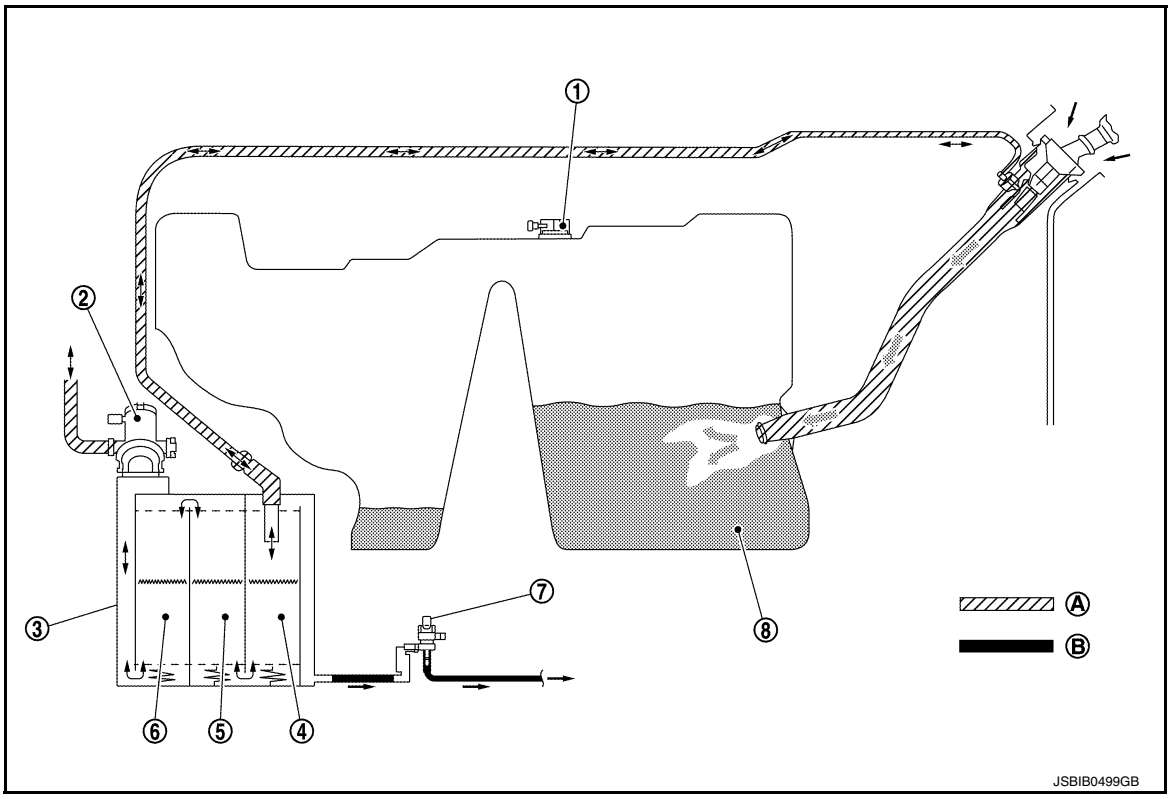
EVAPORATIVE EMISSION SYSTEM : System Description

INFOID:0000000013607962

SYSTEM DIAGRAM



SYSTEM DESCRIPTION



① Fuel tank pressure sensor	② EVAP canister vent control valve	③ EVAP canister
④ Activated EVAP canister chamber 1	⑤ Activated EVAP canister chamber 2	⑥ Activated EVAP canister chamber 3
⑦ EVAP purge control valve	⑧ Fuel tank	
Ⓐ Aeration and vent line	Ⓑ Purge line	

PURGINE SYSTEM WITH LEAK TEST FUNCTION

Purge System Function Requirements with Leak Test, General

The evaporative emission (EVAP) system performed the control when the following conditions are satisfied.

- Stop the vehicle at idle
- Shifting to D or R range (from TCM)
- Blocking time after engine start elapsed (approx. 3 minutes) or self adjustment of the mixture formation occurs
- Intake air temperature via charge air temperature sensor upstream of throttle valve less than 45°C (113°F)
- Lambda control released
- Coolant temperature over coolant temperature for engine start less than 100°C (212°F)
- Air pressure more than 78 kPa (0.795 kg/cm^2, 10.87 psi) (which means that no test takes place above an altitude of about 2500 meters)
- Low loading of activated EVAP canister
- Fuel level in fuel tank between of about 1/4 and 3/4, signal (from BCM)
- No malfunction on sensor element of heated oxygen sensor
- No malfunction on sensor element of Air fuel ratio (A/F) sensor
- No malfunction in EVAP canister vent control valve
- No malfunction on fuel level sensor indicator
- No malfunction in the EVAP purge control valve
- Battery voltage more than 11 V

Purge System with Leak Test, General

The legislator requires that no fuel vapors reaches the open air.

The leak test for the evaporative emission control system must take place in three stages (function chain) and recognizes the following leak:

- Gross leak (a leak the same or greater than a 2.5 mm dia.)
- Fine leak (a leak the same or greater than a 1 mm dia.)

• Very fine leak (a leak the same or greater than a 0.5 mm dia.)

Purge System with Leak Test, Function Sequence

The function sequence is subdivided into the following steps:

• Function sequence for gross leak-fine leak check
• Function sequence for gross leak-very fine leak check

Function Sequence for Gross Leak-Fine Leak Check

Function sequence for gross leak-fine leak checkTo check for a gross leak the activated EVAP canister vent control valve closes and the EVAP purge control valve opens. The vacuum in the intake manifold reaches the fuel tank. Vacuum then builds up in the fuel tank, and is measured by the fuel tank pressure sensor. If no vacuum builds up in the fuel tank (approx. -6 mbar within approx. 12 seconds) there is a major leak (e.q. tank cap open, hose line loose).The test will be interrupted and the error Gross Leak stored in the malfunction memory.If the ECM recognizes a system which has a gross leak, the fuel reserve warning lamp is actuated in combination meter.The additional message CHECK FILLER CAP is output in the malfunction display if a refueling volume of > 25 l is detected. Otherwise only the error Gross Leak is saved in the malfunction memory.While checking for fine leaks, a vacuum of about -6 mbar is built up again and the system is made air proof. The vacuum is them measured for approx. 30 seconds. The vacuum must not reduce more rapidly than 0.3 to 0.5 mbar per second (depends on fuel level). If the vacuum drops more rapidly, there is a fine leak.The test will be interrupted and the error Fine Leak is stored.

NOTE:

If no leak can be found, although a Gross Leak malfunction is indicated (if the leak diameter is more than 2.5 mm, there should be a loud hiss), replace the fuel tank pressure sensor.

Function Sequence for Gross Leak-Very Fine Leak Check

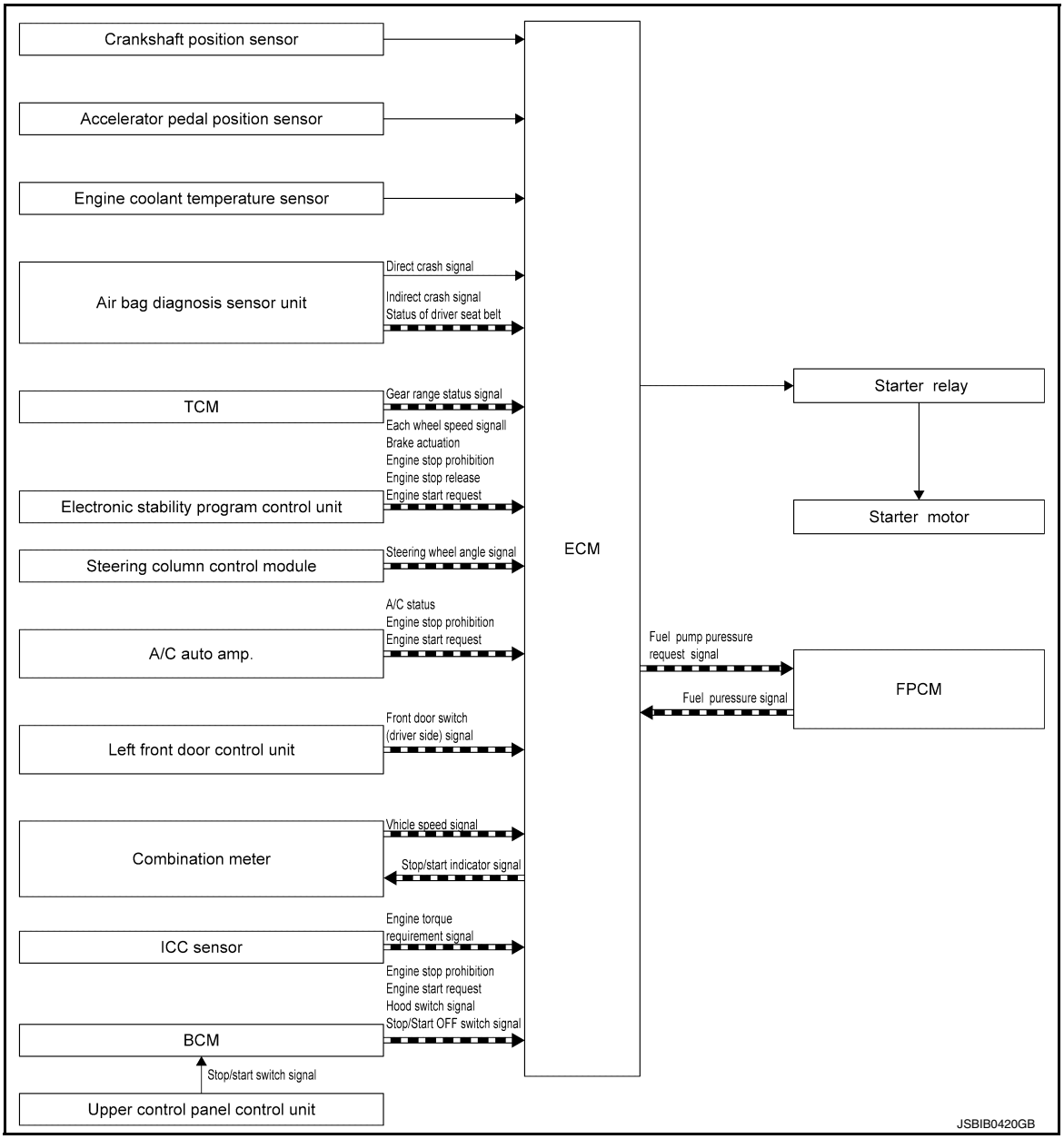
If no Fine Leak has been detected, purging is briefly enabled and a vacuum of about -6 mbar is then built up again. In a closed system, the vacuum must not drop faster than 0.10 to 0.15 mbar per second (depending on fuel level). If the vacuum dissipates more rapidly, the Very Fine Leak malfunction is stored.The reduction in vacuum depends on the fuel level in the fuel tank and on fuel outgassing. Fuel outgassing is measured shortly before fuel tank pressure sensor is checked, and taken into account for malfunction indication.The activated EVAP canister vent control valve is reopened after the tests.The test for fine and very fine leaks is aborted if an excessive lean correction of the lambda control takes place during the buildup of the vacuum.The function of the EVAP purge control valve is checked at the same time by the activation. If the closed EVAP purge control valve jams, the Gross Leak malfunction is stored.If there are malfunction recognized, then these are stored by the ECM in malfunction memory and the MIL is actuated in the combination meter.

STOP/START SYSTEM

STOP/START SYSTEM : System Description

INFOID:0000000013607963

SYSTEM DIAGRAM



DESCRIPTION

For a stationary vehicle, stop/start system switches the engine off automatically and starts it again, as soon as the driver wishes to drive off. The fuel consumption and thus the exhaust emissions are reduced by cutting out the engine with the vehicle at a standstill.

Conventional cutting out and starting of the engine with the transmitter key start/stop button continues to be possible.

The ECM permanently performs a system diagnosis and assesses the system conditions for the stop/start system.

All systems participating on the stop/start system permanently check their status and transmit this via CAN communication to the ECM.

When the function requirements are fulfilled, the driver is notified of the stop/start system readiness by the ECO symbol in the multifunction display in combination meter.

The stop/start system consists of the following partial functions:

- Function sequence for automatic engine stop
- Function sequence for automatic engine start
- Function sequence for forced engine start (a start dictated by the system)

- Function for power supply to on-board electrical system

FUNCTION SEQUENCE FOR AUTOMATIC ENGINE STOP

The engine is switched OFF by ECM when all of the following function requirements are fulfilled:

- Indicator lamp for the stop/start system button lights up (system has no malfunction and stop/start system is activated)
- Vehicle speed: 0 km/h (0MPH)
- Coolant temperature: 60°C – 115°C (140°F – 239°F)
- Engine speed in specified value range
- Transmission oil temperature: 10°C – 120°C (50°F – 248°F)
- Gear range: D or N range
- Accelerator pedal not operated
- Brake pedal operated until vehicle comes to a standstill
- Sufficient vacuum [(−105) – (−9) kPa] in brake booster
- Engine hood closed
- No crash signal
- No previous maximum full-stop braking
- Steering wheel angular velocity in the specified value range
- Condition of the on-board electrical system OK
- Driver door closed
- Driver seat belt applied
- Interior temperature regulated

The following control units read in the following sensors and signals for fulfillment of the function requirements.

ECM
- Engine coolant temperature sensor
- Accelerator pedal sensor, accelerator pedal actuation
- Fuel temperature sensor
- Crankshaft position sensor, engine speed
- Supplemental restraint system (SRS) control unit, direct crash signal

Combination meter
- Vehicle speed

SRS control unit
- Indirect crash signal
- Status of driver seat belt

Body control unit (BCM)
- Engine stop prohibition
- Engine start request
- Signal that engine hood is closed
- Stop/Start system status button

A/C control
- A/C status
- Engine stop prohibition
- Engine start request

Electronic Stability Program control unit
- Wheel speed
- Brake actuation
- Engine stop prohibition
- Engine stop release
- Engine start request

Front door control unit (Driver′s side)
- Front door contact switch (Driver′s side)

Steering column tube module control unit
- Steering wheel angle
- Steering wheel angular velocity
- DISTRONIC electric controller unit, engine torque request (increasing or reducing)
- Fuel pump control module (FPCM), fuel pressure

• TCM, status of gear range

DISTRONIC electric controller unit
• Engine torque request (increasing or reducing)

Fuel pump control module (FPCM)
• Fuel pressure

TCM
• Status of gear range

After an automatic engine stop a maximum of three automatic engine stops are permitted without exceeding the speed threshold of 8 km/h (5 MPH).
After the fourth engine start, the vehicle must exceed a speed of 8 km/h (5 MPH) in the engine stop.
Upon opening of the engine hood in automatic engine stop, the stop/start system is switched off and all indicator lamps in the combination meter light up. The engine must be restarted using the transmitter key or over the stop/start button KEYLESS-GO.

FUNCTION SEQUENCE FOR AUTOMATIC ENGINE START

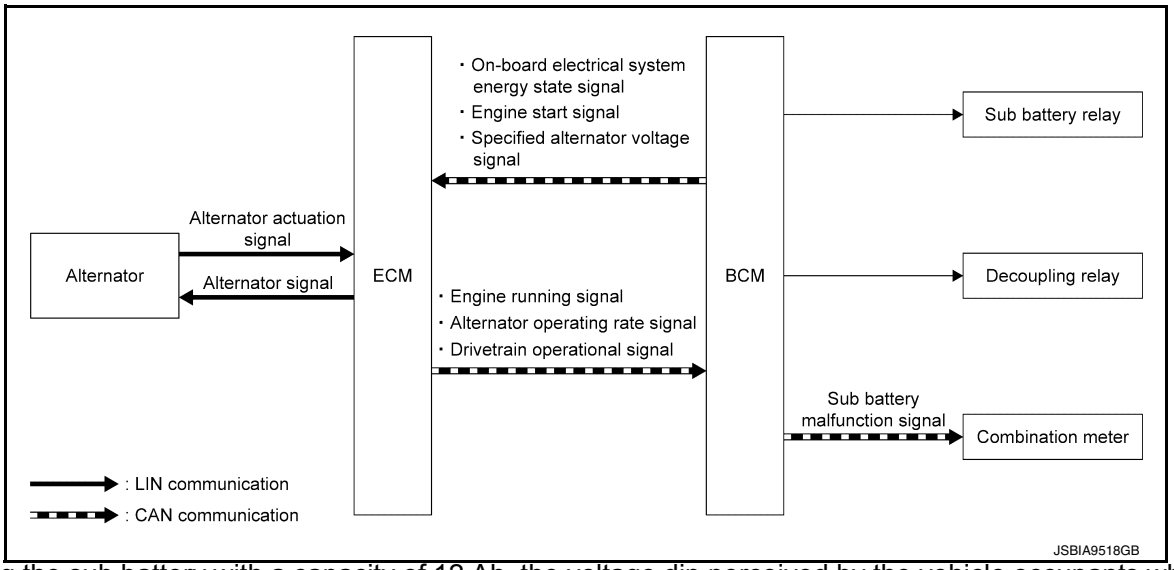
With dual clutch transmission, the engine is automatically started upon releasing the brake or operating the accelerator pedal.
The ECM actuates the starter relay by means of ground signal. The power contact on the relay closes and the starter solenoid switch is supplied battery voltage. Via CAN communication, the fuel pump control module (FPCM) receives the fuel specified pressure signal from ECM and actuates the fuel pump accordingly.

FUNCTION SEQUENCE FOR FORCED ENGINE START (A START DICTATED BY THE SYSTEM)

The forced engine start subfunction is available as a protection function. Here the engine is force started autonomously (without any action taken by the driver) by the ECM when one of the following start requirements occurs:
• On-board network condition requires the engine to run.
• Coolant temperature: more than 115°C (239°F)
• Exceeding of the engine stop period of a maximum of 3 minutes
• A/C required engine running (e.g. windshield fogged up)
• Vacuum on brake booster not in the nominal range (−105 kPa up to 9 kPa)
• Driver presence recognition (driver seat belt or driver door is opened)
• Vehicle speed is more than 2 km/h (1.3 MPH) for forward travel and immediately upon recognition of rolling backwards
• System or communication error of the following systems: driver presence, steering, on-board electrical system, brake and control systems, accelerator pedal, transmission, starter, engine

A maneuvering process is recognized for engaged reverse gear and stop/start system is deactivated. If the engine is stopped it is force started by the system and the engine stop function is suppressed if it is running. The stop/start system is subsequently activated again for an engaged forward gear and for exceeding a vehicle speed 15 km/h (10 MPH).
The engine is also started if the driver door is opened, the driver seat belt buckle is opened or stop/start system is switched off via stop/start system button.

FUNCTION FOR POWER SUPPLY TO ON-BOARD ELECTRICAL SYSTEM



By using the sub battery with a capacity of 12 Ah, the voltage dip perceived by the vehicle occupants when the engine is started (e.g. during radio or ventilation operation) is prevented. The sub battery for stop/start system then assumes the power supply for the active consumers in the process while the main battery is isolated from the on-board electrical system (at engine start). Active comfort functions are not switched off. The sub battery for the stop/start system is activated by actuation of the sub battery relay at the sub battery for the stop/start system. The main battery is decoupled from the on-board electrical system by actuation of the decoupling relay in the fuse box. In addition the BCM checks the function of the components involved in isolating the main battery and connecting the sub battery.

Operation When an Engine Stops

While the engine is running, ECM evaluates the operating rate of the alternator. The alternator and ECM communicate with each other via the LIN. ECM transmits the engine running signal and information on the alternator operating rate to BCM via CAN communication.

BCM receives this, reads in the data from the battery sensor over the battery sensor LIN, evaluates the condition of the main battery, and then transmits information describing the condition of the on-board electrical system or the requirements placed on the on-board electrical system to ECM via CAN communication.

The following information is included in it:

- State of main battery
- State of sub battery
- On-board electrical system status

ECM evaluates all the relevant data, issues the stop enable accordingly and stops the engine. ECM transmits the drive train operational signal to BCM via CAN communication. This prevents the energy management from starting the process of consumer reduction or consumer shutoff as the engine running signal is not transmitted.

NOTE:

The blower output is reduced when the automatic blower speed function of the air conditioning is active. In high ambient temperatures the system changes into air circulation mode depending on the specified temperature adjusted. After an engine stop a maximum of engine starts is permitted without exceeding the speed threshold of 8 km/h (5 MPH).

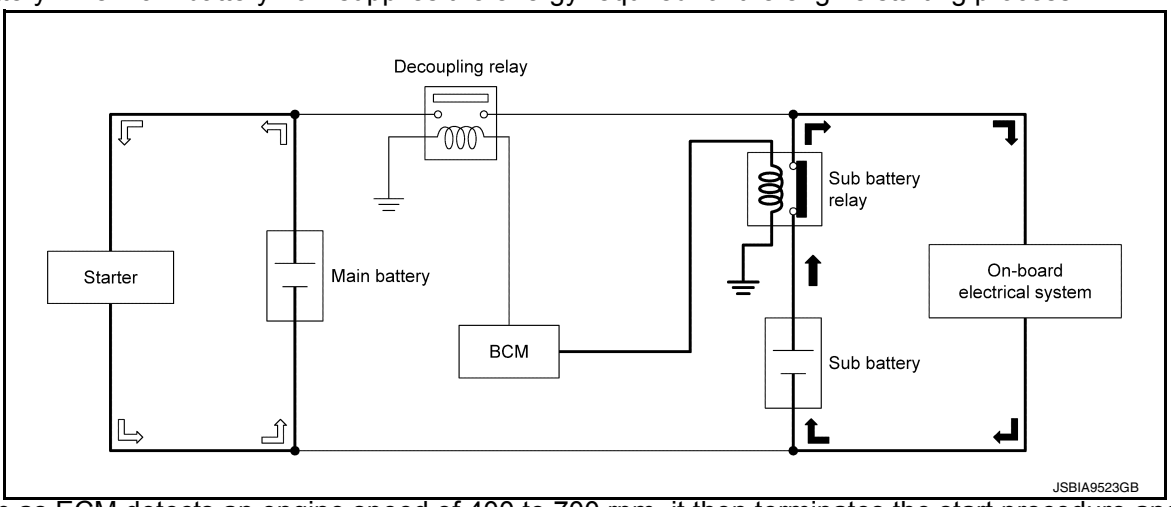
Operation When an Engine Starts

During the starting procedure the main battery is isolated from the on-board electrical system. The power supply for the active consumers is now provided by the additional battery for the stop/start system. This serves to prevent any voltage dip as perceived by vehicle occupants when starting the engine (e.g. during radio or ventilation operation).

ECM evaluates all the relevant variables and issues the start enable (hot start signal). BCM reads in this hot start signal via a direct line and actuates the decoupling relay in the fuse box and the sub battery relay at the sub battery for the stop/start system.

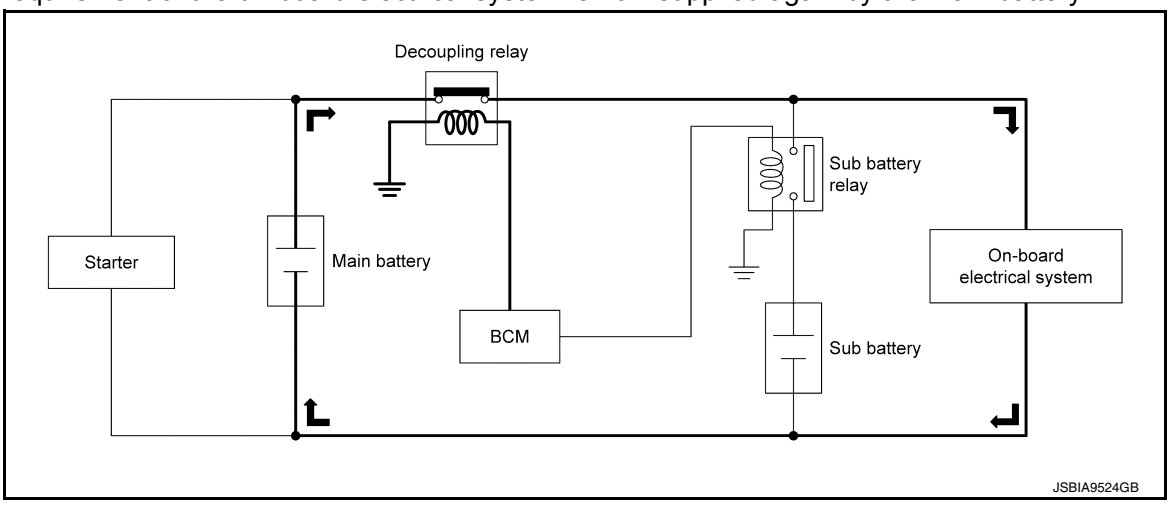
The sub battery for the stop/start system is then switched through to the on-board electrical system. Shortly after this, the decoupling relay isolates the main battery from the on-board electrical system for the duration of

the starting process. The energy requirement of the on-board electrical system is now solely covered by the sub battery. The main battery now supplies the energy required for the engine starting process.



As soon as ECM detects an engine speed of 400 to 700 rpm, it then terminates the start procedure and transmits the engine running signal to BCM via CAN communication. Then BCM actuates the decoupling relay and the sub battery relay.

The decoupling relay connects the main battery to the on-board electrical system. The sub battery relay for stop/start system disconnects the sub battery for stop/start system from the on-board electrical system. The energy requirement of the on-board electrical system is now supplied again by the main battery.



Operation When an Engine Starts Forcibly

As soon as the energy management can no longer guarantee stability of the on-board electrical system, BCM transmits the engine start signal request to ECM via CAN communication.

ECM receives this request and starts the engine.

When, following this, the on-board electrical system stability can still not be assured, the engine is no longer switched off. The start/ stop system is prevented temporarily.

BCM uses the data from the battery sensor to calculate the required alternator specified voltage, and transmits this to ECM via CAN communication. Then ECM starts the alternator regulation process (alternator management). ECM evaluates the operating rate of the alternator and requests the corresponding excitation voltage via LIN.

Status Check of Sub Battery for Stop/start System

BCM runs a battery state recognition immediately after the engine is started. This provides information regarding the availability of electrical power to the sub battery for the stop/start system. When the engine is switched off during the battery state recognition, BCM switches this off and discards the previous results.

Along with the battery state recognition, the voltage of the sub battery for stop/start system in the stop/start system mode is also measured after every engine start.

The sub battery relay for the stop/start system is no longer actuated under the following conditions:

- Sub battery for stop/start system deep discharged
- Internal short circuit
- Short circuit in positive line of sub battery for stop/start system

In order to establish this, the voltage of the sub battery is compared with an internal value.
A corresponding fault message is shown in the multifunction display of combination meter.
BCM transmits the data required for this to the combination meter via CAN communication.

Charge of Sub Battery for Stop/start System

The charging strategy of the sub battery for stop/start system must take two requirements into account:
- The stop/start system additional battery must always be sufficiently charged
- The number of sub battery relay for the stop/start system actuations and the related load on the sub battery for the stop/start system must be minimized as far as possible.

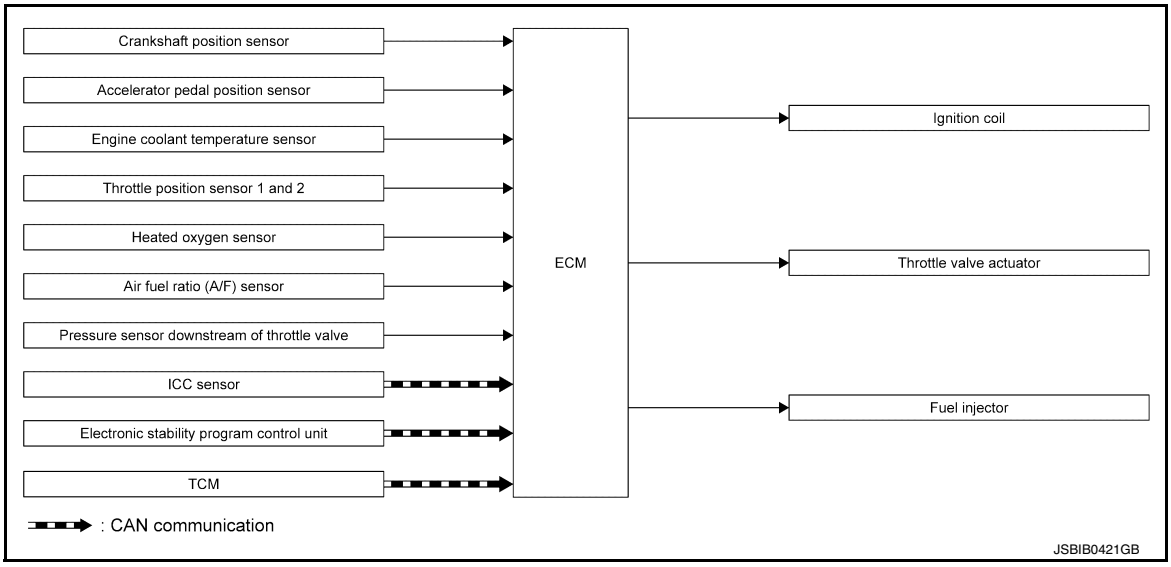
When the open circuit voltage of the sub battery for stop/start system is too low (less than 12.5 V), the alternator's power limit (alternator management) is deactivated so that the sub battery for stop/start system can be charged.
When the voltage dip (less than 11 V) at engine start is too great, an engine stop is suppressed for 5 minutes in order to recharge the sub battery for the stop/start system.
The sub battery for stop/start system is only connected when the alternator's power limit (alternator management) is not active and the on-board electrical system voltage is high enough (more than 13 V). It is cleared again when the alternator's power limit is active or the on-board electrical system is severely overloaded.

ELECTRONIC ACCELERATOR FUNCTION

ELECTRONIC ACCELERATOR FUNCTION : System Description

INFOID:0000000013607964

SYSTEM DIAGRAM



DESCRIPTION

The electronic accelerator function is integrated into the ECM and controls the opening angle of the throttle valve dependent upon the driver input and the operating conditions.
The ECM regulates the throttle valve position, dependent on the following signals:
- Accelerator pedal sensor, accelerator pedal actuation
- DISTRONIC electric controller unit, engine torque request (increasing or reducing)
- Electronic Stability Program control unit, brake actuation
- Electronic Stability Program control unit, request for cruise control
- TCM, status of gear range
- TCM, status reverse travel signal
- The requirements of the torque coordination function are also taken into account.

FUNCTION SEQUENCE FOR ELECTRONIC ACCELERATOR

The function sequence is described in the following steps:
- Function sequence for engine torque specification
- Function sequence for drivability functions
- Function sequence for reverse travel
- Function sequence for adaptive accelerator pedal

FUNCTION SEQUENCE FOR ENGINE TORQUE SPECIFICATION

The ECM controls the engine torque dependent on a characteristic map, dependent on the accelerator pedal sensor.
To do this the ECM actuates the following components:
- Throttle valve actuator motor, modulated signal
- Ignition coil, for regulation of the ignition angle effectiveness over the firing point
- Fuel injectors, for regulation of the lambda value over the fuel quantity

The engine torque is then only determined by the accelerator pedal position if no limited or increased torque requests from other functions or control units (e.g. cruise control request) are active. The throttle valve position sensor 1 and 2 report the current throttle valve position to the ECM.

FUNCTION SEQUENCE FOR DRIVABILITY FUNCTIONS

The drivability functions and throttle change damping have the task of limiting the change of engine torque as a result of a rapid movement of the accelerator pedal. The limitation serves to improve the ride comfort since jolting in the drivetrain is prevented.
The drivability functions and the throttle change damping take place on the basis of the following signals:
- Accelerator pedal sensor, accelerator pedal actuation
- Engine coolant temperature sensor
- Pressure sensor downstream of throttle valve, engine load
- Crankshaft position sensor, engine rpm
- Heated oxygen sensor
- Air fuel ration (A/F) sensor
- Electronic Stability Program control unit, wheel speed

FUNCTION SEQUENCE FOR REVERSE TRAVEL

If the ECM receives the reverse travel CAN signal, the ECM opens the throttle valves slowly and limits the maximum opening angle to about 50%. This optimizes ride comfort and driving safety in reverse travel.

FUNCTION SEQUENCE FOR ACCELERATOR PEDAL

The ECM recognizes how the accelerator pedal is being actuated and switches between two characteristic curves. After a 50% pedal travel, about 80% of the engine load is released for a sporty driver and 40% of the engine load is released for a relaxed driver. There is no further difference felt above a pedal travel of about 90%.
If the calm driver characteristic is active (for example, after a long journey on the freeway), the accelerator pedal at first has to be pressed unusually far in order to obtain high acceleration.

WARNING/INDICATOR/CHIME LIST

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

INFOID:0000000013607965

Regarding the arrangement. Refer to MWI-8, "METER SYSTEM : Design".

Item	Design	Reference
Malfunction indicator lamp (MIL)		For function, refer to MWI-29, "WARNING LAMPS/INDICATOR LAMPS : Malfunction Indicator Lamp (MIL)".

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

INFOID:0000000013607966

Item	Reference
Stop/Start indicator	Refer to EC-93, "STOP/START SYSTEM : Switch Name and Function".

CAN COMMUNICATION

CAN COMMUNICATION : System Description

INFOID:0000000013607967

DESCRIPTION

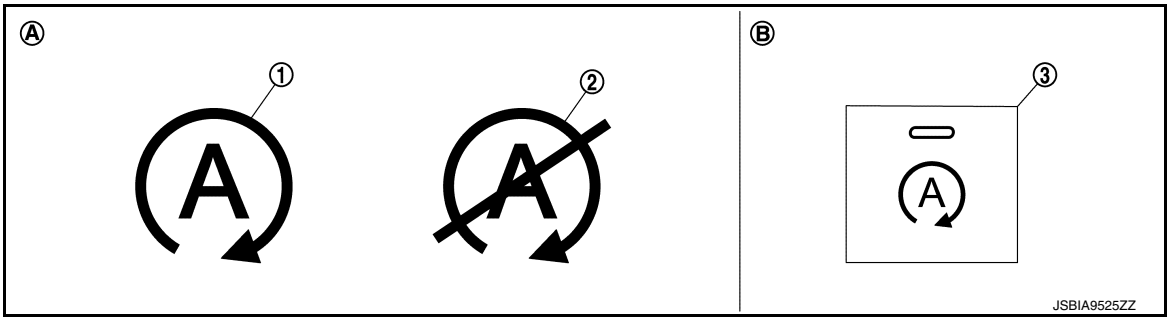
CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information 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. For detail, refer to LAN-16, "CAN COMMUNICATION SYSTEM : System Description".

OPERATION
STOP/START SYSTEM
STOP/START SYSTEM : Switch Name and Function

INFOID:0000000013607968

SWITCHES AND INDICATORS



1. Stop/start indicator (green)*1
2. Stop/start indicator (yellow)*2
3. Stop/start switch
A. On the information display of combination meter
B. Upper control panel

*1: The conditions for ECO stop/start system are fulfilled.

*2: The conditions for ECO stop/start system are not fulfilled.

SWITCH OPERATION

Item	Function
Stop/start switch	When the switch is pressed, LED turns ON and the stop/start system can be activated.

ON BOARD DIAGNOSTIC (OBD) SYSTEM
ECM

ECM : Diagnosis Description

INFOID:0000000013607969

DESCRIPTION

An OBD (on-board diagnosis) system of the second generation uses OBD II. In Europe, the OBD II, with appropriate adaptation for the European market, is called European On-Board Diagnosis (EOBD).
The OBD system is integrated in the ECM and constantly monitors all emissions-relevant components and systems of the vehicle.
The OBD has the following tasks:
- Monitor emissions- relevant components and systems while traveling
- Identify and store malfunctions
- Display of malfunctions via the engine diagnosis indicator lamp (Malfunction Indicator Lamp)
- Detected faults are transmitted over a uniform interface (diagnostic connector) to a diagnostic unit (e.g. CONSULT)

OBD follows the list as below:
- Ensuring permanently low exhaust emissions
- Protect components at risk (such as catalytic converters) against backfires

The following components and systems are monitored:
- Catalytic converter heating
- Smooth running analysis (recognition of combustion misfire)
- Oxygen sensors
- Purge control
- Smooth running control
- Other components which related to emission or which can cause malfunction in the diagnosis of other components.
- Efficiency of the CAT (catalytic converter function)

FUNCTION SEQUENCE FOR ON-BOARD DIAGNOSIS (OBD)

Function Sequence for Fault Detection

The ECM checks itself and its input and output signals for accuracy and detects possible malfunctions.
Malfunctions and the way they are stored are classified as follows:
- Malfunction permanently present
- Loose contact that occurred while driving

The following malfunctions are recognized in their frequency and duration:
- Signals above or below a limit value (for example, open circuit, short circuit, sensor malfunction)
- Illogical combination of various signals
- Closed-loop control circuit (e.g. lambda control) at lower or upper limit of regulation interval
- Malfunctions in function chains (faulty test processes, e.g. for purging)
- Malfunction messages via the CAN data buses

Function Sequence for Test Procedure

The component testing and function chain testing are differentiated on test procedures.

Component test
- Component testing is direct testing of a component. It includes:
  - Monitoring of the power supply and electric circuits
  - Comparison of the sensor signals with other sensor signals and stored comparative values
- The following three test results can occur:
  - Signal present (test passed)
  - Signal not present (malfunction)
  - Signal present, but implausible (malfunction)

Function chain test
- The function chain test is indirect testing of the effect of a controlled change.
  In this process individual components and systems are checked which cannot be tested by means of component testing.
  The function chain is a controlled process studying cause and effect.

The ECM controls one or more components (cause) and evaluates the resulting sensor signals (effect). In the process the ECM compares the sensor signals with stored comparative values and thus recognizes trouble-free or faulty functioning of components and systems.

- The following are monitored by means of function chain tests:
- Self adaptation of mixture formation
- Smooth running analysis (recognition of combustion misfire)
- Catalytic converter function
- Oxygen sensor (aging and regulation)
- Oxygen sensor heater
- Purge control

Function Sequence for Cyclic Monitoring

Cyclic monitoring takes place for components and system which are not permanently active. Regeneration, for example, only takes place when the vehicle is being operated in partial-load range and can therefore only be monitored during this operating phase.

The following components and systems are monitored cyclically:

- Catalytic converter function
- Catalytic converter heating
- Oxygen sensor (aging and regulation)
- Oxygen sensor heater
- Purge control

Function Sequence for Continuous Monitoring

Continuous monitoring means constant monitoring from engine start up to “ignition OFF”.

The following components and systems are monitored continuously:

- Smooth running analysis (recognition of combustion misfire)
- Self adaptation of mixture formation

Function Sequence for Readiness Code

In order to gain reliable information as to the trouble-free status of cyclically monitored components and systems when reading out the malfunctioning memory, these components and systems must be test ready.

The test readiness of a component or a system is shown by the readiness code. The readiness code indicates whether the malfunction detecting test is performed at least once or the component or the system is activated.

Test readiness is checked at least once per driving cycle. If test readiness exists, the readiness code is set. In order to set the components of the system at least once.

The test result is not significant in setting the readiness code. This means that it is also set if a fault in the system or the component is found.

The readiness code is set for the following components and systems once they are tested:

- Catalytic converter function
- Catalytic converter heating
- Oxygen sensor (aging and regulation)
- Oxygen sensor heater
- Purge control

If test readiness does not exist for individual systems or components, it can be established using the diagnostic unit (e.g. CONSULT). To do this the function chain process is started manually using a menu item in the diagnostic software.

NOTE:

All readiness codes are reset automatically when the error code is deleted.

Function Sequence for Fault Storage

Emissions-relevant malfunctions just found from the current and previous driving cycle are temporarily stored in the OBD until confirmed (through occurrence in two consecutive driving cycles) in the form of a error code, also called a DTC (diagnostic trouble code).

When an established fault occurs in two consecutive driving cycles the error code is stored in the malfunctioning memory of the ECM after ending the second driving cycle.

Driving cycle

- A driving cycle consists of an engine start, vehicle journey and stopping the engine, whereby an increase in coolant temperature by at least 22°C (71°F) up to at least 70°C (158°F) must occur during travel.

Function Sequence for Avoiding Consequential Faults

When a error signal is detected and shorted, all tests where this signal is required as a reference parameter are aborted (interlock). This prevents consequential errors from being stored.

Function Sequence for Saving the Error Freeze Frame Data

Besides the malfunctions, the operating conditions under which they occur are also stored (error freeze frame data).

When the malfunction occurs second time, the associated error freeze frame data is stored again. When the malfunction continues to occur then the last stored error freeze frame data from the first and last occurrence of a malfunction can be read out.

For error freeze frame data items, refer to EC-97, "CONSULT Function".

Function Sequence for Fault Display

MIL (Malfunction Indicator Lamp) in the instrument cluster is actuated by the ECM via CAN communication.

When a malfunction occurs in two driving cycles, one after the other, MIL lights up.

In case of catalytic converter damage is caused by ignition misfires, MIL flashes during (remaining) driving cycle.

Fault message by means of MIL cases automatically after 3 consecutive trouble-free driving cycles.

Function sequence for Reading Out Fault Memory

Stored error codes and their error freeze frame data as well as the readiness codes can be read out with the ignition ON or engine running using CONSULT or a commercially available diagnosis tool.

Function Sequence for Erasing Faults

The system automatically clear any stored malfunctions from the fault memory only after 40 consecutive trouble-free driving cycles have occurred. They can, however, also be deleted (after repair work has been done) using commercially available diagnostic equipment or the CONSULT.

FUEL PUMP CONTROL MODULE (FPCM)

FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Description

INFOID:0000000013607970

This system is an on-board diagnostic system that detects a malfunction automatically. A malfunction is stored in ECU memory as a DTC. The diagnostic information can be obtained with CONSULT.

DIAGNOSIS SYSTEM (ECM)

CONSULT Function

INFOID:0000000013607971

FUNCTION

Diagnostic test mode	Function
ECU Identification	ECM part number can be read.
Self Diagnostic Result	Self-diagnostic results can be read and erased.
Data Monitor	Input/Output data in 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.
Active Test	Diagnostic Test Mode in which CONSULT drives some actuators apart from ECM and also shifts some parameters in a specified range.
Configuration	Vehicle configuration can be set.

SELF DIAGNOSTIC RESULT MODE

Self Diagnostic Item

Regarding items of DTC, refer to EC-142, "DTC Index".

How to Erase DTC

- If power is continuously in the ON position after a DTC is detected, turn power switch OFF before turning power switch to the ON position again, and then erase DTC.
- Check the all self-diagnostic screen to confirm there are no DTCs in other ECUs.

Freeze Frame Data

The Freeze Frame Data shows the state of the vehicle at the time a DTC is detected and is useful in re-creating the circumstances that caused the malfunction.

Freeze Frame Data Item List

Item		Value (unit)	
CONSULT screen terms	Full spell	CONSULT screen terms	Full spell
FILL LV ACTIVATD CHARCOAL FILTR (LAST)	Fill level activated charcoal filter (last)	—	—
SPECIFIED ENGINE TORQUE (LAST)	Specified engine torque (last)	%	—
INDICATED ENGINE TORQUE (LAST)	Indicated engine torque (last)	%	—
COOLANT TEMP SENSOR SIGNAL 1 (LAST)	Coolant temperature sensor signal 1 (last)	°C	—
TORQUE REQUEST (LAST)	Torque request (last)	—	—
ACCEL PEDAL SENSOR SUPPLY VOLTAGE 1	Accelerator pedal sensor supply voltage 1	V	—
CAN BUS STATUS (VDC) (LAST)	Controller area network bus status (vehicle dynamics control) (last)	—	—
AMBIENT PRESSURE (LAST)	Ambient pressure (last)	hPa	—
ENGINE START TEMPERATURE SIGNAL 1	Engine start temperature signal 1	°C	—
IGN ANGL OUTPT: ACTUAL CRNT GIVEN ANGL 1	Ignition angle output: actual in the current liner given angle 1	°	—
INTAKE PIPE ABSOLUTE PRESSURE 1	Intake pipe absolute pressure 1	hPa	—
COOLANT TEMP SENSOR SIG 1 (LAST)	Coolant temperature sensor signal 2 (last)	°C	—

Item		Value (unit)	
CONSULT screen terms	Full spell	CONSULT screen terms	Full spell
ENGINE START TEMPERATURE SIGNAL 2	Engine start temperature signal 2	°C	—
EXH VALVE CLOSE ANGLE IN RELATION TO LWOT 1	Exhaust valve close angle in relation to LWOT 1	°	—
EXH VALVE CLOSE ANGLE IN RELATION TO LWOT 2	Exhaust valve close angle in relation to LWOT 2	°	—
EXHAUST VALVE CLOSE ANGLE 1 (NOMINAL)	Exhaust valve close angle 1 (nominal)	°	—
ENGINE OIL TEMPERATURE SENSOR (LAST)	Engine oil temperature sensor (last)	°C	—
INT VALVE OPEN ANGLE IN RELATION TO LWOT 1	Intake valve open angle in relation to LWOT 1	°	—
EXHAUST VALVE CLOSE ANGLE 2 (NOMINAL)	Exhaust valve close angle 2 (nominal)	°	—
IGN CYCL CNTR? DELETE CNTR? --> DFES CTDEL	Ignition cycle counter? delete counter? --> DFES CTDEL	—	—
CAN BUS STATUS (SCCM) (LAST)	Controller area network bus status (SCCM) (last)	—	—
INT VALVE OPEN ANGLE IN RELATION TO LWOT 2	Intake valve open angle in relation to LWOT 2	°	—
EXH CAMSHAFT OPEN ANGLE 1 (NOMINAL)	Exhaust camshaft open angle 1 (nominal)	°	—
CAN BUS STATUS (SCR) (LAST)	Controller area network bus status (selective catalytic reduction) (last)	—	—
INTAKE PIPE ABSOLUTE PRESSURE 2	Intake pipe absolute pressure 2	hPa	—
EXH CAMSHAFT OPEN ANGLE 2 (NOMINAL)	Exhaust camshaft open angle 2 (nominal)	°	—
FUEL PRESSURE IN FUNCTION MONITORING 1	Fuel pressure in function monitoring 1	MPa	—
ENGINE OIL TEMPERATURE (LAST)	Engine oil temperature (last)	°C	—
PRESSURE SENSOR D/STRM THRTL SIG V (LAST)	Pressure sensor downstream throttle signal voltage (last)	kPa	—
INTAKE PIPE ABSOLUTE PRESSURE 3	Intake pipe absolute pressure 3	hPa	—
CAN BUS STATUS (VGS) (LAST)	Controller area network bus status (VGS) (last)	—	—
FUEL PUMP ON/OFF RATIO (LAST)	Fuel pump on/off ratio (last)	%	—
CAN BUS STATUS [ETC (EGS)] (LAST)	Controller area network bus status [ETC (EGS)] (last)	—	—
FUEL PRESSURE IN FUNCTION MONITORING 2	FUEL PRESSURE IN FUNCTION MONITORING 2	MPa	—
FUEL TANK VENTILTN VLV CURRNT DUTY CYCLE 1	Fuel tank ventilation valve current duty cycle 1	%	—
CAN BUS STATUS [ESM (EWM), ISM] (LAST)	Controller area network bus status [ESM (EWM), ISM] (last)	—	—
AMBIENT TEMPERATURE (LAST)	Ambient temperature (last)	°C	—
IGN ANGL OUTPT: ACTUAL CRNT GIVEN ANGL 2	Ignition angle output: actual in the current liner given angle 2	°	—

Item		Value (unit)	
CONSULT screen terms	Full spell	CONSULT screen terms	Full spell
CYL INDIVIDUAL ZW RETARDATN AVE BY KR 1	Cylinder individual ZW retardation average by KR 1	°	—
SPECIFIED ENGINE TORQUE (MAKV) (LAST)	Specified engine torque (MAKV) (last)	Nm	—
PRESSURE 1 IN FRONT OF THROTTLE (NOMINAL)	Pressure 1 in front of throttle (nominal)	hPa	—
PURGING SW/OVR VLV PWR CONSUMPTN (LAST)	Purging switchover valve power consumption (last)	mA	—
ENGINE START TEMPERATURE SIGNAL 3	Engine start temperature signal 3	°C	—
STOP/START SYS MALFUNCTION STATUS (LAST)	Stop/Start system malfunction status (last)	—	—
DMS INTERNAL ORDER OF ALL ENTRY HISTORY 1	DMS internal order of all entry history 1	—	—
PRESSURE 2 IN FRONT OF THROTTLE (NOMINAL)	Pressure 2 in front of throttle (nominal)	hPa	—
VEHICLE DISTANCE INFORMATION 1	Vehicle distance information 1	Km	—
ENGINE SPEED 1	Engine speed 1	1/min	—
ENGINE TEMPERATURE 1	Engine temperature 1	°C	—
ENVIRONMENTAL TEMPERATURE 1	Environmental temperature 1	°C	—
INTERFACE FOR MODE 01&02 VEHICLE SPEED 1	Interface for mode 01 and 02 vehicle speed 1	—	—
INTERFAC FOR OBD SERVICE F/TANK FILL LEVEL 1	Interface for on-board diagnosis service fuel tank fill level 1	%	—
ELAPSED TIME FROM ENG ST/DRIVELINE ACTIVE 1	Elapsed time from engine start/driveline active 1	s	—
MILEAGE WITH MIL ON 1	Mileage with malfunction indicator lamp on 1	Km	—
BATTERY VOLTAGE 1	Battery voltage 1	V	—
CAN BUS STATUS (BMS) (FIRST)	Controller area network bus status (BMS) (first)	—	—
FUEL TANK FILL LEVEL (FIRST)	Fuel tank fill level (first)	l	—
EGR ON/OFF RATIO (FIRST)	Exhaust gas recirculation on/off ratio (first)	%	—
RELATIVE AIR MASS (FIRST)	Relative air mass (first)	%	—
INTAKE AIR TEMPERATURE 1	Intake air temperature 1	°C	—
BDE-MODE DURING FUNCTIONAL CHECK 1	BDE-Mode during functional check 1	—	—
CAN BUS STATUS (BUS OFF) (FIRST)	Controller area network bus status (bus off) (first)	—	—
EGR ACTUATOR (FIRST)	Exhaust gas recirculation actuator (first)	%	—
EXH RELEVANT MISFIRES COUNTR OVR ALL CYL 1	Exhaust relevant misfires counter over all cylinder 1	—	—
AIR MASS (FIRST)	Air mass (first)	kg/h	—
SELF-ADJUSTMENT IN IDLE SPEED RANGE (FIRST)	Self-adjustment in idle speed range (first)	%	—

Item		Value (unit)	
CONSULT screen terms	Full spell	CONSULT screen terms	Full spell
BDE OPER MODE INCLDNG DELIVERED STATES 1	BDE operating mode including delivered states 1	—	—
CAN BUS STATUS [CGW (ZGW)] (FIRST)	Controller area network bus status [CGW (ZGW)] (first)	—	—
COOLANT TEMPERATURE (RAW VALUE) (FIRST)	Coolant temperature (raw value) (first)	°C	—
EGR ACTUATOR (SPECIFIED VALUE) (FIRST)	Exhaust gas recirculation actuator (Specified value) (first)	%	—
MULTIPLICATIVE MIXTURE CORRECTION 1	Multiplicative mixture correction 1	—	—
O2-STORAGE CAPACITY OF CAT RH BANK (FIRST)	Oxygen-storage capacity of catalyst right bank (first)	—	—
CHARGE AIR TEMP SEN U/STRM THROTTL (FIRST)	Charge air temperature sensor upstream throttle (first)	°C	—
THROTTLE VALVE FULLY CLOSED ANGLE 1	Throttle valve fully closed angle 1	%	—
MULTIPLICATIVE MIXTURE CORRECTION 2	Multiplicative mixture correction 2	—	—
CHARGE AIR TEMP SEN D/STRM THROTTL (FIRST)	Charge air temperature sensor downstream throttle (first)	°C	—
MIXTURE ADAPTATN CORRECTN FACTOR (FIRST)	Mixture adaptation correction factor (first)	—	—
THROTTLE POSITION SENSOR (FIRST)	Throttle position sensor (first)	—	—
ENGINE OIL TEMPERATURE (FIRST)	Engine oil temperature (first)	°C	—
THROTTLE VALVE FULLY CLOSED ANGLE 2	Throttle valve fully closed angle 2	%	—
BDE OPER MODE INCLDNG DELIVERED STATES 2	BDE operating mode including delivered states 2	—	—
ENGINE TORQUE (FIRST)	Engine torque (first)	Nm	—
PRESSURE IN FRONT OF THROTTLE VALVE 1	Pressure in front of throttle valve 1	hPa	—
VOLTAGE DK-POTI A 1	Voltage DK-Poti A 1	V	—
VOLTAGE DK-POTI B 1	Voltage DK-Poti B 1	V	—
THROTTLE VALVE POSITION (FIRST)	Throttle valve position (first)	%	—
NUMBER OF INJECTIONS PER PWR STROKE REQ 1	Number of injections per power stroke requested 1	—	—
LAMBDA CONT U/STRM OF RH CATALYST (FIRST) 1	Lambda control upstream right catalyst (first) 1	—	—
LOW PRESSURE NOMINAL VALUE (ABSOLUTE) 1	Low pressure nominal value (absolute) 1	kPa	—
ENVIRONMNT SPEC DATA - THRML MANGMNT(1ST)	Environment specific data - thermal management (first)	—	—
DK-ANGLE NOMINAL VALUE IN 12 BIT 1 (FIRST)	DK-angle nominal value in 12 bit 1 (first)	%	—
CAN BUS STATUS (A/C COMP) (FIRST)	Controller area network bus status (air conditioner compressor) (first)	—	—
FAN ON/OFF RATIO (FIRST)	Fan on/off ratio (first)	%	—

Item		Value (unit)	
CONSULT screen terms	Full spell	CONSULT screen terms	Full spell
ACCELERATOR PEDAL POSITION (FIRST)	Accelerator pedal position (first)	%	—
RELATIVE AIR CONTENT 1	Relative air content 1	%	—
THRMSTAT HEATNG ELMNT ON/OFF RATIO (1ST)	Thermostat heating element on/off ratio (first)	%	—
FUEL TEMPERATURE SENSOR (RAW VALUE) 1	Fuel temperature sensor (raw value) 1	°C	—
VOLTAGE PWG-POTI A 1	Voltage PWG-Poti A 1	V	—
CAN BUS STATUS (EZS) (FIRST)	Controller area network bus status (EZS) (first)	—	—
ADDITIVE MIXTUR CORRCTN1 - MIXTUR ADAPTATN	Additive mixture correction 1 - mixture adaptation	%	—
HDEV TEMPERATURE 1 (CALCULATED VALUE)	HDEV temperature 1 (calculated value)	°C	—
VOLTAGE PWG-POTI B 1	Voltage PWG-Poti B 1	V	—
MULTIPLICATIVE MIXTURE CORRECTION 3	Multiplicative mixture correction 3	—	—
RELATIVE AIR MASS (SPECIFIED VALUE) (FIRST)	Relative air mass (Specified value) (first)	%	—
GRILLE SHUTTER ON/OFF RATIO (FIRST)	Grille shutter on/off ratio (first)	%	—
FUEL TEMPERATURE (MODEL VALUE) 1	Fuel temperature (model value) 1	°C	—
FUEL TEMPERATURE IN RAIL (MODEL VALUE) 1	Fuel temperature in rail (model value) 1	°C	—
MULTIPLICATIVE MIXTURE CORRECTION 4	Multiplicative mixture correction 4	—	—
RELATIVE FUEL MASS (FIRST)	Relative fuel mass (first)	%	—
REQUEST FOR A/C (FIRST)	Request for air conditioning (first)	%	—
O2 SENSOR HEATER OUTPUT RH BANK (FIRST)	Oxygen sensor heater right bank (first)	%	—
CAN BUS STATUS (EFB) (FIRST)	Controller area network bus status (EFB) (first)	—	—
LOW PRESSURE NOMINAL VALUE (ABSOLUTE) 2	Low pressure nominal value (absolute) 2	kPa	—
RELATIVE FUEL MASS 1	Relative fuel mass 1	%	—
TM TEMPERATURE (NOMINAL) 1	TM temperature (nominal) 1	°C	—
CAN BUS STATUS (FPCM) (FIRST)	Controller area network bus status (fuel pump control module) (first)	—	—
VERIFIED ENVIRONMENTAL TEMP (METER) 1	Verified environmental temperature (meter) 1	°C	—
CAN BUS STATUS (AAC) (FIRST)	Controller area network bus status (AAC) (first)	—	—
FRP FILTERED NOMINAL VALUE (ABSOLUTE) 1	Fuel rail pressure filtered nominal value (absolute) 1	MPa	—
FRP UNFILTERED NOMINAL VALUE (ABSOLUTE) 1	Fuel rail pressure unfiltered nominal value (absolute) 1	MPa	—
RAIL PRESSURE REGULATION INDEX VALUE 1	Rail pressure regulation index value 1	MPa	—
DOWNTIME 1	Downtime 1	s	—

Item		Value (unit)	
CONSULT screen terms	Full spell	CONSULT screen terms	Full spell
VERIFID/TEXTURD ENVIRNMENTL TEMP (METER) 1	Verified and textured environmental temperature (meter) 1	°C	—
CAN BUS STATUS (IC) (FIRST)	Controller area network bus status (IC) (first)	—	—
MAX PERMISSIBLE ENGINE TORQUE 1	Maximum permissible engine torque 1	%	—
HDEV TEMPERATURE 2 (CALCULATED VALUE)	HDEV temperature 2 (calculated value)	°C	—
FRP UNFILTERED NOMINAL VALUE (ABSOLUTE) 2	Fuel rail pressure unfiltered nominal value (absolute) 2	MPa	—
DOWNTIME 2	Downtime 2	s	—
FUEL TEMPERATURE SENSOR (RAW VALUE) 2	Fuel temperature sensor (raw value) 2	°C	—
SPECIFIED LAMBDA VALUE (FIRST)	Specified lambda value (first)	—	—
INDEXD RSLTNG NMNL MOMNT F/PATH BFR LMT 1	Indexed resulting nominal moment fuel path before limit 1	%	—
HDEV TEMPERATURE 3 (CALCULATED VALUE)	HDEV temperature 3 (calculated value)	°C	—
LAMBDA CONT U/STRM OF RH CATALYST (FIRST) 2	Lambda control upstream right catalyst (first) 2	—	—
CALCULATED ALTERNATOR TORQUE (FIRST)	Calculated alternator torque (first)	Nm	—
RAIL PRESSURE REGULATOR OUTPUT VALUE 1	Rail pressure regulator output value 1	MPa	—
CAN BUS STATUS (NOX SENSOR) (FIRST)	Controller area network bus status (nitrogen oxide sensor) (first)	—	—
TORQUE REQUEST (FIRST)	Torque request (first)	—	—
AIR MASS FLOW RATE (FIRST)	Air mass flow rate (first)	kg/h	—
CAN BUS STATUS (AIR BAG) (FIRST)	Controller area network bus status (air bag) (first)	—	—
SPECIFIED IDLE SPEED (FIRST)	Specified idle speed (first)	1/min	—
FILL LV ACTIVATD CHARCOAL FILTR (FIRST)	Fill level activated charcoal filter (first)	—	—
SPECIFIED ENGINE TORQUE (FIRST)	Specified engine torque (first)	%	—
INDICATED ENGINE TORQUE (FIRST)	Indicated engine torque (first)	%	—
COOLANT TEMP SENSOR SIGNAL 1 (FIRST)	Coolant temperature sensor signal 1 (first)	°C	—
ACCEL PEDAL SENSOR SUPPLY VOLTAGE 2	Accelerator pedal sensor supply voltage 2	V	—
CAN BUS STATUS (VDC) (FIRST)	Controller area network bus status (vehicle dynamics control) (first)	—	—
AMBIENT PRESSURE (FIRST)	Ambient pressure (first)	hPa	—
ENGINE START TEMPERATURE SIGNAL 4	Engine start temperature signal 4	°C	—
IGN ANGL OUTPT: ACTUAL CRNT GIVEN ANGL 3	Ignition angle output: actual in the current liner given angle 3	°	—
INTAKE PIPE ABSOLUTE PRESSURE 4	Intake pipe absolute pressure 4	hPa	—

Item		Value (unit)	
CONSULT screen terms	Full spell	CONSULT screen terms	Full spell
COOLANT TEMP SENSOR SIGNAL 2 (FIRST)	Coolant temperature sensor signal 2 (first)	°C	—
ENGINE START TEMPERATURE SIGNAL 5	Engine start temperature signal 5	°C	—
EXH VALVE CLOSE ANGLE IN RELATION TO LWOT 3	Exhaust valve close angle in relation to LWOT 3	°	—
EXH VALVE CLOSE ANGLE IN RELATION TO LWOT 4	Exhaust valve close angle in relation to LWOT 4	°	—
EXHAUST CAMSHAFT CLOSES ANGLE (NOMINAL) 1	Exhaust camshaft closes angle (nominal) 1	°	—
ENGINE OIL TEMPERATURE SENSOR (FIRST)	Engine oil temperature sensor (first)	°C	—
INT VALVE OPEN ANGLE IN RELATION TO LWOT 3	Intake valve open angle in relation to LWOT 3	°	—
EXHAUST CAMSHAFT CLOSES ANGLE (NOMINAL) 2	Exhaust camshaft closes angle (nominal) 2	°	—
CAN BUS STATUS (SCCM) (FIRST)	Controller area network bus status (SCCM) (first)	—	—
INT VALVE OPEN ANGLE IN RELATION TO LWOT 4	Intake valve open angle in relation to LWOT 4	°	—
EXHAUST CAMSHAFT OPENS ANGLE (NOMINAL) 1	Exhaust camshaft opens angle (nominal) 1	°	—
CAN BUS STATUS (SCR) (FIRS	Controller area network bus status (selective catalytic reduction) (first)	—	—
INTAKE PIPE ABSOLUTE PRESSURE 5	Intake pipe absolute pressure 5	hPa	—
EXHAUST CAMSHAFT OPENS ANGLE (NOMINAL) 2	Exhaust camshaft opens angle (nominal) 2	°	—
FUEL PRESSURE IN FUNCTION MONITORING 3	Fuel pressure in function monitoring 3	MPa	—
PRESSURE SENSOR D/STRM THRTL SIG V (FIRST)	Pressure sensor downstream throttle signal voltage (first)	kPa	—
INTAKE PIPE PRESSURE (NOMINAL)	Intake pipe pressure (nominal)	hPa	—
CAN BUS STATUS (VGS) (FIRST)	Controller area network bus status (VGS) (first)	—	—
FUEL PUMP ON/OFF RATIO (FIRST)	Fuel pump on/off ratio (first)	%	—
CAN BUS STATUS [ETC (EGS)] (FIRST)	Controller area network bus status [ETC (EGS)] (first)	—	—
FUEL PRESSURE IN FUNCTION MONITORING 4	Fuel pressure in function monitoring 4	MPa	—
FUEL TANK VENTILTN VLV CURRNT DUTY CYCLE 2	Fuel tank ventilation valve current duty cycle 2	%	—
CAN BUS STATUS [ESM (EWM), ISM] (FIRST)	Controller area network bus status [ESM (EWM), ISM] (first)	—	—
AMBIENT TEMPERATURE (FIRST)	Ambient temperature (first)	°C	—
IGN ANGL OUTPT: ACTUAL CRNT GIVEN ANGL 4	Ignition angle output: actual in the current liner given angle 4	°	—
CYL INDIVIDUAL ZW RETARDATN AVE BY KR 2	Cylinder individual ZW retardation average by KR 2	°	—

Item		Value (unit)	
CONSULT screen terms	Full spell	CONSULT screen terms	Full spell
ENHANCED DTC INFORMATION	Enhanced diagnosis trouble code information	—	—
SPECIFIED ENGINE TORQUE (MAKV) (FIRST)	Specified engine torque (MAKV) (first)	Nm	—
NOMINAL PRESS IN FRONT OF THROTTLE VALVE 1	Nominal pressure in front of throttle valve 1	hPa	—
PURGING SW/OVR VLV PWR CONSUMPTN (FIRST)	Purging switchover valve power consumption (first)	mA	—
ENGINE START TEMPERATURE SIGNAL 6	Engine start temperature signal 6	°C	—
STOP/START SYS MALFUNCTION STATUS (FIRST)	Stop/Start system malfunction status (first)	—	—
VEHICLE DISTANCE INFORMATION 2	Vehicle distance information 2	Km	—
NOMINAL PRESS IN FRONT OF THROTTLE VALVE 2	Nominal pressure in front of throttle valve 2	hPa	—
VEHICLE DISTANCE INFORMATION 3	Vehicle distance information 3	Km	—
ENGINE SPEED 2	Engine speed 2	1/min	—
ENGINE TEMPERATURE 2	Engine temperature 2	°C	—
ENVIRONMENTAL TEMPERATURE 2	Environmental temperature 2	°C	—
INTERFACE FOR MODE 01&02 VEHICLE SPEED 2	Interface for mode 01 and 02 vehicle speed 2	—	—
INTERFAC FOR OBD SERVICE F/TANK FILL LEVEL 2	Interface for on-board diagnosis service fuel tank fill level 2	%	—
ELAPSED TIME FROM ENG ST/DRIVELINE ACTIVE 2	Elapsed time from engine start/driveline active 2	s	—
MILEAGE WITH MIL ON 2	Mileage with malfunction indicator lamp on 2	Km	—
BATTERY VOLTAGE 2	Battery voltage 2	V	—
CAN BUS STATUS (BMS) (LAST)	Controller area network bus status (BMS) (last)	—	—
FUEL TANK FILL LEVEL (LAST)	Fuel tank fill level (last)	l	—
EGR ON/OFF RATIO (LAST)	Exhaust gas recirculation on/off ratio (last)	%	—
RELATIVE AIR MASS (LAST)	Relative air mass (last)	%	—
INTAKE AIR TEMPERATURE 2	Intake air temperature 2	°C	—
VEHICLE DISTANCE INFORMATION 4	Vehicle distance information 4	Km	—
BDE-MODE DURING FUNCTIONAL CHECK 2	BDE-Mode during functional check 2	—	—
CAN BUS STATUS (BUS OFF) (LAST)	Controller area network bus status (bus off) (last)	—	—
EGR ACTUATOR (LAST)	Exhaust gas recirculation actuator (last)	%	—
EXH RELEVANT MISFIRES COUNTR OVR ALL CYL 2	Exhaust relevant misfires counter over all cylinder 2	—	—
AIR MASS (LAST)	Air mass (last)	kg/h	—

Item		Value (unit)	
CONSULT screen terms	Full spell	CONSULT screen terms	Full spell
SELF-ADJUSTMENT IN IDLE SPEED RANGE (LAST)	Self-adjustment in idle speed range (last)	%	—
BDE OPER MODE INCLDNG DELIVERED STATES 3	BDE operating mode including delivered states 3	—	—
CAN BUS STATUS [CGW (ZGW)] (LAST)	Controller area network bus status [CGW (ZGW)] (last)	—	—
COOLANT TEMPERATURE (RAW VALUE) (LAST)	Coolant temperature (raw value) (last)	°C	—
EGR ACTUATOR (SPECIFIED VALUE) (LAST)	Exhaust gas recirculation actuator (Specified value) (last)	%	—
MULTIPLICATIVE MIXTURE CORRECTION 5	Multiplicative mixture correction 5	—	—
O2-STORAGE CAPACITY OF CAT RH BANK (LAST)	Oxygen-storage capacity of catalyst right bank (last)	—	—
CHARGE AIR TEMP SEN U/STRM THROTTL (LAST)	Charge air temperature sensor upstream throttle (last)	°C	—
THROTTLE VALVE FULLY CLOSED ANGLE 3	Throttle valve fully closed angle 3	%	—
MULTIPLICATIVE MIXTURE CORRECTION 6	Multiplicative mixture correction 6	—	—
CHARGE AIR TEMP SEN D/STRM THROTTL (LAST)	Charge air temperature sensor downstream throttle (last)	°C	—
MIXTURE ADAPTATN CORRECTN FACTOR (LAST)	Mixture adaptation correction factor (last)	—	—
THROTTLE POSITION SENSOR (LAST)	Throttle position sensor (last)	—	—
THROTTLE VALVE FULLY CLOSED ANGLE 4	Throttle valve fully closed angle 4	%	—
BDE OPER MODE INCLDNG DELIVERED STATES 4	BDE operating mode including delivered states 4	—	—
ENGINE TORQUE (LAST)	Engine torque (last)	Nm	—
PRESSURE IN FRONT OF THROTTLE VALVE 2	PRESSURE IN FRONT OF THROTTLE VALVE 2	hPa	—
VOLTAGE DK-POTI A 2	Voltage DK-Poti A	V	—
VOLTAGE DK-POTI B 2	Voltage DK-Poti B 2	V	—
THROTTLE VALVE POSITION (LAST)	Throttle valve position (last)	%	—
NUMBER OF INJECTIONS PER PWR STROKE REQ 2	Number of injections per power stroke requested 2	—	—
LAMBDA CONT U/STRM OF RH CATALYST (LAST) 1	Lambda control upstream right catalyst (last) 1	—	—
LOW PRESSURE NOMINAL VALUE (ABSOLUTE) 3	Low pressure nominal value (absolute) 3	kPa	—
ENVIRNMNT SPEC DATA-THRML MANGMNT (LAST)	Environment specific data - thermal management (last)	—	—
DK-ANGLE NOMINAL VALUE IN 12 BIT 2 (FIRST)	DK-angle nominal value in 12 bit 2 (first)	%	—
CAN BUS STATUS (A/C COMP) (LAST)	Controller area network bus status (air conditioner compressor) (last)	—	—
FAN ON/OFF RATIO (LAST)	Fan on/off ratio (last)	%	—

Item		Value (unit)	
CONSULT screen terms	Full spell	CONSULT screen terms	Full spell
ACCELERATOR PEDAL POSITION (LAST)	Accelerator pedal position (last)	%	—
RELATIVE AIR CONTENT 2	Relative air content 2	%	—
THRMSTAT HEATNG ELMNT ON/OFF RATIO (LAST)	Thermostat heating element on/off ratio (last)	%	—
FUEL TEMPERATURE SENSOR (RAW VALUE) 3	Fuel temperature sensor (raw value) 3	°C	—
VOLTAGE PWG-POTI A 2	Voltage PWG-Poti A 2	V	—
CAN BUS STATUS (EZS) (LAST)	Controller area network bus status (EZS) (last)	—	—
ADDITIVE MIXTUR CORRCTN2 - MIXTUR ADAPTATN	Additive mixture correction 2 - mixture adaptation	%	—
HDEV TEMPERATURE 4 (CALCULATED VALUE)	HDEV temperature 4 (calculated value)	°C	—
VOLTAGE PWG-POTI B 2	Voltage PWG-Poti B 2	V	—
MULTIPLICATIVE MIXTURE CORRECTION 7	Multiplicative mixture correction 7	—	—
RELATIVE AIR MASS (SPECIFIED VALUE) (LAST)	Relative air mass (Specified value) (last)	%	—
GRILLE SHUTTER ON/OFF RATIO (LAST)	Grille shutter on/off ratio (last)	%	—
FUEL TEMPERATURE (MODEL VALUE) 2	Fuel temperature (model value) 2	°C	—
FUEL TEMPERATURE IN RAIL (MODEL VALUE) 2	Fuel temperature in rail (model value) 2	°C	—
MULTIPLICATIVE MIXTURE CORRECTION 8	Multiplicative mixture correction 8	—	—
RELATIVE FUEL MASS (LAST)	Relative fuel mass (last)	%	—
REQUEST FOR A/C (LAST)	Request for air conditioning (last)	%	—
O2 SENSOR HEATER OUTPUT RH BANK (LAST)	Oxygen sensor heater right bank (last)	%	—
CAN BUS STATUS (EFB) (LAST)	Controller area network bus status (EFB) (last)	—	—
LOW PRESSURE NOMINAL VALUE (ABSOLUTE) 4	Low pressure nominal value (absolute) 4	kPa	—
RELATIVE FUEL MASS 2	Relative fuel mass 2	%	—
TM TEMPERATURE (NOMINAL) 2	TM temperature (nominal) 2	°C	—
CAN BUS STATUS (FPCM) (LAST)	Controller area network bus status (fuel pump control module) (last)	—	—
VERIFIED ENVIRONMENTAL TEMP (METER) 2	Verified environmental temperature (meter) 2	°C	—
CAN BUS STATUS (AAC) (LAST)	Controller area network bus status (AAC) (last)	—	—
FRP FILTERED NOMINAL VALUE (ABSOLUTE) 2	Fuel rail pressure filtered nominal value (absolute) 2	MPa	—
FRP UNFILTERED NOMINAL VALUE (ABSOLUTE) 3	Fuel rail pressure unfiltered nominal value (absolute) 3	MPa	—
RAIL PRESSURE REGULATION INDEX VALUE 2	Rail pressure regulation index value 2	MPa	—
DOWNTIME 3	Downtime 3	s	—

Item		Value (unit)	
CONSULT screen terms	Full spell	CONSULT screen terms	Full spell
VERIFID/TEXTURD ENVIRNMENTL TEMP (METER) 2	Verified and textured environmental temperature (meter) 2	°C	—
CAN BUS STATUS (IC) (LAST)	Controller area network bus status (IC) (last)	—	—
MAX PERMISSIBLE ENGINE TORQUE 2	Maximum permissible engine torque 2	%	—
HDEV TEMPERATURE 5 (CALCULATED VALUE)	HDEV temperature 5 (calculated value)	°C	—
FRP UNFILTERED NOMINAL VALUE (ABSOLUTE) 4	Fuel rail pressure unfiltered nominal value (absolute) 4	MPa	—
DOWNTIME 4	Downtime 4	s	—
FUEL TEMPERATURE SENSOR (RAW VALUE) 4	Fuel temperature sensor (raw value) 4	°C	—
SPECIFIED LAMBDA VALUE (LAST)	Specified lambda value (last)	—	—
INDEXD RSLTNG NMNL MOMNT F/PATH BFR LMT 2	Indexed resulting nominal moment fuel path before limit 2	%	—
HDEV TEMPERATURE 6 (CALCULATED VALUE)	HDEV temperature 6 (calculated value)	°C	—
DFES FREQUENCY COUNTER	DFES frequency counter	—	—
LAMBDA CONT U/STRM OF RH CATALYST (LAST) 2	Lambda control upstream right catalyst (last) 2	—	—
CALCULATED ALTERNATOR TORQUE (LAST)	Calculated alternator torque (last)	Nm	—
RAIL PRESSURE REGULATOR OUTPUT VALUE 2	Rail pressure regulator output value 2	MPa	—
CAN BUS STATUS (NOX SENSOR) (LAST)	Controller area network bus status (nitrogen oxide sensor) (last)	—	—
AIR MASS FLOW RATE (LAST)	Air mass flow rate (last)	kg/h	—
CAN BUS STATUS (AIR BAG) (LAST)	Controller area network bus status (air bag) (last)	—	—
SPECIFIED IDLE SPEED (LAST)	Specified idle speed (last)	1/min	—

DATA MONITOR MODE

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

Monitored Item
For reference values of the following items, refer to EC-119, "Reference Value".

Monitor item	Unit	Remarks
ABORTD	No/Yes	—
ACCEL PEDAL SENSOR	%	Accelerator pedal sensor
ACCELERATOR PEDAL	Yes/No	—
ACCELERATOR PEDAL SEN 1	V	Accelerator pedal sensor 1
ACCELERATOR PEDAL SEN 2	V	Accelerator pedal sensor 2
ACTUAL VOLTAGE CYL1	mAs	Actual voltage cylinder 1
ACTUAL VOLTAGE CYL2	mAs	Actual voltage cylinder 2
ACTUAL VOLTAGE CYL3	mAs	Actual voltage cylinder 3
ACTUAL VOLTAGE CYL4	mAs	Actual voltage cylinder 4

Monitor item	Unit	Remarks
Adaptation COMPLETE	No/Yes	—
Adaptation STARTED	No/Yes	—
Adaptation value	%	—
Aging factor of NOx storage cat	—	—
AIR CONDITIONER STATUS	off/on/DeratingSNA	Air conditioner status
air-mass flow	kg/h	—
AIRMASS	kg/h	Air mass
ALT REGULATD V (STANDRD)	V	Alternator regulated voltage (standard)
ALTERNATOR ID	—	Alternator ID
AMBIENT TEMP (CAN)	°C	Ambient temperature (controller area network)
BAROMETRIC PRESSURE	hPa	Barometric pressure
BATTERY VOLTAGE	V	Power consumption pressure regulating valve
BOOST PRES POSITNR DUTY	%	Boost pressure positioner duty
BRAKE ASSIST SYSTEM	Yes/No	Brake Assist System
BRAKE PEDAL	off/on	Brake pedal
Brake vacuum	Yes/No	—
C/AIR TEMP/S D/STRM THRTL	°C	Charge air temperature sensor downstream throttle
C/AIR TEMP/S U/STRM THL V	V	Charge air temperature sensor upstream throttle voltage
CALCULATED ALT TORQ	Nm	Calculated alternator torque
Calculated fuel temperature	°C	—
CAN COM W/ AT N POSI SW	Yes/No	—
CAN COM W/ DRCT SLCT LVR	Yes/No	—
CAN COM W/ E PRKNG BRK	Yes/No	—
CAN COM W/ STEERING	Yes/No	—
CAN COM W/ TRANSMISSION	Yes/No	CAN communication with TCM
CANISTER SHUTOFF VALVE	open/closed	EVAP canister vent control valve
Capacity utilization of alternatr	%	—
CHARCOAL FILTR FILL LEVEL	—	EVAP canister fill level
Charcoal filter shutoff vlv activ	Pending/undefined/ok/Fault	EVAP canister vent control valve activate
CHG/A COOLR CIRCLTN PMP	off/on	Charge air cooler circulation pump
CLNT PMP CNTL/CIRC	off/on	—
CLNT PMP SWOVR VLV	%	Coolant pump switchover valve
Closing err memory entry avail	No/Yes	—
Clutch	Yes/No	—
CLUTCH PEDAL SWITCH	off/on	Clutch pedal switch
Combustion engine	Yes/No	—
compression check status	—	—
compression time cylinder 1	ms	—
compression time cylinder 2	ms	—
compression time cylinder 3	ms	—
compression time cylinder 4	ms	—
COMPRESSOR ACTUATION	%	—
Conditn discontinuatn TLD	No/Yes	—

Monitor item	Unit	Remarks
COOLANT TEMP SENSOR V	V	Coolant temperature sensor voltage
Coolant temp substitute value	°C	—
COOLANT TEMPERATURE	°C	Coolant temperature
Coolant thermostat	%	—
Coolnt tmp low / no lmbda cont	No/Yes	—
COOLNT TEMP (ENG START)	°C	Coolant temperature (engine start)
COOLNT TEMP (SPECFD VAL)	°C	Coolant temperature (specified value)
Corrctn progrmng fuel quantity	—	—
Corrctn valu specifd idle speed	1/min	—
Correction factor - MAF	—	—
Correction value of RON	—	—
Course sensor TM adaptation	No/Yes	—
Crankcase ventilation heating	off/on	—
Crctn val desird idle spd (driv)	1/min	—
CRRCTN FACTR FAN OPER/T	%	Correction factor fan operation time
CRRCTN FACTR MAF	—	Correction factor mass air flow
CVN-calculation ready	—	—
Cycle duration of MAF sensor	μs	—
CYL1 F/INJCTOR CONTROL V	V	Cylinder1 fuel injector control voltage
CYL1 FUEL INJ SUPPLY PWR	mAs	Cyl1 fuel injector supply power
CYL1 MALFUNCTION COUNTR	—	Cylinder1 malfunction counter
CYL2 F/INJCTOR CONTROL V	V	Cylinder2 fuel injector control voltage
CYL2 FUEL INJ SUPPLY PWR	mAs	Cyl2 fuel injector supply power
CYL2 MALFUNCTION COUNTR	—	Cylinder2 malfunction counter
CYL3 F/INJCTOR CONTROL V	V	Cylinder3 fuel injector control voltage
CYL3 FUEL INJ SUPPLY PWR	mAs	Cyl3 fuel injector supply power
CYL3 MALFUNCTION COUNTR	—	Cylinder3 malfunction counter
CYL4 F/INJCTOR CONTROL V	V	Cylinder4 fuel injector control voltage
CYL4 FUEL INJ SUPPLY PWR	mAs	Cyl4 fuel injector supply power
CYL4 MALFUNCTION COUNTR	—	Cylinder4 malfunction counter
CYLINDER 1 INJECTOR CODE	—	—
CYLINDER 2 INJECTOR CODE	—	—
CYLINDER 3 INJECTOR CODE	—	—
CYLINDER 4 INJECTOR CODE	—	—
DECEL AIR SWOVER VALVE	open/closed	Deceleration air switchover valve
Deceleration fuel shutoff status	No/Yes	—
Desulfurizatn NOx storage cat	—	—
ECO S/S FUNC ACTVE	Yes/No	Monitoring of ECO start/stop function ACTIVE
EEPROM storage of stroke correction for piezo injectors	—	—
EGR 1st adaptatn releas Bnch1	No/Yes	—
EGR actuator sensor	%	—
EGR adaptatn bench 1 err code	—	—
EGR adaptatn Bench 1 success	No/Yes	—

Monitor item	Unit	Remarks
EGR POSTNR OPN CLAMPING	Pending/undefined/ ok/Fault	Exhaust gas regulation positioner open clamping
EGR rls lowr/q stop adapt Bnh1	No/Yes	—
ELECTRICAL FAULT IN ALT	No/Yes	Electrical fault in alternator
Enabling of sig of NOx sensor	No/Yes	—
ENG DIAGNOSIS IND LAMP	off/on	—
ENG OIL PUMP VLV V (SHUNT)	V	Engine oil pump valve voltage (shunt)
Engine hood	Yes/No	—
ENGINE LOAD	%	Engine load
ENGINE OIL PUMP VALVE	%	Engine oil pump valve
ENGINE SPEED	1/min	Engine speed
Err: Positn NOT DETECTD (Y)	No/Yes	—
Error: Electrical fault (X)	No/Yes	—
Error: Electrical malfunction (Y)	No/Yes	—
Error: Position NOT DETECTED (X)	No/Yes	—
Error: Threshold value (X)	No/Yes	—
Error: Threshold value (Y)	No/Yes	—
ESP®*	Yes/No	—
Ethanl proportn aftr last tch-in	%	—
Ethanol factor	—	—
Ethanol operation	No/Yes	—
EVAP em cont sys (large leak)	Pending/undefined/ ok/Fault	—
EVAP em cont system (min leak)	Pending/undefined/ ok/Fault	—
EXCITATION CURRENT	A	Excitation current
EXH CAMSHAFT ADAPT STAT	initialized/Error/ started/interrupted/ finished	Exhaust camshaft adaptation status
Exh gas tmp u/strm cat (raw val)	V	—
Exh press upstream EGR valve	hPa	—
Exh temp - RH NOx storage cat	°C	—
EXH TEMP D/STRM TWC	°C	Exhaust temperature downstream three way catalyst
EXH TEMP RH CAT CONVRTR	°C	Exhaust temperature right catalytic converter
Exh temp upstream oxidatn cat	°C	—
Exhaust actuatn - tester default	%	—
Exhaust pressure downstream of exhaust gas recirculation valve	hPa	—
F/P PERMANENTLY ON	off/on	Fuel pump permanently
F/TNK PRES DIFF (RAW VALU)	V	Fuel tank Pressure differential (raw value)
Factor 1	—	—
FAN ACTUATION DUTY	%	Fan actuation duty
Fan output request by engine	—	—
FAN RUN-ON	No/Yes	Fan run-on
FAN SPEED REQUEST (A/C)	%	Fan speed request (air conditioner)
Fill level of engine oil	OK/low	—

Monitor item	Unit	Remarks
Fill level of fuel tank	l	—
Flex fuel learn process finished	No/Yes	—
Flex fuel learning process fuel	No/Yes	—
Frequency counter for message on instrument cluster ″Clutch overheated″	—	—
FUEL PUMP	No/Yes	—
Fuel tank pressure difference	hPa	—
FUEL TEMPERATURE	°C	Fuel temperature
FULL LOAD DETECTION	No/Yes	Full load detection
GEAR RANGE ENGAGED	P/N/1/2/3/4/5/6/R/ Error	Gear range engaged
Generator high temperature	No/Yes	—
GRADIENT	Yes/No	—
GRILL SHUTTER POSI (TEST)	%	Grill shutter actuator position (test)
GRILL SHUTTER POSITION	%	Grill shutter actuator position
IDLE RECOGNITION	No/Yes	Idle recognition
IDLE RPM (NOMINAL)	1/min	Idle revolutions per minute (nominal)
IDLE SPEED INCREASE	1/min	Idle speed increase
IN/MANI P F/CAPA CNVR FCTR	—	Intake manifold pressure filling capacity conversion factor
IN/MNFLD P CRR VL (STRTFD)	hPa	Intake manifold pressure correction value (stratified)
Inhibit of engine start by crash event	No/Yes	—
INJECTION TIME RIGHT	ms	Injection time right
INSIDE TEMP OF CONT UNIT	°C	Inside temperature of control unit
Int camsft/vlv lift sw actuatr stat	—	—
INTAK CAMSFT ADAPT STAT	initialized/Error/ started/interrupted/ finished	Intake camshaft adaptation status
Intake air temp - MAF sen/TC	V	—
intake air temperature	°C	—
Intake air temperature too high	No/Yes/ok/Fault/ Pending/undefined	—
KICKDOWN	off/on	Kickdown
KNOCK CONTROL ENABLE	No/Yes	Knock control enable
KNOCKING COMBUSTION	No/Yes	Knocking combustion
L/CONT STAT U/STRM RH CAT	off/on	Lambda control status upstream right catalyst
Lambda value right NOx sensor	—	—
LAMDA CONT D/STRM CAT	—	Lambda control downstream catalyst
LAMDA CONT U/STRM CAT	—	Lambda control upstream catalyst
LOW FUEL PRESSURE	kPa	—
MASS AIR FLOW CRRCTN VAL	kg/h	Mass air flow correction value
MECH FAULT IN ALTRNATR	No/Yes	Mechanical fault in alternator
Mileage of CAN-Bus	km/No/Yes	—
Misfire counter homogeneous cylinder 1	—	—
Misfire counter layer cylinder 1	—	—
MIXTUR ADAPT IN/MANI PRES	hPa	Mixture adaptation intake manifold pressure

Monitor item	Unit	Remarks
Mixture adaptatn b1 (partial ld)	—	—
MIXTURE ADAPTATN CANCEL	No/Yes	Mixture adaptation cancel
MIXTURE ADAPTATN FINISHD	No/Yes	Mixture adaptation finished
MIXTURE ADAPTN IN OPERTN	No/Yes	Mixture adaptation in operation
NORMAL MODE	No/Yes	Normal mode
NOx of NOx storage catalyst	ppm	—
Number of ethanol refuel ope	No/Yes	—
Number of ignitions in stratified operation	—	—
Number of ignitions in the homogeneous and stratified operation	—	—
O2 SENS D/STRM CAT VOLT	V	Oxygen sensor downstream catalyst voltage
O2 SENS U/STRM CAT VOLT	V	Oxygen sensor upstream catalyst voltage
O2 SENSOR HEATER STATUS	%	Oxygen sensor heater status
On-board electrical system	Yes/No	—
Ope mode layer at total time	%	—
OPERATING POINT INDICATR	—	—
Outside temperature	Yes/No	—
OVERHEATING PROTECTION	No/Yes	Overheating protection
Pedal val sen 50% supply volt	V	—
PRES/S D/STRM THRTL VLV V	V	Pressure sensor downstream throttle valve voltage
Presence of driver	Yes/No	—
PRESS D/STRM THRTL VALV	hPa	Pressure downstream throttle valve
Press sensor d/stream air filter	hPa	—
PRESS U/STRM THRTL VALV	hPa	Pressure upstream throttle valve
PRS SEN D/STRM AIR FILTR V	V	Pressure sensor downstream air filter voltage
PRS SEN U/STRM THRTL VLV	V	Pressure sensor upstream throttle valve
purge line pressure	hPa	—
PURGING SWOVER VLV DUTY	%	Purging switchover valve duty
PWR CSMN (PURG SWOVR/V)	mA	Power consumption (Purging switchover valve)
QANTY C/V T/ACT ANGL (SPC)	Grad KW	Quantity control valve total actuation angle (Specified)
QUANTY C/V TOTL ACT ANGL	deg	quantity control valve total actuation angle
RAIL PRES (ACTUAL VALUE)	MPa	Rail pressure (actual value)
RAIL PRES (SPECIFIED VALU)	MPa	Rail pressure (specified value)
RAIL PRESSURE	MPa	—
RH CYL/B EX CAMSHAFT POS	deg	Right cylinder bank exhaust camshaft position
RH CYL/B IN CAMSHAFT POS	deg	Right cylinder bank intake camshaft position
RH EX C/S INS/P CRCTN FCTR	deg CrS	Right exhaust camshaft installation position correction factor
RH IN C/S INS/P CRCTN FCTR	deg CrS	Right intake camshaft installation position correction factor
RH IN CAM ANGL (NOMINAL)	deg	Right inlet camshaft angle (nominal)
RH OUT CAM ANGL (NOMINL)	deg	Right outlet camshaft angle (nominal)
Right NOx sensor	No/Yes	—
S/S CNL: AIR CONDITIONER	Yes/No	Stop/Start cancel: Air conditioner
S/S CNL: AIR SUSPENSION	Yes/No	Stop/Start cancel: air suspension

Monitor item	Unit	Remarks
S/S CNL: EMERGENCY VHCL	Yes/No	Stop/Start cancel: emergency vehicle
S/S CNL: OFF-RD ENGNR PK	Yes/No	Stop/Start cancel: off-road engineering package
SELECT LEVER ′N′	not neutral/neutral	—
SELF ADJ LWR P/LOAD RANGE	—	Self-adjustment lower partial-load range
SELF ADJ UPR P/LOAD RANGE	—	Self adjustment upper partial-load range
SELF-ADJ IN IDLE RANGE	%	Self-adjustment in idle speed range
SEN ROTOR ADAPT CMPLT	Yes/not valid/No	Sensor rotor adaptation complete
SEN ROTOR ADAPT STATUS	No/Yes	Sensor rotor adaptation status
SMOOTH OPR OF CYL 1	(rev/s)2	Smooth operation of cylinder 1
SMOOTH OPR OF CYL 2	(rev/s)2	Smooth operation of cylinder 2
SMOOTH OPR OF CYL 3	(rev/s)2	Smooth operation of cylinder 3
SMOOTH OPR OF CYL 4	(rev/s)2	Smooth operation of cylinder 4
Speed of the rear axle	km/h	—
Speed threshold	Yes/No	—
START ENABLE CL PDL SW	off/on	Start enable clutch pedal switch
START/STOP SW FUNCTION	Yes/No	—
Starter	Yes/No	—
Status of adaptation	No/Yes	—
Status of circuit 61	No/Yes	—
STEERING ANGLE	Yes/No	Steering angle
STOP LAMP SWITCH	off/on	Stop lamp switch
Stratified ope with cat heating	No/Yes	—
Stratified operation	No/Yes	—
Sulfur of NOx storage catalyst	g	—
System	Yes/No	—
T/R (O2 SEN U/STRM CAT)	No/Yes	Test readiness (oxygen sensor upstream of catalytic converter)
T/R (O2 SENSR D/STRM CAT)	No/Yes	Test readiness (oxygen sensor downstream of catalytic converter)
Tank check error: large leak	No/Yes	—
Tank density exam completion	—	—
Tank leak check active	No/Yes	—
Tank leak ck: collection break	No/Yes	—
Tank leak diag (0.5) threshold	hPa/s	—
Tank lk ck - Max devtn lambda	—	—
Tank lk ck: lambda cont break	No/Yes	—
Tank vent outgasing value	hPa/s	—
Tank vent valve is activated	No/Yes	—
Tank ventilation: large leak	No/Yes	—
Tank ventilation: minimum leak	No/Yes	—
temperature sensor oil	°C	—
THRMST HEAT ELMNT DUTY	%	Thermostat heating element duty
Throttle learn process finished	No/Yes	—
Throttle valve actuator status	No/Yes	—
THROTTLE VALVE POSITION	GRAD	Throttle valve position

Monitor item	Unit	Remarks
THRTL VALVE ACTUATOR1 V	V	Throttle valve actuator1 voltage
THRTL VALVE ACTUATOR2 V	V	Throttle valve actuator2 voltage
TM gear sen: Horizontl position	%	—
TM gear sen: Vertical position	%	—
TRANSMISSION	Yes/No	—
UNIFORMTY OF LAMBDA CNT	—	Uniformity of lambda control
Vacuum body gradient	hPa/s	—
Vacuum dismantling gradient	hPa/s	—

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

WORK SUPPORT MODE

Work Item

Work item	Full spell	Usage
ACTIVATION OF FUEL PUMP	ACTIVATION OF FUEL PUMP	Use after ECM and FPCM change
CAMSHAFT REFERENCE ADAPTATION	CAMSHAFT REFERENCE ADAPTATION	Use after one of the following components: • Replace the engine • Remove of timing chain • Remove intake camshaft actuator or exhaust camshaft actuator.
Corrctn progrmng fuel quantity	Corrctn progrmng fuel quantity	Follow the instruction of CONSULT display.
Correction programming - specified idle speed	Correction programming - specified idle speed	Follow the instruction of CONSULT display.
Correction programming of ignition	Correction programming of ignition	Follow the instruction of CONSULT display.
Correctn programng - specified idle speed (gr engaged)	Correctn programng - specified idle speed (gr engaged)	Follow the instruction of CONSULT display.
ECU reset	ECU reset	Follow the instruction of CONSULT display.
ETHANOL READING FREQUENCY COUNTER RESET	ETHANOL READING FREQUENCY COUNTER RESET	Follow the instruction of CONSULT display.
FUEL PUMP	FUEL PUMP	Follow the instruction of CONSULT display.
INJECTOR INJECTION QUANTITY ADJUSTMENT	INJECTOR INJECTION QUANTITY ADJUSTMENT	Use after replacing ECM or fuel injector
RESETTING OF ADAPTION VALUES	RESETTING OF ADAPTION VALUES	Use after a repair on the charge air system and fuel mixture generation including all affected components
STATUS OF TEACH IN PROCESSES	STATUS OF TEACH IN PROCESSES	Use to check status of teach-in processes
TEACH IN OF CAMSHAFT POSITION	TEACH IN OF CAMSHART POSITION	Use after one of the following components: • Replace the engine • Remove of timing chain • Remove intake camshaft actuator or exhaust camshaft actuator.
Teach in of sensor rotor adaptation	Teach in of sensor rotor adaptation	Follow the instruction of CONSULT display.
TEACH IN OF THROTTLE VALVE STOP	TEACH IN OF THROTTLE VALVE STOP	Use after replacing ECM or throttle valve actuator
TEACH IN THE ETHANOL PROPORTION IN THE FUEL	TEACH IN THE ETHANOL PROPORTION IN THE FUEL	Follow the instruction of CONSULT display.
VIN REGISTRATION	VIN REGISTRATION	Used when registering VIN in ECM
Enabling of engine start after crash event	Enabling of engine start after crash event	Used when cancelling engine start inhibition after air bag has deployed.

ACTIVE TEST MODE

Test Item

Test item	Full spell	Condition
BOOST PRESSURE CONTROL PRESSURE TRANSDUCER	BOOST PRESSURE CONTROL PRESSURE TRANSDUCER	Follow the instruction of CONSULT display.
CAMSHAFT POSITIONER	CAMSHAFT POSITIONER	• Apply parking brake. • Move selector lever to position 'P' or 'N' on vehicles with automatic transmission. • During the test the engine speed must be between 2,700 and 3,500 rpm.
CAUSES OF ENGINE STOP PREVENTION	CAUSES OF ENGINE STOP PREVENTION	Follow the instruction of CONSULT display.
CHECK ACTIVATED CHARCOAL CANISTER SHUTOFF VALVE	CHECK ACTIVATED CHARCOAL CANISTER SHUTOFF VALVE	Follow the instruction of CONSULT display.
CHECK BOOST PRESSURE CONTROL	CHECK BOOST PRESSURE CONTROL	Follow the instruction of CONSULT display.
Check purging pressure control	Check purging pressure control	Follow the instruction of CONSULT display.
Check coolant thermostat heating element	Check coolant thermostat heating element	Follow the instruction of CONSULT display.
CHECK COOLANT PUMP SWITCHOVER VALVE	CHECK COOLANT PUMP SWITCHOVER VALVE	Follow the instruction of CONSULT display.
CHECK CYLINDER FUEL INJECTORS	CHECK CYLINDER FUEL INJECTORS	Follow the instruction of CONSULT display.
CHECK CYLINDER FUEL INJECTORS FOR LEAKS	CHECK CYLINDER FUEL INJECTORS FOR LEAKS	Follow the instruction of CONSULT display.
CHECK DECELERATION AIR SWITCHOVER VALVE	CHECK DECELERATION AIR SWITCHOVER VALVE	• Combustion engine AT STANDSTILL. • Ignition ON.
CHECK ENGINE OIL PUMP VALVE	CHECK ENGINE OIL PUMP VALVE	• Combustion engine AT STANDSTILL. • Ignition ON.
CHECK EXHAUST CAMSHAFT SOLENOID	CHECK EXHAUST CAMSHAFT SOLENOID	• The ignition is switched on. • Engine running at idle • Coolant temperature > 80°C (176°F)
CHECK FUEL HIGH PRESSURE CIRCUIT	CHECK FUEL HIGH PRESSURE CIRCUIT	• Ignition ON. • Apply parking brake.
CHECK FUEL HI PRESS CIRC FOR LEAKTIGHTNESS	CHECK FUEL HIGH PRESSURE CIRCUIT FOR LEAKTIGHTNESS	• Ignition ON. • Coolant temperature between 75°C and 105°C (167°F and 221°F) • Fuel temperature between 40°C and 80°C (104°F and 176°F) • Start combustion engine. • Combustion engine IDLING • Switch off all current consumers. • Connect charger for battery.
CHECK FUEL PRESSURE AND TEMPERATURE SENSOR RAIL PRESSURE	CHECK FUEL PRESSURE AND TEMPERATURE SENSOR	• Combustion engine IDLING. • Coolant temperature between 75°C (167°F) and 105°C (221°F) • All electrical accessories must be switched OFF.
Check fuel tank pressure sensor	Check fuel tank pressure sensor	Follow the instruction of CONSULT display.
CHECK INTAKE CAMSHAFT SOLENOID	CHECK INTAKE CAMSHAFT SOLENOID	• The ignition is switched ON. • Engine running at idle • Coolant temperature > 80°C (176°F)

Test item	Full spell	Condition
CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHING ACTUATOR	CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHING ACTUATOR	Follow the instruction of CONSULT display.
CHECK LEAK TEST OF FUEL TANK	CHECK LEAK TEST OF FUEL TANK	Follow the instruction of CONSULT display.
CHECK POWER SUPPLY	CHECK POWER SUPPLY	Follow the instruction of CONSULT display.
CHECK PURGING SWITCHOVER VALVE	CHECK PURGING SWITCHOVER VALVE	• Combustion engine AT STANDSTILL • Ignition ON.
CHECK SYSTEM DRIVE AUTHORIZATION	CHECK SYSTEM DRIVE AUTHORIZATION	Follow the instruction of CONSULT display.
CHECK THROTTLE VALVE ACTUATOR	CHECK THROTTLE VALVE ACTUATOR	• Coolant temperature > 80°C (176°F) • Ignition ON • The combustion engine is at a standstill. • Accelerator pedal NOT OPERATED
CK ENG AND AC WITH INTGRTED CONT FAN MOTOR	CK ENG AND AC WITH INTGRTED CONT FAN MOTOR	Follow the instruction of CONSULT display.
COMPONENT QUANTITY CONTROL VALVE	COMPONENT QUANTITY CONTROL VALVE	Follow the instruction of CONSULT display.
COMPRESSION TEST	COMPRESSION TEST	Follow the instruction of CONSULT display.
ENGINE DIAGNOSIS INDICATOR LAMP	ENGINE DIAGNOSIS INDICATOR LAMP	Follow the instruction of CONSULT display.
Malfunction status of stop/start system	Malfunction status of stop/start system	Follow the instruction of CONSULT display.
FUEL PUMP	FUEL PUMP	Follow the instruction of CONSULT display.
MIXTURE ADAPTATION	MIXTURE ADAPTATION	• Engine speed: 400 – 800 rpm • Coolant temperature between 40°C (104°F) and 80°C (176°F) • Engine load: 30% or less • Selector lever: P or N
MIXTURE FORMATION	MIXTURE FORMATION	Follow the instruction of CONSULT display.
PARTIAL LOAD OPERATION CRANKCASE VENTILATION VALVE	PARTIAL LOAD OPERATION CRANKCASE VENTILATION VALVE	Follow the instruction of CONSULT display.
Purging switchover valve	Purging switchover valve	Follow the instruction of CONSULT display.
QUANTITY CONTROL VALVE	QUANTITY CONTROL VALVE	Follow the instruction of CONSULT display.
RAIL PRESSURE REDUCTION	RAIL PRESSURE REDUCTION	Follow the instruction of CONSULT display.
REQUIREMENTS FOR AUTOMATIC ENGINE START	REQUIREMENTS FOR AUTOMATIC ENGINE START	Follow the instruction of CONSULT display.
THROTTLE VALVE ACTUATOR	THROTTLE VALVE ACTUATOR	Follow the instruction of CONSULT display.
THROTTLE VALVE STICKS ICED UP	THROTTLE VALVE STICKS ICED UP	Follow the instruction of CONSULT display.
WIDE OPEN THROTTLE OPERATION VENT LINE HEATING ELEMENT	WIDE OPEN THROTTLE OPERATION VENT LINE HEATING ELEMENT	Follow the instruction of CONSULT display.

DIAGNOSIS SYSTEM (FPCM)

CONSULT Function

INFOID:0000000013607972

FUNCTION

Diagnostic test mode	Function
ECU Identification	FPCM part number can be read.
Self Diagnostic Result	Self-diagnostic results can be read and erased.
Data monitor	Input/Output data in FPCM can be read.
Active test	Diagnostic Test Mode in which CONSULT drives some actuators apart from FPCM and also shifts some parameters in a specified range.

SELF DIAGNOSTIC RESULT MODE

Self Diagnostic Item

Regarding items of DTC, refer to EC-157, "2WD : DTC Index".

How to Erase DTC

- If ignition switch is continuously in the ON position after a DTC is detected, turn ignition switch OFF before turning ignition switch to the ON position again, and then erase DTC.
- Check the all self-diagnostic screen to confirm there are no DTCs in other ECUs.

Freeze Frame Data

The Freeze Frame Data shows the state of the vehicle at the time a DTC is detected and is useful in re-creating the circumstances that caused the malfunction.

Freeze Frame Data Item List

Item		Value (unit)	
CONSULT screen terms	Full spell	CONSULT screen terms	Full spell
OCCURRENCE TRACER	Occurrence tracer	ERROR	Error
		EVENT	Event
PERIPHERAL DATA	Peripheral data	ERROR	Error
		EVENT	Event
KILOMETER READING - FIRST OCCURRENCE	Kilometer reading - first occurrence	km	—
		NOT AVLBL / DEFAULT	Not available / Default
KILOMETER READING - LAST OCCURRENCE	Kilometer reading - last occurrence	km	—
		NOT AVLBL / DEFAULT	Not available / Default
FREQUENCY COUNTER - LAST OCCURRENCE	Frequency counter - last occurrence	—	—
		NOT AVLBL / DEFAULT	Not available / Default
OPRATNG CYCL COUNTR - LST OCCURRNCE	Operating cycle counter - last occurrence	—	—
		NOT AVLBL / DEFAULT	Not available / Default

DATA MONITOR MODE

NOTE:

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

Monitored Item

For reference values of the following items, refer to EC-156, "2WD : Reference Value".

MONITOR ITEM	Unit	Remarks
FUEL PRESSSEN	bar	Fuel Pressure Sensor Signal
FUEL PRESSURE	bar	Fuel pressure
Power consumption of F/P	A	Power consumption of component 'M3 (Fuel pump)'

MONITOR ITEM	Unit	Remarks
RDDNT SAM CONT RLYP	OFF	Ignition (circuit 15)
	On	
Rpm of fuel pump	1/min	Rpm of fuel pump
Voltage of fuel pump	V	Voltage of fuel pump

ACTIVE TEST MODE

Test Item

Test item	Condition
ACTUATION OF FUEL PUMP	• The fuel level must be greater than 10 liter. • The coolant temperature must be less than 80°C (176°F). • Run combustion engine at idle.
EMPTY FUEL TANK	The fuel level should be more than 5.0 liter.

ECU DIAGNOSIS INFORMATION

ECM

Reference Value

INFOID:0000000013608066

VALUES ON THE DIAGNOSIS TOOL

NOTE:

- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- Numerical values in the following table are reference values.
- These values are input/output values that ECM receives/transmits and may differ from actual operations.
- For outlines of following items, refer to EC-97, "CONSULT Function".

Monitor item	Condition	Values/Status
ABORTD	Ignition switch: ON	Yes
ACCEL PEDAL SENSOR	• Ignition switch: ON • Accelerator pedal: Fully released	0%
	• Ignition switch: ON • Accelerator pedal: Fully depressed	100%
ACCELERATORPEDAL	Ignition switch: ON	No
ACCELERATOR PEDAL SEN 1	• Ignition switch: ON • Accelerator pedal: Fully depressed	0.3076 V
	• Ignition switch: ON • Accelerator pedal: Fully depressed	4.6654 V
ACCELERATOR PEDAL SEN 2	• Ignition switch: ON • Accelerator pedal: Fully depressed	0.1660 V
	• Ignition switch: ON • Accelerator pedal: Fully depressed	2.2852 V
ACTUAL VOLTAGE CYL1	Ignition switch: ON	0.00 mAs
	Engine running at 2,000 rpm	0.7520 mAs
ACTUAL VOLTAGE CYL2	Ignition switch: ON	0.69990 mAs
	Engine running at 2,000 rpm	0.7640 mAs
ACTUAL VOLTAGE CYL3	Ignition switch: ON	0.6960 mAs
	Engine running at 2,000 rpm	0.7620 mAs
ACTUAL VOLTAGE CYL4	Ignition switch: ON	0.6980 mAs
	Engine running at 2,000 rpm	0.7620 mAs
Adaptation COMPLETE	Engine running at 2,000 rpm	No
Adaptation STARTED	Ignition switch: ON	No
AIR CONDITIONER STATUS	Ignition switch: ON	OFF
AIRMASS	Ignition switch: ON	0.0 kg/h
	Engine running at idle	1903.800 kg/h
air-mass flow	Ignition switch: ON	0.0 kg/h
	Engine running at idle	16.900 kg/h
ALT REGULATD V (STANDRD)	Ignition switch: ON	10.6 V
	Engine running at idle	14.6000 V
ALTERNATOR ID	Ignition switch: ON	3
AMBIENT TEMP (CAN)	Ignition switch: ON	Displays ambient temperature
BAROMETRIC PRESSURE	Ignition switch: ON	Displays barometric pressure.

Monitor item	Condition	Values/Status
BATTERY VOLTAGE	Ignition switch: ON	Displays main battery voltage.
BOOST PRES POSITNR DUTY	Ignition switch: ON	8.99%
	Engine running at 2,000 rpm	97.1104%
BRAKE ASSIST SYSTEM	Ignition switch: ON	No
BRAKE PEDAL	• Ignition switch: ON • Accelerator pedal: Fully released	OFF
	• Ignition switch: ON • Accelerator pedal: Fully depressed	On
C/AIR TEMP/S D/STRM THRTL	Ignition switch: ON	28.60°C
	Engine running at 2,000 rpm	42.75°C
C/AIR TEMP/S U/STRM THL V	Ignition switch: ON	3.6791 V
	Engine running at 2,000 rpm	2.8906 V
CALCULATED ALT TORQ	Ignition switch: ON	-0.3750 Nm
	Engine running at 2,000 rpm	-6.5000 Nm
Calculated fuel temperature	Ignition switch: ON	Displays calculated fuel temperature.
CAN COM W/ AT N POSI SW	Ignition switch: ON	No
CAN COM W/ DRCT SLCT LVR	Ignition switch: ON	No
CAN COM W/ E PRKNG BRK	Ignition switch: ON	No
CAN COM W/ STEERING	Ignition switch: ON	No
CAN COM W/ TRANSMISSION	Ignition switch: ON	No
CANISTER SHUTOFF VALVE	Ignition switch: ON	OPEN
Capacity utilization of alternatr	Ignition switch: ON	0%
	Engine running at idle	100%
Charcoal filter shutoff vlv activ	Ignition switch: ON	OK
CHARCOAL FILTR FILL LEVEL	Ignition switch: ON	0
	Engine running at idle	0
	Engine running at 2,000 rpm	0
Charcoal filter shutoff vlv activ	Ignition switch: ON	ok
CHG/A COOLR CIRCLTN PMP	Ignition switch: ON	OFF
CLNT PMP CNTL/CIRC	Ignition switch: ON	OFF
CLNT PMP SWOVR VLV	Ignition switch: ON	100%
	Engine running at idle	0%
Closing err memory entry avail	Ignition switch: ON	No
Clutch	Ignition switch: ON	No
CLUTCH PEDAL SWITCH	• Ignition switch: ON • Accelerator pedal: Fully released	OFF
	• Ignition switch: ON • Accelerator pedal: Fully depressed	On
compression check status	Ignition switch: ON	0
	Engine running at idle	0
	Engine running at 2,000 rpm	0
compression time cylinder 1	Ignition switch: ON	0.0 ms
compression time cylinder 2	Ignition switch: ON	0.0 ms
compression time cylinder 3	Ignition switch: ON	0.0 ms

Monitor item	Condition	Values/Status
compression time cylinder 4	Ignition switch: ON	0.0 ms
COMPRESSOR ACTUATION	Ignition switch: ON	0%
Conditn discontinuatn TLD	Ignition switch: ON	No
COOLANT TEMP SENSOR V	Ignition switch: ON	0.4639 V
	• Ignition switch: ON • Coolant temperature: 47.25 °C	0.5420 V
	• Ignition switch: ON • Coolant temperature: 78.75 °C	0.9180 V
Coolant temp substitute value	Ignition switch: ON	Displays coolant temperature substitute value.
	Engine running at idle	80.25°C
	Engine running at 2,000 rpm	47.25°C
	Engine running at 2,000 rpm	105.00°C
COOLANT TEMPERATURE	Ignition switch: ON	Displays coolant temperature.
	Engine running at idle	78.75°C
	Engine running at 2,000 rpm	47.25°C
	Engine running at 2,000 rpm	105.00°C
Coolant thermostat	Ignition switch: ON	100%
Coolnt tmp low / no lmbda cont	Ignition switch: ON	No
COOLNT TEMP (ENG START)	Ignition switch: ON	39.75°C
COOLNT TEMP (SPECFD VAL)	Ignition switch: ON	105.0°C
Corrctn progrmng fuel quantity	Ignition switch: ON	0
Corrctn valu specifd idle speed	Ignition switch: ON	0 1/min
Correction factor - MAF	Ignition switch: ON	1.062988
	Engine running at 2,000 rpm	1.064514
Correction value of RON	Ignition switch: ON	0
Course sensor TM adaptation	Ignition switch: ON	No
Crankcase ventilation heating	Ignition switch: ON	OFF
Crctn val desird idle spd (driv)	Ignition switch: ON	0
CRRCTN FACTR FAN OPER/T	Ignition switch: ON	0%
CRRCTN FACTR MAF	Ignition switch: ON	1.062988
	Engine running at 2,000 rpm	0.993103
Cycle duration of MAF sensor	Ignition switch: ON	0.0 μs
CYL1 F/INJCTOR CONTROL V	Ignition switch: ON	150.29 V
	Engine running at 2,000 rpm	148.7100 V
CYL1 FUEL INJ SUPPLY PWR	Ignition switch: ON	0.754 mAs
	Engine running at 2,000 rpm	0.7420 mAs
CYL1 MALFUNCTION COUNTR	Ignition switch: ON	0
CYL2 F/INJCTOR CONTROL V	Ignition switch: ON	161.17 V
	Engine running at 2,000 rpm	155.5400 V
CYL2 FUEL INJ SUPPLY PWR	Ignition switch: ON	0.786 mAs
	Engine running at 2,000 rpm	0.7560 mAs
CYL2 MALFUNCTION COUNTR	Ignition switch: ON	0
CYL3 F/INJCTOR CONTROL V	Ignition switch: ON	158.24 V
	Engine running at 2,000 rpm	156.6500 V

Monitor item	Condition	Values/Status
CYL3 FUEL INJ SUPPLY PWR	Ignition switch: ON	0.762 mAs
	Engine running at 2,000 rpm	0.7480 mAs
CYL3 MALFUNCTION COUNTR	Ignition switch: ON	0
CYL4 F/INJCTOR CONTROL V	Ignition switch: ON	156.65 V
	Engine running at 2,000 rpm	154.8800 V
CYL4 FUEL INJ SUPPLY PWR	Ignition switch: ON	0.7620 mAs
	Engine running at 2,000 rpm	0.7500 mAs
CYL4 MALFUNCTION COUNTR	Ignition switch: ON	0
	Engine running at 2,000 rpm	0
CYLINDER 1 INJECTOR CODE	Ignition switch: ON	Displays No.1 injector code
CYLINDER 2 INJECTOR CODE	Ignition switch: ON	Displays No.2 injector code
CYLINDER 3 INJECTOR CODE	Ignition switch: ON	Displays No.3 injector code
CYLINDER 4 INJECTOR CODE	Ignition switch: ON	Displays No.4 injector code
Cylinder pressure dP characteristic first element with limited range	Ignition switch: ON	hPa
	Engine running at idle	1670963
	Engine running at 2,000 rpm	1702618
Cylinder pressure dP characteristic third element with limited range	Ignition switch: ON	hPa
	Engine running at idle	1012.9688 hPa
	Engine running at 2,000 rpm	1012.9688 hPa
Cylinder pressure H50 characteristic second element with limited range	Engine running at idle	0
Cylinder pressure H50 characteristic third element with limited range	Engine running at idle	26
Cylinder pressure H50 characteristic fourth element with limited range	Engine running at idle	0
DECEL AIR SWOVER VALVE	Ignition switch: ON	OPEN
Deceleration fuel shutoff status	Ignition switch: ON	No
Desulfurizatn NOx storage cat	Ignition switch: ON	0
ECO S/S FUNC ACTVE	Ignition switch: ON	No
ELECTRICAL FAULT IN ALT	Ignition switch: ON	No
ENG DIAGNOSIS IND LAMP	Ignition switch: ON	OFF
ENG OIL PUMP VLV V (SHUNT)	Ignition switch: ON	0.0989 V
	Engine running at 2,000 rpm	0.098 V
ENGINE LOAD	Ignition switch: ON	71.8126%
	Engine running at 2,000 rpm	14.5781%
ENGINE OIL PUMP VALVE	Ignition switch: ON	10.196%
	Engine running at 2,000 rpm	89.804%
ENGINE SPEED	Ignition switch: ON	0.0 1/min
	Engine running at 2,000 rpm	1987.500 1/min
Environmental condition CGW state byte 3	Engine running at idle	Yes

Monitor item	Condition	Values/Status
Environmental condition IC state high byte	Engine running at idle	Yes
Environmental condition IC state low byte	Engine running at idle	Yes
Err: Positn NOT DETECTD (Y)	Ignition switch: ON	Yes
Error: Electrical malfunction (Y)	Ignition switch: ON	Yes
Error: Threshold value (Y)	Ignition switch: ON	Yes
ESP®	Ignition switch: ON	No
Ethanl proportn aftr last tch-in	Ignition switch: ON	0.0%
Ethanol factor	Ignition switch: ON	0.0
Ethanol operation	Ignition switch: ON	No
EVAP em cont sys (large leak)	Ignition switch: ON	OK
EVAP em cont system (min leak)	Ignition switch: ON	PENDNG
EXCITATION CURRENT	Ignition switch: ON	0.0 A
	Engine running at idle	5.500 A
	Engine running at 2,000 rpm	2.000 A
EXH CAMSHAFT ADAPT STAT	Ignition switch: ON	finished
Exh gas tmp u/strm cat (raw val)	Ignition switch: ON	4.9951 V
Exh press upstream EGR valve	Ignition switch: ON	1012.9688 hPa
Exh temp - RH NOx storage cat	Ignition switch: ON	0.0°C
EXH TEMP D/STRM TWC	Ignition switch: ON	24.5°C
	Engine running at 2,000 rpm	324.1°C
EXH TEMP RH CAT CONVRTR	Engine running at idle: Warm-up condition	196.8°C
	Engine running at 2,000 rpm	406.6°C
Exh temp upstream oxidatn cat	Engine running at idle: Warm-up condition	270.5°C
	Engine running at 2,000 rpm	412.6°C
Exhaust actuatn - tester default	Ignition switch: ON	0.0%
F/P PERMANENTLY ON	Ignition switch: ON	On
F/TNK PRES DIFF (RAW VALU)	Ignition switch: ON	4.9951 V
Factor 1	Ignition switch: ON	1.00006
FAN ACTUATION DUTY	Ignition switch: ON	9.766%
	Engine running at 2,000 rpm	9.766%
Fan output request by engine	Ignition switch: ON	0
FAN RUN-ON	Ignition switch: ON	No
FAN SPEED REQUEST (A/C)	Ignition switch: ON	0%
Fill level of engine oil	Ignition switch: ON	OK
Flex fuel learn process finished	Ignition switch: ON	No
Flex fuel learning process fuel	Ignition switch: ON	No
FUEL FILL LEVEL	Ignition switch: ON	Displays fuel tank level
FUEL PUMP	Ignition switch: ON	OFF
	Engine running at idle	On
Fuel tank pressure difference	Ignition switch: ON	0.0 hPa
FUEL TEMPERATURE	Ignition switch: ON	Displays fuel temperature
FULL LOAD DETECTION	Ignition switch: ON	No
GEAR RANGE ENGAGED	Ignition switch: ON	P/N

Monitor item	Condition	Values/Status
Generator high temperature	Ignition switch: ON	No
GRILL SHUTTER POSI (TEST)	Ignition switch: ON	0.0%
GRILL SHUTTER POSITION	Ignition switch: ON	99.9987%
IDLE RECOGNITION	Ignition switch: ON	Yes
IDLE RPM (NOMINAL)	Ignition switch: ON	0.0 1/min
	Engine running at 2,000 rpm	2014.000 1/min
IDLE SPEED INCREASE	Ignition switch: ON	0.0 1/min
IN/MANI P F/CAPA CNVR FCTR	Ignition switch: ON	1.00
IN/MNFLD P CRR VL (STRTFD)	Ignition switch: ON	0.0 hPa
INJECTION TIME RIGHT	Ignition switch: ON	0.0 ms
	Engine running at idle	0.413000 ms
INSIDE TEMP OF CONT UNIT	Ignition switch: ON	35.25
Int camsft/vlv lift sw actuatr stat	Ignition switch: ON	0
INTAK CAMSFT ADAPT STAT	Ignition switch: ON	finished
Intake air temp - MAF sen/TC	Ignition switch: ON	V
	Engine running at idle	3.6475 V
intake air temperature	Ignition switch: ON	Displays intake air temperature.
Intake air temperature too high	Ignition switch: ON	No
KICKDOWN	• Ignition switch: ON • Accelerator pedal: Fully released	OFF
	• Ignition switch: ON • Accelerator pedal: Fully depressed	On
KNOCK CONTROL ENABLE	Ignition switch: ON	No
KNOCKING COMBUSTION	Ignition switch: ON	No
L/CONT STAT U/STRM RH CAT	Ignition switch: ON	OFF
	Engine running at idle	On
LAMDA CONT D/STRM CAT	Ignition switch: ON	0.906586
	Engine running at 2,000 rpm	0.975403
LAMDA CONT U/STRM CAT	Ignition switch: ON	1.00
	Engine running at 2,000 rpm	1.098389
LOW FUEL PRESSURE	Ignition switch: ON	565.0 kPa
	Engine running at idle	495.000 kPa
	Engine running at 2,000 rpm	500.000 kPa
MASS AIR FLOW CRRCTN VAL	Ignition switch: ON	3.0 kg/h
MECH FAULT IN ALTRNATR	Ignition switch: ON	No
Mileage of CAN-Bus	Ignition switch: ON	228.0 km
MIXTUR ADAPT IN/MANI PRES	Ignition switch: ON	0.0 hPa
Mixture adaptatn b1 (partial ld)	Ignition switch: ON	0.9604
MIXTURE ADAPTATN CANCEL	Ignition switch: ON	No
MIXTURE ADAPTATN FINISHD	Ignition switch: ON	No
MIXTURE ADAPTN IN OPERTN	Ignition switch: ON	No
NORMAL MODE	Ignition switch: ON	Yes
Number of ethanol refuel ope	Ignition switch: ON	0

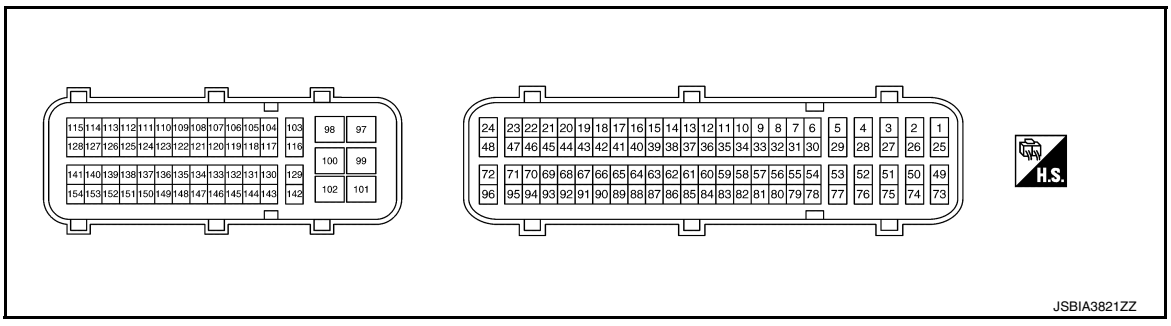
Monitor item	Condition	Values/Status
O2 SENS D/STRM CAT VOLT	Ignition switch: ON	1.607 V
	Engine running at 2,000 rpm	0.982 V
O2 SENS U/STRM CAT VOLT	Ignition switch: ON	1.4990 V
	Engine running at 2,000 rpm	1.5234 V
O2 SENSOR HEATER STATUS	Ignition switch: ON	0.0%
	Engine running at 2,000 rpm	33.7317%
Ope mode layer at total time	Ignition switch: ON	0.0%
OPERATING POINT INDICATR	Ignition switch: ON	0
OVERHEATING PROTECTION	Ignition switch: ON	No
Pedal val sen 50% supply volt	Ignition switch: ON	2.6049
PRES/S D/STRM THRTL VLV V	Ignition switch: ON	1.9482 V
	Engine running at 2,000 rpm	1.0107 V
	Ignition switch: ON	998.9844 hPa
	Engine running at 2,000 rpm	510.000 hPa
Press sensor d/stream air filter	Engine running at idle	1005.0129
	Engine running at 2,000 rpm	1005.0129
PRESS U/STRM THRTL VALV	Ignition switch: ON	1003.9844 hPa
	Ignition switch: ON	1006.4973 hPa
	Engine running at 2,000 rpm	1025.9375 hPa
PRS SEN D/STRM AIR FILTR V	Ignition switch: ON	4.3213 V
	Engine running at idle	4.3164 V
PRS SEN U/STRM THRTL VLV	Ignition switch: ON	1.9531 V
	Engine running at idle	1.9678 V
purge line pressure	Ignition switch: ON	-897.5 hPa
PURGING SWOVER VLV DUTY	Ignition switch: ON	0.0%
	Engine running at 2,000 rpm	31.765%
PWR CSMN (PURG SWOVR/V)	Ignition switch: ON	6.5313 mA
	Engine running at 2,000 rpm	261.8750 mA
QANTY C/V T/ACT ANGL (SPC)	Ignition switch: ON	94.0°
	Engine running at idle	33.200°
QUANTY C/V TOTL ACT ANGL	Ignition switch: ON	94.0°
	Engine running at idle	31.500°
RAIL PRES (ACTUAL VALUE)	Ignition switch: ON	17.404 MPa
	Engine running at idle	12.82200 MPa
RAIL PRES (SPECIFIED VALU)	Ignition switch: ON	17.50250 MPa
	Engine running at idle	13.00000 MPa
RAIL PRESSURE	Ignition switch: ON	17.5 MPa
	Engine running at idle	13.00550 MPa
Repetition Security	Engine running at idle	No
RH CYL/B EX CAMSHAFT POS	Ignition switch: ON	-32.000°
	Engine running at 2,000 rpm	-24.9688°
RH CYL/B IN CAMSHAFT POS	Ignition switch: ON	35.0°
	Engine running at 2,000 rpm	17.0000°
RH EX C/S INS/P CRCTN FCTR	Ignition switch: ON	0.2856°

Monitor item	Condition	Values/Status
RH IN C/S INS/P CRCTN FCTR	Ignition switch: ON	0.3955°
RH IN CAM ANGL (NOMINAL)	Ignition switch: ON	32.99297°
	Engine running at 2,000 rpm	17.8047°
RH OUT CAM ANGL (NOMINL)	Ignition switch: ON	-33.2109°
	Engine running at 2,000 rpm	-25.0000°
SELECT LEVER ″N″	• Ignition switch: ON • Selector lever: N	NEUTRAL
	• Ignition switch: ON • Other position	Not neut
SELF ADJ LWR P/LOAD RANGE	Ignition switch: ON	0.964142
SELF ADJ UPR P/LOAD RANGE	Ignition switch: ON	0.960449
SELF-ADJ IN IDLE RANGE	Ignition switch: ON	0.2813%
SEN ROTOR ADAPT CMPLT	Ignition switch: ON	Yes
SEN ROTOR ADAPT STATUS	Ignition switch: ON	No
SMOOTH OPR OF CYL 1	Ignition switch: ON	0.0 (rev/s)2
	Engine running at idle	0.7674 (rev/s)2
SMOOTH OPR OF CYL 2	Ignition switch: ON	0.0 (rev/s)2
	Engine running at idle	0.7176 (rev/s)2
SMOOTH OPR OF CYL 3	Ignition switch: ON	0.0 (rev/s)2
	Engine running at idle	0.4263 (rev/s)2
SMOOTH OPR OF CYL 4	Ignition switch: ON	0.0 (rev/s)2
	Engine running at idle	0.2132 (rev/s)2
Speed of the rear axle	Ignition switch: ON	0,0 km/h
Speed threshold	Ignition switch: ON	Yes
START ENABLE CL PDL SW	• Ignition switch: ON • Clutch pedal: Fully released	OFF
	• Ignition switch: ON • Clutch pedal: Fully depressed	On
START/STOP SW FUNCTION	• Ignition switch: ON • Stop/Start system operate	Yes
	• Ignition switch: ON • Start system is not operate	No
Status of circuit 61	Ignition switch: ON	No
STEERING ANGLE	Ignition switch: ON	No
STOP LAMP SWITCH	• Ignition switch: ON • Brake pedal: Fully released	OFF
	• Ignition switch: ON • Brake pedal: Fully depressed	On
Stratified ope with cat heating	Ignition switch: ON	No
Stratified operation	Ignition switch: ON	No
Sulfur of NOx storage catalyst	Ignition switch: ON	0.0 g
T/R (O2 SEN U/STRM CAT)	Ignition switch: ON	No
	Engine running at idle	Yes
T/R (O2 SENSR D/STRM CAT)	Ignition switch: ON	No
Tank check error: large leak	Ignition switch: ON	No
Tank density exam completion	Ignition switch: ON	0
Tank leak check active	Ignition switch: ON	No

Monitor item	Condition	Values/Status
Tank leak ck: collection break	Ignition switch: ON	No
Tank leak diag (0.5) threshold	Ignition switch: ON	0.0 hPa/s
Tank lk ck - Max devtn lambda	Ignition switch: ON	0.0
Tank lk ck: lambda cont break	Ignition switch: ON	No
Tank vent outgasing value	Ignition switch: ON	0.0 hPa/s
Tank vent valve is activated	Ignition switch: ON	No
	Engine running at idle	Yes
Tank ventilation: large leak	Ignition switch: ON	Yes
Tank ventilation: minimum leak	Ignition switch: ON	No
THRMST HEAT ELMNT DUTY	Ignition switch: ON	100%
Throttle learn process finished	Ignition switch: ON	Yes
Throttle valve actuator status	Ignition switch: ON	Yes
THROTTLE VALVE POSITION	• Ignition switch: ON • Accelerator pedal: Fully released	4.80°
	Engine running at idle	1.700°
	Engine running at 2,000 rpm	27.400°
	• Ignition switch: ON • Accelerator pedal: Fully depressed	78.8°
THRTL VALVE ACTUATOR1 V	• Ignition switch: ON • Accelerator pedal: Fully released	4.2566 V
	• Ignition switch: ON • Accelerator pedal: Fully depressed	0.7703 V
	Engine running at idle	0.6091 V
THRTL VALVE ACTUATOR2 V	• Ignition switch: ON • Accelerator pedal: Fully released	0.7593 V
	• Ignition switch: ON • Accelerator pedal: Fully depressed	4.2688 V
	Engine running at idle	4.4116 V
TM gear sen: Horizontl position	Ignition switch: ON	66.6%
TM gear sen: Vertical position	Ignition switch: ON	50.19%
TRANSMISSION	Ignition switch: ON	No
UNIFORMTY OF LAMBDA CNT	Ignition switch: ON	0.0
Vacuum body gradient	Ignition switch: ON	0.0 hPa/s
Vacuum dismantling gradient	Ignition switch: ON	0. 0 hPa/s

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

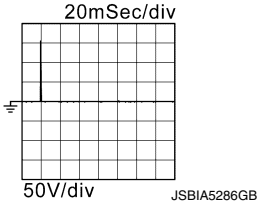
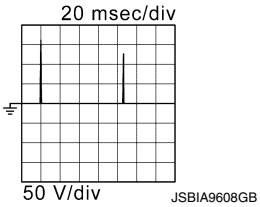
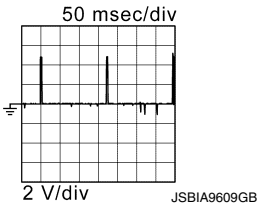
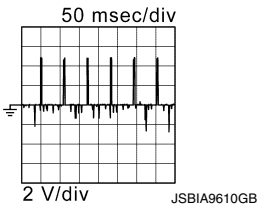
TERMINAL LAYOUT



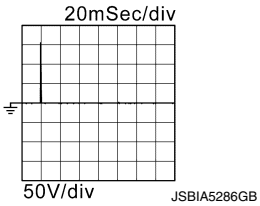
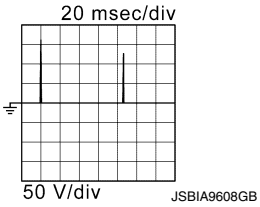
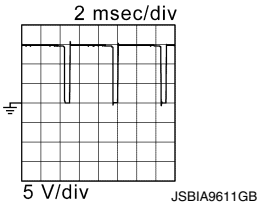
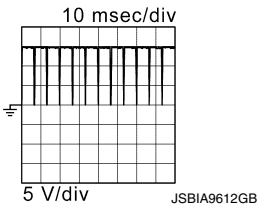
PHYSICAL VALUES

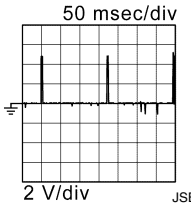
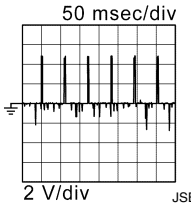
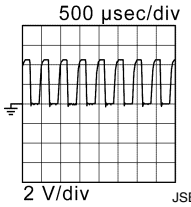
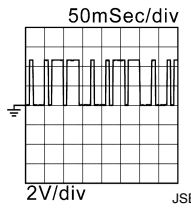
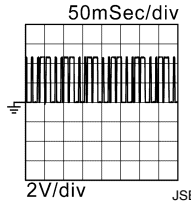
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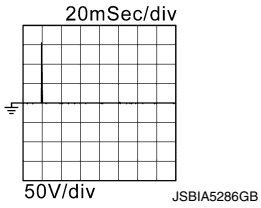
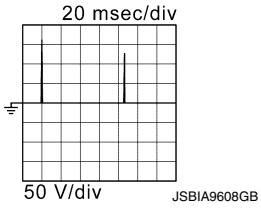
Pulse signal is measured by CONSULT.

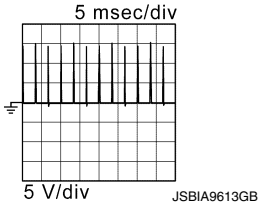
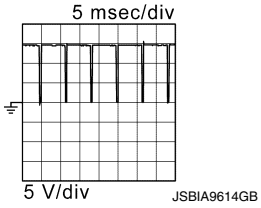
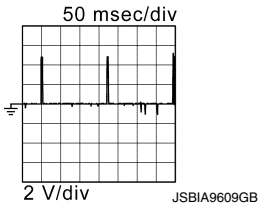
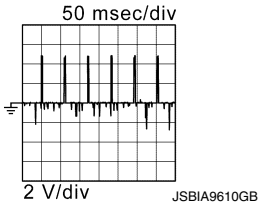
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
1 (BR/B)	98 (BR)	Fuel injector (No.1)	Output	[Ignition switch: ON]	0.5 V
				[Engine is running] • Idle speed	
2 (GY)	98 (BR)	Fuel injector (No.1)	Output	[Ignition switch: ON]	0.5 V
				[Engine is running] • Idle speed	
3 (Y/BR)	98 (BR)	Partial load operation crankcase ventilation valve	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Idle speed	Battery voltage
4 (G/W)	98 (BR)	Coolant thermostat heater element	Output	[Ignition switch: ON] Coolant temperature: Approx. 24°C (75.2°F)[*1]	3.42 V
7 (L)	98 (BR)	Ignition coil (No. 2)	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	
10 (R/Y)	—	Sensor ground (Intake camshaft position sensor, exhaust camshaft position sensor)	—	—	—

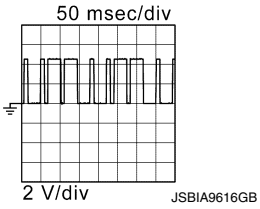
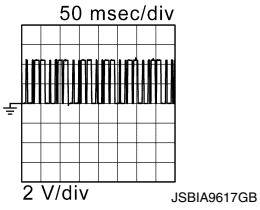
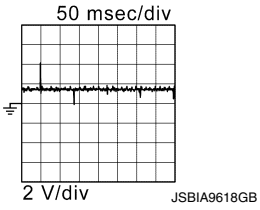
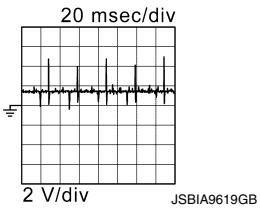
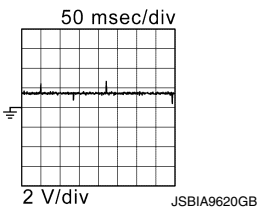
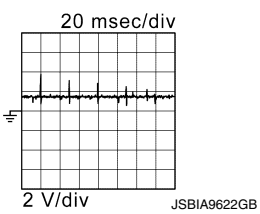
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	−	Signal name	Input/ Output		
11 (G/Y)	—	Sensor ground (Engine coolant temperature sensor, charge air temperature sensor downstream of throttle valve, charge air temperature sensor upstream of throttle valve, pressure sensor upstream of throttle valve, pressure sensor downstream of air filter)	—	—	—
12 (R/V)	—	Sensor ground (Crankshaft position sensor, fuel pressure and temperature sensor, pressure sensor downstream of throttle valve)	—	—	—
13 (BR)	—	Sensor ground (Heated oxygen sensor)	—	—	—
14 (BR/G)	—	Sensor ground (Throttle valve actuator)	—	—	—
16 (W/B)	98 (BR)	Sensor power supply (Pressure sensor upstream of throttle valve, pressure sensor downstream of air filter, intake camshaft position sensor, exhaust camshaft position sensor)	Output	[Ignition switch: ON]	5 V
17 (BR/W)	98 (BR)	Sensor power supply (Throttle valve actuator)	Output	[Ignition switch: ON]	5 V
18 (W/V)	98 (BR)	Sensor power supply (Crankshaft position sensor, fuel pressure and temperature sensor, pressure sensor downstream of throttle valve)	Output	[Ignition switch: ON]	5 V
23 (B/BR)	98 (BR)	Divert air switchover valve	Output	[Ignition switch: ON]	Battery voltage
				[Ignition switch: ON] Perform “CHECK DECELERATION AIR SWITCHOVER VALVE” in “ACTIVE TEST” mode.*1 Touch “START” and select “OPEN”.	0.5 V
24 (L/R)	98 (BR)	Throttle valve motor (+)	Output	[Ignition switch: ON]	0 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	2 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: For few seconds after depressing fully.	10 V

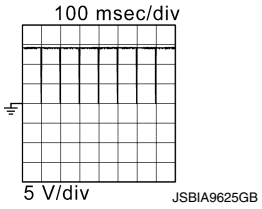
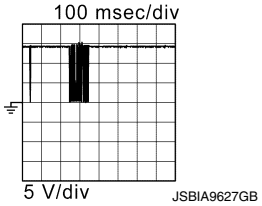
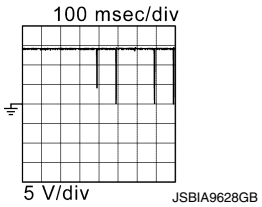
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
25 (L/G)	98 (BR)	Fuel injector (No.4)	Output	[Ignition switch: ON]	0.5 V
				[Engine is running] • Idle speed	
26 (W/L)	98 (BR)	Fuel injector (No.4)	Output	[Ignition switch: ON]	0.5 V
				[Engine is running] • Idle speed	
28 (W/R)	98 (BR)	Engine oil pump valve	Output	[Ignition switch: ON] Cold condition	Battery voltage
				[Ignition switch: ON] Warm-up condition	1.6 V
				[Engine is running] • Idle speed	1.9 V★ 
29 (B)	98 (BR)	Intake camshaft actuator	Output	[Ignition switch: ON]	Battery voltage
				[Engine is running] • Idle speed	Battery voltage★ 

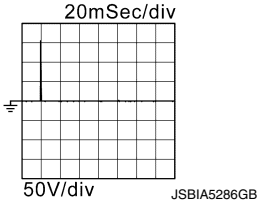
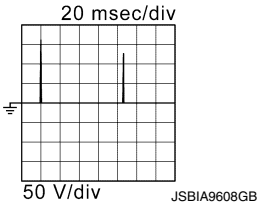
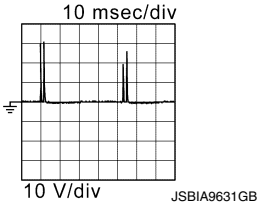
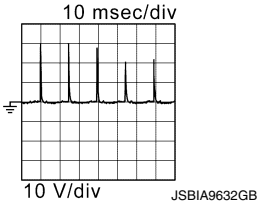
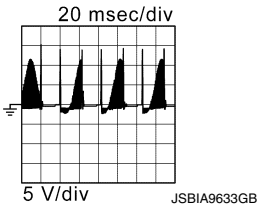
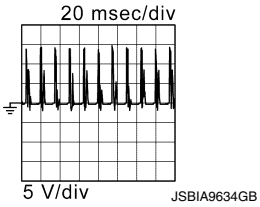
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
31 (V/L)	98 (BR)	Ignition coil (No. 4)	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0.04 V★  JSBIA9609GB
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.04 V★  JSBIA9610GB
33 (BR/O)	98 (BR)	Intake camshaft valve lift switchover actuator	Output	[Ignition switch: ON]	2 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	2 V★  JSBIA9624GB
				[Ignition switch: ON] Perform “Check intake camshaft valve lift switching actuator” in “ACTIVE TEST” mode.* Touch “START”	2.6 V During operation
34 (Y/L)	98 (BR)	Exhaust camshaft position sensor	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	 JSBIA5290GB
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	 JSBIA5291GB
36 (O/B)	98 (BR)	EVAP control system pressure sensor	Input	[Ignition switch: ON]	1.8 - 4.8 V
37 (GY/L)	98 (BR)	Heated oxygen sensor	Input	[Ignition switch: ON] Cold condition	1.5 V
				[Engine is running] • Warm-up condition • Idle speed	0.8 V

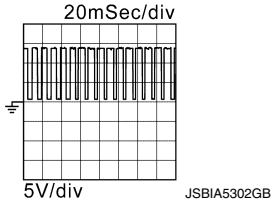
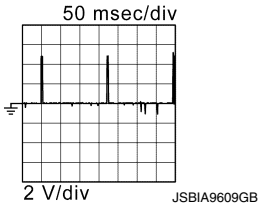
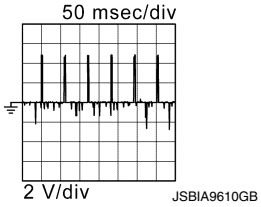
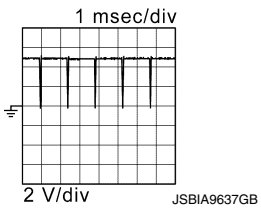
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
38 (GY/R)	98 (BR)	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.74 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	4.3 V
40 (BR/ GY)	98 (BR)	Charge air temperature sensor downstream of throttle valve	Input	[Ignition switch: ON] • Charge air temperature: 21°C (69.8°F)*	3.8 V
				[Ignition switch: ON] • Charge air temperature downstream of throttle valve: 27°C (80.6°F)*	3.6 V
41 (Y/B)	98 (BR)	Pressure sensor upstream of throttle valve	Input	[Ignition switch: ON]	1.96 V
				[Engine is running] • Engine speed: 2,000 rpm	2 V
45 (L/W)	98 (BR)	LIN	Input/ Output	[Ignition switch: ON]	11 V
48 (G/V)	98 (BR)	Throttle valve motor (-)	Output	[Ignition switch: ON]	0 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	0.1 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: For few seconds after depressing fully.	12 V
49 (BR/L)	98 (BR)	Fuel injector (No.3)	Output	[Ignition switch: ON]	0.5 V
				[Engine is running] • Idle speed	
50 (B/Y)	98 (BR)	Fuel injector (No.3)	Output	[Ignition switch: ON]	0.5 V
				[Engine is running] • Idle speed	

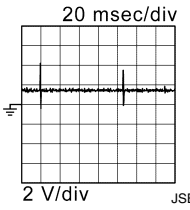
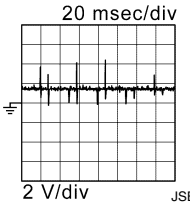
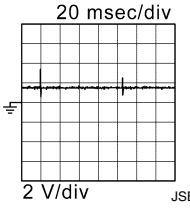
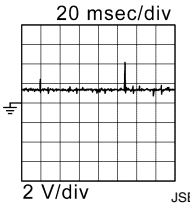
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
51 (BR/Y)	98 (BR)	Boost pressure control vacuum transducer	Output	[Ignition switch: ON]	Battery voltage
				[Engine is running] • Idle speed	Battery voltage★ 
53 (P/Y)	98 (BR)	Exhaust camshaft actuator	Output	[Ignition switch: ON]	Battery voltage
				[Engine is running] • Idle speed	Battery voltage★ 
				[Engine is running] • Engine speed: 2,000 rpm	Battery voltage★ 
54 (BR/B)	98 (BR)	Coolant pump switchover valve	Output	[Ignition switch: ON]	Battery voltage
				[Engine is running] • Coolant temperature: 85°C • Idle speed • A/C switch off	0 V
55 (G)	98 (BR)	Ignition coil (No. 3)	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	

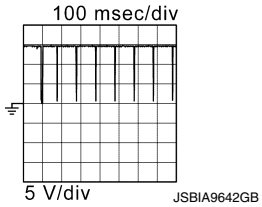
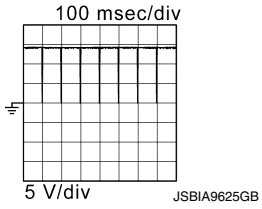
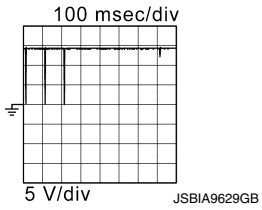
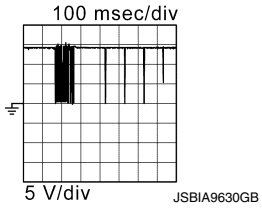
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
58 (R/B)	98 (BR)	Intake camshaft position sensor	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	
59 (V/GY)	98 (BR)	Knock sensor 2	Input	[Ignition switch: ON]	1.63 V
				[Engine is running] • Idle speed	1.63 V★ 
				[Engine is running] • Engine speed: 2,000 rpm	1.45 V★ 
60 (G/B)	98 (BR)	Knock sensor 1	Input	[Ignition switch: ON]	1.63 V
				[Engine is running] • Idle speed	1.63 V★ 
				[Engine is running] • Engine speed: 2,000 rpm	1.45 V★ 

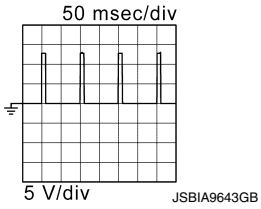
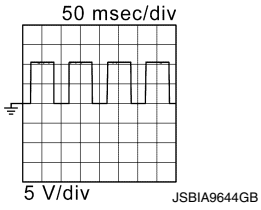
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
61 (BR/R)	98 (BR)	Charge air temperature sensor upstream of throttle valve	Input	[Ignition switch: ON] • Charge air temperature upstream of throttle valve: 21°C (69.8°F)*1	3.87 V
				[Ignition switch: ON] • Charge air temperature upstream of throttle valve: 27°C (80.6°F)*1	3.6 V
62 (Y/GY)	98 (BR)	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.58 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	4.24 V
63 (L/R)	98 (BR)	Air fuel ratio (A/F) sensor	Input	[Ignition switch: ON]	2.7 V
64 (B/Y)	98 (BR)	Air fuel ratio (A/F) sensor	Input	[Ignition switch: ON]	2.5 V
65 (Y/R)	98 (BR)	Fuel temperature signal	Input	Fuel temperature: Approx. 24°C (75.2°F)*1	3.8 V
				Fuel temperature: Approx. 31°C (87.8°F)*1	3.5 V
67 (W/L)	98 (BR)	Fuel pressure signal	Input	[Ignition switch: ON]	2.5 V
				[Engine is running] • Idle speed	3.33 V
72 (R/GY)	98 (BR)	Intake camshaft valve lift switchover position sensor 2	Output	[Ignition switch: ON]	12 V
				[Engine is running] • Idle speed	12 V★ 
				[Engine is running] • Perform “Check intake camshaft valve lift switching actuator” in “ACTIVE TEST” mode.*1 Touch “START” • Change cam (small valve lift ⇔ normal valve lift)	•Move small valve lift  •Move return normal valve lift 

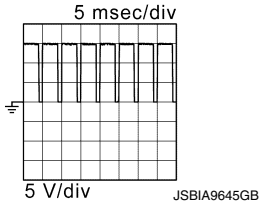
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
73 (B/R)	98 (BR)	Fuel injector (No.2)	Output	[Ignition switch: ON]	0.5 V
				[Engine is running] • Idle speed	
74 (B/W)	98 (BR)	Fuel injector (No.2)	Output	[Ignition switch: ON]	0.5 V
				[Engine is running] • Idle speed	
75 (V)	98 (BR)	Quantity control valve (LOW)	Output	[Ignition switch: ON]	0.72 V
				[Engine is running] • Idle speed	
				[Engine is running] • Engine speed: 2,000 rpm	
76 (G/B)	98 (BR)	Quantity control valve (HIGH)	Output	[Ignition switch: ON]	0.72 V
				[Engine is running] • Idle speed	
				[Engine is running] • Engine speed: 2,000 rpm	

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
77 (R/B)	98 (BR)	Air fuel ratio (A/F) sensor heater	Output	[Ignition switch: ON]	Battery voltage
				[Engine is running] • Warm-up condition • Idle speed	Battery voltage★ 
78 (V/G)	98 (BR)	Full-load operation vent line heater element	Output	[Ignition switch: ON]	Battery voltage
79 (P)	98 (BR)	Ignition coil (No. 1)	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	
81 (Y/W)	98 (BR)	Crankshaft position sensor	Input	[Ignition switch: ON]	5 V
				[Engine is running] • Idle speed	4.7 V★ 
82 (O)	98 (BR)	Engine oil level switch	Input	Engine oil level: Filled enough	0 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
83 (P/G)	98 (BR)	Knock sensor 2	Input	[Ignition switch: ON]	1.63 V
				[Engine is running] • Idle speed	1.63 V★  JSBIA9638GB
				[Engine is running] • Engine speed: 2,000 rpm	1.45 V★  JSBIA9639GB
84 (W/Y)	98 (BR)	Knock sensor 1	Input	[Ignition switch: ON]	1.63 V
				[Engine is running] • Idle speed	1.63 V★  JSBIA9640GB
				[Engine is running] • Engine speed: 2,000 rpm	1.45 V★  JSBIA9641GB
86 (GY/Y)	98 (BR)	Engine coolant temperature sensor	Input	Engine coolant temperature: 31°C (87.8°F)*	2.8 V
				Engine coolant temperature: 80°C (176°F)*	0.5 V
87 (V)	98 (BR)	Air fuel ratio (A/F) sensor	Input	[Ignition switch: ON]	2.9 V
88 (GY/B)	98 (BR)	Air fuel ratio (A/F) sensor	Input	[Ignition switch: ON]	2.8 V
				[Engine is running] • Warm-up condition • Idle speed	2.1 - 2.8 V Output voltage varies with air fuel ratio.
90 (O/G)	98 (BR)	Pressure sensor downstream of air filter	Input	[Ignition switch: ON]	4.34 V
				[Engine is running] • Warm-up condition • Idle speed	4.34 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
91 (GY)	98 (BR)	Pressure sensor downstream of throttle valve	Input	[Ignition switch: ON]	1.96 V
				[Engine is running] • Warm-up condition • Idle speed	0.84 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.55 V
95 (R)	98 (BR)	Heated oxygen sensor heater	Output	[Ignition switch: ON]	Battery voltage
				[Engine is running] • Warm-up condition • Idle speed	Battery voltage★ 
96 (L/Y)	98 (BR)	Intake camshaft valve lift switchover position sensor 1	Output	[Ignition switch: ON]	12 V
				[Engine is running] • Idle speed	12 V★ 
				[Engine is running] • Perform “Check intake camshaft valve lift switching actuator” in “ACTIVE TEST” mode.*1 Touch “START” • Change cam (small valve lift ⇔ normal valve lift)	•Move small valve lift  •Move return normal valve lift 
97 (R)	98 (BR)	Power supply (ECM)	Input	[Ignition switch: ON]	Battery voltage
98 (BR)	—	ECM ground	—	—	—
99 (V)	98 (BR)	Power supply (ECM)	Input	[Ignition switch: ON]	Battery voltage
100 (BR)	—	ECM ground	—	—	—
101 (R)	98 (BR)	Power supply (ECM)	Input	[Ignition switch: ON]	Battery voltage
102 (B)	—	ECM ground	—	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	−	Signal name	Input/ Output		
103 (L)	98 (BR)	Cooling fan control signal	Output	[Ignition switch: ON] • Cooling fan: Not operates	
				[Ignition switch: ON] • Perform “CHECK COMBUSTION ENGINE AND AC WITH INTEGRATED CONTROL FAN MOTOR” in “ACTIVE TEST” mode.*1 • Touch “START” • Cooling fan: 60% operates*	
104 (R)	106 (BR)	Sensor power supply (Accelerator pedal position sensor 1)	Output	[Ignition switch: ON]	5 V
105 (G)	119 (GR)	Sensor power supply (Accelerator pedal position sensor 2)	Output	[Ignition switch: ON]	5 V
106 (BR)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—
111 (B)	98 (BR)	Ignition signal	Input	[Ignition switch: ON]	12 V
112 (Y)	98 (BR)	Power supply (Battery)	Input	—	Battery voltage
116 (W)	98 (BR)	Starter relay-L	Output	[Ignition switch: ON]	3.45 V
				During engine cranking	3.45 V → 0 V → 3.45 V
119 (GR)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
120*2 (O)	—	Sensor ground (Fuel tank pressure sensor)	—	—	—
122 (R)	98 (BR)	Hot start signal	Output	[Ignition switch: ON]	12 V
123 (GR)	98 (BR)	Motor relay control signal	Output	[Ignition switch: ON]	12 V
				[Ignition switch: OFF] • After ECM self shut-off	12 V
127 (O)	98 (BR)	Fuel pump on signal	Output	[Ignition switch: ON] • Fuel pump: Not operates	12 V
				[Engine is running] • Warm-up condition • Idle speed	0 V
132 (G)	106 (BR)	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Accelerator pedal: Fully depressed	4.56 V
				[Ignition switch: ON] • Accelerator pedal: Released	0.32 V
136 (Y)	—	Powertrain sensor CAN-H	Input/ Output	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	−	Signal name	Input/ Output		
137 (W)	—	CAN-H	Input/ Output	—	—
138 (GR)	—	Powertrain CAN-H	Input/ Output	—	—
141 (B)	98 (BR)	Water pump relay control signal	Output	[Ignition switch: ON]	12 V
145 (W)	119 (GR)	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] • Accelerator pedal: Fully depressed	2.27 V
				[Ignition switch: ON] • Accelerator pedal: Released	0.16 V
146*2 (G)	120 (O)	Fuel tank pressure sensor	Input	[Ignition switch: ON]	2.486 V
				[Engine is running] • Engine speed: Idle	2.492 V
147 (L)	98 (BR)	Crash signal	Input	[Ignition switch: ON]	0 V
148 (W)	98 (BR)	Starter relay-H	Output	[Ignition switch: ON]	3.45 V
				During engine cranking	3.45 V → 0 V → 3.45 V
149 (B)	—	Powertrain sensor CAN-L	Input/ Output	—	—
150 (G)	—	CAN-L	Input/ Output	—	—
151 (L)	—	Powertrain CAN-L	Input/ Output	—	—
152*2 (V)	98 (BR)	EVAP canister vent control valve	Output	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
153 (BR)	98 (BR)	EVAP purge control valve	Output	[Ignition switch: OFF]	Battery voltage
				[Engine is running] • Idle speed	BATTERY VOLTAGE★ 

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
*1: It can be confirmed using CONSULT.
*2: Except for Mexico

Limp-home Mode

INFOID:0000000013608067

DESCRIPTION

The task of the engine limp-home mode consists of ensuring continued safe driving in the case of malfunctions on individual components of the engine management.

FUNCTION SEQUENCE FOR LIMP-HOME MODE FOR ACCELERATOR PEDAL POSITION SENSOR MALFUNCTION

If a position sensor error, the system switches over to the second position sensor. The throttle valve opening is limited to about 60% of the maximum opening. In addition, the speed at the which the throttle valve opens is dynamically limited (throttle valve opens with a delay). If the brake pedal is operated, this always means idle

speed input. If the plausibility check for the position sensor signals is negative or if both position sensors error, only idle speed is then still controlled.

FUNCTION SEQUENCE FOR LIMP-HOME MODE FOR THROTTLE VALVE POSITION SENSOR 1 or 2 MALFUNCTION

If one position sensor error, the other position sensor is used. Air mass is used as an additional comparison value. If both position sensors are malfunction, the return spring brings the throttle valve to the limp-home position of about a 10° opening angle.

FUNCTION SEQUENCE FOR LIMP-HOME MODE FOR THROTTLE VALVE ACTUATOR MOTOR MALFUNCTION

The actuator motor is de energized and the throttle valve is set to the limp-home position at an opening angle of approx. 10° by the return spring.

FUNCTION SEQUENCE FOR LIMP-HOME MODE FOR THROTTLE VALVE POSITION

When the throttle valve is in limp-home position, fuel is shut off/resupplied to the cylinders to limit engine speed to about 1200 to 1,400 rpm at idle. and about 1,800 rpm in driving mode. If the brake pedal is operated, this always means idle speed input. Switching off and switching in of the cylinder takes place by the ECM through switching off and switching in of the cylinder 1 to 4 fuel injectors, dependent on:

- Engine speed
- Brake recognition

FUNCTION SEQUENCE FOR LIMP-HOME MODE IN THE EVENT FOR CRANKSHAFT POSITION SENSOR MALFUNCTION (WITH ROTATIONAL DIRECTION RECOGNITION)

If the voltage signal from the crankshaft position sensor (with rotational direction recognition) malfunctions, the voltage signals from the intake camshaft position sensor or from exhaust camshaft position sensor are used as a replacement for limp-home mode.

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DTC	Items (CONSULT screen terms)	Reference page
P1CCF	HIGH PRESSURE SYSTEM	EC-763, "DTC Description"
P1CD8	EXHAUST LEAKAGE	EC-768, "DTC Description"
P1CDE	ECO START/STOP FUNCTION	EC-769, "DTC Description"
P1CDF	ECO START/STOP FUNCTION	EC-770, "DTC Description"
P1CE0	ECO START/STOP FUNCTION	EC-771, "DTC Description"
P1CE1	ECO START/STOP FUNCTION	EC-772, "DTC Description"
P1CE2	ECO START/STOP FUNCTION	EC-773, "DTC Description"
P1CE3	F/INJ INJECTION QUANTITY ADJ VLU	EC-774, "Diagnosis Description"
P1CE4	F/INJ INJECTION QUANTITY ADJ VLU	EC-775, "Diagnosis Description"
P1CE5	F/INJ INJECTION QUANTITY ADJ VLU	EC-776, "Diagnosis Description"
P1CE6	F/INJ INJECTION QUANTITY ADJ VLU	EC-777, "Diagnosis Description"
P1CE7	CRANKCASE VENTILATION SYSTEM	EC-778, "DTC Description"
P1CEF	F/INJ INJECTION QUANTITY ADJ VLU	EC-779, "Diagnosis Description"
P1CF0	F/INJ INJECTION QUANTITY ADJ VLU	EC-780, "Diagnosis Description"
P1CF1	Smooth running control	EC-781, "Diagnosis Description"
P1CF2	F/INJ INJECTION QUANTITY ADJ VLU	EC-782, "Diagnosis Description"
P1CF3	F/INJ INJECTION QUANTITY ADJ VLU	EC-783, "Diagnosis Description"
P1CF4	F/INJ INJECTION QUANTITY ADJ VLU	EC-784, "Diagnosis Description"
P1D01	CRANKCASE VENT VALVE	EC-785, "DTC Description"
P1D02	CRANKCASE VENT VALVE	EC-786, "DTC Description"
P1D03	CRANKCASE VENT VALVE	EC-787, "DTC Description"
P1D04	ECO START/STOP FUNCTION	EC-788, "DTC Description"
P1D05	ECO START/STOP FUNCTION	EC-789, "DTC Description"
P1D06	ECO START/STOP FUNCTION	EC-790, "DTC Description"
P1D07	ECO START/STOP FUNCTION	EC-791, "DTC Description"
P1D68	CRANKCASE VENT LINE	EC-792, "DTC Description"
P2065	Fuel level sensor rh	EC-793, "DTC Description"
P2066	Right fuel level sensor malf	EC-794, "DTC Description"
P2067	Fuel level sensor B	EC-795, "DTC Description"
P2068	Fuel level sensor B	EC-796, "DTC Description"
P2072	Throttle actuator control system	EC-797, "Diagnosis Description"
P2088	Camshaft A position actuator b1	EC-798, "DTC Description"
P2089	Camshaft A position actuator b1	EC-800, "DTC Description"
P2090	Camshaft B position actuator b1	EC-802, "DTC Description"
P2091	Camshaft B position actuator b1	EC-804, "DTC Description"
P2096	Post catalyst fuel trim system b1	EC-806, "DTC Description"
P2097	Post catalyst fuel trim system b1	EC-807, "DTC Description"
P2101	THROTTLE ACT A CONT MOTOR	EC-808, "DTC Description"
P2102	THROTTLE ACT A CONT MOTOR	EC-810, "DTC Description"
P2103	THROTTLE ACT A CONT MOTOR	EC-812, "DTC Description"
P2111	Throttle actuator A control system	EC-814, "DTC Description"
P2119	THROTTLE ACT A CONT THRTL BDY	EC-816, "DTC Description"
P2122	THROTTLE/PDL POSITION SEN/SW D	EC-818, "Diagnosis Description"
P2123	THROTTLE/PDL POSITION SEN/SW D	EC-820, "Diagnosis Description"

DTC	Items (CONSULT screen terms)	Reference page
P2127	THROTTLE/PDL POSITION SEN/SW E	EC-822, "Diagnosis Description"
P2128	THROTTLE/PDL POSITION SEN/SW E	EC-824, "Diagnosis Description"
P2135	THTL/PDL POS SEN/SW A/B CRRLTN	EC-826, "Diagnosis Description"
P2136	Thrtl/Pdl pos sen/sw A/C correlatn	EC-828, "Diagnosis Description"
P2137	Thrtl/Pdl pos sen/sw B/C correlatn	EC-830, "Diagnosis Description"
P2138	THTL/PDL POS SEN/SW D/E CRRLTN	EC-832, "Diagnosis Description"
P2176	Throttle actuator A control system	EC-834, "DTC Description"
P2177	System lean bank1	EC-836, "DTC Description"
P2178	System rich bank1	EC-837, "DTC Description"
P2187	System lean bank1	EC-838, "DTC Description"
P2188	System rich bank1	EC-839, "DTC Description"
P2195	O2 SENSOR SIGNAL B1 SEN 1	EC-840, "DTC Description"
P2196	O2 SENSOR SIGNAL B1 SEN 1	EC-842, "DTC Description"
P219C	Cylinder 1 Air-fuel ratio imbalance	EC-844, "DTC Description"
P219D	Cylinder 2 Air-fuel ratio imbalance	EC-845, "DTC Description"
P219E	Cylinder 3 Air-fuel ratio imbalance	EC-846, "DTC Description"
P219F	Cylinder 4 Air-fuel ratio imbalance	EC-847, "DTC Description"
P2227	BAROMETRIC PRESSURE SENSOR A	EC-848, "DTC Description"
P2228	BAROMETRIC PRESSURE SENSOR A	EC-849, "DTC Description"
P2229	BAROMETRIC PRESSURE SENSOR A	EC-850, "DTC Description"
P2230	Barometric pressure sensor A	EC-851, "DTC Description"
P2231	Oxygen sensor bank1 sensor 1	EC-852, "DTC Description"
P2237	O2 SENSOR B1 SEN 1	EC-854, "DTC Description"
P2243	O2 SENSOR REF VOLTAGE B1 SEN 1	EC-856, "DTC Description"
P2251	O2 SENSOR B1 SEN 1	EC-858, "DTC Description"
P2263	TC/SC BOOST SYSTEM	EC-860, "DTC Description"
P2270	Oxygen sensor bank1 sensor 2	EC-863, "DTC Description"
P2271	Oxygen sensor bank1 sensor 2	EC-865, "DTC Description"
P2279	INTAKE AIR SYSTEM LEAK	EC-867, "DTC Description"
P2280	AIR FLOW RESTRICTION/AIR LEAK	EC-868, "DTC Description"
P2300	Ignition coil A primary control	EC-869, "DTC Description"
P2301	Ignition coil A primary control	EC-871, "DTC Description"
P2303	Ignition coil B primary control	EC-873, "DTC Description"
P2304	Ignition coil B primary control	EC-875, "DTC Description"
P2306	Ignition coil C primary control	EC-877, "DTC Description"
P2307	Ignition coil C primary control	EC-879, "DTC Description"
P2309	Ignition coil D primary control	EC-881, "DTC Description"
P230A	Cylinder 1 Air-Fuel Ratio Imbalance	EC-885, "DTC Description"
P230B	Cylinder 2 air-Fuel Ratio Imbalance	EC-886, "DTC Description"
P230C	Cylinder 3 Air-Fuel Ratio Imbalance	EC-887, "DTC Description"
P230D	Cylinder 4 Air-Fuel Ratio Imbalance	EC-888, "DTC Description"
P2310	Ignition coil D primary control	EC-883, "DTC Description"
P2336	Cyl1 knock/combustn vibration sen	EC-889, "DTC Description"
P2337	Cyl2 knock/combustn vibration sen	EC-889, "DTC Description"

DTC	Items (CONSULT screen terms)	Reference page
P2338	Cyl3 knock/combustn vibration sen	EC-889, "DTC Description"
P2339	Cyl4 knock/combustn vibration sen	EC-889, "DTC Description"
P2414	Oxygen sensor bank1 sensor 1	EC-890, "DTC Description"
P2421	Evaporation system vent valve	EC-892, "DTC Description"
P2422	Evaporation system vent valve	EC-894, "DTC Description"
P24D5	EVAP system pressure sen/sw B	EC-896, "DTC Description"
P24D6	EVAP system pressure sensor/sw B	EC-898, "DTC Description"
P24D7	EVAP system pressure sen/sw B	EC-900, "DTC Description"
P24D8	EVAP pressure sensor/switch B	EC-902, "DTC Description"
P2505	ECM/PCM power input signal	EC-904, "DTC Description"
P250B	ENGINE OIL LEVEL SENSOR	EC-905, "Diagnosis Description"
P250E	Engine oil level sensor	EC-907, "Diagnosis Description"
P252B	ENGINE OIL QUALITY SENSOR	EC-909, "Diagnosis Description"
P2539	LOW PRESS FUEL SYSTEM SENSOR	EC-910, "ECM : DTC Description"
P2540	LOW PRESS FUEL SYSTEM SENSOR	EC-913, "ECM : DTC Description"
P2541	LOW PRESS FUEL SYSTEM SENSOR	EC-916, "ECM : DTC Description"
P2542	LOW PRESS FUEL SYSTEM SENSOR	EC-919, "ECM : DTC Description"
P257D	ENGINE HOOD SWITCH	EC-922, "DTC Description"
P2600	COOLANT PUMP A	EC-924, "DTC Description"
P2602	COOLANT PUMP A	EC-926, "DTC Description"
P2603	COOLANT PUMP A	EC-928, "DTC Description"
P2610	ECM/PCM ENGINE OFF TIMER	EC-930, "DTC Description"
P2614	Camshaft position signal	EC-931, "DTC Description"
P2615	Camshaft position signal	EC-933, "DTC Description"
P2616	Camshaft position signal	EC-935, "DTC Description"
P2617	CRANKSHFT POSITION SIGNAL	EC-937, "DTC Description"
P261A	Coolant pump B	EC-940, "DTC Description"
P261B	Coolant pump B	EC-942, "DTC Description"
P261C	Coolant pump B	EC-944, "DTC Description"
P261D	Coolant pump B	EC-946, "DTC Description"
P2626	O2 SENSOR B1 SEN 1	EC-948, "DTC Description"
P2716	Pressure control solenoid D	EC-950, "Diagnosis Description"
P2725	Pressure control solenoid E	EC-951, "Diagnosis Description"
P2734	Pressure control solenoid F	EC-952, "Diagnosis Description"
P2757	Trq converter clutch press cont sol	EC-953, "Diagnosis Description"
P2759	Trq converter clutch press cont sol	EC-954, "Diagnosis Description"
P2766	Input/Turbine speed sensor B	EC-955, "Diagnosis Description"
P2767	Input/Turbine speed sensor B	EC-956, "Diagnosis Description"
P2768	Input/Turbine speed sensor B	EC-957, "Diagnosis Description"
P2810	Pressure control solenoid G	EC-958, "Diagnosis Description"

DTC Sub Type Index

INFOID:0000000013608069

Malfunction Type	Items (CONSULT screen terms)	Description
00	NO SUBTYPE INFORMATION	No subtype information
01	ELECTRICAL MALFUNCTION	Electrical malfunction
02	GENERAL ELEC MALFUNCTN	General electrical malfunction
03	FM/PWM ERROR	Frequency modulated/Pulse width modulated
04	SYSTEM INTERNAL MALFUNCTN	System internal malfunction
05	SYSTEM PROGRAMMING ERROR	System programming error
06	ALGORITHM BASED ERROR	Algorithm based error
07	MECHANICAL MALFUNCTION	Mechanical malfunction
08	BUS SIGNAL/MESSAGE ERROR	Bus Signal/Message error
09	COMPONENT MALFUNCTION	Component malfunction
11	CIRCUIT SHORT TO GROUND	Circuit short to ground
12	CIRCUIT SHORT TO BATTERY	Circuit short to battery
13	CIRCUIT OPEN	Circuit open
14	CIRC SHORT TO GRND OR OPEN	Circuit short to ground or open
15	CIRC SHORT TO BATT OR OPEN	Circuit short to battery or open
16	CIRC VOLT BELOW THRESHOLD	Circuit voltage below threshold
17	CIRC VOLT ABOVE THRESHOLD	Circuit voltage above threshold
18	CIRC CRRNT BELOW THRESHLD	Circuit current below threshold
19	CIRC CRRNT ABOVE THRESHOLD	Circuit current above threshold
1A	CIRC RESIST BELOW THRESHLD	Circuit resistance below threshold
1B	CIRC RESIST ABOVE THRESHLD	Circuit resistance above threshold
1C	CIRC VOLTAGE OUT OF RANGE	Circuit voltage out of range
1D	CIRC CURRENT OUT OF RANGE	Circuit current out of range
1E	CIRC RESISTANCE OUT OF RANGE	Circuit resistance out of range
1F	CIRCUIT INTERMITTENT	Circuit intermittent
21	SIGNAL AMPLTUDE < MIN	Signal amplitude < minimum
22	SIG AMPLTUDE > MAX	Signal amplitude > maximum
23	SIGNAL STUCK LOW	Signal stuck low
24	SIGNAL STUCK HIGH	Signal stuck high
25	SIG SHAPE/WAVEFORM FAILURE	Signal shape/waveform failure
26	SIG RTE OF CHNG BLW THRESHLD	Signal rate of change below threshold
27	SIG RTE OF CHNG ABV THRESHLD	Signal rate of change above threshold
28	SG BS LVL O-OF RNG/ZR AJST FLR	Signal bias level out of range/zero adjustment failure
29	SIGNAL INVALID	Signal invalid
2A	SIGNAL STUCK IN RANGE	Signal stuck in range
2B	SIGNAL CROSS COUPLED	Signal cross coupled
2F	SIGNAL ERRATIC	Signal erratic
31	NO SIGNAL	No signal
32	SIGNAL LOW TIME < MIN	Signal low time < minimum
33	SIGNAL LOW TIME > MAX	Signal low time > maximum
34	SIGNAL HIGH TIME < MIN	Signal high time < minimum

Malfunction Type	Items (CONSULT screen terms)	Description
35	SIGNAL HIGH TIME > MAX	Signal high time > maximum
36	SIGNAL FREQUENCY TOO LOW	Signal frequency too low
37	SIGNAL FREQUENCY TOO HIGH	Signal frequency too high
38	SIGNAL FREQUENCY INCORRECT	Signal frequency incorrect
39	SIGNAL HAS TOO FEW PULSES	Signal has too few pulses
3A	SIGNAL HAS TOO MANY PULSES	Signal has too many pulses
41	GENERAL CHECKSUM ERROR	General checksum error
42	MEMORY ERROR	Memory error
43	SPECIAL MEMORY ERROR	Special memory error
44	DATA MEMORY ERROR	Data memory error
45	PROGRAM MEMORY ERROR	Program memory error
46	CALIB/PRMTER MEMORY ERROR	Calibration/parameter memory error
47	WATCHDOG/SAFETY μC ERROR	Watchdog/safety μC error
48	SUPERVISION SOFTWARE ERROR	Supervision software error
49	INTERNAL ELECTRONIC ERROR	Internal electronic error
4A	INCRRCT COMPNT INSTALLED	Incorrect component installed
4B	OVER TEMPERATURE	Overtemperature
51	NOT PROGRAMMED	Not programmed
52	NOT ACTIVATED	Not activated
53	DEACTIVATED	Deactivated
54	MISSING CALIBRATION	Missing calibration
55	NOT CONFIGURED	Not configured
61	SIGNAL CALCULATION ERROR	Signal calculation error
62	SIGNAL COMPARE ERROR	Signal compare error
63	CIRC/COMP PROTECTN TIMEOUT	Circuit/component protection timeout
64	SIGNAL PLAUSIBILITY ERROR	Signal plausibility error
65	SIG HAS TOO FEW TRNSIT/EVNTS	Signal has too few transitions/events
66	SIG HAS TOO MANY TRNSIT/EVNTS	Signal has too many transitions/events
67	SIGNAL INCORRECT AFTER EVENT	Signal incorrect after event
68	EVENT INFORMATION	Event information
71	ACTUATOR STUCK	Actuator stuck
72	ACTUATOR STUCK OPEN	Actuator stuck open
73	ACTUATOR STUCK CLOSED	Actuator stuck closed
74	ACTUATOR SLIPPING	Actuator slipping
75	EMRGNCY POSI NOT REACHABLE	Emergency position not reachable
76	WRONG MOUNTING POSITION	Wrong mounting position
77	COMMAND POSI NOT REACHABLE	Commanded position not reachable
78	ALGNMNT OR ADJSTMNT INCRRCT	Alignment or adjustment incorrect
79	MECHANCL LINKAGE MALFNCTN	Mechanical linkage malfunction
7A	FLUID LEAK OR SEAL FAILURE	Fluid leak or seal failure
7B	LOW FLUID LEVEL	Low fluid level
81	INVALID SERIAL DATA RECEIVED	Invalid serial data received
82	SEQUENCE COUNTER INCORRECT	Sequence counter incorrect
83	PROTECT CALCULATION ERROR	Protection calculation error

Malfunction Type	Items (CONSULT screen terms)	Description
84	SIG BELOW ALLOWABLE RANGE	Signal below allowable range
85	SIG ABOVE ALLOWABLE RANGE	Signal above allowable range
86	SIGNAL INVALID	Signal invalid
87	MISSING MESSAGE	Missing message
88	BUS OFF	Bus off
8F	ERRATIC	Erratic
91	PARAMETRIC	Parametric
92	PFM/INCORRECT OPERATN	Performance/Incorrect operation
93	NO OPERATION	No operation
94	UNEXPECTED OPERATION	Unexpected operation
95	INCORRECT ASSEMBLY	Incorrect assembly
96	CMPNENT INTERNAL MLFNCTN	Component internal malfunction
97	CMP/SYS OPR OBST OR BLKD	Component or system operation obstructed or blocked
98	COMPONENT/SYS OVER TEMP	Component/System overtemperature
9A	OPERATING CONDITIONS	Operating conditions
F0	TIME OUT	Time out
F1	OVERLOAD	Overload
F2	NOT READABLE	Not readable

FUEL PUMP CONTROL MODULE (FPCM)

2WD

2WD : Reference Value

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VALUES ON THE DIAGNOSIS TOOL

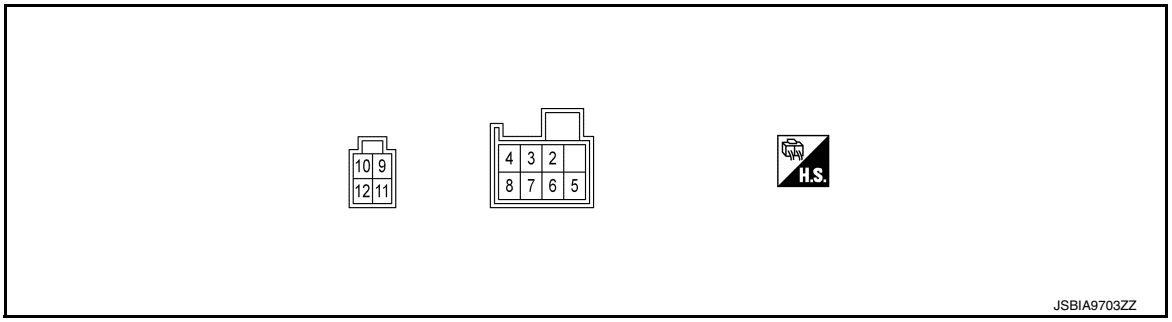
NOTE:

- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- Numerical values in the following table are reference values.
- These values are input/output values that FPCM receives/transmits and may differ from actual operations.

For outlines of following items, refer to EC-117, "CONSULT Function".

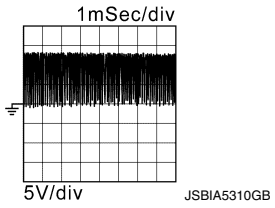
Monitor item	Condition	Values/Status (Approx.)
STATUS OF FUEL PUMP	• Ignition switch: ON • Engine: Stopped • Fuel pump: Not operates	0.0 V
	• Engine: running (at idle)	5.2 V
FUEL PRESSURE	• Engine: running (at idle)	4.6 bar
INSIDE TEMP OF CONT UNIT	Indicates inside temperature of FPCM.	
FUEL PUMP REQUEST	• Ignition switch: ON • Engine: Stopped • Fuel pump: Not operates	Off
	• Engine: running (at idle)	On
STATUS OF CIRCUIT	Ignition switch: ON	On

TERMINAL LAYOUT



PHYSICAL VALUES

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
2 (L)	9 (BR)	Fuel pump activation request signal	Input	Ignition switch: ON	12 V
				Engine is running	0 V
3 (W)	—	Drivetrain CAN-H	Input/ Output	—	—
4 (L)	—	Drivetrain CAN-L	Input/ Output	—	—
5 (GR)	9 (BR)	Ignition signal	Input	Ignition switch: ON	Battery voltage
6 (O)	—	Sensor ground (Fuel pressure sensor)	—	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
7 (V)	9 (BR)	Fuel pressure sensor signal	Input	Ignition switch: ON	2.5 V
				Engine is running	2.3 V
8 (G)	9 (BR)	Sensor power supply (Fuel pressure sensor)	Output	Ignition switch: ON	5 V
9 (BR)	—	FPCM ground	—	—	—
10 (O/LG)	9 (BR)	Battery power supply	Input	Always	Battery voltage
11 (BR/O)	—	Fuel pump ground	—	—	—
12 (O/L)	9 (BR)	Fuel pump control signal	Output	Ignition switch: ON	0 V
				Engine is running (at idle)	

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

*: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-102, "MAIN BATTERY : How to Handle Battery".

2WD : DTC Index

INFOID:0000000013608085

DTC*	Items (CONSULT screen terms)	Reference page
U0100	Communication error	EC-217, "DTC Description"
U0155	COMMUNICATION ERROR (LOST)	EC-232, "ECM : DTC Description"
U0401	Communication error (invalid)	EC-239, "DTC Description"
B210D	Power supply	EC-269, "DTC Description"
B210E	Power supply	EC-269, "DTC Description"
P0087	FUEL RAIL/SYSTEM PRESSURE	EC-370, "FUEL PUMP CONTROL MODULE (FPCM) : DTC Description"
P0627	FUEL PUMP A CONTROL	EC-667, "FUEL PUMP CONTROL MODULE (FPCM) : DTC Description"
P0628	FUEL PUMP A CONTROL	EC-670, "FUEL PUMP CONTROL MODULE (FPCM) : DTC Description"

DTC*	Items (CONSULT screen terms)	Reference page
P0629	FUEL PUMP A CONTROL	EC-673, "FUEL PUMP CONTROL MODULE (FPCM) : DTC Description"
P062A	FUEL PUMP A CONTROL	EC-676, "FUEL PUMP CONTROL MODULE (FPCM) : DTC Description"
P0A7C	MOTOR ELECTRONICS OVER TEMP	EC-724, "DTC Description"
P1240	CAN BUS	EC-733, "DTC Description"
P1611	FUEL PUMP	EC-757, "DTC Description"
P162A	CONTROL UNIT “FUEL PUMP”	EC-758, "DTC Description"
P2539	LOW PRESS FUEL SYSTEM SENSOR	EC-910, "FUEL PUMP CONTROL MODULE (FPCM) : DTC Description"
P2540	LOW PRESS FUEL SYSTEM SENSOR	EC-913, "FUEL PUMP CONTROL MODULE (FPCM) : DTC Description"
P2541	LOW PRESS FUEL SYSTEM SENSOR	EC-916, "FUEL PUMP CONTROL MODULE (FPCM) : DTC Description"
P2542	LOW PRESS FUEL SYSTEM SENSOR	EC-919, "FUEL PUMP CONTROL MODULE (FPCM) : DTC Description"

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

AWD

AWD : Reference Value

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VALUES ON THE DIAGNOSIS TOOL

NOTE:

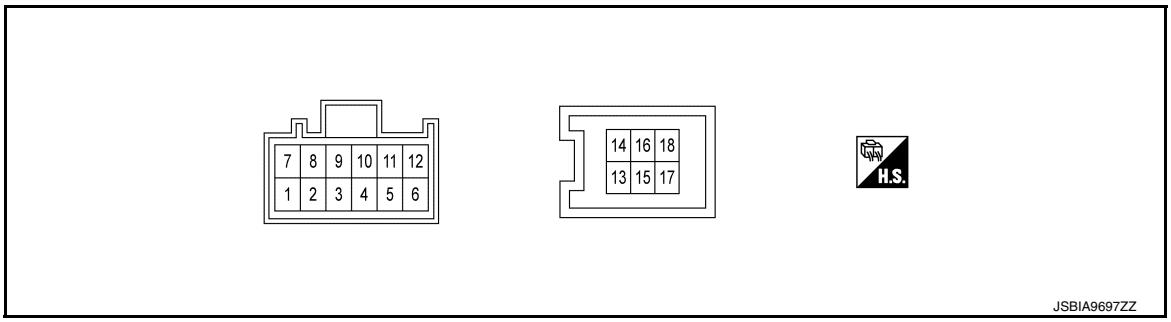
- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- Numerical values in the following table are reference values.
- These values are input/output values that FPCM receives/transmits and may differ from actual operations.

For outlines of following items, refer to EC-117, "CONSULT Function".

Monitor item	Condition	Values/Status
FUEL PRESSSEN	Engine running at idle	4.00 bar
Voltage of fuel pump	• Ignition switch: ON • Engine: Stopped • Fuel pump: Not operates	0.0 V
	• Engine running at idle • Engine running under normal operating temperature	9.1 V

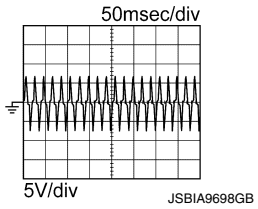
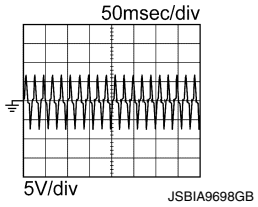
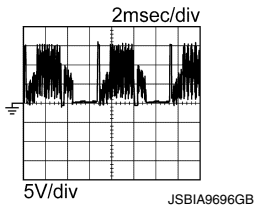
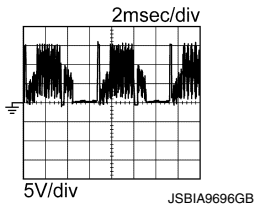
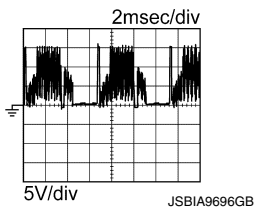
Monitor item	Condition	Values/Status
Power consumption of F/P	• Ignition switch: ON • Engine: Stopped • Fuel pump: Not operates	0.000 A
	• Engine running at idle • Engine running under normal operating temperature	5.450 A
Fuel pump rpm	• Ignition switch: ON • Engine: Stopped • Fuel pump: Not operates	0 1/min
	• Engine running at idle • Engine running under normal operating temperature	4587 1/min
RDDNT SAM CONT RLY	Ignition switch ON	On

TERMINAL LAYOUT



PHYSICAL VALUES

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	−	Signal name	Input/ Output		
3 (G)	5 (O)	Sensor power supply (Fuel pressure sensor)	Output	Ignition switch: ON	5 V
4 (V)	14 (BR)	Fuel pressure sensor signal	Input	Ignition switch: ON	0.49 V
				• Engine running at idle • Engine running under normal operating temperature	1.98 V
5 (O)	—	Sensor ground (Fuel pressure sensor)	—	—	—
6 (GR)	14 (BR)	Ignition signal	Input	Ignition switch: OFF (after self-shut off)	0 V
				Ignition switch: ON	Battery voltage
9 (L)	—	Powertrain CAN-L	Input/ Output	—	—
10 (W)	—	Powertrain CAN-H	Input/ Output	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
11 (L)	14 (BR)	Fuel pump activation request signal	Input	For 10 seconds after ignition switch is turned OFF.	12.8 V
				For 20 seconds after ignition switch is turned ON.	0 V★ 
				Engine is running	0 V★ 
13 (O/LG)	14 (BR)	Battery power supply	Input	Always	Battery voltage
14 (BR)	—	FPCM ground	—	—	—
15 (BR)	—	Fuel pump motor ground	—	—	—
16 (B/W)	14 (BR)	Fuel pump motor U	Output	Ignition switch: ON	0 V
				• Engine running at idle • Engine running under normal operating temperature	4.54 V★ 
17 (V)	14 (BR)	Fuel pump motor W	Output	Ignition switch: ON	0 V
				• Engine running at idle • Engine running under normal operating temperature	4.54 V★ 
18 (W)	14 (BR)	Fuel pump motor V	Output	Ignition switch: ON	0 V
				• Engine running at idle • Engine running under normal operating temperature	4.54 V★ 

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

*: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-102, "MAIN BATTERY : How to Handle Battery".

AWD : Fail-safe (FPCM AWD)

INFOID:0000000013608087

DTC No.	Operating condition in fail-safe mode
U0100 U0168	Pressure control on substitute value
P2539 P2540 P2541 P2542	Open loop pressure control

AWD : DTC Index

INFOID:0000000013608088

DTC*	Items (CONSULT screen terms)	Reference page
U0100	Communication error	EC-217, "DTC Description"
U0111	COMMUNICATION ERROR (LOST)	EC-224, "DTC Description"
U0155	COMMUNICATION ERROR (LOST)	EC-232, "ECM : DTC Description"
U0168	COMMUNICATION ERROR (LOST)	EC-235, "ECM : DTC Description"
U0401	Communication error (invalid)	EC-239, "DTC Description"
U0427	COMMUNICATION ERROR (INVALID)	EC-249, "ECM : DTC Description"
B210D	Power supply	EC-269, "DTC Description"
B210E	Power supply	EC-269, "DTC Description"
P0087	FUEL RAIL/SYSTEM PRESSURE	EC-370, "FUEL PUMP CONTROL MODULE (FPCM) : DTC Description"
P008A	Low pressure fuel system pressure	EC-380, "ECM : DTC Description"
P0627	FUEL PUMP A CONTROL	EC-667, "FUEL PUMP CONTROL MODULE (FPCM) : DTC Description"
P0628	FUEL PUMP A CONTROL	EC-670, "FUEL PUMP CONTROL MODULE (FPCM) : DTC Description"
P0629	FUEL PUMP A CONTROL	EC-673, "FUEL PUMP CONTROL MODULE (FPCM) : DTC Description"
P0A7C	MOTOR ELECTRONICS OVER TEMP	EC-724, "DTC Description"
P1240	CAN BUS	EC-733, "DTC Description"

DTC*	Items (CONSULT screen terms)	Reference page
P2539	LOW PRESS FUEL SYSTEM SENSOR	EC-910, "FUEL PUMP CONTROL MODULE (FPCM) : DTC Description"
P2540	LOW PRESS FUEL SYSTEM SENSOR	EC-913, "FUEL PUMP CONTROL MODULE (FPCM) : DTC Description"
P2541	LOW PRESS FUEL SYSTEM SENSOR	EC-916, "FUEL PUMP CONTROL MODULE (FPCM) : DTC Description"
P2542	LOW PRESS FUEL SYSTEM SENSOR	EC-919, "FUEL PUMP CONTROL MODULE (FPCM) : DTC Description"

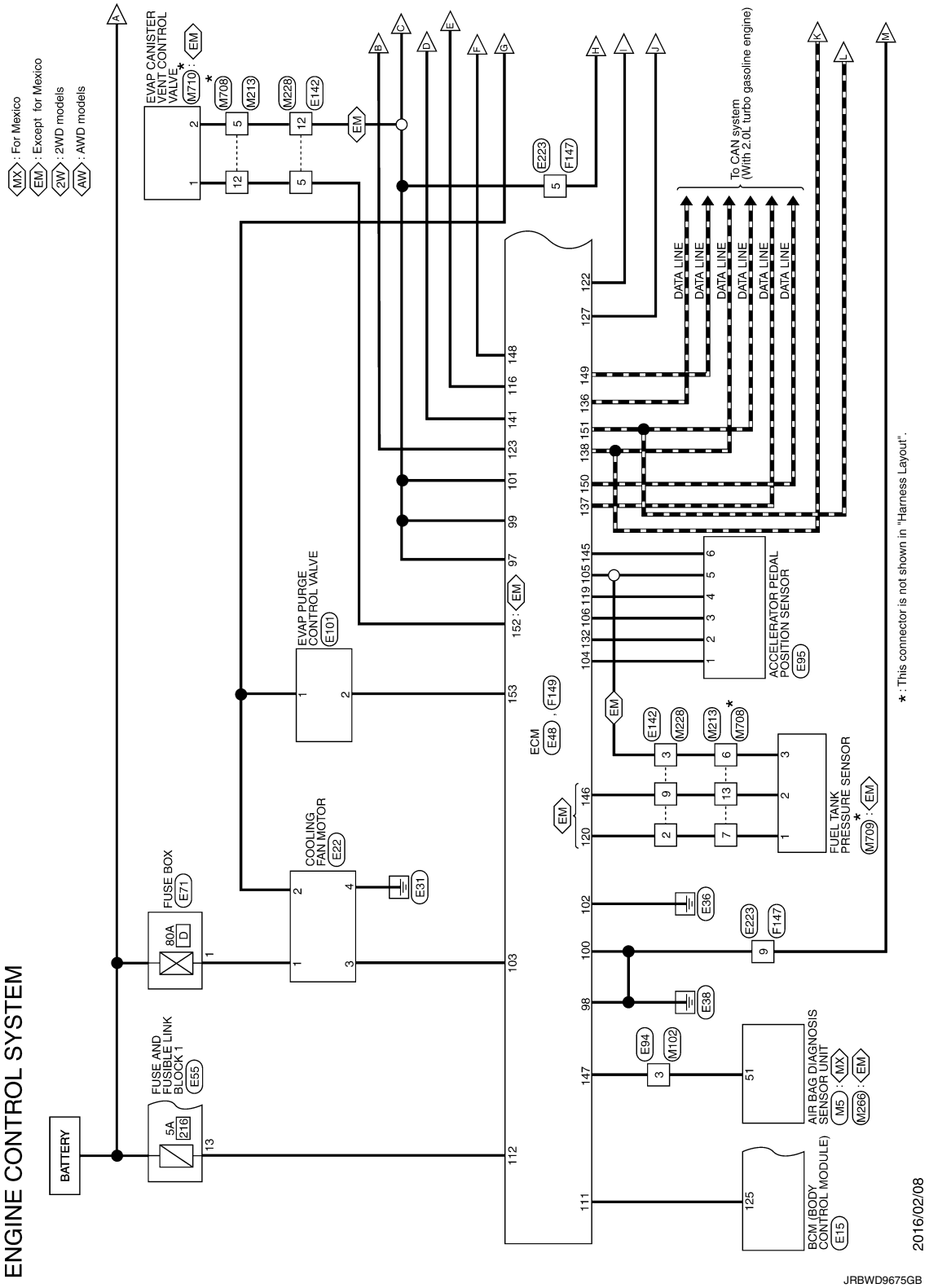
*: This number is prescribed by SAE J2012/ISO 15031-6.

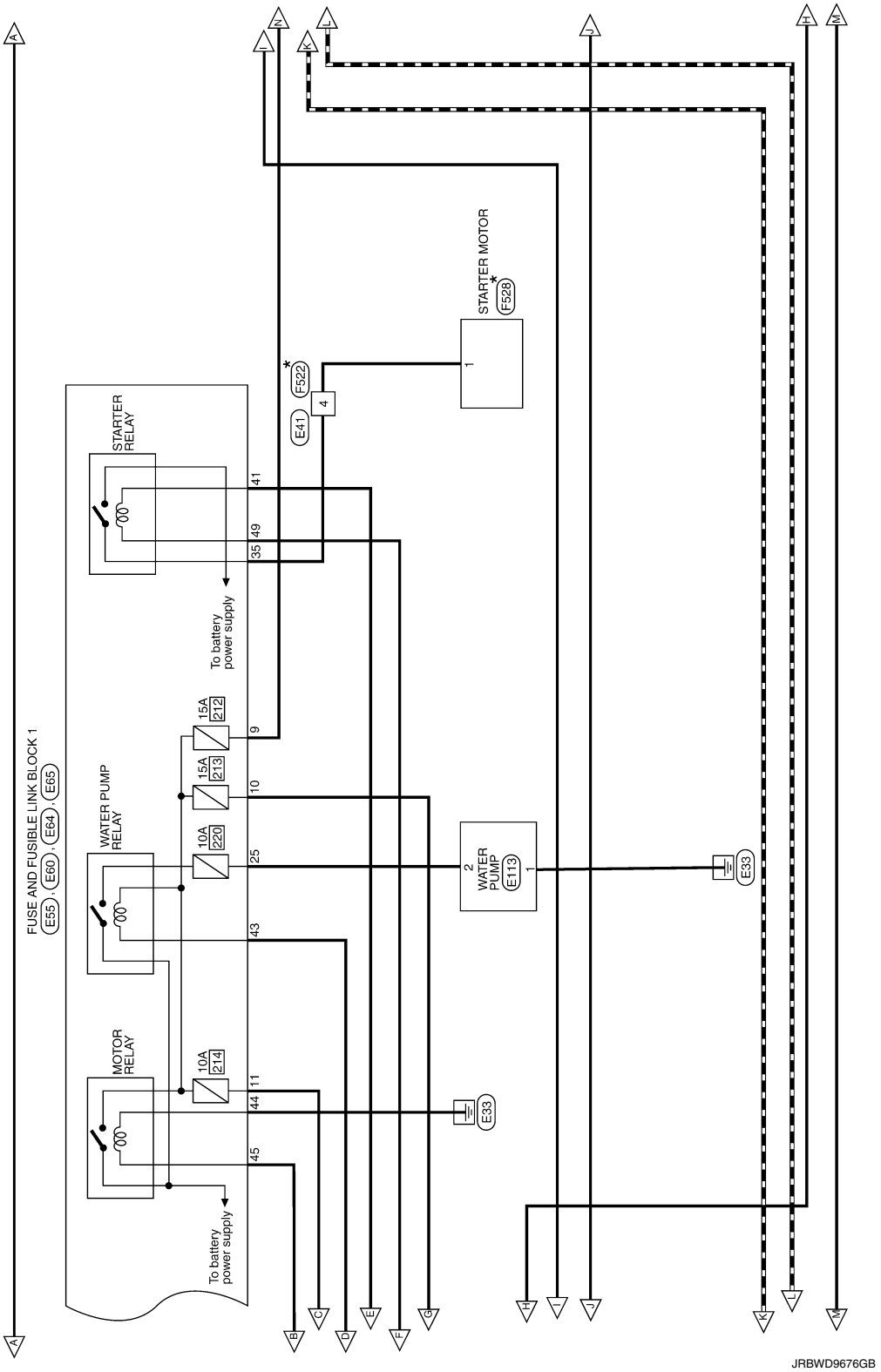
WIRING DIAGRAM

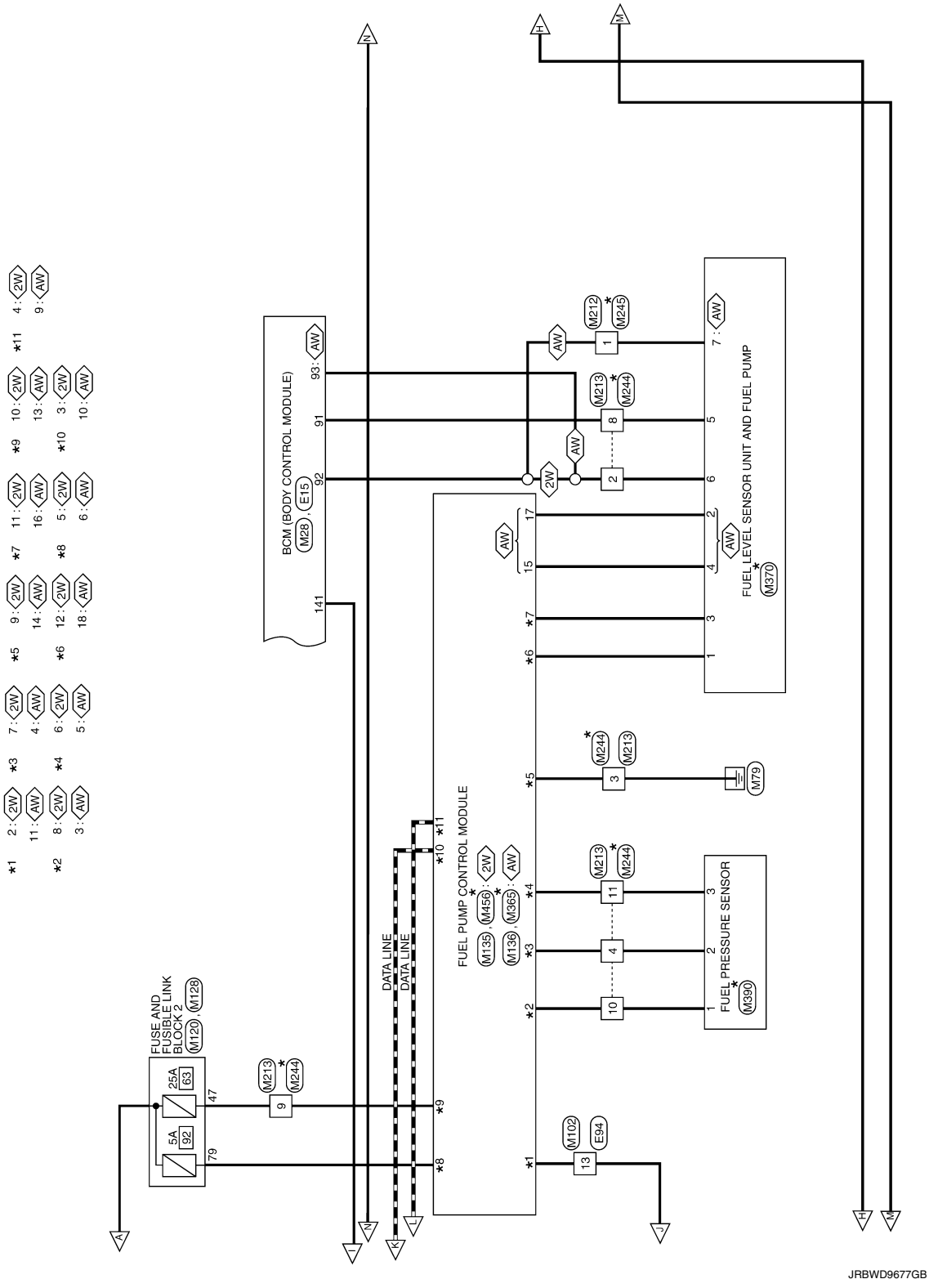
ENGINE CONTROL SYSTEM

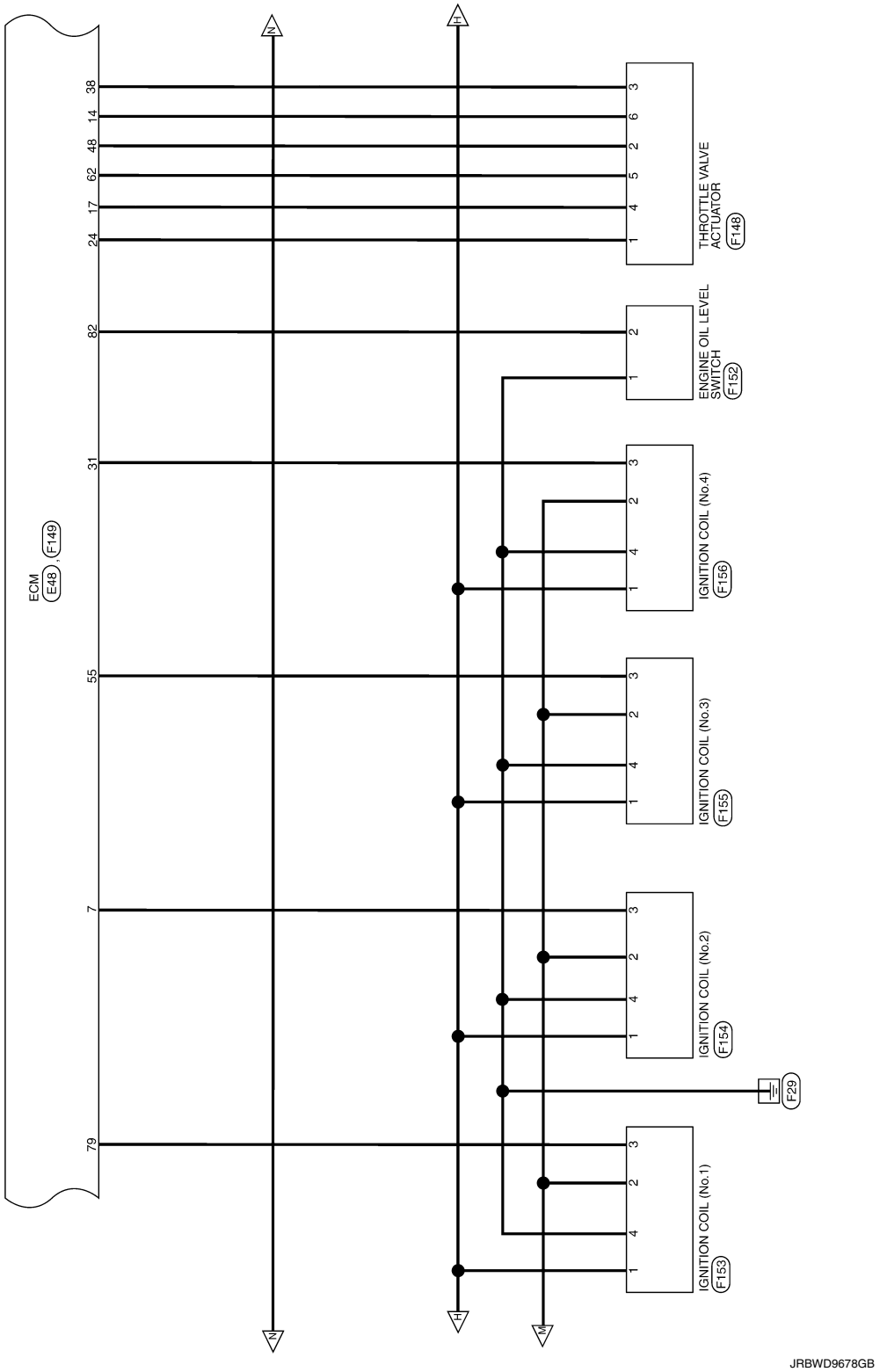
Wiring Diagram

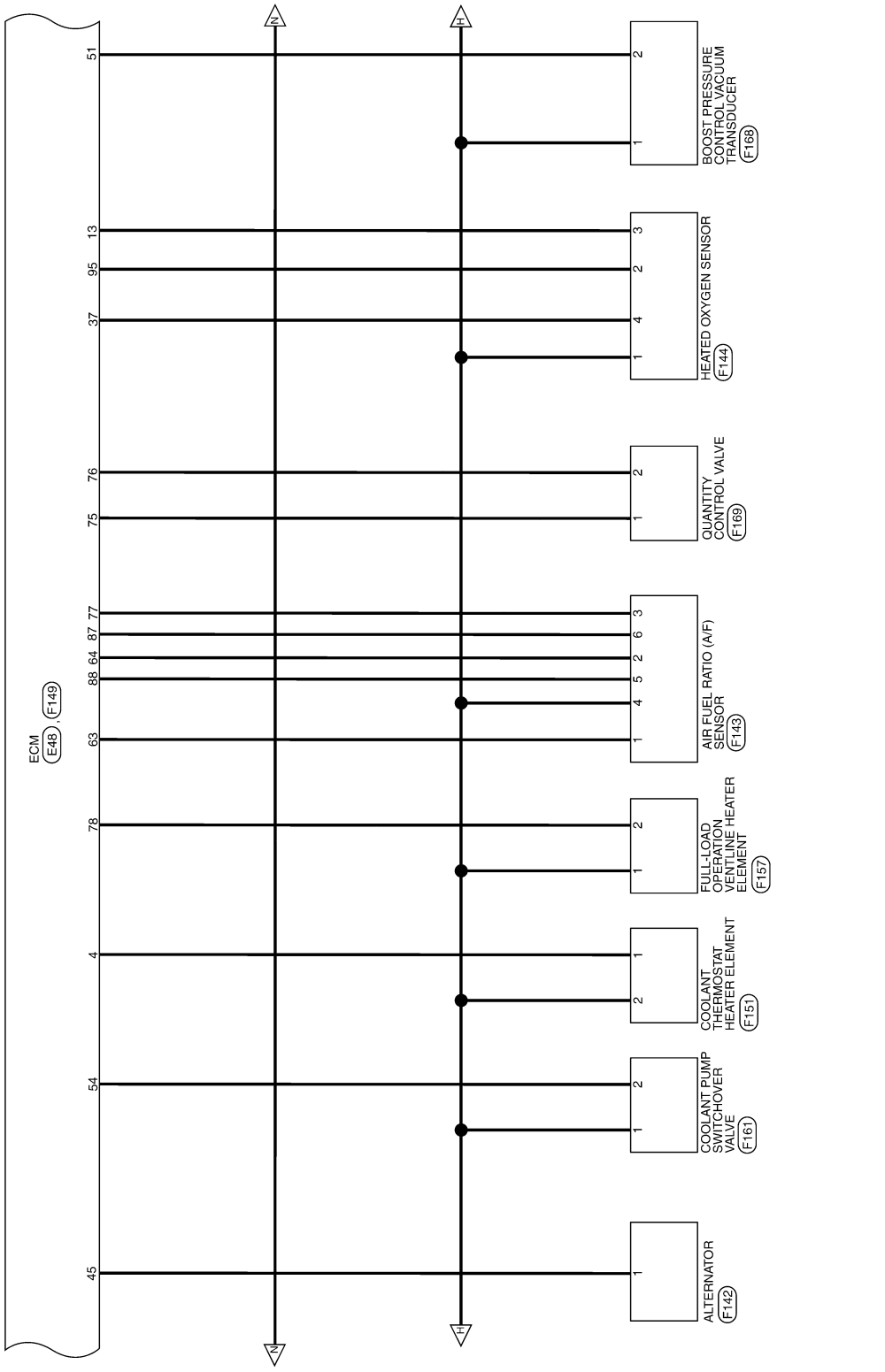
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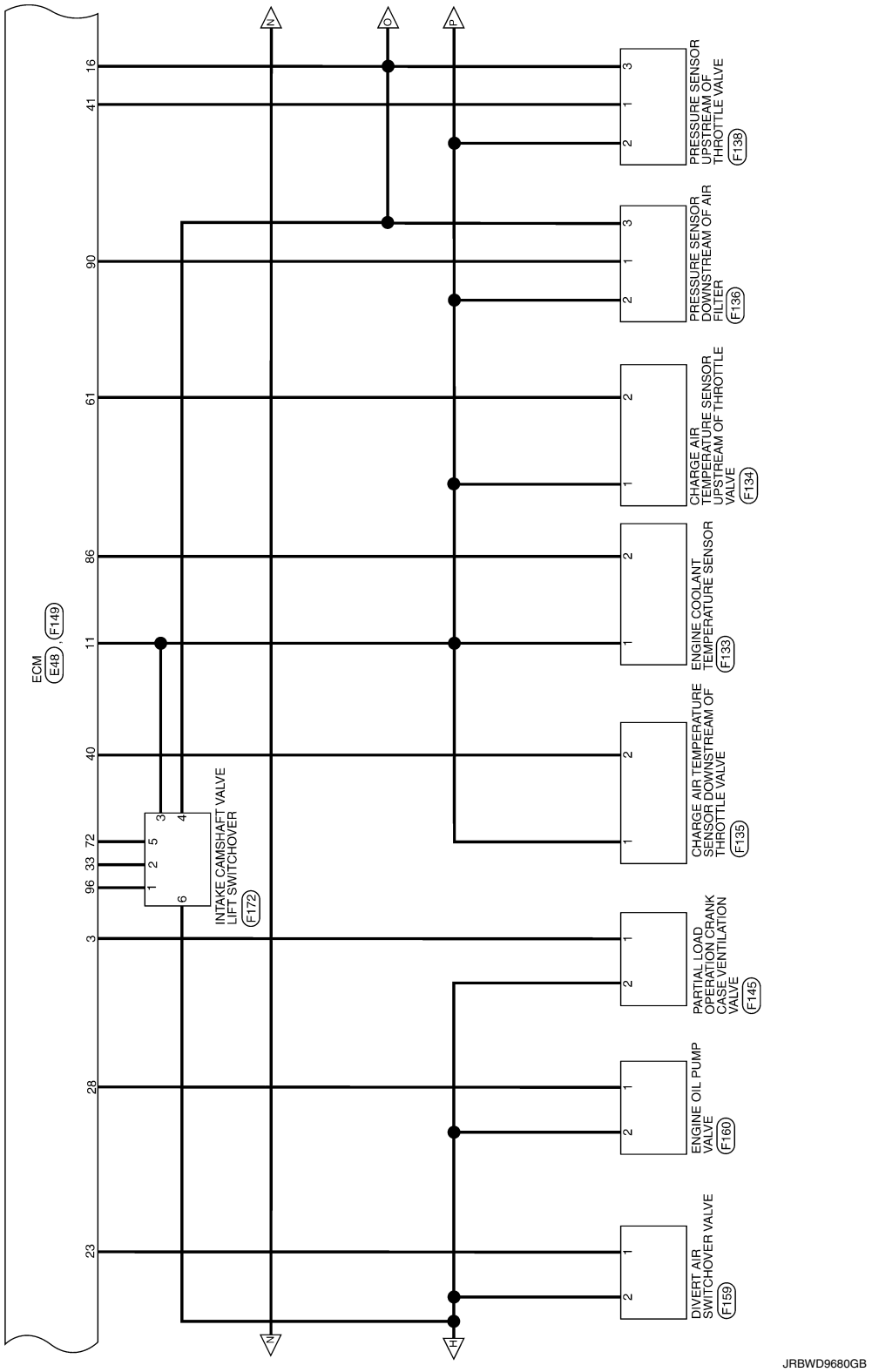



FUSE AND FUSIBLE LINK BLOCK 1
E55, E60, E64, E65
STARTER RELAY
WATER PUMP RELAY
MOTOR RELAY
To battery power supply
To battery power supply
15A 212
15A 213
10A 220
10A 214
41
49
35
9
10
25
43
11
44
45
STARTER MOTOR
F528
F522
E41
4
1
WATER PUMP
E113
2
1
E33
E33
JRBWD9676GB

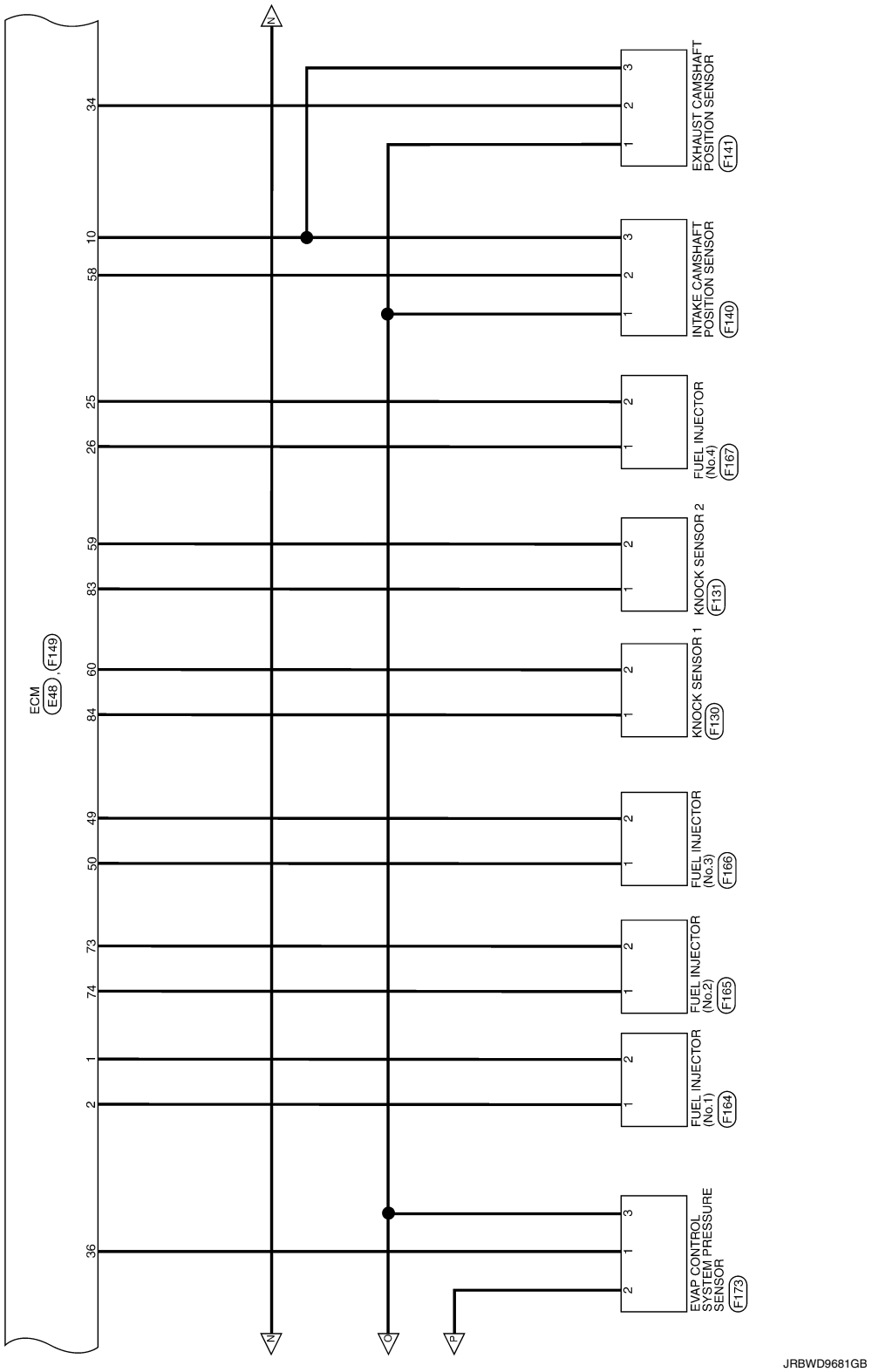

BCM (BODY CONTROL MODULE)
M28, E15
FUEL PUMP CONTROL MODULE
M135, M136, M456, M365
FUEL LEVEL SENSOR UNIT AND FUEL PUMP
M370
FUEL PRESSURE SENSOR
M390
FUSE AND FUSIBLE LINK BLOCK 2
M120, M128
DATA LINE
DATA LINE
M79
M102
E94
JRBWD9677GB

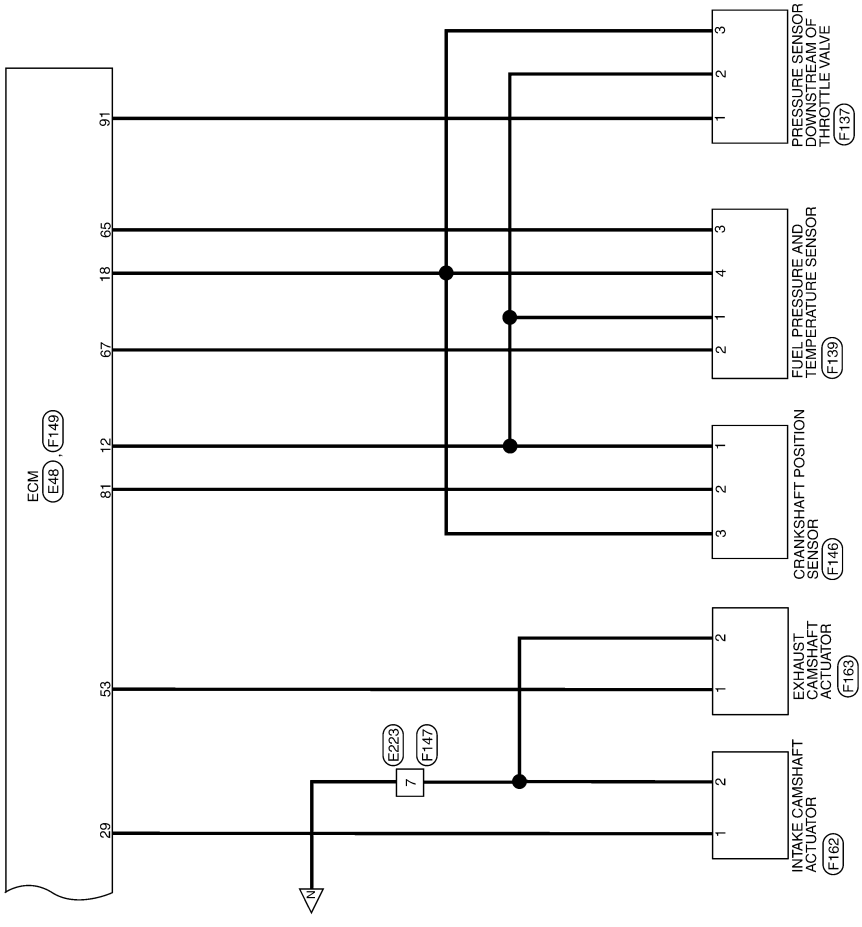

ECM
E48
F149
38
14
48
62
17
24
82
31
55
7
79
THROTTLE VALVE ACTUATOR
F148
ENGINE OIL LEVEL SWITCH
F152
IGNITION COIL (No.4)
F156
IGNITION COIL (No.3)
F155
IGNITION COIL (No.2)
F154
F29
IGNITION COIL (No.1)
F153
JRBWD9678GB


ECM
E48
F149
51
13
95
37
76
75
77
87
64
88
63
78
4
54
45
BOOST PRESSURE CONTROL VACUUM TRANSDUCER
F168
HEATED OXYGEN SENSOR
F144
QUANTITY CONTROL VALVE
F169
AIR FUEL RATIO (A/F) SENSOR
F143
FULL-LOAD OPERATION VENTLINE HEATER ELEMENT
F157
COOLANT THERMOSTAT HEATER ELEMENT
F151
COOLANT PUMP SWITCHOVER VALVE
F161
ALTERNATOR
F142
JRBWD9679GB



JRBWD9680GB


ECM (E48), (F149)
34
10
58
25
26
59
83
60
84
49
50
73
74
1
2
36
EXHAUST CAMSHAFT POSITION SENSOR (F141)
INTAKE CAMSHAFT POSITION SENSOR (F140)
FUEL INJECTOR (No.4) (F167)
KNOCK SENSOR 2 (F131)
KNOCK SENSOR 1 (F130)
FUEL INJECTOR (No.3) (F166)
FUEL INJECTOR (No.2) (F165)
FUEL INJECTOR (No.1) (F164)
EVAP CONTROL SYSTEM PRESSURE SENSOR (F173)
Z
O
P
JRBWD9681GB


ECM
E48, F149
91
65
18
67
12
81
53
29
E223
F147
7
PRESSURE SENSOR DOWNSTREAM OF THROTTLE VALVE
F137
FUEL PRESSURE AND TEMPERATURE SENSOR
F139
CRANKSHAFT POSITION SENSOR
F146
EXHAUST CAMSHAFT ACTUATOR
F163
INTAKE CAMSHAFT ACTUATOR
F162
JRBWD9682GB

ENGINE CONTROL SYSTEM

Connector No.	E15
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	MB_A16654000811

Terminal No.	Color Of Wire	Signal Name [Specification]
119	V	RR WASHER CONT
120	GR	FR WASHER CONT
121	W	BRAKE PEDAL
122	Y	SPARY NOZZLE HOSE HEATER POWER SUPPLY
123	G	INJECTION RELAY CONT
124	BR	HOOD SWITCH STATUS 1
125	B	K-LINE MOTORST
126	GR	PARKING LAMP LH
129	G	FRONT WIPER STOP POSITION
131	Y	FRONT FOG LAMP LH
132	O	HIGH BEAM LH
133	L	LOW BEAM RH [With halogen lamp]
133	Y	LOW BEAM RH [With LED lamp]
134	BR	WASHER LEVEL SW GND
135	P	HORN CONT
136	R	FR WIPER RELAY CONT
137	V	FR WIPER HI/LO RELAY CONT
138	G	BRAKE FLUID LEVEL SW SIG
139	L	WASHER LEVEL SW SIG
140	Y	HOOD SWITCH STATUS 2
141	R	WARM START
142	V	FRONT TURN SIGNAL LH

Connector No.	E22
Connector Name	COOLING FAN MOTOR
Connector Type	MB_A2225400081

Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	BATTERY POWER SUPPLY
2	R	BATTERY POWER SUPPLY (MOTOR RELAY)
3	L	COOLING FAN MOTOR CONTROL
4	B	GROUND

Connector No.	E41
Connector Name	WIRE TO WIRE
Connector Type	MB_A0275459826

Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	-	-
3	R	-
4	V	-
8	V	-
10	P	-
11	G	-
12	BR	-
14	W	-

Connector No.	E48
Connector Name	ECM
Connector Type	MB_A0075406981

Terminal No.	Color Of Wire	Signal Name [Specification]
97	R	POWER SUPPLY (ECM)
98	BR	ECM GROUND
99	V	POWER SUPPLY (ECM)
100	BR	ECM GROUND
101	R	POWER SUPPLY (ECM)
102	B	ECM GROUND
103	L	COOLING FAN CONTROL SIGNAL
104	R	SENSOR POWER SUPPLY (ACCELERATOR PEDAL POSITION SENSOR 1)
105	G	SENSOR POWER SUPPLY (ACCELERATOR PEDAL POSITION SENSOR 2)
106	BR	SENSOR GROUND (ACCELERATOR PEDAL POSITION SENSOR1)
111	B	IGNITION SIGNAL
112	Y	POWER SUPPLY (BATTERY)
116	W	STARTER RELAY-L
119	GR	SENSOR GROUND (ACCELERATOR PEDAL POSITION SENSOR 2)
120	O	SENSOR GROUND
122	R	HOT START SIGNAL
123	GR	MOTOR RELAY CONTROL SIGNAL
127	O	FUEL PUMP ON SIGNAL
132	G	ACCELERATOR PEDAL POSITION SENSOR 1
136	Y	POWERTRAIN SENSOR CAN-H
137	W	CAN-H
138	GR	POWERTRAIN CAN-H
141	B	WATER PUMP RELAY CONTROL SIGNAL
145	W	ACCELERATOR PEDAL POSITION SENSOR 2
146	G	FUEL TANK PRESSURE SENSOR
147	L	CRASH SIGNAL
148	W	STARTER RELAY-H
149	B	POWERTRAIN SENSOR CAN-L
150	G	CAN-L
151	L	POWERTRAIN CAN-L
152	V	EVAP CANISTER VENT CONTROL VALVE
153	BR	EVAP PURGE CONTROL VALVE

Connector No.	E55
Connector Name	FUSE AND FUSIBLE LINK BLOCK 1
Connector Type	MB_A0055459901

Terminal No.	Color Of Wire	Signal Name [Specification]
9	G	-
10	L	-
11	V	-
13	Y	-
14	W	-

Connector No.	E60
Connector Name	FUSE AND FUSIBLE LINK BLOCK 1
Connector Type	MB_A0065451301

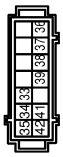
Terminal No.	Color Of Wire	Signal Name [Specification]
25	R	-

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ENGINE CONTROL SYSTEM

Connector No.	E64
Connector Name	FUSE AND FUSIBLE LINK BLOCK 1
Connector Type	MB_A0315459626

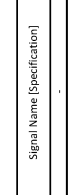
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
33	BR	-
34	G	-
35	V	-
36	P	-
37	R	-
38	V	-
39	P	-
41	W	-
42	R	-

Connector No.	E65
Connector Name	FUSE AND FUSIBLE LINK BLOCK 1
Connector Type	MB_A0315459926

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
43	B	-
44	BR	-
45	GR	-
49	W	-
51	R	-

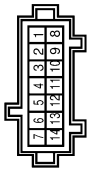
Connector No.	E71
Connector Name	FUSE BOX
Connector Type	MB_A0019822702

H.S.

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

Connector No.	E94
Connector Name	WIRE TO WIRE
Connector Type	MB_A2205459928

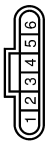
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	V	-
2	GR	-
3	L	-
4	W	-
6	BR	-
7	L	-
9	P	-
10	Y	-
12	GR	-
13	O	-
14	P	-

Connector No.	E95
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Type	MB_A2115452128

H.S.



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

Connector No.	E101
Connector Name	EVAP PURGE CONTROL VALVE
Connector Type	MB_A0435454228

H.S.



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

Connector No.	E113
Connector Name	WATER PUMP
Connector Type	MB_A0225452426

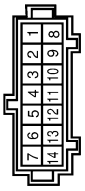
H.S.



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

Connector No.	E142
Connector Name	WIRE TO WIRE
Connector Type	MB_A2205453728

H.S.



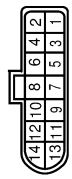
Terminal No.	Color Of Wire	Signal Name [Specification]
2	O	-
3	L	-
5	V	-
9	G	-
12	R	-

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ENGINE CONTROL SYSTEM

Connector No.	E223
Connector Name	WIRE TO WIRE
Connector Type	Delphi_33104047

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
5	-	-
9	-	-

Connector No.	F130
Connector Name	KNOCK SENSOR 1
Connector Type	A0225451926

H.S.



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

Connector No.	F131
Connector Name	KNOCK SENSOR 2
Connector Type	A2035450528

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	P/G	-
2	V/GY	-

Connector No.	F133
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Type	A0225452126

H.S.



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

Connector No.	F134
Connector Name	CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE
Connector Type	A0225452026

H.S.



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

Connector No.	F135
Connector Name	CHARGE AIR TEMPERATURE SENSOR DOWNSTREAM OF THROTTLE VALVE
Connector Type	A0225452026

H.S.



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

Connector No.	F136
Connector Name	PRESSURE SENSOR DOWNSTREAM OF AIR FILTER
Connector Type	A0225452526

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	O/G	-
2	G/Y	-
3	W/B	-

Connector No.	F137
Connector Name	PRESSURE SENSOR DOWNSTREAM OF THROTTLE VALVE
Connector Type	A0225452426

H.S.



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

JRBWD9685GB

ENGINE CONTROL SYSTEM

Connector No.	F138
Connector Name	PRESSURE SENSOR UPSTREAM OF THROTTLE VALVE
Connector Type	A0225453426

H.S.



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

Connector No.	F139
Connector Name	FUEL PRESSURE AND TEMPERATURE SENSOR
Connector Type	A0235454926

H.S.

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

Connector No.	F140
Connector Name	INTAKE CAMSHAFT POSITION SENSOR
Connector Type	A0225452426

H.S.



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

Connector No.	F141
Connector Name	EXHAUST CAMSHAFT POSITION SENSOR
Connector Type	A0225452426

H.S.



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

Connector No.	F142
Connector Name	ALTERNATOR
Connector Type	A0255454726

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L/W	-

Connector No.	F143
Connector Name	AIR FUEL RATIO (A/F) SENSOR
Connector Type	A0465459128

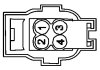
H.S.



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

Connector No.	F144
Connector Name	HEATED OXYGEN SENSOR
Connector Type	A0565451228

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R/G	-
2	R	-
3	BR	-
4	GY/L	-

Connector No.	F145
Connector Name	PARTIAL LOAD OPERATION CRANKCASE VENTILATION VALVE
Connector Type	A0225452126

H.S.



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

JRBWD9686GB

ENGINE CONTROL SYSTEM

Connector No.	F146
Connector Name	CRANKSHAFT POSITION SENSOR
Connector Type	A0245457826

H.S.

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

Connector No.	F147
Connector Name	WIRE TO WIRE
Connector Type	Delphi_13665259

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
5	-	-
9	-	-

Connector No.	F148
Connector Name	THROTTLE VALVE ACTUATOR
Connector Type	A0285453026

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	L/R	-
2	G/V	-
3	GY/R	-
4	BR/W	-
5	Y/GY	-
6	BR/G	-

Connector No.	F149
Connector Name	ECM
Connector Type	A0075407381

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR/B	FUEL INJECTOR (No. 1)
2	GY	FUEL INJECTOR (No. 1)
3	Y/BR	PARTIAL LOAD OPERATION CRANKCASE VENTILATION VALVE
4	G/W	COOLANT THERMOSTAT HEATER ELEMENT
7	L	IGNITION COIL (No. 2)
10	R/Y	SENSOR GROUND
11	G/Y	SENSOR GROUND
12	R/V	SENSOR GROUND
13	BR	SENSOR GROUND
14	BR/G	SENSOR GROUND
16	W/B	SENSOR POWER SUPPLY
17	BR/W	SENSOR POWER SUPPLY
18	W/V	SENSOR POWER SUPPLY
23	B/BR	DIVERT AIR SWITCHOVER VALVE
24	L/R	THROTTLE VALVE MOTOR (+)
25	L/G	FUEL INJECTOR (No. 4)
26	W/L	FUEL INJECTOR (No. 4)
28	W/R	ENGINE OIL PUMP VALVE
29	B	INTAKE CAMSHAFT ACTUATOR
31	V/L	IGNITION COIL (No. 4)
33	BR/O	INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR
34	Y/L	EXHAUST CAMSHAFT POSITION SENSOR
36	O/B	EVAP CONTROL SYSTEM PRESSURE SENSOR
37	GY/L	HEATED OXYGEN SENSOR
38	GY/R	THROTTLE POSITION SENSOR 2
40	BR/GY	CHARGE AIR TEMPERATURE SENSOR DOWNSTREAM OF THROTTLE VALVE
41	Y/B	PRESSURE SENSOR UPSTREAM OF THROTTLE VALVE
45	L/W	LIN
48	G/V	THROTTLE VALVE MOTOR (-)
49	BR/L	FUEL INJECTOR (No. 3)
50	B/Y	FUEL INJECTOR (No. 3)
51	BR/Y	BOOST PRESSURE CONTROL VACUUM TRANSDUCER
53	P/Y	EXHAUST CAMSHAFT ACTUATOR
54	BR/B	COOLANT PUMP SWITCHOVER VALVE
55	G	IGNITION COIL (No. 3)
58	R/B	INTAKE CAMSHAFT POSITION SENSOR
59	V/GY	KNOCK SENSOR 2
60	G/B	KNOCK SENSOR 1
61	BR/R	CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE
62	Y/GY	THROTTLE POSITION SENSOR 1
63	L/R	AIR FUEL RATIO (A/F) SENSOR
64	B/Y	AIR FUEL RATIO (A/F) SENSOR
65	Y/R	FUEL TEMPERATURE SIGNAL
67	W/L	FUEL PRESSURE SIGNAL
72	R/GY	INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 2
73	B/R	FUEL INJECTOR (No. 2)
74	B/W	FUEL INJECTOR (No. 2)
75	V	QUANTITY CONTROL VALVE (LOW)
76	G/B	QUANTITY CONTROL VALVE (HIGH)
77	R/B	AIR FUEL RATIO (A/F) SENSOR HEATER
78	V/G	FULL LOAD OPERATION VENT LINE HEATER ELEMENT
79	P	IGNITION COIL (No. 1)
81	Y/W	CRANKSHAFT POSITION SENSOR
82	O	ENGINE OIL LEVEL SWITCH
83	P/G	KNOCK SENSOR 2
84	W/Y	KNOCK SENSOR 1
86	GY/Y	ENGINE COOLANT TEMPERATURE SENSOR
87	V	AIR FUEL RATIO (A/F) SENSOR
88	GY/B	AIR FUEL RATIO (A/F) SENSOR
90	O/G	PRESSURE SENSOR DOWNSTREAM OF AIR FILTER
91	GY	PRESSURE SENSOR DOWNSTREAM OF THROTTLE VALVE
95	R	HEATED OXYGEN SENSOR HEATER
96	L/Y	INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 1

Connector No.	F151
Connector Name	COOLANT THERMOSTAT HEATER ELEMENT
Connector Type	A0225452126

H.S.

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

Connector No.	F152
Connector Name	ENGINE OIL LEVEL SWITCH
Connector Type	A0225451926

H.S.

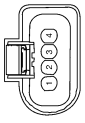
Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	-
2	O	-

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ENGINE CONTROL SYSTEM

Connector No.	F153
Connector Name	IGNITION COIL (No.1)
Connector Type	A0225457026

H.S.



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

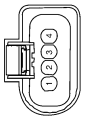
Connector No.	F154
Connector Name	IGNITION COIL (No.2)
Connector Type	A0225457026

H.S.

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

Connector No.	F155
Connector Name	IGNITION COIL (No.3)
Connector Type	A0225457026

H.S.



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

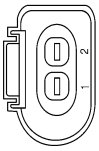
Connector No.	F156
Connector Name	IGNITION COIL (No.4)
Connector Type	A0225457026

H.S.

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

Connector No.	F157
Connector Name	FUEL LOAD OPERATION VENTUNE HEATER ELEMENT
Connector Type	A0525453826

H.S.



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

Connector No.	F159
Connector Name	DIVERT AIR SWITCHOVER VALVE
Connector Type	A0315454826

H.S.



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

Connector No.	F160
Connector Name	ENGINE OIL PUMP VALVE
Connector Type	A0225451926

H.S.



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

Connector No.	F161
Connector Name	COOLANT PUMP SWITCHOVER VALVE
Connector Type	A0065401781

H.S.



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

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ENGINE CONTROL SYSTEM

Connector No.	F162
Connector Name	INTAKE CAMSHAFT ACTUATOR
Connector Type	A031545482 6

H.S.



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

Connector No.	F163
Connector Name	EXHAUST CAMSHAFT ACTUATOR
Connector Type	A031545482 6

H.S.



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

Connector No.	F164
Connector Name	FUEL INJECTOR (No. 1)
Connector Type	A022545192 6

H.S.



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

Connector No.	F165
Connector Name	FUEL INJECTOR (No. 2)
Connector Type	A022545192 6

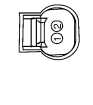
H.S.



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

Connector No.	F166
Connector Name	FUEL INJECTOR (No. 3)
Connector Type	A022545192 6

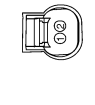
H.S.



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

Connector No.	F167
Connector Name	FUEL INJECTOR (No. 4)
Connector Type	A022545192 6

H.S.



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

Connector No.	F168
Connector Name	BOOST PRESSURE CONTROL VACUUM TRANSDUCER
Connector Type	A022545192 6

H.S.



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

Connector No.	F169
Connector Name	QUANTITY CONTROL VALVE
Connector Type	A028545362 6

H.S.



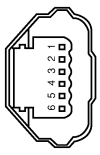
Terminal No.	Color Of Wire	Signal Name [Specification]
1	V	-
2	G/B	-

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ENGINE CONTROL SYSTEM

Connector No.	F172
Connector Name	INTAKE CAMSHAFT VALVE LIFT SWITCHOVER
Connector Type	A03254456926

H.S.



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

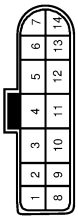
Connector No.	F173
Connector Name	EVAP CONTROL SYSTEM PRESSURE SENSOR
Connector Type	A02254453626

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	O/B	-
2	G/Y	-
3	W/B	-

Connector No.	F522
Connector Name	WIRE TO WIRE
Connector Type	MB_A0555452928

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	-	-
3	R	-
4	V	-
8	V	-
10	P	-
11	G	-
12	BR	-
14	W	-

Connector No.	F528
Connector Name	STARTER MOTOR
Connector Type	YPZ01FGY

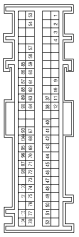
H.S.



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

Connector No.	M5
Connector Name	AIR BAG DIAGNOSIS SENSOR UNIT
Connector Type	MB_A0095405681

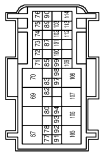
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	BUMPER SENSOR RH GROUND
2	W	BUMPER SENSOR RH SIGNAL
3	B	BUMPER SENSOR LH SIGNAL
4	W	BUMPER SENSOR LH GROUND
9	L/G	POP-UP ENGINE HOOD ACTUATOR RH (-)
10	BR/B	POP-UP ENGINE HOOD ACTUATOR RH (+)
11	O	POP-UP ENGINE HOOD ACTUATOR LH (+)
12	BR/W	POP-UP ENGINE HOOD ACTUATOR LH (-)
37	V	FUSE(-)
38	W	FUSE(+)
40	Y	OCCUPANT LIN SIGNAL
41	V/G	RPRH(+)
42	BR/Y	RPRH(-)
43	BR/Y	RPLH(-)
44	V/G	RPLH(+)
45	B	REAR BUCKLE SWITCH RH(-)
46	G	REAR BUCKLE SWITCH RH(+)
47	B	REAR BUCKLE SWITCH CENTER(-)
48	G	REAR BUCKLE SWITCH CENTER(+)
49	B	REAR BUCKLE SWITCH RH(-)
50	G	REAR BUCKLE SWITCH RH(+)
51	Y	AIR BAG SIGNAL
52	P	AIR BAG SIGNAL
53	G	CAN-L
54	W	CAN-H
57	R	B-SATELITE LH(+)
58	B	B-SATELITE LH(-)
59	BR	B-SATELITE RH(-)
60	L	B-SATELITE RH(+)
61	BR	FRONT DOOR SATELLITE RH(-)
62	G	FRONT DOOR SATELLITE RH(+)
63	B	FRONT DOOR SATELLITE LH(+)
64	BR	FRONT DOOR SATELLITE LH(-)
67	W	REAR DOOR SATELLITE RH(-)
68	B	REAR DOOR SATELLITE RH(+)
69	R	REAR DOOR SATELLITE LH(+)
70	W	REAR DOOR SATELLITE LH(-)
71	Y	BUCKLE SWITCH AS(+)
72	O	BUCKLE SWITCH AS(-)
73	Y	BUCKLE SWITCH DR(-)
74	O	BUCKLE SWITCH DR(+)
75	V/G	CLH(+)
76	BR/Y	CLH(-)
77	W/BR	CRH(+)
78	R/V	CRH(-)
85	P	CZS RH(-)
86	W	CZS RH(+)
87	BR	CZS LH(+)
88	L	CZS LH(-)
89	O	SAB AS(-)
90	Y	SAB AS(+)
93	Y	SAB DR(+)
94	O	SAB DR(-)
95	BR	FPRH(-)
96	L/W	FPRH(+)
97	G	FPLH(+)
98	V	FPLH(-)
100	BR	GND
101	BR	GND
103	Y	KL15R
104	G	KL30

Connector No.	M28
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	MB_A1665400481

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
67	V	BACK DOOR UNLOCK
69	GR	STOP LAMP (BODY RH)
70	B	REAR TURN SIGNAL LH
71	GR	BACK-UP LAMP RH
72	Y	LICENSE PLATE LAMP RH
73	L	RR POWER WINDOW SW RH UP
74	B	RR POWER WINDOW SW RH DOWN
75	L	RR POWER WINDOW SW RH GND
76	GR	HALL SENSOR RH POWER SUPPLY

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ENGINE CONTROL SYSTEM

Connector No.	M228
Connector Name	WIRE TO WIRE
Connector Type	MB_A2205459228

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
2	W	-
3	L	-
5	BR	-
9	G	-
12	R	-

Connector No.	M244
Connector Name	WIRE TO WIRE
Connector Type	MB_A2205459928

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
2	GR	- [4WD models] - [2WD models]
2	L	
3	B	-
4	V	-
8	P	-
9	R	-
10	G	-
11	O	-
12	BR	-
13	G	-

Connector No.	M245
Connector Name	WIRE TO WIRE
Connector Type	MB_A0365458728

H.S.

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

Connector No.	M266
Connector Name	AIR BAG DIAGNOSIS SENSOR UNIT
Connector Type	MB_A0105404681

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
5	B	ACTIVE VENT PS(-)
6	Y	ACTIVE VENT PS(+)
37	V	FUSE-
38	W	FUSE+
40	Y	OCCUPANT LIN SIGNAL
41	V/G	RPRH(+)
42	BR/Y	RPRH(-)
43	BR/Y	RPLH(-)
44	V/G	RPLH(+)
51	Y	AIR BAG SIGNAL
52	P	AIR BAG SIGNAL
53	G	CAN-L
54	W	CAN-H
57	R	B-SATELITE LH(+)
58	B	B-SATELITE LH(-)
59	BR	B-SATELITE RH(-)
60	L	B-SATELITE RH(+)

61	BR	FRONT DOOR SATELLITE RH(-)
62	G	FRONT DOOR SATELLITE RH(+)
63	B	FRONT DOOR SATELLITE LH(+)
64	BR	FRONT DOOR SATELLITE LH(-)
65	G	SEAT POS PS(+)
66	BR	SEAT POS PS(-)
67	W	REAR DOOR SATELLITE RH(-)
68	B	REAR DOOR SATELLITE RH(+)
69	R	REAR DOOR SATELLITE LH(+)
70	W	REAR DOOR SATELLITE LH(-)
71	Y	BUCKLE_SWITCH_PS+
72	O	BUCKLE_SWITCH_PS-
73	Y	BUCKLE_SWITCH_DR+
74	O	BUCKLE_SWITCH_DR-
75	V/G	CLH(+)
76	BR/Y	CLH(-)
77	W/BR	CRH(+)
78	R/V	CRH(-)
81	R	FORCE LIMITER PS(-)
82	B	FORCE LIMITER PS(+)
85	P	CZS RH(-)
86	W	CZS RH(+)
87	BR	CZS LH(-)
88	L	CZS LH(+)
89	O	SAB AS(-)
90	Y	SAB AS(+)
93	Y	SAB DR(+)
94	O	SAB DR(-)
95	BR	FPRH(-)
96	L/W	FPRH(+)
97	G	FPLH(+)
98	V	FPLH(-)
100	BR	GND
101	BR	GND
103	Y	KL15R
104	G	KL30

Connector No.	M365
Connector Name	FUEL PUMP CONTROL MODULE
Connector Type	M365

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
13	O/LG	BATTERY POWER SUPPLY
14	BR	PCM GROUND
15	BR	FUEL PUMP MOTOR GROUND
16	B/W	FUEL PUMP MOTOR U
17	V	FUEL PUMP MOTOR W
18	W	FUEL PUMP MOTOR V

Connector No.	M370
Connector Name	FUEL LEVEL SENSOR UNIT AND FUEL PUMP
Connector Type	Tyco_1 965474-1 1

H.S.

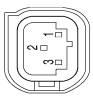
Terminal No.	Color Of Wire	Signal Name [Specification]
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-
6	-	-
7	-	-

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ENGINE CONTROL SYSTEM

Connector No.	M390
Connector Name	FUEL PRESSURE SENSOR
Connector Type	A2105402181

H.S.



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

Connector No.	M456
Connector Name	FUEL PUMP CONTROL MODULE
Connector Type	HIRSCHMANN_772-717-501

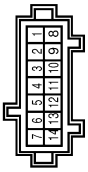
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
9	BR	GROUND
10	O/LG	POWER SUPPLY (BATTERY)
11	BR/O	FUEL PUMP GROUND
12	O/L	FUEL PUMP CONTROL SIGNAL

Connector No.	M708
Connector Name	WIRE TO WIRE
Connector Type	MB_A2205459928

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
5	-	-
6	-	-
7	-	-
12	-	-
13	-	-

Connector No.	M709
Connector Name	FUEL TANK PRESSURE SENSOR
Connector Type	A2105402181

H.S.



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

Connector No.	M710
Connector Name	EVAP CANISTERVENT CONTROL VALVE
Connector Type	MB_A0435454228

H.S.



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

JRBWD9693GB

BASIC INSPECTION

SERVICE AFTER REPLACING OR REMOVING ENGINE PARTS

Special Repair Requirement List

INFOID:0000000013608175

×:Applicable

Repair or replace part		Service performed		CONSULT function	Reference
		Replacement	Removal		
ECU	ECM	×	—	• ECM programming • ACTIVATION OF FUEL PUMP • Key ID registration • VIN REGISTRATION • Configuration • INJECTOR INJECTION QUANTITY ADJUSTMENT • TEACH IN OF THROTTLE VALVE STOP	EC-183, "Description"
	FPCM	×	—	• Configuration • ACTIVATION OF FUEL PUMP	EC-191, "Description"
Fuel	High pressure fuel pump	×	—	H/P FUEL PUMP TOTAL STARTS COUNTER CLEAR	EC-198, "Description"
	Fuel injector	×	—	INJECTOR INJECTION QUANTITY ADJUSTMENT	EC-189, "Description"
Intake air	Throttle valve actuator	×	—	TEACH IN OF THROTTLE VALVE STOP	EC-192, "Description"
Timing control	Intake camshaft actuator	×	×	• TEACH IN OF CAMSHAFT POSITION • CAMSHAFT REFERENCE ADAPTATION	EC-194, "Description", EC-193, "Description"
	Exhaust camshaft actuator				
	Crankshaft position sensor	×	—	—	EC-190, "Description"
	Timing chain	×	×	• TEACH IN OF CAMSHAFT POSITION • CAMSHAFT REFERENCE ADAPTATION	EC-194, "Description", EC-193, "Description"
Others	Starter motor	×	—	STRT OPRTN CNTR CLEAR	EC-197, "Description"
	Engine	×	—	• TEACH IN OF CAMSHAFT POSITION • CAMSHAFT REFERENCE ADAPTATION	EC-194, "Description", EC-193, "Description"
	All sensors and all actuators	×	—	RESETTING OF ADAPTION VALUES	EC-195, "Description"

ADDITIONAL SERVICE WHEN REPLACING ECM

Description

INFOID:0000000013608176

When replacing ECM, the procedures of BEFORE REPLACEMENT and AFTER REPLACEMENT must be performed. For work procedure, refer to the following:
- Before ECM replacement: EC-183, "Work Procedure (Before Replacing ECM)"
- After ECM replacement: EC-183, "Work Procedure (After Replacing ECM)"

BEFORE REPLACEMENT

When replacing ECM, save ‘Operation log.’

AFTER REPLACEMENT

After replacing ECM, the following items must be performed:
- ECM programming
- Activation of fuel pump
- Key ID registration
- VIN registration
- Injector injection quantity adjustment value registration
- Teach in of throttle valve stop

Work Procedure (Before Replacing ECM)

INFOID:0000000013608177

1.SAVE ‘OPERATION LOG’

With CONSULT

Save Operation Log, according to the procedure of “Programming” in CONSULT Operation Manual.

NOTE:
- Log in to the network, according to the CONSULT screen.
- ECM part number is saved in Operating Log saved in CONSULT.
- After replacing ECM, perform necessary work.

>> • Replace ECM. Refer to EC-963, "Removal and Installation".
• After replacing ECM, perform necessary work. Refer to EC-183, "Work Procedure (After Replacing ECM)".

Work Procedure (After Replacing ECM)

INFOID:0000000013608178

1.CHECK ‘OPERATION LOG’

With CONSULT

Check Operation Log saved before replacing ECM, according to the procedure of “Programming” in CONSULT Operation Manual.

NOTE:
- Log in to the network, according to the CONSULT screen.
- For the vehicle that the programming is to be performed, check if Operation Log of Vehicle Identification Number (VIN) is in Saved Data List.

Is there an applicable Operation Log in the Saved Data List?

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

2.PERFORM ECM PROGRAMMING

With CONSULT

Perform ECM programming, according to “Programming” of CONSULT Operation Manual. Refer to CONSULT Operation Manual.

CAUTION:

During programming, maintain the following conditions:
- **Ignition switch: ON**
- **Electric load: OFF**
- **Brake pedal: Not depressed**
- **Battery voltage: 12 – 13.5 V (Check the value displayed on the CONSULT screen.)**

NOTE:
Log in to the network, according to the CONSULT screen.

>> GO TO 5.

3. READ IN ECM PART NUMBER BY 'FAST LINKED'

Obtain ECM part number by NISSAN PARTS CATALOGUE GLOBAL Web-FAST, according to the procedure of 'FAST linked' in CONSULT Operation Manual. Refer to CONSULT Operation Manual.

NOTE:
'FAST linked' allows an appropriate programming by obtaining ECU part number from NISSAN PARTS CATALOGUE GLOBAL Web-FAST even when the part number cannot be obtained from the old ECU used before replacing with a new one.

>> GO TO 4.

4. PERFORM PROGRAMMING (FAST LINKED)

With CONSULT
Perform ECM programming according to the procedure of FAST linked in CONSULT Operation Manual. Refer to CONSULT Operation Manual.

CAUTION:
During programming, maintain the following conditions:
- **Ignition switch: ON**
- **Electric load: OFF**
- **Brake pedal: Not depressed**
- **Battery voltage: 12 – 13.5 V (Check the value displayed on the CONSULT screen.)**

NOTE:
Log in to the network, according to the CONSULT screen.

>> GO TO 5.

5. PERFORM CONFIGURATION (WRITING VEHICLE SPECIFICATION)

With CONSULT
Perform configuration. Refer to EC-188, "Description".

NOTE:
Log in to the network, according to the CONSULT screen.

>> GO TO 6.

6. PERFORM ACTIVATION OF FUEL PUMP

With CONSULT
Perform Activation of Fuel Pump. Refer to EC-191, "Description".

>> GO TO 7.

7. PERFORM INITIALIZATION OF INFINITI VEHICLE IMMOBILIZER SYSTEM (NATS) AND REGISTRATION OF ALL IVIS (NATS) IGNITION KEY IDS

Perform initialization of INFINITI VEHICLE IMMOBILIZER SYSTEM (NATS) and registration of all IVIS (NATS) ignition key IDs. Refer to CONSULT Operation Manual.

>> GO TO 8.

8. PERFORM VIN REGISTRATION

With CONSULT
Perform VIN Registration. Refer to EC-196, "Description".

>> GO TO 9.

9. PERFORM INJECTOR INJECTION QUANTITY ADJUSTMENT VALUE REGISTRATION

With CONSULT
Perform INJECTOR INJECTION QUANTITY ADJUSTMENT. Refer to EC-189, "Description".

>> GO TO 10.

10. PERFORM TEACH IN OF THROTTLE VALVE STOP

With CONSULT
1. Select “ENGINE” >> “WORK SUPPORT” >> “TEACH IN OF THROTTLE VALVE STOP”. Refer to EC-194, "Description".
2. Follow the instruction of CONSULT display.

>> GO TO 11.

11. CHECK DTC

1. Turn ignition switch OFF and wait at least 30 seconds.
2. Turn ignition switch ON.
3. Check DTC. If DTC is displayed, erase it.

>> END

ADDITIONAL SERVICE WHEN REPLACING FPCM

Description

INFOID:0000000013608179

When replacing FPCM, the procedures of BEFORE REPLACEMENT and AFTER REPLACEMENT must be performed. For work procedure, refer to the following:
- Before FPCM replacement: EC-186, "Work Procedure (Before Replacing FPCM)"
- After FPCM replacement: EC-186, "Work Procedure (After Replacing FPCM)"

BEFORE REPLACEMENT

When replacing FPCM, save ‘Operation log.’

AFTER REPLACEMENT

After replacing FPCM, the following items must be performed:
- Configuration
- Activation of fuel pump

Work Procedure (Before Replacing FPCM)

INFOID:0000000013608180

1.SAVE ‘OPERATION LOG’

With CONSULT
Save Operation Log, according to the procedure of “Programming” in CONSULT Operation Manual.
NOTE:
- Log in to the network, according to the CONSULT screen.
- FPCM part number is saved in Operating Log saved in CONSULT.
- After replacing FPCM, perform necessary work.

>> • Replace FPCM. Refer to EC-964, "Removal and Installation".
• After replacing FPCM, perform necessary work. Refer to EC-186, "Work Procedure (After Replacing FPCM)".

Work Procedure (After Replacing FPCM)

INFOID:0000000013608181

1.CHECK ‘OPERATION LOG’

With CONSULT
Check Operation Log saved before replacing FPCM, according to the procedure of “Programming” in CONSULT Operation Manual.
NOTE:
- Log in to the network, according to the CONSULT screen.
- For the vehicle that the programming is to be performed, check if Operation Log of Vehicle Identification Number (VIN) is in Saved Data List.

Is there an applicable Operation Log in the Saved Data List?

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

2.PERFORM FPCM PROGRAMMING

With CONSULT
Perform FPCM programming, according to “Programming” of CONSULT Operation Manual. Refer to CONSULT Operation Manual.
CAUTION:
During programming, maintain the following conditions:
- **Ignition switch: ON**
- **Electric load: OFF**
- **Brake pedal: Not depressed**
- **Battery voltage: 12 – 13.5 V (Check the value displayed on the CONSULT screen.)**

NOTE:
Log in to the network, according to the CONSULT screen.

>> GO TO 5.

3. READ IN FPCM PART NUMBER BY 'FAST LINKED'

Obtain FPCM part number by NISSAN PARTS CATALOGUE GLOBAL Web-FAST, according to the procedure of 'FAST linked' in CONSULT Operation Manual. Refer to CONSULT Operation Manual.

NOTE:

'FAST linked' allows an appropriate programming by obtaining ECU part number from NISSAN PARTS CATALOGUE GLOBAL Web-FAST even when the part number cannot be obtained from the old ECU used before replacing with a new one.

>> GO TO 4.

4. PERFORM PROGRAMMING (FAST LINKED)

With CONSULT

Perform FPCM programming according to the procedure of FAST linked in CONSULT Operation Manual. Refer to CONSULT Operation Manual.

CAUTION:

During programming, maintain the following conditions:

- **Ignition switch: ON**
- **Electric load: OFF**
- **Brake pedal: Not depressed**
- **Battery voltage: 12 – 13.5 V (Check the value displayed on the CONSULT screen.)**

NOTE:

Log in to the network, according to the CONSULT screen.

>> GO TO 5.

5. PERFORM CONFIGURATION (WRITING VEHICLE SPECIFICATION)

With CONSULT

Perform configuration. Refer to EC-188, "Description".

NOTE:

Log in to the network, according to the CONSULT screen.

>> GO TO 6.

6. PERFORM ACTIVATION OF FUEL PUMP

With CONSULT

Perform Activation of Fuel Pump. Refer to EC-191, "Description".

>> END

CONFIGURATION

Description

INFOID:0000000013608182

Vehicle specification needs to be written with CONSULT because it is not written after replacing the ECM or FPCM.
The configuration requires network connection. CONSULT connects to network and then it downloads the configuration data from the server. Then CONSULT writes the vehicle specification to the ECM or FPCM.
Refer to EC-188, "Work Procedure".
NOTE:
For details the network connection and operation, refer to “CONSULT Operation Manual”.
The configuration no need to “save” configuration data from the ECM or FPCM.The configuration data is always generated freshly at the server and then downloaded to the CONSULT.
CAUTION:
Follow the instructions listed below.
- **Complete the procedure of “Read / Write Configuration” in order.**
- **If incorrect “Read / Write Configuration”, incidents might occur.**
- **Never perform “Read / Write Configuration” except for new CAN gateway.**

Work Procedure

INFOID:0000000013608183

1.WRITING VEHICLE SPECIFICATION

CONSULT Configuration
Perform “WRITE CONFIGURATION” for CONTROL UNIT according to “CONSULT Operation Manual”.
NOTE:
- Log in the network according to CONSULT guidance.
- For details the network connection and operation, refer to “CONSULT Operation Manual”.

>> END

INJECTOR INJECTION QUANTITY ADJUSTMENT

Description

INFOID:0000000013608184

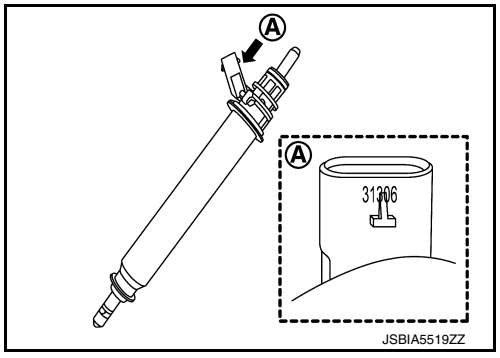
Injector Injection Quantity Adjustment allows to perform registration of the individual characteristics code of the fuel injector. (For details, refer to EC-189, "Work Procedure".)
Injector Injection Quantity Adjustment must be performed after the following cases.
- Injector(s) are replaced.
- ECM is replaced.

Work Procedure

INFOID:0000000013608185

1.START

NOTE:
Before performing this procedure, record injector characteristics code printed on a fuel injector.
1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select “ENGINE” >> “WORK SUPPORT” >> “INJECTOR INJECTION QUANTITY ADJUSTMENT”.
3. Touch “START”.
   NOTE:
   When touching “START”, CONSULT reads injector adjustment values stored in ECM.
4. Select the number of the cylinder which needs Injector Injection Quantity Adjustment.
5. Input injector adjustment value Ⓐ.
   CAUTION:
   Input four digits from the left with CONSULT, although the stamped number is five digits.
   NOTE:
   “I”, “O”, “Q” and “V” are not applied.
6. Repeat step 4 - 5 till there is no cylinder which needs Injector Injection Quantity Adjustment, and touch “START”.
   NOTE:
   When touching “START”, injector adjustment values stored in CONSULT are written onto ECM memory.
7. Check that the following values are same for each cylinder.



- Injector characteristics code which is printed on a fuel injector.
- Injector characteristics code which is displayed on CONSULT screen.

NOTE:
- In this step, CONSULT reads injector characteristics codes stored in ECM and displays the values on the CONSULT screen. This is for checking if injector characteristics codes are written onto ECM memory correctly.

8. Turn ignition switch OFF and wait at least 30 seconds.

>> END

TEACH IN PROCESS SENSOR ROTOR ADAPTATION

Description

INFOID:0000000013608186

TEACH-IN PROCESS SENSOR ROTOR ADAPTATION allows to learn the position of the sensor rotor for crankshaft position sensor. (For details, refer to EC-190, "Work Procedure".)

Work Procedure

INFOID:0000000013608187

1.PRECONDITION-1

With CONSULT
1. Turn ignition switch ON.
2. On the CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “SEN ROTOR ADAPT CMPLT”.
3. Start the engine.
4. Push stop/start OFF switch to deactivate stop/start system.
5. Shift selector lever to manual mode (1st gear).

>> GO TO 2.

2.START

With CONSULT
1. Accelerate to 20 km/h (13 MPH), and then release the accelerator pedal to decelerate for 4 seconds or more (in the fuel cut status).
   CAUTION:
   Never rev up the engine speed to 4,000 rpm or more.
2. Check “SEN ROTOR ADAPT CMPLT” display.

Is “YES” displayed on CONSULT screen?

YES >> END
NO >> GO TO 1.

ACTIVATION OF FUEL PUMP

Description

INFOID:0000000013608188

ACTIVATION OF FUEL PUMP must be performed when ECM or FPCM is replaced. (For details, refer to EC-191, "Work Procedure".)

Work Procedure

INFOID:0000000013608189

1.START

With CONSULT
1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select “ENGINE” >> “WORK SUPPORT” >> “ACTIVATION OF FUEL PUMP”.
3. Touch “Start”.

>> END

TEACH IN OF THROTTLE VALVE STOP

Description

INFOID:0000000013608190

TEACH-IN OF THROTTLE VALVE STOP must be performed when ECM or throttle valve actuator is replaced. (For details, refer to EC-192, "Work Procedure".)

Work Procedure

INFOID:0000000013608191

1.PRECONDITION-1

With CONSULT
1. Turn ignition switch ON.
2. On the CONSULT screen, select “ENGINE” >> “WORK SUPPORT” >> “TEACH IN OF THROTTLE VALVE STOP”.
3. Touch “Start”.

>> GO TO 2.

2.PRECONDITION-2

With CONSULT
Check the following conditions.

ENGINE SPEED	≤ 10 1/min
COOLANT TEMPERATURE	5°C (41°F) ≤ temperature ≥ 100°C (212°F)
C/AIR TENP/S U/STRM THRTL	≤ 40°C (104°F)
ACCEL PEDAL SENSOR	≤ 5%

Is the condition satisfied?

YES >> GO TO 3.
NO >> Satisfy the condition, and GO TO 3.

3.START

With CONSULT
Touch “Start” and wait a few seconds.

Is “Test Finished” displayed on CONSULT screen?

YES >> END
NO >> Follow the instruction of CONSULT display.

CAMSHAFT REFERENCE ADAPTATION

Description

INFOID:0000000013608192

CAMSHAFT REFERENCE ADAPTATION must be performed when the component related to camshaft control (e.g. timing chain, camshaft actuator, etc.) is replaced. (For details, refer to EC-193, "Work Procedure".)

Work Procedure

INFOID:0000000013608193

1.PRECONDITION-1

With CONSULT
1. Turn ignition switch ON.
2. On the CONSULT screen, select “ENGINE” >> “WORK SUPPORT” >> “CAMSHAFT REFERENCE ADAPTATION”.
3. Touch “Start”.

>> GO TO 2.

2.PRECONDITION-2

With CONSULT
1. Start the engine and let it idle.
2. Check the following conditions.

BATTERY VOLTAGE	> 10 V
ENGINE SPEED	> 2,520 1/min
COOLANT TEMP (RAW VALUE)	80°C (176°F) ≤ temperature ≥ 90°C (194°F)
ENG OIL TEMP	≤ 110°C (230°F)

Is the condition satisfied?

YES >> GO TO 3.
NO >> Satisfy the condition, and GO TO 3.

3.START

With CONSULT
1. Touch “Start” and wait a few seconds.
2. Touch “Continue” and wait a few seconds.

Is “COMPLETED” displayed on CONSULT screen?

YES >> END
NO >> Follow the instruction of CONSULT display.

TEACH IN OF CAMSHAFT POSITION

Description

INFOID:0000000013608194

TEACH-IN OF CAMSHAFT POSITON allows to learn the position of the camshafts. (For details, refer to EC-194, "Work Procedure".)

Work Procedure

INFOID:0000000013608195

1.PRECONDITION-1

With CONSULT
1. Turn ignition switch ON.
2. On the consult screen, select “ENGINE” >> “WORK SUPPORT” >> “TEACH IN OF CAMSHAFT POSITION”.
3. Touch “Start”.

>> GO TO 2.

2.PRECONDITION-2

With CONSULT
1. Start the engine and let it idle.
2. Check the following conditions.

ENGINE SPEED	500 1/min ≤ engine speed ≥ 1,000 1/min
COOLANT TEMPERATURE	60°C (140°F) ≤ temperature ≥ 90°C (194°F)

Is the condition satisfied?

YES >> GO TO 3.
NO >> Satisfy the condition, and GO TO 3.

3.START

With CONSULT
1. Touch “Start” and wait a few seconds.
2. Touch “Continue” and wait a few seconds.

Is “COMPLETED” displayed on CONSULT screen?

YES >> END
NO >> Follow the instruction of consult display.

RESETTING OF ADAPTATION VALUES

Description

INFOID:0000000013608196

RESETTING OF ADAPTATION VALUES must be performed when any sensors and actuators are replaced. (For details, refer to EC-195, "Work Procedure".)

Work Procedure

INFOID:0000000013608197

1.PRECONDITION-1

With CONSULT
1. Turn ignition switch ON.
2. On the CONSULT screen, select “ENGINE” >> “WORK SUPPORT” >> “RESETTING OF ADAPTION VALUES”.
3. Touch “Start”.

>> GO TO 2.

2.PRECONDITION-2

With CONSULT
Check the following conditions.

ENGINE SPEED	≤ 10 1/min
COOLANT TEMPERATURE	5°C (41°F) ≤ temperature ≥ 100°C (212°F)
ACCEL PEDAL SENSOR	≤ 5%

Is the condition satisfied?

YES >> GO TO 3.
NO >> Satisfy the condition, and GO TO 3.

3.START

With CONSULT
Touch “Start” and wait a few seconds.

Is “COMPLETED” displayed on CONSULT screen?

YES >> END
NO >> Follow the instruction of CONSULT display.

VIN REGISTRATION

Description

INFOID:0000000013608198

VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced. (For details, refer to EC-196, "Work Procedure".)

Work Procedure

INFOID:0000000013608199

1.CHECK VIN

Check the VIN of the vehicle and note it. Refer to GI-52, "Information About Identification or Model Code".

>> GO TO 2.

2.PERFORM VIN REGISTRATION

With CONSULT
1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select “ENGINE” >> “WORK SUPPORT” >> “VIN REGISTRATION”.
3. Follow the instruction of CONSULT display.

>> END

STARTER OPERATION COUNTER CLEAR

Description

INFOID:0000000013608200

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. (For details, refer to EC-197, "Work Procedure".)

CAUTION:

Never Perform Starter Operation Counter Clear when starter motor is not replaced as new one.

Work Procedure

INFOID:0000000013608201

1.ERASE STARTER OPERATION COUNTER

With CONSULT

1. Turn ignition switch ON.
2. On the CONSULT screen, select “ENGINE” >> “WORK SUPPORT” >> “STRT OPRTN CNTR CLEAR”.
3. Touch “CLEAR” and erase starter operation counter.

>> END

HIGH PRESSURE FUEL PUMP TOTAL STARTS COUNTER RESET

Description

INFOID:0000000013608202

High Pressure Fuel Pump Total Starts Counter Reset is a function to erase the accumulated number of high pressure fuel pump operation with engine start. It must be performed when high pressure fuel pump is replaced. (For details, refer to EC-198, "Work Procedure".)

CAUTION:

Never perform High Pressure Fuel Pump Total Starts Counter Reset when the high pressure fuel pump is not replaced as new one.

Work Procedure

INFOID:0000000013608203

1.START

With CONSULT

1. Turn ignition switch ON.
2. On the CONSULT screen, select “ENGINE” >> “WORK SUPPORT” >> “H/P FUEL PUMP TOTAL STARTS COUNTER CLEAR”.
3. Touch “CLEAR” and wait a few seconds.
4. Make sure that “CMPLT” is displayed on CONSULT screen.

>> END

ENABLING OF ENGINE START AFTER CRASH EVENT

Description

INFOID:0000000013946510

After air bag has deployed, ECM inhibits the engine from starting.
“Enabling of engine start after crash event” cancels engine start inhibition after air bag has deployed. (For details, refer to EC-199, "Work Procedure".)

Work Procedure

INFOID:0000000013946511

1.START

With CONSULT
1. Turn ignition switch ON.
2. On the CONSULT screen, select “ENGINE” >> “WORK SUPPORT” >> “Enabling of engine start after crash event”.
3. Touch “START and wait a few seconds.
4. Make sure that “CMPLT” is displayed on CONSULT screen.

>> GO TO 2.

2.CHECK DTC

With CONSULT
1. Turn ignition switch OFF and wait at least 30 seconds.
2. Turn ignition switch ON.
3. Check DTC. If DTC is displayed, erase it.

>> END

FUEL PRESSURE

Work Procedure

INFOID:0000000013608204

LOW FUEL PRESSURE CHECK

1.INSPECTION START

With CONSULT

1. Turn ignition switch OFF.
2. Start the engine and let it idle.
3. On CONSULT screen, select “FPCM” >> “DATA MONITOR” >> “FUEL PRESSURE”.
4. Check that the indicated value is between 400 kPa (4 bar, 4.08 kg/cm^2, 58 psi) and 670 kPa (6.7 bar, 6.834 kg/cm^2, 97.15 psi).

>> INSPECTION END

HOW TO SET SRT CODE

Description

INFOID:0000000013822915

OUTLINE

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

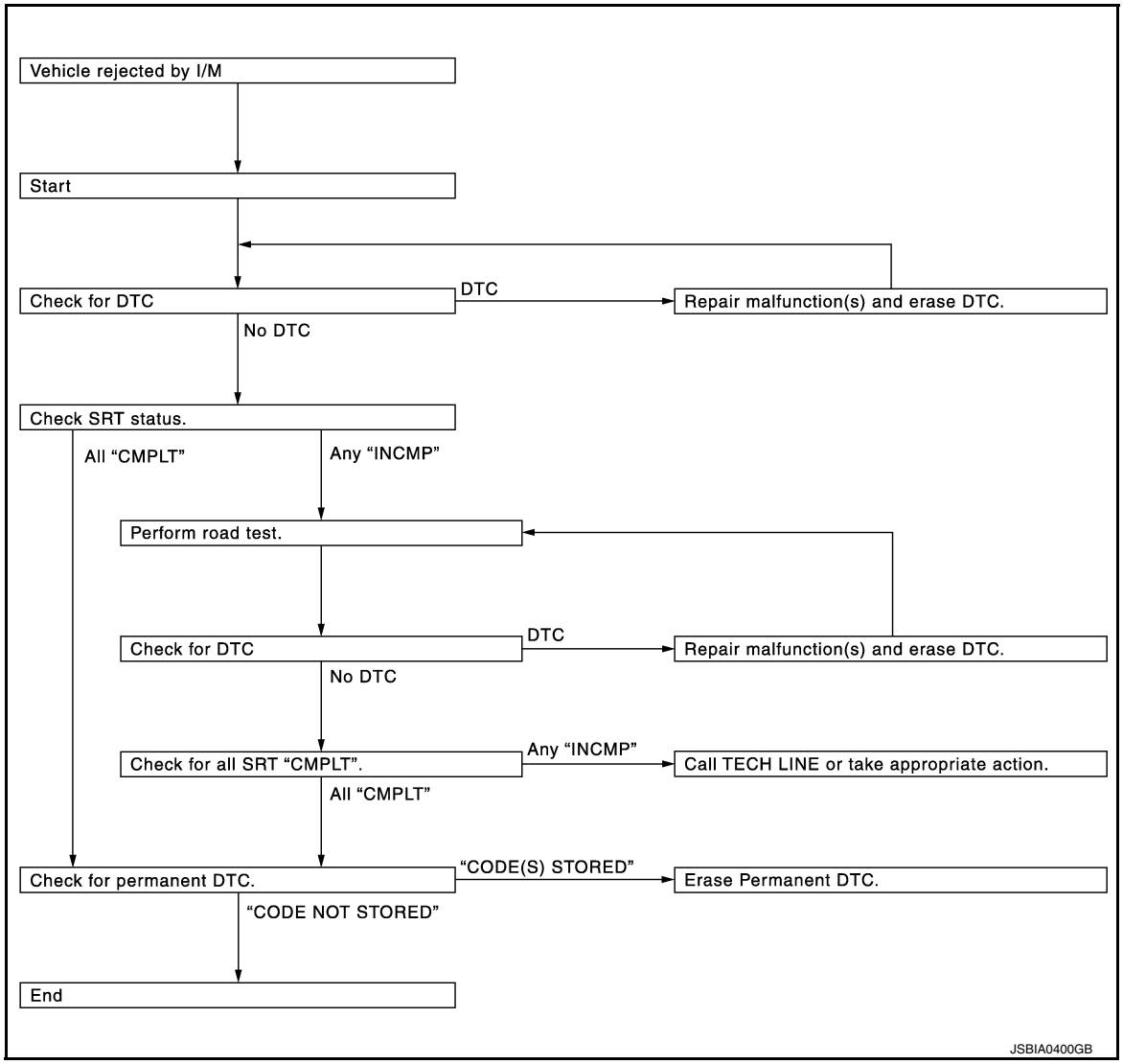
SRT ITEM

The table below shows required self-diagnostic items to set the SRT to “CMPLT”. (For details, refer to EC-202, "SRT Set Driving Pattern".)

SRT item (CONSULT indication)	Required self-diagnostic items to set the SRT to “CMPLT”
EGR/VVT SYSTEM	Exhaust gas recirculation
HO2S HTR	Oxygen sensor heater
HO2S	Oxygen sensor or oxygen sensors
S-AIR SYSTEM	Secondary air system
EVAP SYSTEM	Ventilation of fuel tank
HEATED CAT	Catalytic converter heating
CATALYST	Catalytic converter

SRT SERVICE PROCEDURE

If a vehicle has failed the state emissions inspection due to one or more SRT items indicating “INCMP”, review the flowchart diagnostic sequence, referring to the following flowchart. (For details, refer to EC-203, "Work Procedure".)



SRT Set Driving Pattern

INFOID:0000000013822916

CAUTION:

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

Exhaust gas recirculation

Run engine at idle for approximately 1 minute.
The test drive must last for at least 5 minutes.
The following systems are combined under test readiness code Exhaust gas recirculation:

- Exhaust gas recirculation
- Camshaft adjustment

Oxygen sensor heater

Perform cold start.
The engine must have been switched off for a duration of at least 2 minutes.
The ignition must have been on for a duration of at least 1 minute.
Engine idling.
Wait until readiness reaches status.

Oxygen sensor or oxygen sensors

The engine must have been switched off for a duration of at least 2 minutes.
The ignition must have been on for a duration of at least 1 minute.
NOTE:
Drive the vehicle consistently for a duration of 5 minutes.

During the trip at least 5 deceleration phases from a speed more than 80km/h must be performed.
Each deceleration phase must last for at least 10 seconds.
During the deceleration phase, the engine rpm should not fall below 1,500 rpm.

Secondary air system

Perform cold start.
Engine idling
Vehicle at standstill
The air conditioning is switched off.
Enabling of lambda control

Ventilation of fuel tank

The battery voltage must be higher than 12V.
Charger NOT CONNECTED
The coolant temperature must be between 1.5 – 60°C (34.7 – 140°F).
The ambient temperature must range between 1.5 – 38°C (34.7 – 100°F).
Fuel temperature more than 30°C (86°F).
Fill level in fuel tank between 30% and 90%.
The tank cap is locked.
The vehicle must not be refueled shortly before the test.
The test drive must last for at least 10 minutes.
Switch off ignition and wait for 8 minutes run-on time of control unit to end.

Catalytic converter heating

Follow the instruction of CONSULT display.

Catalytic converter

The engine must have been switched off for a duration of at least 2 minutes.
The ignition must have been on for a duration of at least 1 minute.
For a duration of at least 10 minutes, drive constantly in top gear at a speed of 80 – 110km/h (49 – 68 MPH).

Work Procedure

INFOID:0000000013822917

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-142, "DTC Index".
NO >> GO TO 2.

2.CHECK SRT STATUS

WITH CONSULT
Select “SRT Status” of “SRT & P-DTC” with CONSULT.

Is SRT code(s) set?

YES >> GO TO 6.
NO >> GO TO 3.

3.PERFORM ROAD TEST

WITH CONSULT
- Perform the most efficient SRT set driving pattern to set the SRT properly. Refer to EC-202, "SRT Set Driving Pattern".
  In order to set all SRTs, the SRT set driving pattern must be performed at least once.

>> GO TO 4.

4.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-142, "DTC Index". and GO TO 3.
NO >> GO TO 5.

5. CHECK SRT STATUS

WITH CONSULT
Select “SRT STATUS” with CONSULT.

Is SRT(s) set?

YES >> GO TO 6.
NO >> Call TECH LINE or take appropriate action.

6. CHECK PERMANENT DTC

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

WITH CONSULT
Select “Permanent DTC Status” of “SRT & P-DTC” with CONSULT.

Is permanent DTC(s) detected?

YES >> Go to EC-205, "Description".
NO >> END

HOW TO ERASE PERMANENT DTC

Description

INFOID:0000000013822918

When a DTC is stored in ECM

the DTCs must first be erased by the CONSULT from the normal malfunction memory. After that perform the driving condition to reach the test prerequisites for the DTCs so the OBD-System can confirm that the malfunction is no longer present. Only then it will delete the malfunction from the permanent DTC memory. (For details, refer to EC-205, "Work Procedure".)

Work Procedure

INFOID:0000000013822919

CAUTION:

Permanent DTC can only be erased by a legally stipulated driving cycle.

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-142, "DTC Index".
NO >> GO TO 2.

2.CHECK PERMANENT DTC

With CONSULT

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “Permanent DTC Status” of “SRT & P-DTC” mode with CONSULT.

Is any permanent DTC detected?

YES >> GO TO 3.
NO >> END

3.SET SRT

With CONSULT

Set SRT. Refer to EC-201, "Description".

If a vehicle has one or more SRT items indicating “INCMP”, perform the most efficient SRT set driving pattern to set the SRT properly.

>> GO TO 4.

4.DRIVE DRIVING PATTERN

CAUTION:

Always drive at a safe speed.

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Use “Permanent DTC Status” of “SRT & P-DTC” mode with CONSULT.
3. Drive the vehicle according to driving cycle.

The driving cycle must be performed under the following conditions:

- The state of driving at 40 km/h (25 MPH) reaches 300 seconds or more in total.
- Idle speed lasts 15 seconds or more.
- A lapse of 600 seconds or more after engine start.

>> GO TO 5.

5.CHECK PERMANENT DTC

With CONSULT

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

3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “Permanent DTC Status” of “SRT & P-DTC” mode with CONSULT.

Is any permanent DTC detected?

YES >> GO TO 4.
NO >> END

DTC/CIRCUIT DIAGNOSIS

POWER SUPPLY AND GROUND CIRCUIT

ECM

ECM : Diagnosis Procedure

INFOID:0000000013609078

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that the following fuse is not blown (open).

Location	Fuse No.	Capacity
Fuse and fusible link block 1	#216	5A
	#214	10A
	#220	10A
	#213	15A
	#212	15A

Are the fuses blown (open)?

YES >> Replace the fuse. [Check the power supply if fuse is blowing again.]
NO >> GO TO 2.

2.CHECK ECM GROUND CIRCUIT

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

+		–	Continuity
ECM			
Connector	Terminal		
E48	98	Ground	Existed
	100		
	102		

Is the inspection result normal?

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

3.CHECK ECM POWER SUPPLY

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

+		–	Voltage
ECM			
Connector	Terminal		
E48	97	Ground	Battery voltage
	99		
	101		
	112		

Is the inspection result normal?

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

4.CHECK ECM POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuse and fusible link block 1 harness connector.
4. Check the continuity between ECM harness connector and “fuse and fusible link block 1” harness connector.

+		–		Continuity
ECM		Fuse and fusible link block 1		
Connector	Terminal	Connector	Terminal	
E48	97	E55	11	Existed
	99			
	101			
	112		13	

5. Also check harness for short to ground.

Is the inspection result normal?

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

5.CHECK MOTOR RELAY CONTROL CIRCUIT

1. Check the continuity between ECM harness connector and “fuse and fusible link block 1” harness connector.

+		–		Continuity
ECM		Fuse and fusible link block 1		
Connector	Terminal	Connector	Terminal	
E48	123	E65	45	Existed

2. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit. Refer to PCS-13, "Wiring Diagram".
NO >> Repair or replace error-detected parts.

FUEL PUMP CONTROL MODULE (FPCM)

FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure

INFOID:0000000013609079

2WD models

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that the following fuse is not blown (open).

Location	Fuse No.	Capacity
Fuse and fusible link block 2	#63	25A
	#92	5A

Are the fuses blown (open)?

YES >> Replace the fuse. [Check the power supply if fuse is blowing again.]
NO >> GO TO 2.

2.CHECK FPCM GROUND CIRCUIT

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

+		–	Continuity
FPCM			
Connector	Terminal		
M456	9	Ground	Existed

Is the inspection result normal?

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

3.CHECK FPCM POWER SUPPLY

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

+		–	Voltage
FPCM			
Connector	Terminal		
M456	10	Ground	Battery voltage
M135	5		

Is the inspection result normal?

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

4.CHECK FPCM POWER SUPPLY CIRCUIT

1. Disconnect fuse and fusible link block 2 harness connector.
2. Check the continuity between FPCM harness connector and fuse and fusible link block 2 harness connector.

+		–		Continuity
FPCM		Fuse and fusible link block 2		
Connector	Terminal	Connector	Terminal	
M456	10	M120	47	Existed
M135	5	M128	79	

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply. Refer to PCS-13, "Wiring Diagram".
NO >> Repair or replace error-detected parts.

AWD models

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that the following fuse is not blown (open).

Location	Fuse No.	Capacity
Fuse and fusible link block 2	#63	25A
	#92	5A

Are the fuses blown (open)?

YES >> Replace the fuse. [Check the power supply if fuse is blowing again.]
NO >> GO TO 2.

2.CHECK FPCM GROUND CIRCUIT

1. Disconnect FPCM harness connector.

2. Check the continuity between FPCM harness connector and ground.

+		–	Continuity
FPCM			
Connector	Terminal		
M365	14	Ground	Existed

Is the inspection result normal?

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

3. CHECK FPCM POWER SUPPLY

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

+		–	Voltage
FPCM			
Connector	Terminal		
M136	6	Ground	Battery voltage
M365	13		

Is the inspection result normal?

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

4. CHECK FPCM POWER SUPPLY CIRCUIT

1. Disconnect fuse and fusible link block 2 harness connector.
2. Check the continuity between FPCM harness connector and fuse and fusible link block 2 harness connector.

+		–		Continuity
FPCM		Fuse and fusible link block 2		
Connector	Terminal	Connector	Terminal	
M136	6	M128	79	Existed
M365	13	M120	47	

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply. Refer to PCS-13, "Wiring Diagram".
NO >> Repair or replace error-detected parts.

U0002 POWERTRAIN CAN COMMUNICATION

DTC Description

INFOID:0000000013609080

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
U0002	00	Control module comm bus A off (High Speed CAN Communication Bus Performance)	NO SUBTYPE INFORMATION	Drive train CAN bus OFF malfunction.

POSSIBLE CAUSE

- Harness and connectors (Powertrain CAN communication circuit)
- TCM
- AWD control unit (AWD models)
- Electronic shift control unit
- FPCM

Diagnosis Procedure

INFOID:0000000013609081

1.CHECK SELF-DIAGNOSTIC RESULT

With CONSULT

1. Perform “All DTC reading”.
2. Check DTC of “TRANSMISSION”, “4WD”, and “FPCM”.

Is the DTC related to “communication error with ECM” detected?

YES >> GO TO 2.
NO >> Replace ECM. Refer to EC-963, "Removal and Installation".

2.CHECK HARNESS AND CONNECTORS FOR CAN COMMUNICATION

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect harness connector of the following items.

- TCM
- AWD control unit (AWD models)
- Electronic shift control unit
- FPCM

4. Check the continuity between ECM harness connector and the other ECU harness connector.

+		–			Continuity
ECM		Other ECU			
Connector	Terminal	Name	Connector	Terminal	
E48	138	TCM	E47	3	Existed
	151			1	
	138	AWD control unit*2	M48	3	
	151			2	
	138	Electronic shift control unit	M58	3	
	151			4	
	138	FPCM	M135*1	3	
	151			4	
	138		M136*2	10	
	151			9	

*1: 2WD models
*2: AWD models

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

Is the inspection result normal?

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

3.REPLACE ECM

With CONSULT

1. Replace ECM. Refer to EC-963, "Removal and Installation".
2. Turn ignition switch ON and wait at least 5 seconds.
3. Check “Self-diagnostic result” of “ENGINE”.

Is DTC “U0002” detected again?

YES >> Replace ECU which detects DTC related to communication error with ECM.
NO >> INSPECTION END

U0028 POWERTRAIN CAN COMMUNICATION

DTC Description

INFOID:0000000013609082

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
U0028	86	Vehicle communication bus A (Vehicle Communication Bus A)	SIGNAL INVALID	Communication with the CAN bus has a malfunction. There is an incorrect signal.
	87		MISSING MESSAGE	Communication with the CAN bus has a malfunction. The message is missing.
	88		BUS OFF	Communication with the CAN bus has a malfunction. Bus OFF.

POSSIBLE CAUSE

- Harness and connectors (Powertrain CAN communication circuit)
- TCM
- AWD control unit (AWD models)
- Electronic shift control unit
- FPCM

Diagnosis Procedure

INFOID:0000000013609083

1.CHECK SELF-DIAGNOSTIC RESULT

With CONSULT

1. Perform “All DTC reading”.
2. Check DTC of “TRANSMISSION”, “4WD”, “SHIFT”, and “FPCM”.

Is the DTC related to “communication error with ECM” detected?

YES >> GO TO 2.
NO >> Replace ECM. Refer to EC-963, "Removal and Installation".

2.CHECK HARNESS AND CONNECTORS FOR CAN COMMUNICATION

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect harness connector of the following items.

- TCM
- AWD control unit (AWD models)
- Electronic shift control unit
- FPCM

4. Check the continuity between ECM harness connector and the other ECU harness connector.

+		–			Continuity
ECM		Other ECU			
Connector	Terminal	Name	Connector	Terminal	
E48	138	TCM	E47	3	Existed
	151			1	
	138	AWD control unit*2	M48	3	
	151			2	
	138	Electronic shift control unit	M58	3	
	151			4	
	138	FPCM	M135*1	3	
	151			4	
	138		M136*2	10	
	151			9	

*1: 2WD models
*2: AWD models

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

Is the inspection result normal?

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

3.REPLACE ECM

With CONSULT

1. Replace ECM. Refer to EC-963, "Removal and Installation".
2. Turn ignition switch ON and wait at least 5 seconds.
3. Check “Self-diagnostic result” of “ENGINE”.

Is DTC “U0028” detected again?

YES >> Replace ECU which detects DTC related to communication error with ECM.
NO >> INSPECTION END

U0037 CAN COMMUNICATION

DTC Description

INFOID:0000000013609084

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
U0037	88	Vehicle communication bus B (Vehicle Communication Bus B)	BUS OFF	Communication with the chassis CAN bus has a malfunction. Bus OFF

POSSIBLE CAUSE
- CAN communication

Diagnosis Procedure

INFOID:0000000013609085

1.CHECK DTC

With CONSULT
Check that the DTC related to CAN communication is not detected.

Is the inspection result normal?

YES >> Perform trouble diagnosis for detected DTC. Refer to EC-142, "DTC Index".
NO >> Perform trouble diagnosis for CAN communication system. Refer to LAN-19, "CAN COMMUNICATION SYSTEM : CAN System Specification Chart".

U0046 CAN COMMUNICATION

DTC Description

INFOID:0000000013609086

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
U0046	88	VEHICLE COMMUNICATION BUS C (Vehicle Communication Bus C)	BUS OFF	Communication with the drive train sensor CAN bus has a malfunction. Bus OFF

POSSIBLE CAUSE

CAN bus OFF

Diagnosis Procedure

INFOID:0000000013609087

1.CHECK DTC

With CONSULT

Check that the DTC related to CAN communication is not detected.

Is the inspection result normal?

YES >> Perform trouble diagnosis for detected DTC. Refer to EC-142, "DTC Index".

NO >> Perform trouble diagnosis for CAN communication system. Refer to LAN-19, "CAN COMMUNICATION SYSTEM : CAN System Specification Chart".

U0100 POWERTRAIN CAN COMMUNICATION (ECM)

DTC Description

INFOID:0000000013609088

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
U0100	00	Communication error (Lost communication With ECM/PCM “A”)	NO SUBTYPE INFORMATION	Communication with the control unit ‘combustion engine’ has a malfunction.

POSSIBLE CAUSE

- CAN harness or connectors
- FPCM
- ECM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check “Self Diagnostic Result” of “FPCM”.

Is DTC “U0100” detected?

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

Diagnosis Procedure

INFOID:0000000013609089

2WD

1.CHECK CAN COMMUNICATION HARNESS AND CONNECTORS

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

+		–		Continuity
ECM		FPCM		
Connector	Terminal	Connector	Terminal	
E48	138	M135	3	Existed
	151		4	

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

Is the inspection result normal?

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

2.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

With CONSULT

1. Reconnect all harness connector disconnected.
2. Turn ignition switch ON.
3. Erase “Self Diagnostic Result” of “FPCM”.
4. Perform DTC confirmation procedure again. Refer to EC-217, "DTC Description".

Is DTC “U0100” detected again?

YES >> GO TO 3.

NO >> GO TO 4.

3.REPLACE FPCM

1. Replace FPCM. Refer to EC-964, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EC-217, "DTC Description".

Is DTC “U0100” detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

4.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

>> INSPECTION END

AWD

1.CHECK DTC OF ECM

With CONSULT
Check “Self Diagnostic Result” of “ENGINE”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".
NO >> INSPECTION END

U0101 POWERTRAIN CAN COMMUNICATION (TCM)

DTC Description

INFOID:0000000013609090

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
U0101	87	COMMUNICATION ERROR (LOST) (Lost Communication with TCM)	MISSING MESSAGE	Communication with control unit TCM has a malfunction. The message is missing.

POSSIBLE CAUSE

- Harness and connectors (CAN circuit)
- TCM
- ECM

Diagnosis Procedure

INFOID:0000000013609091

1.CHECK SELF-DIAGNOSTIC RESULT

With CONSULT

1. Perform “All DTC reading”.
2. Check DTC of “TRANSMISSION”.

Is the DTC related to “communication error with ECM” detected?

YES >> GO TO 2.
NO >> Replace ECM. Refer to EC-963, "Removal and Installation".

2.CHECK HARNESS AND CONNECTORS FOR CAN COMMUNICATION

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

+		–		Continuity
ECM		TCM		
Connector	Terminal	Connector	Terminal	
E48	138	E47	3	Existed
	151		1	

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

Is the inspection result normal?

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

3.REPLACE ECM

With CONSULT

1. Replace ECM. Refer to EC-963, "Removal and Installation".
2. Turn ignition switch ON and wait at least 5 seconds.
3. Check “Self-diagnostic result” of “ENGINE”.

Is DTC “U0101” detected again?

YES >> Replace TCM. Refer to TM-216, "Removal and Installation".
NO >> INSPECTION END

U0103 CAN COMMUNICATION

DTC Description

INFOID:0000000013609092

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
U0103	00	COMMUNICATION ERROR (LOST) (Lost Communication With Gear Shift Control Module “A”)	NO SUBTYPE INFORMATION	Communication with the electronic selector lever module has a malfunction.
	87		MISSING MESSAGE	Communication with the electronic selector lever module has a malfunction. The message is missing.

POSSIBLE CAUSE
Steering column control module

Diagnosis Procedure

INFOID:0000000013609093

1.CHECK DTC OF STEERING COLUMN CONTROL MODULE

With CONSULT
Check “Self-diagnostic result” of “Steering column cont module”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BCS-61, "DTC Index".
NO >> Replace steering column control module. Refer to BCS-250, "Removal and Installation".

U0108 COMMUNICATION ERROR (LOST)

Diagnosis Description

INFOID:0000000013609094

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

U0109 POWERTRAIN CAN COMMUNICATION (FPCM)

DTC Description

INFOID:0000000013609095

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
U0109	87	COMMUNICATION ERROR (LOST) (Lost Communication With Fuel Pump Control Module “A”)	MISSING MESSAGE	Communication with FPCM has a malfunction. The message is missing.

POSSIBLE CAUSE

- Harness and connectors (CAN circuit)
- FPCM (Fuel Pump Control Module)

Diagnosis Procedure

INFOID:0000000013609096

1.CHECK SELF-DIAGNOSTIC RESULT IN FPCM

With CONSULT

1. Perform “All DTC reading”.
2. Check DTC of “FPCM”.

Is the DTC related to “communication error with ECM” detected?

YES >> GO TO 2.
NO >> Replace ECM. Refer to EC-963, "Removal and Installation".

2.CHECK HARNESS AND CONNECTORS FOR CAN COMMUNICATION

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

2WD models

+		–		Continuity
ECM		FPCM		
Connector	Terminal	Connector	Terminal	
E48	138	M135	3	Existed
	151		4	

AWD models

+		–		Continuity
ECM		FPCM		
Connector	Terminal	Connector	Terminal	
E48	138	M136	10	Existed
	151		9	

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

Is the inspection result normal?

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

3.REPLACE FPCM

With CONSULT

1. Replace FPCM. Refer to EC-964, "Removal and Installation".

2. Turn ignition switch ON and wait at least 5 seconds.
3. Check “Self-diagnostic result” of “ENGINE”.

Is DTC “U0109” detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

U0111 CAN COMMUNICATION (BCM)

DTC Description

INFOID:0000000013609097

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
U0111	00	COMMUNICATION ERROR (LOST) (Lost communication with battery energy control module “A”)	NO SUBTYPE INFORMATION	Communication with BCM has a malfunction.

POSSIBLE CAUSE

- CAN communication circuit
- BCM

Diagnosis Procedure

INFOID:0000000013609098

1.CHECK DTC OF BCM

With CONSULT

Check “Self Diagnostic Result” of “BCM”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to BCS-51, "DTC Index".

NO >> INSPECTION END

U0120 LIN COMMUNICATION (ALTERNATOR)

DTC Description

INFOID:0000000013609099

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
U0120	08	COMMUNICATION ERROR (LOST) (Lost communication with starter/generator control module)	BUS SIGNAL/MESSAGE ERROR	Communication with the starter or alternator has a malfunction. There is a signal error or the message error.
	87		MISSING MESSAGE	Communication with the starter or alternator has a malfunction. The message is missing.

POSSIBLE CAUSE

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

Diagnosis Procedure

INFOID:0000000013609100

1.CHECK CHARGING SYSTEM

Check charging system. Refer to CHG-21, "Work Flow (With EXP-800 NI or GR8-1200 NI)" (With EXP-800 NI or GR8-1200 NI) or CHG-25, "Work Flow (Without EXP-800 NI or GR8-1200 NI)" (Without EXP-800 NI or GR8-1200 NI).

Is the inspection result normal?

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

2.CHECK LIN CIRCUIT

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

+		−		Continuity
Alternator		ECM		
Connector	Terminal	Connector	Terminal	
F142	1	F149	45	Existed

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

Is the inspection result normal?

YES >> Replace alternator. Refer to CHG-35, "1.6L/2.0L TURBO ENGINE : Removal and Installation".
NO >> Repair or replace error-detected parts.

U0121 CAN COMMUNICATION (ELECTRONIC STABILITY PROGRAM CONTROL UNIT)

DTC Description

INFOID:0000000013609101

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
U0121	81	COMMUNICATION ERROR (LOST) (Lost Communication With Anti-Lock Brake System (ABS) Control Module)	INVALID SERIAL DATA RECEIVED	Communication with ESP has a malfunction. Incorrect data were received.

POSSIBLE CAUSE

- Harness and connectors (CAN communication circuit is open or shorted.)
- ECM
- Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609102

1.CHECK SELF-DIAGNOSTIC RESULT

With CONSULT

1. Perform “All DTC reading”.
2. Check DTC of “ABS”.

Is the DTC related to “communication error with ECM” detected?

YES >> GO TO 2.
NO >> Replace ECM. Refer to EC-963, "Removal and Installation".

2.CHECK HARNESS AND CONNECTORS FOR CAN COMMUNICATION

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect the ECU harness connector in which is detecting DTC.
4. Check the continuity between ECM harness connector and the electronic stability program control unit harness connector.

+		–		Continuity
ECM		Electronic stability program control unit		
Connector	Terminal	Connector	Terminal	
E48	137	E46	26	Existed
	150		14	

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

Is the inspection result normal?

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

3.REPLACE ECM

With CONSULT

1. Replace ECM. Refer to EC-963, "Removal and Installation".
2. Turn ignition switch ON and wait at least 5 seconds.
3. Check “Self-diagnostic result” of “ENGINE”.

Is DTC “U0121” detected again?

YES >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

NO >> INSPECTION END

U0122 CAN COMMUNICATION (ELECTRONIC STABILITY PROGRAM CONTROL UNIT)

DTC Description

INFOID:0000000013609103

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
U0122	87	Lost Communication With VDCM (Lost Communication With Vehicle Dynamics Control Module)	MISSING MESSAGE	Communication with control unit 'Traction system' has a malfunction. The message is missing.

POSSIBLE CAUSE

- Harness and connectors (CAN communication circuit)
- Electronic stability program control unit
- ECM

Diagnosis Procedure

INFOID:0000000013609104

1.CHECK SELF-DIAGNOSTIC RESULT

With CONSULT

1. Perform “All DTC reading”.
2. Check DTC of “ABS”.

Is the DTC related to “communication error with ECM” detected?

YES >> GO TO 2.
NO >> Replace ECM. Refer to EC-963, "Removal and Installation".

2.CHECK HARNESS AND CONNECTORS FOR CAN COMMUNICATION

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect the ECU harness connector in which is detecting DTC.
4. Check the continuity between ECM harness connector and the electronic stability program control unit harness connector.

+		–		Continuity
ECM		Electronic stability program control unit		
Connector	Terminal	Connector	Terminal	
E48	137	E46	26	Existed
	150		14	

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

Is the inspection result normal?

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

3.REPLACE ECM

With CONSULT

1. Replace ECM. Refer to EC-963, "Removal and Installation".
2. Turn ignition switch ON and wait at least 5 seconds.
3. Check “Self-diagnostic result” of “ENGINE”.

Is DTC “U0122” detected again?

YES >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

NO >> INSPECTION END

U0128 CAN COMMUNICATION (ELECTRIC PARKING BRAKE CONTROL MODULE)

DTC Description

INFOID:0000000013609105

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
U0128	87	COMMUNICATION ERROR (LOST) (Lost communication with park brake control module)	MISSING MESSAGE	Communication with electric parking brake control module has a malfunction. The message is missing.

POSSIBLE CAUSE

CAN communication circuit

Diagnosis Procedure

INFOID:0000000013609106

Perform the trouble diagnosis for CAN communication system. Refer to LAN-58, "Trouble Diagnosis Flow Chart".

U0151 CAN COMMUNICATION (AIR BAG DIAGNOSIS SENSOR UNIT)

DTC Description

INFOID:0000000013609107

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
U0151	00	COMMUNICATION ERROR (LOST) (Lost Communication With Restraints Control Module)	NO SUBTYPE INFORMATION	Communication with the supplemental restraint system (SRS) has a malfunction.
	87		MISSING MESSAGE	Communication with the supplemental restraint system (SRS) has a malfunction. The message is missing.

POSSIBLE CAUSE

CAN communication circuit

Diagnosis Procedure

INFOID:0000000013609108

Perform the trouble diagnosis for CAN communication system. Refer to LAN-58, "Trouble Diagnosis Flow Chart".

U0155 CAN COMMUNICATION (COMBINATION METER)

ECM

ECM : DTC Description

INFOID:0000000013609109

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
U0155	00	COMMUNICATION ERROR (LOST) [Lost Communication With Instrument Panel Cluster (IPC) Control Module]	NO SUBTYPE INFORMATION	Communication with the combination meter has a malfunction.
	87		MISSING MESSAGE	Communication with the combination meter has a malfunction. The message is missing.
	8F		ERRATIC	Communication with the combination meter has a malfunction. The signal or message is erratic.

POSSIBLE CAUSE
Combination meter

ECM : Diagnosis Procedure

INFOID:0000000013609110

1.CHECK DTC OF COMBINATION METER

With CONSULT
Check “Self-diagnostic result” of “METER/M&A”.
Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to MWI-85, "DTC Index".
NO >> Replace combination meter. Refer to MWI-155, "Removal and Installation".

FUEL PUMP CONTROL MODULE (FPCM)

FUEL PUMP CONTROL MODULE (FPCM) : DTC Description

INFOID:0000000013609111

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
U0155	00	COMMUNICATION ERROR (LOST) [Lost Communication With Instrument Panel Cluster (IPC) Control Module]	NO SUBTYPE INFORMATION	Communication with the combination meter has a malfunction.

POSSIBLE CAUSE
- Harness and connectors (CAN communication circuit)
- Combination meter
- ECM

FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure

INFOID:0000000013609112

2WD

1.PERFORM CAN DIAGNOSIS

With CONSULT
Perform “CAN Diagnosis” using CONSULT.
Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform the trouble diagnosis for CAN communication. Refer to LAN-58, "Trouble Diagnosis Flow Chart".

2.CHECK SELF-DIAGNOSTIC RESULT

With CONSULT

Perform “All DTC reading”.

Is the DTC related to communication error with ECM detected in other ECUs?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> Replace combination meter. Refer to MWI-155, "Removal and Installation".

AWD

1.CHECK DTC OF COMBINATION METER

With CONSULT

Check “Self Diagnostic Result” of “METER/M&A”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to MWI-85, "DTC Index".
NO >> INSPECTION END

U0164 CAN COMMUNICATION (A/C AUTO AMP.)

DTC Description

INFOID:0000000013609113

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
U0164	87	COMMUNICATION ERROR (LOST) (Lost Communication With HVAC Control Module)	MISSING MESSAGE	Communication with the air conditioning has a malfunction. The message is missing.

POSSIBLE CAUSE
A/C auto amp.

Diagnosis Procedure

INFOID:0000000013609114

1.CHECK DTC OF A/C AUTO AMP.

With CONSULT
Check “Self-diagnostic result” of “HVAC”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to HAC-36, "DTC Index".
NO >> Replace A/C auto amp. Refer to HAC-121, "Removal and Installation".

U0168 CAN COMMUNICATION

ECM

ECM : DTC Description

INFOID:0000000013609115

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
U0168	87	COMMUNICATION ERROR (LOST) (Lost Communication With Vehicle Security Control Module)	MISSING MESSAGE	Communication with the electronic ignition lock has a malfunction. The message is missing.

POSSIBLE CAUSE

Electronic ignition switch control unit

ECM : Diagnosis Procedure

INFOID:0000000013609116

1.CHECK DTC OF ELECTRONIC IGNITION SWITCH CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “Electronic ign switch cont unit”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to PCS-12, "DTC Index".
NO >> Replace electronic ignition switch control unit. Refer to PCS-47, "Removal and Installation".

FUEL PUMP CONTROL MODULE (FPCM)

FUEL PUMP CONTROL MODULE (FPCM) : DTC Description

INFOID:0000000013609117

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
U0168	00	COMMUNICATION ERROR (LOST) (Lost communication with vehicle security control module)	NO SUBTYPE INFORMATION	Communication with electronic ignition switch control unit has a malfunction.

POSSIBLE CAUSE

- CAN communication circuit
- Electronic ignition switch control unit

FAIL-SAFE

Pressure control on substitute value

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check “Self Diagnostic Result” of “FPCM”.

Is DTC “U0168” detected?

YES >> Proceed to EC-236, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-56, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure

INFOID:0000000013609118

1.CHECK DTC OF ELECTRONIC IGNITION SWITCH CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “Electronic ign switch cont unit”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to PCS-12, "DTC Index".
NO >> INSPECTION END

U0212 CAN COMMUNICATION (STEERING COLUMN CONTROL MODULE)

DTC Description

INFOID:0000000013609119

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
U0212	87	COMMUNICATION ERROR (LOST) (Lost Communication With Steering Column Control Module)	MISSING MESSAGE	Communication with the steering column module has a malfunction. The message is missing.

POSSIBLE CAUSE
Steering column control module

Diagnosis Procedure

INFOID:0000000013609120

1.CHECK DTC OF STEERING COLUMN CONTROL MODULE

With CONSULT
Check “Self-diagnostic result” of “Steering column cont module”.
Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BCS-61, "DTC Index".
NO >> Replace steering column control module. Refer to BCS-250, "Removal and Installation".

U029E CAN COMMUNICATION

Diagnosis Description

INFOID:0000000013609121

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

U0401 CAN COMMUNICATION

DTC Description

INFOID:0000000013609122

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
U0401	00	Communication error (invalid) (Invalid Data Received From ECM/PCM “A”)	NO SUBTYPE INFORMATION	Implausible data were received from control unit ’combustion engine’.

POSSIBLE CAUSE

- CAN harness or connectors
- ECM
- Fuel pump ON voltage signal circuit

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check “Self Diagnostic Result” of “FPCM”.

Is DTC “U0401” detected?

YES >> Proceed to EC-239, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000013609123

2WD

1.CHECK FUEL PUMP ON SIGNAL CIRCUIT

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

+		–		Continuity
ECM		FPCM		
Connector	Terminal	Connector	Terminal	
E48	127	M135	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 CAN COMMUNICATION HARNESS AND CONNECTORS

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

+		–		Continuity
ECM		FPCM		
Connector	Terminal	Connector	Terminal	
E48	138	B135	3	Existed
	151		4	

2. Also check harness for short.

Is the inspection result normal?

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

3.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

With CONSULT

1. Reconnect all harness connector disconnected.
2. Turn ignition switch ON.
3. Erase “Self Diagnostic Result” of “FPCM”.
4. Perform DTC confirmation procedure again. Refer to EC-239, "DTC Description".

Is DTC “U0401” detected again?

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

4.REPLACE FPCM

1. Replace FPCM. Refer to EC-964, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EC-239, "DTC Description".

Is DTC “U0401” detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

5.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

>> INSPECTION END

AWD

1.CHECK DTC OF ECM

With CONSULT

1. Turn ignition switch ON.
2. Check “Self Diagnostic Result” of “ECM”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".
NO >> INSPECTION END

U0402 CAN COMMUNICATION

DTC Description

INFOID:0000000013609124

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
U0402	00	COMMUNICATION ERROR (INVALID) (Invalid Data Received From TCM)	NO SUBTYPE INFORMATION	Implausible data were received from TCM.
	08		BUS SIGNAL/MESSAGE ERROR	Implausible data were received from TCM. There is a signal error or the message is abnormal.

POSSIBLE CAUSE

- Harness and connectors (CAN circuit)
- TCM
- ECM

Diagnosis Procedure

INFOID:0000000013609125

1.CHECK SELF-DIAGNOSTIC RESULT

With CONSULT

1. Perform “All DTC reading”.
2. Check DTC of “TRANSMISSION”.

Is the DTC related to “communication error with ECM” detected?

YES >> GO TO 2.
NO >> Replace ECM. Refer to EC-963, "Removal and Installation".

2.CHECK HARNESS AND CONNECTORS FOR CAN COMMUNICATION

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

+		–		Continuity
ECM		TCM		
Connector	Terminal	Connector	Terminal	
E48	138	E47	3	Existed
	151		1	

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

Is the inspection result normal?

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

3.REPLACE ECM

With CONSULT

1. Replace ECM. Refer to EC-963, "Removal and Installation".
2. Turn ignition switch ON and wait at least 5 seconds.
3. Check “Self-diagnostic result” of “ENGINE”.

Is DTC “U0402” detected again?

YES >> Replace TCM. Refer to TM-216, "Removal and Installation".
NO >> INSPECTION END

U0404 POWERTRAIN CAN COMMUNICATION (ELECTRIC SHIFT CONTROL UNIT)

DTC Description

INFOID:0000000013609126

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
U0404	00	COMMUNICATION ERROR (INVALID) (Invalid Data Received From Gear Shift Control Module “A”)	NO SUBTYPE INFORMATION	Implausible data were received from the electronic selector lever module.
	08		BUS SIGNAL/MESSAGE ERROR	Implausible data were received from the electronic selector lever module. There is a signal error or the message error.

POSSIBLE CAUSE

Electronic shift control unit

Diagnosis Procedure

INFOID:0000000013609127

1.CHECK DTC OF ELECTRONIC SHIFT CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “SHIFT”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to TM-45, "DTC Index".

NO >> Replace electronic shift control unit. Refer to TM-227, "Removal and Installation".

U0405 CAN COMMUNICATION

DTC Description

INFOID:0000000013609128

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
U0405	00	COMMUNICATION ERROR (INVALID) (Invalid Data Received From Cruise Control Module)	NO SUBTYPE INFORMATION	Implausible data were received from the speed control.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609129

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

U040A CAN COMMUNICATION (A/C AUTO AMP.)

DTC Description

INFOID:0000000013609130

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
U040A	00	Communication error (invalid) (Invalid Data Received From Air Conditioning Control Module)	NO SUBTYPE INFORMATION	Implausible data were received from A/C auto amp.

POSSIBLE CAUSE

A/C auto amp.

Diagnosis Procedure

INFOID:0000000013609131

1.CHECK DTC OF A/C AUTO AMP.

With CONSULT

Check “Self-diagnostic result” of “HVAC”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to HAC-36, "DTC Index".

NO >> Replace A/C auto amp. Refer to HAC-121, "Removal and Installation".

U0416 CAN COMMUNICATION

DTC Description

INFOID:0000000013609132

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
U0416	00	COMMUNICATION ERROR (INVALID) (Invalid data received from vehicle dynamics control module)	NO SUBTYPE INFORMATION	Implausible data were received from Electronic stability program control unit.
	08		BUS SIGNAL/MESSAGE ERROR	Implausible data were received from Electronic stability program control unit. There is a signal error or the message is malfunctioning.
	81		INVALID SERIAL DATA RECEIVED	Implausible data were received from Electronic stability program control unit. Incorrect data were received.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609133

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

U0417 CAN COMMUNICATION (ELECTRIC PARKING BRAKE CONTROL MODULE)

DTC Description

INFOID:0000000013609134

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	Malfunction type	
U0417	00	COMMUNICATION ERROR (INVALID) (Invalid Data Received From Park Brake Control Module)	NO SUBTYPE INFORMATION	Implausible data were received from the electric parking brake.
	08		BUS SIGNAL/MESSAGE ERROR	Implausible data were received from the electric parking brake. There is a signal malfunction or the message is malfunctioning.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609135

1. CHECK “SELF-DIAGNOSTIC RESULT” OF “BRAKE”

With CONSULT

Check “Self-diagnostic result” of “BRAKE”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace Electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

U0423 CAN COMMUNICATION (COMBINATION METER)

DTC Description

INFOID:0000000013609136

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
U0423	08	COMMUNICATION ERROR (INVALID) Invalid Data Received From Instrument Panel Cluster Control Module)	BUS SIGNAL/MESSAGE ERROR	Implausible data were received from the instrument cluster. There is a signal malfunction or the message is malfunctioning.
	83		PROTECT CALCULATION ERROR	Implausible data were received from the instrument cluster. The checksum for the message has an incorrect value.

POSSIBLE CAUSE

Combination meter

Diagnosis Procedure

INFOID:0000000013609137

1.CHECK DTC OF COMBINATION METER

With CONSULT

Check “Self-diagnostic result” of “METER/M&A”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to MWI-85, "DTC Index".

NO >> Replace combination meter. Refer to MWI-155, "Removal and Installation".

U0424 CAN COMMUNICATION (A/C AUTO AMP.)

DTC Description

INFOID:0000000013609138

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
U0424	00	COMMUNICATION ERROR (INVALID) (Invalid Data Received From HVAC Control Module)	NO SUBTYPE INFORMATION	Implausible data were received from A/C auto amp.
	08		BUS SIGNAL/MESSAGE ERROR	Implausible data were received from A/C auto amp. There is a signal error or the message is abnormal.
	4A		INCRRCT COMPNT INSTALLED	Implausible data were received from A/C auto amp. The wrong component is installed.
	86		SIGNAL INVALID	Implausible data were received from A/C auto amp. There is an incorrect signal.

POSSIBLE CAUSE

A/C auto amp.

Diagnosis Procedure

INFOID:0000000013609139

1.CHECK DTC OF A/C AUTO AMP.

With CONSULT

Check “Self-diagnostic result” of “HVAC”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to HAC-36, "DTC Index".

NO >> Replace A/C auto amp. Refer to HAC-121, "Removal and Installation".

U0427 CAN COMMUNICATION

ECM

ECM : DTC Description

INFOID:0000000013609140

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
U0427	08	COMMUNICATION ERROR (INVALID) (Invalid data received from vehicle security control module)	BUS SIGNAL/MESSAGE ERROR	Implausible data were received from the electronic ignition lock. There is a signal malfunction or the message is malfunctioning.

POSSIBLE CAUSE

BCM

ECM : Diagnosis Procedure

INFOID:0000000013609141

1.CHECK “SELF-DIAGNOSTIC RESULT” OF “BCM”

With CONSULT

Check “Self-diagnostic result” of “BCM”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BCS-51, "DTC Index".
NO >> Replace BCM. Refer to BCS-248, "Removal and Installation".

FUEL PUMP CONTROL MODULE (FPCM)

FUEL PUMP CONTROL MODULE (FPCM) : DTC Description

INFOID:0000000013609142

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
U0427	00	COMMUNICATION ERROR (INVALID) (Invalid data received from vehicle security control module)	NO SUBTYPE INFORMATION	Implausible data were received from electronic ignition switch control unit.

POSSIBLE CAUSE

Electronic ignition switch control unit

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check “Self Diagnostic Result” of “FPCM”.

Is DTC “U0427” detected?

YES >> Proceed to EC-250, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-56, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure

INFOID:0000000013609143

1.CHECK DTC OF ELECTRONIC IGNITION SWITCH CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of Electronic ignition switch control unit.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to PCS-12, "DTC Index".
NO >> Replace electronic ignition switch control unit. Refer to PCS-47, "Removal and Installation".

U0429 CAN COMMUNICATION (STEERING COLUMN CONTROL MODULE)

DTC Description

INFOID:0000000013609144

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
U0429	08	COMMUNICATION ERROR (INVALID) (Invalid Data Received From Steering Column Control Module)	BUS SIGNAL/MESSAGE ERROR	Implausible data were received from the steering column control module. There is a signal malfunction or the message is malfunctioning.

POSSIBLE CAUSE
Steering column control module

Diagnosis Procedure

INFOID:0000000013609145

1.CHECK DTC OF STEERING COLUMN CONTROL MODULE

With CONSULT
Check “Self-diagnostic result” of “Steering column cont module”.
Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to STC-16, "DTC Index".
NO >> Replace steering column control module. Refer to STC-57, "Removal and Installation".

U0452 CAN COMMUNICATION (AIR BAG DIAGNOSIS SENSOR UNIT)

DTC Description

INFOID:0000000013609146

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
U0452	00	Communication error (invalid) (Invalid Data Received From Restraints Control Module)	NO SUBTYPE INFORMATION	Implausible data were received from the supplemental restraint system (SRS).
	08		BUS SIGNAL/MESSAGE ERROR	Implausible data were received from the supplemental restraint system (SRS). There is a signal malfunction or the message is malfunctioning.

POSSIBLE CAUSE

Air bag diagnosis sensor unit

Diagnosis Procedure

INFOID:0000000013609147

1.CHECK DTC OF AIR BAG DIAGNOSIS SENSOR UNIT

With CONSULT

Check “Self-diagnostic result” of “AIR BAG”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to SRC-20, "DTC Index".

NO >> Replace air bag diagnosis sensor unit. Refer to SR-41, "Removal and Installation".

U0469 LIN COMMUNICATION (ALTERNATOR)

DTC Description

INFOID:0000000013609148

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
U0469	08	COMMUNICATION ERROR (INVALID) (Invalid Data Received From Starter / Generator Control Module)	BUS SIGNAL/MESSAGE ERROR	Implausible data were received from the starter or alternator. There is a signal malfunction or the message is malfunctioning.

POSSIBLE CAUSE
Alternator

Diagnosis Procedure

INFOID:0000000013609149

1.CHECK CHARGING SYSTEM

Check charging system. Refer to CHG-21, "Work Flow (With EXP-800 NI or GR8-1200 NI)" (With EXP-800 NI or GR8-1200 NI) or CHG-25, "Work Flow (Without EXP-800 NI or GR8-1200 NI)" (Without EXP-800 NI or GR8-1200 NI).

Is the inspection result normal?

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

2.CHECK LIN CIRCUIT

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

+		–		Continuity
Alternator		ECM		
Connector	Terminal	Connector	Terminal	
F142	1	F149	45	Existed

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

Is the inspection result normal?

YES >> Replace alternator. Refer to CHG-35, "1.6L/2.0L TURBO ENGINE : Removal and Installation".
NO >> Repair or replace error-detected parts.

U1041 COMM WITH ENGINE CAN BUS

DTC Description

INFOID:0000000013609150

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
U1041	88	Comm with engine CAN bus (—)	BUS OFF	Communication with the engine CAN bus has a malfunction. Bus OFF

POSSIBLE CAUSE

- Powertrain CAN communication circuit
- TCM
- AWD control unit (AWD models)
- Electronic shift control unit
- FPCM

Diagnosis Procedure

INFOID:0000000013609151

1.CHECK SELF-DIAGNOSTIC RESULT

With CONSULT

1. Perform “All DTC reading”.
2. Check DTC of “TRANSMISSION”, “4WD”, and “FPCM”.

Is the DTC related to “communication error with ECM” detected?

YES >> GO TO 2.
NO >> Replace ECM. Refer to EC-963, "Removal and Installation".

2.CHECK HARNESS AND CONNECTORS FOR CAN COMMUNICATION

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect harness connector of the following items.

- TCM
- AWD control unit (AWD models)
- Electronic shift control unit
- FPCM

4. Check the continuity between ECM harness connector and the other ECU harness connector.

+		–			Continuity
ECM		Other ECU			
Connector	Terminal	Name	Connector	Terminal	
E48	138	TCM	E47	3	Existed
	151			1	
	138	AWD control unit*2	M48	3	
	151			2	
	138	Electronic shift control unit	M58	3	
	151			4	
	138	FPCM	M135*1	3	
	151			4	
	138		M136*2	10	
	151			9	

*1: 2WD models
*2: AWD models

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

Is the inspection result normal?

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

3. REPLACE ECM

With CONSULT

1. Replace ECM. Refer to EC-963, "Removal and Installation".
2. Turn ignition switch ON and wait at least 5 seconds.
3. Check “Self-diagnostic result” of “ENGINE”.

Is DTC “U1041” detected again?

YES >> Replace ECU which detects DTC related to communication error with ECM.
NO >> INSPECTION END

U1110 CAN COMMUNICATION (ELECTRONIC STABILITY PROGRAM CONTROL UNIT)

DTC Description

INFOID:0000000013609152

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	Malfunction type	
U1110	29	VEHICLE SPEED SIGNAL (Vehicle speed signal)	SIGNAL INVALID	The vehicle speed signal was not received. There is an invalid signal.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609153

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

U11A6 CAN COMMUNICATION (ICC SENSOR)

DTC Description

INFOID:0000000013609154

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
U11A6	87	Comm ECU radar sensorics malf (Lost communication with ICC sensor)	MISSING MESSAGE	Communication with control unit ICC sensor has a malfunction. The message is missing.

POSSIBLE CAUSE

CAN communication circuit

Diagnosis Procedure

INFOID:0000000013609155

Perform the trouble diagnosis for CAN communication system. Refer to LAN-58, "Trouble Diagnosis Flow Chart".

U1200 COMMUNICATION ERROR

Diagnosis Description

INFOID:0000000013609156

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

U1201 COMMUNICATION ERROR

Diagnosis Description

INFOID:0000000013609157

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

U1407 CAN COMMUNICATION (TCM)

DTC Description

INFOID:0000000013609158

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	Malfunction type	
U1407	81	Engine torque signal (Engine torque signal)	INVALID SERIAL DATA RECEIVED	Implausible signal “Engine torque” is received. Incorrect data were received.
	86		SIGNAL INVALID	Implausible signal “Engine torque” is received. There is an incorrect signal.
	87		MISSING MESSAGE	Implausible signal “Engine torque” is received. The message is missing.

POSSIBLE CAUSE

CAN massage signal

Diagnosis Procedure

INFOID:0000000013609159

1.CHECK SELF-DIAGNOSTIC RESULT

With CONSULT

Perform “All DTC reading”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC.
NO >> INSPECTION END

U140D WHEEL SPEED SIGNAL

DTC Description

INFOID:0000000013609160

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
U140D	29	WHEEL SPEED SIGNAL (Wheel speed signal)	SIGNAL INVALID	An implausible wheel speed signal was received. There is an invalid signal.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609161

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

U1444 CAN COMMUNICATION (ICC SENSOR)

DTC Description

INFOID:0000000013609162

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
U1444	08	Implausible data (radar sensorics) (Invalid data received from ICC sensor)	BUS SIGNAL/MESSAGE ERROR	Implausible data were received from ICC sensor. There is a signal malfunction or the message is malfunctioning.

POSSIBLE CAUSE

ICC sensor

Diagnosis Procedure

INFOID:0000000013609163

1.CHECK DTC OF ICC SENSOR

With CONSULT

Check “Self-diagnostic result” of “ICC sensor”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to CCS-42, "DTC Index".

NO >> Replace ICC sensor. Refer to CCS-340, "Removal and Installation".

U3003 BATTERY VOLTAGE

DTC Description

INFOID:0000000013609164

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
U3003	16	Battery voltage (Battery voltage)	CIRC VOLT BELOW THRESHOLD	The test of the output stages was not performed because the battery voltage is too high or too low. The limit value for electrical voltage has not been attained.
	17		CIRC VOLT ABOVE THRESHOLD	The test of the output stages was not performed because the battery voltage is too high or too low. The limit value for electrical voltage has been exceeded.

POSSIBLE CAUSE

- Harness or connectors
  (ECM power supply circuit)
- ECM

Diagnosis Procedure

INFOID:0000000013609165

1.CHECK CHARGING SYSTEM

Check charging system. Refer to CHG-21, "Work Flow (With EXP-800 NI or GR8-1200 NI)" (With EXP-800 NI or GR8-1200 NI) or CHG-25, "Work Flow (Without EXP-800 NI or GR8-1200 NI)" (Without EXP-800 NI or GR8-1200 NI).

Is the inspection result normal?

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

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

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

U300E CAN COMMUNICATION

DTC Description

INFOID:0000000013609166

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
U300E	00	Ignition input on (Ignition input ON)	NO SUBTYPE INFORMATION	Input signal is implausible.

POSSIBLE CAUSE

- Harness or connectors
  (ECM power supply circuit)

Diagnosis Procedure

INFOID:0000000013609167

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

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

U3011 CAN COMMUNICATION

DTC Description

INFOID:0000000013609168

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
U3011	00	IGNITION INPUT OFF (Ignition input OFF)	NO SUBTYPE INFORMATION	Ignition input signal is implausible.

POSSIBLE CAUSE

- Harness or connectors (ECM power supply circuit)

Diagnosis Procedure

INFOID:0000000013609169

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

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

B1109 CAN COMMUNICATION

DTC Description

INFOID:0000000013609170

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
B1109	00	Cabin temperature sensor 1 (—)	NO SUBTYPE INFORMATION	In vehicle sensor has a short circuit to ground.

POSSIBLE CAUSE

A/C auto amp.

Diagnosis Procedure

INFOID:0000000013609171

1.CHECK DTC OF A/C AUTO AMP.

With CONSULT

Check “Self-diagnostic result” of “HVAC”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to HAC-36, "DTC Index".

NO >> Replace A/C auto amp. Refer to HAC-121, "Removal and Installation".

B110A CAN COMMUNICATION

DTC Description

INFOID:0000000013609172

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
B110A	00	Cabin temperature sensor 1 (—)	NO SUBTYPE INFORMATION	Interior temperature sensor 1 has a short circuit to positive.

POSSIBLE CAUSE

A/C auto amp.

Diagnosis Procedure

INFOID:0000000013609173

1.CHECK DTC OF A/C AUTO AMP.

With CONSULT

Check “Self-diagnostic result” of “HVAC”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to HAC-36, "DTC Index".

NO >> Replace A/C auto amp. Refer to HAC-121, "Removal and Installation".

B1CE8 CRACH SIGNAL

DTC Description

INFOID:0000000013609174

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
B1CE8	12	COLLISION SIGNAL ERROR (—)	NO SUBTYPE INFORMATION	The digital output for the crash signal has a malfunction. There is a short circuit to positive.

POSSIBLE CAUSE

Air bag system

Diagnosis Procedure

INFOID:0000000013609175

1.CHECK DTC OF AIR BAG DIAGNOSIS SENSOR UNIT

With CONSULT

Check “Self-diagnostic result” of “AIR BAG”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to SRC-20, "DTC Index".
NO >> GO TO 2.

2.CHECK CRASH SIGNAL

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

+		–	Voltage (Approx.)
ECM			
Connector	Terminal		
E48	147	Ground	0 V

Is the inspection result normal?

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

3.CHECK CRASH SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect air bag diagnosis sensor unit harness connector.
4. Check harness for short to power.

Is the inspection result normal?

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

B210D, B210E FPCM POWER SUPPLY

DTC Description

INFOID:0000000013609176

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
B210D	00	Power supply (Table B210D Manufacturer Controlled DTC)	NO SUBTYPE INFORMATION	The power supply is too low.
B210E	00	Power supply (Table B210E Manufacturer Controlled DTC)	NO SUBTYPE INFORMATION	The power supply is too high.

POSSIBLE CAUSE

- Harness and connectors (FPCM power supply circuit)
- Battery
- Charging system

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check “Self Diagnostic Result” of “FPCM”.

Is DTC “B210D” or “B210E” detected?

YES >> Proceed to EC-269, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000013609177

1.CHECK FPCM POWER SUPPLY

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

2WD models

FPCM			voltage
Connector	+	–	
	Terminal		
M456	10	9	11 – 15 V

AWD models

FPCM			voltage
Connector	+	–	
	Terminal		
M365	13	14	11 – 15 V

Is the inspection result normal?

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

2.CHECK FPCM POWER SUPPLY CIRCUIT

Check FPCM power supply circuit. Refer to EC-208, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

Is the inspection result normal?

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

C0001 ELECTRONIC STABILITY PROGRAM CONTROL UNIT

DTC Description

INFOID:0000000013609181

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
C0001	00	TCS control channel A valve 1 (TCS Control Channel "A" Valve 1)	NO SUBTYPE INFORMATION	Control unit has a malfunction.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609182

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check "Self-diagnostic result" of "ABS".

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

C0002 ELECTRONIC STABILITY PROGRAM CONTROL UNIT

DTC Description

INFOID:0000000013609183

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
C0002	00	TCS control channel A valve 2 (TCS Control Channel ″A″ Valve 2)	NO SUBTYPE INFORMATION	Control unit has a malfunction.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609184

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

C0016 WHEEL SENSOR

DTC Description

INFOID:0000000013609185

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
C0016	00	RH RR WHEEL SPEED SENSOR (Right Front Hydraulic Release Too Long)	NO SUBTYPE INFORMATION	The right front wheel speed sensor has a malfunction.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609186

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

C001A WHEEL SENSOR

DTC Description

INFOID:0000000013609187

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
C001A	00	LH FR WHEEL SPEED SENSOR (Left Rear Hydraulic Release Too Long)	NO SUBTYPE INFORMATION	The left rear wheel speed sensor has a malfunction.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609188

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

C001E WHEEL SENSOR

DTC Description

INFOID:0000000013609189

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
C001E	00	RH FR WHEEL SPEED SENSOR (Right Rear Hydraulic Release Too Long)	NO SUBTYPE INFORMATION	The right rear wheel speed sensor has a malfunction.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609190

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

C0020 EPS PUMP MOTOR CONTROL

DTC Description

INFOID:0000000013609191

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
C0020	00	ABS pump motor control (ABS Pump Motor Control)	NO SUBTYPE INFORMATION	The hydraulic pump in the electronic stability program system has a malfunction.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609192

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

C0021 BRAKE BOOSTER

DTC Description

INFOID:0000000013609193

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
C0021	00	Brake booster (Brake Booster Performance)	NO SUBTYPE INFORMATION	The brake booster has a malfunction.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609194

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

C0022 BRAKE BOOSTER

DTC Description

INFOID:0000000013609195

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
C0022	00	Brake booster solenoid (Brake Booster Solenoid)	NO SUBTYPE INFORMATION	he pressure regulating valve in the brake booster has a malfunction.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609196

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

C0030 WHEEL SPEED SENSOR

DTC Description

INFOID:0000000013609197

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
C0030	00	Left front tone wheel (Left Front Tone Wheel)	NO SUBTYPE INFORMATION	The pulse ring of the left front wheel speed sensor has a malfunction.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609198

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

C0031 WHEEL SPEED SENSOR

DTC Description

INFOID:0000000013609199

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
C0031	00	LH RR WHEEL SPEED SENSOR (Left Front Wheel Speed Sensor)	NO SUBTYPE INFORMATION	The left front wheel speed sensor has a malfunction.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609200

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".
NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

C0032 WHEEL SPEED SENSOR

DTC Description

INFOID:0000000013609201

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
C0032	00	L/Fr wheel speed sensor supply (Left Front Wheel Speed Sensor Supply)	NO SUBTYPE INFORMATION	The power supply of the left front wheel speed sensor has a malfunction.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609202

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

C0033 WHEEL SPEED SENSOR

DTC Description

INFOID:0000000013609203

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
C0033	00	Right front tone wheel (Right Front Tone Wheel)	NO SUBTYPE INFORMATION	The pulse ring of the right front wheel speed sensor has a malfunction.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609204

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

C0034 WHEEL SPEED SENSOR

DTC Description

INFOID:0000000013609205

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
C0034	00	RH RR WHEEL SPEED SENSOR (Right Front Wheel Speed Sensor)	NO SUBTYPE INFORMATION	The right front wheel speed sensor has a malfunction.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609206

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

C0035 WHEEL SPEED SENSOR

DTC Description

INFOID:0000000013609207

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
C0035	00	R/Fr wheel speed sensor supply (Right Front Wheel Speed Sensor Supply)	NO SUBTYPE INFORMATION	The power supply of the right front wheel speed sensor has a malfunction.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609208

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".
NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

C0036 WHEEL SPEED SENSOR

DTC Description

INFOID:0000000013609209

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
C0036	00	Left rear tone wheel (Left Rear Tone Wheel)	NO SUBTYPE INFORMATION	The pulse ring of the left rear wheel speed sensor has a malfunction.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609210

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

C0037 WHEEL SPEED SENSOR

DTC Description

INFOID:0000000013609211

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
C0037	00	LH FR WHEEL SPEED SENSOR Left Rear Wheel Speed Sensor)	NO SUBTYPE INFORMATION	The left rear wheel speed sensor has a malfunction.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609212

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".
NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

C0038 WHEEL SPEED SENSOR

DTC Description

INFOID:0000000013609213

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
C0038	00	L/Rr wheel speed sensor supply (Left Rear Wheel Speed Sensor Supply)	NO SUBTYPE INFORMATION	The power supply of the left rear wheel speed sensor has a malfunction.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609214

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

C0039 WHEEL SPEED SENSOR

DTC Description

INFOID:0000000013609215

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
C0039	00	Right rear tone wheel (Right Rear Tone Wheel)	NO SUBTYPE INFORMATION	The pulse ring of the right rear wheel speed sensor has a malfunction.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609216

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".
NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

C003A WHEEL SPEED SENSOR

DTC Description

INFOID:0000000013609217

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
C003A	00	RH FR WHEEL SPEED SENSOR (Right Rear Wheel Speed Sensor)	NO SUBTYPE INFORMATION	The right rear wheel speed sensor has a malfunction.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609218

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

C003B WHEEL SPEED SENSOR

DTC Description

INFOID:0000000013609219

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
C003B	00	R/Rr wheel speed sensor supply (Right Rear Wheel Speed Sensor Supply)	NO SUBTYPE INFORMATION	The power supply of the right rear wheel speed sensor has a malfunction

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609220

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

C0048 BRAKE BOOSTER

DTC Description

INFOID:0000000013609221

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
C0048	00	Brake booster travel sensor (Brake Booster Travel Sensor)	NO SUBTYPE INFORMATION	The membrane travel sensor in the brake booster has a malfunction.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609222

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

P0001 QUANTITY CONTROL VALVE

DTC Description

INFOID:0000000013609223

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0001	00	FUEL VOLUME REGULATOR (Fuel volume regulator control circuit/open)	NO SUBTYPE INFORMATION	The quantity control valve has an electrical malfunction or an open circuit.

POSSIBLE CAUSE

- Harness or connectors (Quantity control valve circuit)
- Quantity control valve

Diagnosis Procedure

INFOID:0000000013609224

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Check that the low fuel pressure system does not have malfunction.
2. Start the engine and let it idle.
3. Turn OFF all auxiliaries. (Electrical load: OFF)
4. On CONSULT screen, select “ENGINE” >> “DATA MONITOR”.
5. Set the vehicle as the following conditions:

Item	Condition
ENGINE SPEED	50 rpm or more
COOLANT TEMPERATURE	75 – 105°C (167 – 221°F)
FUEL TEMPERATURE	40 – 80°C (104 – 176°F)
AIR CONDITIONER STATUS	NOT ACT

6. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK QUANTITY CONTROL VALVE”.
7. Perform Active Test.

Is the fuel rail pressure increase to approximately 20 MPa (200 bar, 204 kg/cm^2, 2900 psi)?

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

2.CHECK DTC

With CONSULT

Check that the ECM does not detect other DTC.

NOTE:

- If the actuation angle of the quantity control valve matches the specified value exactly, synchronization between the camshaft and crankshaft must be checked.
- If the DTC related to camshaft is detected, perform Diagnosis Procedure for the detected DTC. Refer to EC-142, "DTC Index".
- If the DTC related to crankshaft is detected, perform Diagnosis Procedure for the detected DTC. Refer to EC-142, "DTC Index".

>> INSPECTION END

3.CHECK QUANTITY CONTROL VALVE

Check quantity control valve. Refer to EC-297, "Component Inspection (Quantity Control Valve)".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace high pressure fuel pump. Refer to EM-44, "Removal and Installation".

4. CHECK QUANTITY CONTROL VALVE CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and quantity control valve harness connector.

+		–		Continuity
ECM		Quantity control valve		
Connector	Terminal	Connector	Terminal	
F149	75	F169	1	Existed
	76		2	

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

Is the inspection result normal?

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

5. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Quantity Control Valve)

INFOID:0000000013609225

1. CHECK QUANTITY CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect quantity control valve harness connector.
3. Check the resistance between quantity control valve terminals.

Terminal	Resistance
1 and 2	0.3 – 1.1 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure fuel pump. Refer to EM-44, "Removal and Installation".

P0003 QUANTITY CONTROL VALVE

DTC Description

INFOID:0000000013609226

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0003	00	FUEL VOLUME REGULATOR (Fuel volume regulator control circuit low)	NO SUBTYPE INFORMATION	The quantity control valve has a short circuit to ground.

POSSIBLE CAUSE

- Harness or connectors (Quantity control valve circuit)
- Quantity control valve

Diagnosis Procedure

INFOID:0000000013609227

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Check that the low fuel pressure system does not have malfunction.
2. Start the engine and let it idle.
3. Turn OFF all auxiliaries. (Electrical load: OFF)
4. On CONSULT screen, select “ENGINE” >> “DATA MONITOR”.
5. Set the vehicle as the following conditions:

Item	Condition
ENGINE SPEED	50 rpm or more
COOLANT TEMPERATURE	75 – 105°C (167 – 221°F)
FUEL TEMPERATURE	40 – 80°C (104 – 176°F)
AIR CONDITIONER STATUS	NOT ACT

6. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK QUANTITY CONTROL VALVE”.
7. Perform Active Test.

Is the fuel rail pressure increase to approximately 20 MPa (200 bar, 204 kg/cm^2, 2900 psi)?

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

2.CHECK DTC

With CONSULT

Check that the ECM does not detect other DTC.

NOTE:

- If the actuation angle of the quantity control valve matches the specified value exactly, synchronization between the camshaft and crankshaft must be checked.
- If the DTC related to camshaft is detected, perform Diagnosis Procedure for the detected DTC. Refer to EC-142, "DTC Index".
- If the DTC related to crankshaft is detected, perform Diagnosis Procedure for the detected DTC. Refer to EC-142, "DTC Index".

>> INSPECTION END

3.CHECK QUANTITY CONTROL VALVE

Check quantity control valve. Refer to EC-297, "Component Inspection (Quantity Control Valve)".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace high pressure fuel pump. Refer to EM-44, "Removal and Installation".

4. CHECK QUANTITY CONTROL VALVE CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and quantity control valve harness connector.

+		–		Continuity
ECM		Quantity control valve		
Connector	Terminal	Connector	Terminal	
F149	75	F169	1	Existed
	76		2	

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

Is the inspection result normal?

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

5. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Quantity Control Valve)

INFOID:0000000013609228

1. CHECK QUANTITY CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect quantity control valve harness connector.
3. Check the resistance between quantity control valve terminals.

Terminal	Resistance
1 and 2	0.3 – 1.1 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure fuel pump. Refer to EM-44, "Removal and Installation".

P0004 QUANTITY CONTROL VALVE

DTC Description

INFOID:0000000013609229

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0004	00	FUEL VOLUME REGULATOR (Fuel volume regulator control circuit high)	NO SUBTYPE INFORMATION	The quantity control valve has a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Quantity control valve circuit)
- Quantity control valve

Diagnosis Procedure

INFOID:0000000013609230

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Check that the low fuel pressure system does not have malfunction.
2. Start the engine and let it idle.
3. Turn OFF all auxiliaries. (Electrical load: OFF)
4. On CONSULT screen, select “ENGINE” >> “DATA MONITOR”.
5. Set the vehicle as the following conditions:

Item	Condition
ENGINE SPEED	50 rpm or more
COOLANT TEMPERATURE	75 – 105°C (167 – 221°F)
FUEL TEMPERATURE	40 – 80°C (104 – 176°F)
AIR CONDITIONER STATUS	NOT ACT

6. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK QUANTITY CONTROL VALVE”.
7. Perform Active Test.

Is the fuel rail pressure increase to approximately 20 MPa (200 bar, 204 kg/cm^2, 2900 psi)?

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

2.CHECK DTC

With CONSULT

Check that the ECM does not detect other DTC.

NOTE:

- If the actuation angle of the quantity control valve matches the specified value exactly, synchronization between the camshaft and crankshaft must be checked.
- If the DTC related to camshaft is detected, perform Diagnosis Procedure for the detected DTC. Refer to EC-142, "DTC Index".
- If the DTC related to crankshaft is detected, perform Diagnosis Procedure for the detected DTC. Refer to EC-142, "DTC Index".

>> INSPECTION END

3.CHECK QUANTITY CONTROL VALVE

Check quantity control valve. Refer to EC-297, "Component Inspection (Quantity Control Valve)".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace high pressure fuel pump. Refer to EM-44, "Removal and Installation".

4.CHECK QUANTITY CONTROL VALVE CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and quantity control valve harness connector.

+		–		Continuity
ECM		Quantity control valve		
Connector	Terminal	Connector	Terminal	
F149	75	F169	1	Existed
	76		2	

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

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Quantity Control Valve)

INFOID:0000000013609231

1.CHECK QUANTITY CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect quantity control valve harness connector.
3. Check the resistance between quantity control valve terminals.

Terminal	Resistance
1 and 2	0.3 – 1.1 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure fuel pump. Refer to EM-44, "Removal and Installation".

P0008 CRANKSHAFT POSITION CONTROL

DTC Description

INFOID:0000000013609232

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0008	01	ENGINE POSITION SYSTEM (Engine position system performance)	ELECTRICAL MALFUNCTION	The position of the crankshaft (cylinder bank 1) is implausible. There is a general electrical malfunction.

POSSIBLE CAUSE

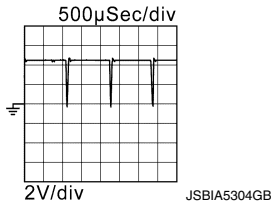
- Harness or connectors (Crankshaft position sensor circuit)
- Crankshaft position sensor

Diagnosis Procedure

INFOID:0000000013609233

1.COMPONENT FUNCTION CHECK

1. Start the engine and let it idle.
2. Check signal between ECM harness connector terminals.

ECM			Reference value
Connector	+	–	
	Terminal		
F149	81	12	

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK CRANKSHAFT POSITION SENSOR POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect crankshaft position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between crankshaft position sensor harness connector terminals.

Crankshaft position sensor			Voltage
Connector	+	–	
	Terminal		
F146	3	1	4.8 – 5.3 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK CRANKSHAFT POSITION SENSOR POWER SUPPLY-2

Check the voltage between crankshaft position sensor harness connector and ground.

+		–	Voltage
Crankshaft position sensor			
Connector	Terminal		
F146	3	Ground	4.8 – 5.3 V

Is the inspection result normal?

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

4. CHECK CRANKSHAFT POSITION SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
ECM		Crankshaft position sensor		
Connector	Terminal	Connector	Terminal	
F149	18	F146	3	Existed

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

Is the inspection result normal?

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

5. CHECK CRANKSHAFT POSITION SENSOR GROUND CIRCUIT

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

+		–		Continuity
ECM		Crankshaft position sensor		
Connector	Terminal	Connector	Terminal	
F149	12	F146	1	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

6. CHECK CRANKSHAFT POSITION SENSOR CIRCUIT

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

+		–		Continuity
ECM		Crankshaft position sensor		
Connector	Terminal	Connector	Terminal	
F149	81	F146	2	Existed

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

Is the inspection result normal?

YES >> Replace crankshaft position sensor. Refer to EM-100, "Exploded View".
NO >> Repair or replace error-detected parts.

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

>> INSPECTION END

P000E QUANTITY CONTROL VALVE

DTC Description

INFOID:0000000013609234

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P000E	00	FUEL VOLUME REGULATOR (Fuel volume regulator control exceeded learning limit)	NO SUBTYPE INFORMATION	The adaptation values of the quantity control valve are outside the valid range.

POSSIBLE CAUSE

- Harness or connectors (Quantity control valve circuit)
- Quantity control valve

Diagnosis Procedure

INFOID:0000000013609235

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Check that the low fuel pressure system does not have malfunction.
2. Start the engine and let it idle.
3. Turn OFF all auxiliaries. (Electrical load: OFF)
4. On CONSULT screen, select “ENGINE” >> “DATA MONITOR”.
5. Set the vehicle as the following conditions:

Item	Condition
ENGINE SPEED	50 rpm or more
COOLANT TEMPERATURE	75 – 105°C (167 – 221°F)
FUEL TEMPERATURE	40 – 80°C (104 – 176°F)
AIR CONDITIONER STATUS	NOT ACT

6. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK QUANTITY CONTROL VALVE”.
7. Perform Active Test.

Is the fuel rail pressure increase to approximately 20 MPa (200 bar, 204 kg/cm^2, 2900 psi)?

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

2.CHECK DTC

With CONSULT

Check that the ECM does not detect other DTC.

NOTE:

- If the actuation angle of the quantity control valve matches the specified value exactly, synchronization between the camshaft and crankshaft must be checked.
- If the DTC related to camshaft is detected, perform Diagnosis Procedure for the detected DTC. Refer to EC-142, "DTC Index".
- If the DTC related to crankshaft is detected, perform Diagnosis Procedure for the detected DTC. Refer to EC-142, "DTC Index".

>> INSPECTION END

3.CHECK QUANTITY CONTROL VALVE

Check quantity control valve. Refer to EC-302, "Component Inspection (Quantity Control Valve)".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace high pressure fuel pump. Refer to EM-44, "Removal and Installation".

4.CHECK QUANTITY CONTROL VALVE CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and quantity control valve harness connector.

+		–		Continuity
ECM		Quantity control valve		
Connector	Terminal	Connector	Terminal	
F149	75	F169	1	Existed
	76		2	

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

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Quantity Control Valve)

INFOID:0000000013609236

1.CHECK QUANTITY CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect quantity control valve harness connector.
3. Check the resistance between quantity control valve terminals.

Terminal	Resistance
1 and 2	0.3 – 1.1 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure fuel pump. Refer to EM-44, "Removal and Installation".

P0010 INTAKE CAMSHAFT ACTUATOR

DTC Description

INFOID:0000000013609237

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0010	00	CAMSHAFT POSITION ACTUATR A B1 (“A” camshaft position actuator circuit/open bank 1)	NO SUBTYPE INFORMATION	The Intake camshaft actuator (cylinder bank 1) has an electrical malfunction or an open circuit.

POSSIBLE CAUSE

- Harness or connectors
  (Intake camshaft actuator circuit)
- Intake camshaft actuator

Diagnosis Procedure

INFOID:0000000013609238

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “DATA MONITOR”.
3. Set the vehicle as the following conditions:

Item	Condition
ENGINE SPEED	3,000 – 3,500 rpm or more
COOLANT TEMPERATURE	80°C (176°F)

4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK INTAKE CAMSHAFT SOLENOID”.
5. Perform Active Test.
   NOTE:
   After performing Active Test, erase DTC if necessary.

Is the actuator actuated?

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

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that No. 212 (15 A) fuse is not blowing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK INTAKE CAMSHAFT ACTUATOR POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect intake camshaft actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake camshaft actuator harness connector and ground.

+		–	Voltage
Intake camshaft actuator			
Connector	Terminal		
F162	2	Ground	Battery voltage

Is the inspection result normal?

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

4. CHECK INTAKE CAMSHAFT ACTUATOR CONTROL CIRCUIT

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

+		–		Continuity
ECM		Intake camshaft actuator		
Connector	Terminal	Connector	Terminal	
F149	29	F162	1	Existed

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

Is the inspection result normal?

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

5. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake camshaft actuator. Refer to EM-63, "Exploded View".
NO >> Repair or replace error-detected parts.

P0011 INTAKE CAMSHAFT CONTROL

DTC Description

INFOID:0000000013609239

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0011	64	CAMSHAFT A POSITION (“A” Camshaft position - timing over-advanced or system performance bank 1)	SIGNAL PLAUSIBILITY ERROR	The position of the intake camshaft (cylinder bank 1) deviates from the specified value. There is an implausible signal.
	77		COMMAND POSI NOT REACHABLE	The position of the intake camshaft (cylinder bank 1) deviates from the specified value. The commanded position cannot be reached.

POSSIBLE CAUSE

- Intake camshaft
- Exhaust camshaft

Diagnosis Procedure

INFOID:0000000013609240

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Apply parking brake.
2. Shift the selector lever to P or N position.
3. Start the engine and let it idle.
4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CAMSHAFT POSITIONER”.
5. Keep the engine speed between 2,700 – 3,500 rpm.
6. Perform Active Test.

   NOTE:

   Start the Active Test immediately after that engine speed reaches to specified range.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning camshaft. Refer to EM-63, "Removal and Installation".

P0012 INTAKE CAMSHAFT CONTROL

DTC Description

INFOID:0000000013609241

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P0012	00	CAMSHAFT A POSITION (“A” Camshaft position - timing over-retarded bank 1)	NO SUBTYPE INFORMATION	Adjustment of the intake camshaft (cylinder bank 1) is performed late.

POSSIBLE CAUSE

- Intake camshaft
- Exhaust camshaft

Diagnosis Procedure

INFOID:0000000013609242

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Apply parking brake.
2. Shift the selector lever to P or N position.
3. Start the engine and let it idle.
4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CAMSHAFT POSITIONER”.
5. Keep the engine speed between 2,700 – 3,500 rpm.
6. Perform Active Test.

   NOTE:

   Start the Active Test immediately after that engine speed reaches to specified range.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning camshaft. Refer to EM-63, "Removal and Installation".

P0013 EXHAUST CAMSHAFT ACTUATOR

DTC Description

INFOID:0000000013609243

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0013	00	CAMSHAFT B POSITION (“B” camshaft position - actuator circuit/open bank 1)	NO SUBTYPE INFORMATION	The exhaust camshaft actuator (cylinder bank 1) has an electrical malfunction or an open circuit.

POSSIBLE CAUSE

- Harness or connectors
  (Exhaust camshaft actuator circuit)
- Exhaust camshaft actuator

Diagnosis Procedure

INFOID:0000000013609244

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “DATA MONITOR”.
3. Set the vehicle as the following conditions:

Item	Condition
ENGINE SPEED	500 rpm or more
COOLANT TEMPERATURE	80°C (176°F)

4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK EXHAUST CAMSHAFT SOLENOID”.
5. Perform Active Test.
   NOTE:
   After performing Active Test, erase DTC if necessary.

Is the actuator actuated?

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

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that No. 97 (15 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK EXHAUST CAMSHAFT ACTUATOR POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect exhaust camshaft actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust camshaft actuator harness connector and ground.

+		–	Voltage
Exhaust camshaft actuator			
Connector	Terminal		
F163	2	Ground	Battery voltage

Is the inspection result normal?

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

4. CHECK EXHAUST CAMSHAFT ACTUATOR CONTROL CIRCUIT

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

+		–		
ECM		Exhaust camshaft actuator		Continuity
Connector	Terminal	Connector	Terminal	
F149	53	F163	1	Existed

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

Is the inspection result normal?

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

5. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace exhaust camshaft actuator. Refer to EM-79, "Exploded View".
NO >> Repair or replace error-detected parts.

P0014 EXHAUST CAMSHAFT CONTROL

DTC Description

INFOID:0000000013609245

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0014	64	CAMSHAFT B POSITION (“B” Camshaft position - timing over-advanced or system performance bank 1)	SIGNAL PLAUSIBILITY ERROR	The position of the exhaust camshaft (cylinder bank 1) deviates from the specified value. There is an implausible signal.
	77		COMMAND POSI NOT REACHABLE	The position of the exhaust camshaft (cylinder bank 1) deviates from the specified value. The commanded position cannot be reached.

POSSIBLE CAUSE

- Intake camshaft
- Exhaust camshaft

Diagnosis Procedure

INFOID:0000000013609246

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Apply parking brake.
2. Shift the selector lever to P or N position.
3. Start the engine and let it idle.
4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CAMSHAFT POSITIONER”.
5. Keep the engine speed between 2,700 – 3,500 rpm.
6. Perform Active Test.

   NOTE:

   Start the Active Test immediately after that engine speed reaches to specified range.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning camshaft. Refer to EM-63, "Removal and Installation".

P0015 EXHAUST CAMSHAFT CONTROL

DTC Description

INFOID:0000000013609247

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P0015	00	CAMSHAFT B POSITION (“A” Camshaft position - timing over-retarded bank 1)	NO SUBTYPE INFORMATION	Adjustment of the exhaust camshaft (cylinder bank 1) is performed late.

POSSIBLE CAUSE

- Intake camshaft
- Exhaust camshaft

Diagnosis Procedure

INFOID:0000000013609248

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Apply parking brake.
2. Shift the selector lever to P or N position.
3. Start the engine and let it idle.
4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CAMSHAFT POSITIONER”.
5. Keep the engine speed between 2,700 – 3,500 rpm.
6. Perform Active Test.

   NOTE:

   Start the Active Test immediately after that engine speed reaches to specified range.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning camshaft. Refer to EM-63, "Removal and Installation".

P0016 CKP - CMP CORRELATION

DTC Description

INFOID:0000000013609249

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0016	64	CKP - CMP CORRELATION B1 SEN A (Crankshaft position - camshaft position correlation bank 1 sensor A)	SIGNAL PLAUSIBILITY ERROR	The position of the intake camshaft (bank 1) is implausible relative to the position of the crankshaft. There is an implausible signal.
	85		SIG ABOVE ALLOWABLE RANGE	The position of the intake camshaft (bank 1) is implausible relative to the position of the crankshaft. There is a signal above the permissible limit value.

POSSIBLE CAUSE

- Improper installation of timing chain
- Timing chain tensioner
- Camshaft signal plate
- Camshaft actuator

Diagnosis Procedure

INFOID:0000000013609250

1.CHECK DTC PRIORITY

Check that the DTC related to the following parts is not detected.
- Intake camshaft position sensor
- Intake camshaft actuator
- Exhaust camshaft position sensor
- Exhaust camshaft actuator
- Crank shaft position sensor

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".
NO >> GO TO 2.

2.CHECK COMPONENT PARTS

Check the following items:
- Wear of timing chain or timing chain stretch.
- Check signal plate of camshafts for deformation.
- Intake camshaft actuator and exhaust camshaft actuator.
- Improper installation of timing chain
- Improper installation of chain tensioner

>> INSPECTION END

P0017 CKP-CMP CORRELATION

DTC Description

INFOID:0000000013609251

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0017	64	CKP - CMP CORRELATION B1 SEN A (Crankshaft position - camshaft position correlation bank 1 sensor B)	SIGNAL PLAUSIBILITY ERROR	The position of the exhaust camshaft (bank 1) is implausible relative to the position of the crankshaft. There is an implausible signal.
	85		SIG ABOVE ALLOWABLE RANGE	The position of the exhaust camshaft (bank 1) is implausible relative to the position of the crankshaft. There is a signal above the permissible limit value.

POSSIBLE CAUSE

- Improper installation of timing chain
- Timing chain tensioner
- Camshaft signal plate
- Camshaft actuator

Diagnosis Procedure

INFOID:0000000013609252

1.CHECK DTC PRIORITY

Check that the DTC related to the following parts is not detected.

- Intake camshaft position sensor
- Intake camshaft actuator
- Exhaust camshaft position sensor
- Exhaust camshaft actuator
- Crank shaft position sensor

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".
NO >> GO TO 2.

2.CHECK COMPONENT PARTS

Check the following items:

- Wear of timing chain or timing chain stretch.
- Check signal plate of camshafts for deformation.
- Intake camshaft actuator and exhaust camshaft actuator.
- Improper installation of timing chain
- Improper installation of chain tensioner

>> INSPECTION END

P001A INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

DTC Description

INFOID:0000000013609253

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P001A	13	Camshaft A profile bank 1 (″A″ Camshaft Profile Control Circuit/Open Bank 1)	CIRCUIT OPEN	The output for actuator of the CAMTRONIC has an electrical malfunction or an open circuit. There is an open circuit.

POSSIBLE CAUSE

- Harness or connectors
  (Intake camshaft valve lift switchover actuator circuit)
- Intake camshaft valve lift switchover actuator

Diagnosis Procedure

INFOID:0000000013609254

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHING ACTUATOR”.
3. Perform Active Test.

Is the actuator actuated?

YES >> GO TO 9.
NO >> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

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

3.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR FUNCTION CHECK

Check signal between ECM harness connector terminal No. 33 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

4.CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

1. Check intake camshaft valve lift switchover actuator. Refer to EC-314, "Component Inspection (Intake Camshaft Valve Lift Switchover)".

Is the inspection result normal?

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

5.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 1 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 96 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

6.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 2 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 72 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

7. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake camshaft valve lift switchover harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake camshaft valve lift switchover harness connector and ground.

+		–	Voltage (Approx.)
Intake camshaft valve lift switchover			
Connector	Terminal		
F172	4	Ground	5 V
	6		Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for intake camshaft valve lift switchover power supply circuit.

8. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ECM harness connector and intake camshaft valve lift switchover harness connector.

ECM		Intake camshaft valve lift switchover		Continuity
Connector	Terminal	Connector	Terminal	
F149	11	F172	3	Existed

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake camshaft valve lift switchover. Refer to EC-27, "Component Parts Location".
NO >> Repair or replace error-detected parts.

Component Inspection (Intake Camshaft Valve Lift Switchover)

INFOID:0000000013609255

1. CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHOVER

1. Turn ignition switch OFF.
2. Disconnect intake camshaft valve lift switchover harness connector.
3. Check the resistance between intake camshaft valve lift switchover terminals.

Intake camshaft valve lift switchover		Resistance (Approx.)
Terminal		
2	1	3 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake camshaft valve lift switchover. Refer to EC-27, "Component Parts Location".

P001B INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

DTC Description

INFOID:0000000013609256

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P001B	11	Camshaft A profile bank 1 (″A″ Camshaft Profile Control Circuit Low Bank 1)	CIRCUIT SHORT TO GROUND	The output for actuator of the CAMTRONIC has a short circuit to ground. There is a short circuit to ground.

POSSIBLE CAUSE

- Harness or connectors
  (Intake camshaft valve lift switchover actuator circuit)
- Intake camshaft valve lift switchover actuator

Diagnosis Procedure

INFOID:0000000013609257

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHING ACTUATOR”.
3. Perform Active Test.

Is the actuator actuated?

YES >> GO TO 9.
NO >> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

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

3.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR FUNCTION CHECK

Check signal between ECM harness connector terminal No. 33 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

4.CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

1. Check intake camshaft valve lift switchover actuator. Refer to EC-314, "Component Inspection (Intake Camshaft Valve Lift Switchover)".

Is the inspection result normal?

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

5.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 1 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 96 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

6.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 2 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 72 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

7. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake camshaft valve lift switchover harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake camshaft valve lift switchover harness connector and ground.

+		–	Voltage (Approx.)
Intake camshaft valve lift switchover			
Connector	Terminal		
F172	4	Ground	5 V
	6		Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for intake camshaft valve lift switchover power supply circuit.

8. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ECM harness connector and intake camshaft valve lift switchover harness connector.

ECM		Intake camshaft valve lift switchover		Continuity
Connector	Terminal	Connector	Terminal	
F149	11	F172	3	Existed

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake camshaft valve lift switchover. Refer to EC-27, "Component Parts Location".
NO >> Repair or replace error-detected parts.

P001C INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

DTC Description

INFOID:0000000013609258

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P001C	12	Camshaft A profile bank 1 (″A″ Camshaft Profile Control Circuit High Bank 1)	CIRCUIT SHORT TO BATTERY	The output for actuator of the CAMTRONIC has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Intake camshaft valve lift switchover actuator circuit)
- Intake camshaft valve lift switchover actuator

Diagnosis Procedure

INFOID:0000000013609259

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHING ACTUATOR”.
3. Perform Active Test.

Is the actuator actuated?

YES >> GO TO 9.
NO >> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

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

3.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR FUNCTION CHECK

Check signal between ECM harness connector terminal No. 33 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

4.CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

1. Check intake camshaft valve lift switchover actuator. Refer to EC-314, "Component Inspection (Intake Camshaft Valve Lift Switchover)".

Is the inspection result normal?

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

5.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 1 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 96 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

6.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 2 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 72 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

7. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake camshaft valve lift switchover harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake camshaft valve lift switchover harness connector and ground.

+		–	Voltage (Approx.)
Intake camshaft valve lift switchover			
Connector	Terminal		
F172	4	Ground	5 V
	6		Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for intake camshaft valve lift switchover power supply circuit.

8. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ECM harness connector and intake camshaft valve lift switchover harness connector.

ECM		Intake camshaft valve lift switchover		Continuity
Connector	Terminal	Connector	Terminal	
F149	11	F172	3	Existed

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake camshaft valve lift switchover. Refer to EC-27, "Component Parts Location".
NO >> Repair or replace error-detected parts.

P002A INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

DTC Description

INFOID:0000000013609260

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P002A	13	Camshaft B profile bank 1 (″B″ Camshaft Profile Control Circuit/Open Bank 1)	CIRCUIT OPEN	The output for actuator of the CAMTRONIC has an electrical malfunction or an open circuit. There is an open circuit.

POSSIBLE CAUSE

- Harness or connectors
  (Intake camshaft valve lift switchover actuator circuit)
- Intake camshaft valve lift switchover actuator

Diagnosis Procedure

INFOID:0000000013609261

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHING ACTUATOR”.
3. Perform Active Test.

Is the actuator actuated?

YES >> GO TO 9.
NO >> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

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

3.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR FUNCTION CHECK

Check signal between ECM harness connector terminal No. 33 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

4.CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

1. Check intake camshaft valve lift switchover actuator. Refer to EC-314, "Component Inspection (Intake Camshaft Valve Lift Switchover)".

Is the inspection result normal?

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

5.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 1 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 96 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

6.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 2 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 72 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

7. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake camshaft valve lift switchover harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake camshaft valve lift switchover harness connector and ground.

+		–	Voltage (Approx.)
Intake camshaft valve lift switchover			
Connector	Terminal		
F172	4	Ground	5 V
	6		Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for intake camshaft valve lift switchover power supply circuit.

8. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ECM harness connector and intake camshaft valve lift switchover harness connector.

ECM		Intake camshaft valve lift switchover		Continuity
Connector	Terminal	Connector	Terminal	
F149	11	F172	3	Existed

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake camshaft valve lift switchover. Refer to EC-27, "Component Parts Location".
NO >> Repair or replace error-detected parts.

P002B INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

DTC Description

INFOID:0000000013609262

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P002B	11	Camshaft B profile bank 1 (″B″ Camshaft Profile Control Circuit Low Bank 1)	CIRCUIT SHORT TO GROUND	The output for actuator of the CAMTRONIC has a short circuit to ground. There is a short circuit to ground.

POSSIBLE CAUSE

- Harness or connectors
  (Intake camshaft valve lift switchover actuator circuit)
- Intake camshaft valve lift switchover actuator

Diagnosis Procedure

INFOID:0000000013609263

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHING ACTUATOR”.
3. Perform Active Test.

Is the actuator actuated?

YES >> GO TO 9.
NO >> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

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

3.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR FUNCTION CHECK

Check signal between ECM harness connector terminal No. 33 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

4.CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

1. Check intake camshaft valve lift switchover actuator. Refer to EC-314, "Component Inspection (Intake Camshaft Valve Lift Switchover)".

Is the inspection result normal?

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

5.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 1 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 96 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

6.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 2 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 72 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

7. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake camshaft valve lift switchover harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake camshaft valve lift switchover harness connector and ground.

+		–	Voltage (Approx.)
Intake camshaft valve lift switchover			
Connector	Terminal		
F172	4	Ground	5 V
	6		Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for intake camshaft valve lift switchover power supply circuit.

8. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ECM harness connector and intake camshaft valve lift switchover harness connector.

ECM		Intake camshaft valve lift switchover		Continuity
Connector	Terminal	Connector	Terminal	
F149	11	F172	3	Existed

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake camshaft valve lift switchover. Refer to EC-27, "Component Parts Location".
NO >> Repair or replace error-detected parts.

P002C INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

DTC Description

INFOID:0000000013609264

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P002C	12	Camshaft B profile bank 1 (″B″ Camshaft Profile Control Circuit High Bank 1)	CIRCUIT SHORT TO BATTERY	The output for actuator of the CAMTRONIC has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Intake camshaft valve lift switchover actuator circuit)
- Intake camshaft valve lift switchover actuator

Diagnosis Procedure

INFOID:0000000013609265

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHING ACTUATOR”.
3. Perform Active Test.

Is the actuator actuated?

YES >> GO TO 9.
NO >> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

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

3.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR FUNCTION CHECK

Check signal between ECM harness connector terminal No. 33 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

4.CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

1. Check intake camshaft valve lift switchover actuator. Refer to EC-314, "Component Inspection (Intake Camshaft Valve Lift Switchover)".

Is the inspection result normal?

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

5.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 1 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 96 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

6.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 2 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 72 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

7. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake camshaft valve lift switchover harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake camshaft valve lift switchover harness connector and ground.

+		–	Voltage (Approx.)
Intake camshaft valve lift switchover			
Connector	Terminal		
F172	4	Ground	5 V
	6		Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for intake camshaft valve lift switchover power supply circuit.

8. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ECM harness connector and intake camshaft valve lift switchover harness connector.

ECM		Intake camshaft valve lift switchover		Continuity
Connector	Terminal	Connector	Terminal	
F149	11	F172	3	Existed

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake camshaft valve lift switchover. Refer to EC-27, "Component Parts Location".
NO >> Repair or replace error-detected parts.

P0030, P0031, P0032 A/F SENSOR HEATER

DTC Description

INFOID:0000000013609266

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0030	00	Heated O2 sensor heater b1 sen1 (HO2S Heater Control Circuit Bank 1 Sensor 1)	NO SUBTYPE INFORMATION	The output for the heater of A/F sensor (cylinder bank 1) has an electrical malfunction or open circuit.
P0031	00	Heated O2 sensor heater b1 sen1 HO2S Heater Control Circuit Low Bank 1 Sensor 1)	NO SUBTYPE INFORMATION	The output for the heater of A/F sensor (cylinder bank 1) has a short circuit to ground.
P0032	00	Heated O2 sensor heater b1 sen1 (HO2S Heater Control Circuit High Bank 1 Sensor 1)	NO SUBTYPE INFORMATION	The output for the heater of A/F sensor (cylinder bank 1) has a short circuit to positive.

POSSIBLE CAUSE

- Harness and connectors
  (Air fuel ratio (A/F) sensor circuit is open or shorted.)
- Air fuel ratio (A/F) sensor

Diagnosis Procedure

INFOID:0000000013609267

1.CHECK A/F SENSOR POWER SUPPLY

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

+		−	Voltage
A/F sensor			
Connector	Terminal		
F143	4	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK A/F SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #98 fuse is not fusing.
3. Check the continuity between A/F sensor harness connector and fuse terminal.

+		−	Continuity
A/F sensor			
Connector	Terminal		
F143	4	#98 fuse terminal	Existed

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

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3. CHECK A/F SENSOR HEATER CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor harness connector and ECM harness connector.

+		–		Continuity
A/F sensor		ECM		
Connector	Terminal	Connector	Terminal	
F143	1	F149	63	Existed
	2		64	
	3		77	
	5		88	
	6		87	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace A/F sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P0033 DIVERT AIR SWITCHOVER VALVE

DTC Description

INFOID:0000000013609268

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0033	00	TC/SC BYPASS VALVE (Turbocharger/Supercharger bypass valve “A” control circuit)	NO SUBTYPE INFORMATION	The output for the divert air switchover valve has an electrical malfunction.

POSSIBLE CAUSE

- Harness or connectors
  (Divert air switchover valve circuit)
- Divert air switchover valve

Diagnosis Procedure

INFOID:0000000013609269

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that #214 (15 A) fuse is not fusing.

Is the inspection result normal?

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

2.DIVERT AIR SWITCHOVER VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect divert air switchover valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between divert air switchover valve harness connector and ground.

+		–	Voltage
Divert air switchover valve			
Connector	Terminal		
F159	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis for divert air switchover valve power supply circuit.

3.CHECK DIVERT AIR SWITCHOVER VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and divert air switchover valve harness connector.

+		–		Continuity
ECM		Divert air switchover valve		
Connector	Terminal	Connector	Terminal	
F149	23	F159	1	Existed

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

Is the inspection result normal?

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

4.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace divert air switchover valve. Refer to EM-42, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0034 DIVERT AIR SWITCHOVER VALVE

DTC Description

INFOID:0000000013609270

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0034	00	TC/SC BYPASS VALVE (Turbocharger/Supercharger bypass valve “A” control circuit low)	NO SUBTYPE INFORMATION	The output for the divert air switchover valve has a short circuit to ground.

POSSIBLE CAUSE

- Harness or connectors
  (Divert air switchover valve circuit)
- Divert air switchover valve

Diagnosis Procedure

INFOID:0000000013609271

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that #214 (15 A) fuse is not fusing.

Is the inspection result normal?

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

2.DIVERT AIR SWITCHOVER VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect divert air switchover valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between divert air switchover valve harness connector and ground.

+		–	Voltage
Divert air switchover valve			
Connector	Terminal		
F159	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis for divert air switchover valve power supply circuit.

3.CHECK DIVERT AIR SWITCHOVER VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and divert air switchover valve harness connector.

+		–		Continuity
ECM		Divert air switchover valve		
Connector	Terminal	Connector	Terminal	
F149	23	F159	1	Existed

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

Is the inspection result normal?

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

4. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace divert air switchover valve. Refer to EM-42, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0035 DIVERT AIR SWITCHOVER VALVE

DTC Description

INFOID:0000000013609272

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	Malfunction type	
P0035	00	TC/SC BYPASS VALVE (Turbocharger/Supercharger bypass valve “A” control circuit high)	NO SUBTYPE INFORMATION	The output for the divert air switchover valve has a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Divert air switchover valve circuit)
- Divert air switchover valve

Diagnosis Procedure

INFOID:0000000013609273

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that #214 (15 A) fuse is not fusing.

Is the inspection result normal?

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

2.DIVERT AIR SWITCHOVER VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect divert air switchover valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between divert air switchover valve harness connector and ground.

+		–	Voltage
Divert air switchover valve			
Connector	Terminal		
F159	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis for divert air switchover valve power supply circuit.

3.CHECK DIVERT AIR SWITCHOVER VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and divert air switchover valve harness connector.

+		–		Continuity
ECM		Divert air switchover valve		
Connector	Terminal	Connector	Terminal	
F149	23	F159	1	Existed

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

Is the inspection result normal?

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

4. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace divert air switchover valve. Refer to EM-42, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0036, P0037, P0038 O2 SENSOR HEATER

DTC Description

INFOID:0000000013609274

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0036	13	HO2S HEATER B1 SEN2 (HO2S heater control circuit bank 1 sensor 2)	CIRCUIT OPEN	The output for the heater of oxygen sensor (cylinder bank 1) has an electrical malfunction or open circuit. There is an open circuit.
P0037	11	HO2S HEATER B1 SEN2 (HO2S heater control circuit low bank 1 sensor 2)	CIRCUIT SHORT TO GROUND	The output for the heater of oxygen sensor (cylinder bank 1) has a short circuit to ground. There is a short circuit to ground.
P0038	12	HO2S HEATER B1 SEN2 (HO2S heater control circuit high bank 1 sensor 2)	CIRCUIT SHORT TO BATTERY	The output for the heater of oxygen sensor (cylinder bank 1) has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

- Harness and connectors
  (Heated oxygen sensor circuit is open or shorted.)
- Heated oxygen sensor

Diagnosis Procedure

INFOID:0000000013609275

1.CHECK HEATED OXYGEN SENSOR POWER SUPPLY

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

+		−	Voltage
Heated oxygen sensor			
Connector	Terminal		
F144	1	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK HEATED OXYGEN SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #98 fuse is not fusing.
3. Check the continuity between heated oxygen sensor harness connector and fuse terminal.

+		−	Continuity
Heated oxygen sensor			
Connector	Terminal		
F144	1	#98 fuse terminal	Existed

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

Is the inspection result normal?

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

3.CHECK HEATED OXYGEN SENSOR HEATER CONTROL CIRCUIT

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

+		–		Continuity
Heated oxygen sensor		ECM		
Connector	Terminal	Connector	Terminal	
F144	2	F149	95	Existed
	3		13	
	4		37	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace heated oxygen sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P0039 DIVERT AIR SWITCH OVER VALVE

DTC Description

INFOID:0000000013609276

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0039	73	TC/SC bypass valve A (Turbocharger/Supercharger Bypass Valve ″A″ Control Circuit Range/Performance)	ACTUATOR STUCK CLOSED	The output for the divert air switchover valve has an electrical malfunction. The actuator does not open.

POSSIBLE CAUSE

- Harness or connectors
  (Divert air switchover valve circuit)
- Divert air switchover valve

Diagnosis Procedure

INFOID:0000000013609277

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that #214 (15 A) fuse is not fusing.

Is the inspection result normal?

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

2.DIVERT AIR SWITCHOVER VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect divert air switchover valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between divert air switchover valve harness connector and ground.

+		−	Voltage
Divert air switchover valve			
Connector	Terminal		
F159	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis for divert air switchover valve power supply circuit.

3.CHECK DIVERT AIR SWITCHOVER VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and divert air switchover valve harness connector.

+		−		Continuity
ECM		Divert air switchover valve		
Connector	Terminal	Connector	Terminal	
F149	23	F159	1	Existed

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

Is the inspection result normal?

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

4. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace divert air switchover valve. Refer to EM-42, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P003C INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

DTC Description

INFOID:0000000013609278

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P003C	77	Camshaft A profile bank 1 (″A″ Camshaft Profile Control Performance/Stuck Off Bank 1)	COMMAND POSI NOT REACHABLE	The switchover of the CAMTRONIC (solenoid 1) to the small tilt position was not completed successfully. The commanded position cannot be reached.
	78		ALGNMNT OR ADJSTMNT INCRRCT	The switchover of the CAMTRONIC (solenoid 1) to the small tilt position was not completed successfully. The adaptation or adjustment is incorrect.

POSSIBLE CAUSE

- Harness or connectors
  (Intake camshaft valve lift switchover actuator circuit)
- Intake camshaft valve lift switchover actuator

Diagnosis Procedure

INFOID:0000000013609279

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHING ACTUATOR”.
3. Perform Active Test.

Is the actuator actuated?

YES >> GO TO 9.
NO >> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

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

3.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR FUNCTION CHECK

Check signal between ECM harness connector terminal No. 33 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

4.CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

1. Check intake camshaft valve lift switchover actuator. Refer to EC-314, "Component Inspection (Intake Camshaft Valve Lift Switchover)".

Is the inspection result normal?

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

5.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 1 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 96 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 2 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 72 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

7. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake camshaft valve lift switchover harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake camshaft valve lift switchover harness connector and ground.

+		–	Voltage (Approx.)
Intake camshaft valve lift switchover			
Connector	Terminal		
F172	4	Ground	5 V
	6		Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for intake camshaft valve lift switchover power supply circuit.

8. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ECM harness connector and intake camshaft valve lift switchover harness connector.

ECM		Intake camshaft valve lift switchover		Continuity
Connector	Terminal	Connector	Terminal	
F149	11	F172	3	Existed

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake camshaft valve lift switchover. Refer to EC-27, "Component Parts Location".
NO >> Repair or replace error-detected parts.

P003D INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

DTC Description

INFOID:0000000013609280

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P003D	53	Camshaft A profile bank 1 ("A" Camshaft Profile Control Circuit/Open Bank 1)	DEACTIVATED	The switchover of the CAMTRONIC (solenoid 1) from the large to the small tilt position was not completed successfully. The component is deactivated.
	75		EMRGNCY POSI NOT REACHABLE	The switchover of the CAMTRONIC (solenoid 1) from the large to the small tilt position was not completed successfully. The emergency position was not reached.

POSSIBLE CAUSE

- Harness or connectors
  (Intake camshaft valve lift switchover actuator circuit)
- Intake camshaft valve lift switchover actuator

Diagnosis Procedure

INFOID:0000000013609281

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHING ACTUATOR”.
3. Perform Active Test.

Is the actuator actuated?

YES >> GO TO 9.
NO >> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

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

3.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR FUNCTION CHECK

Check signal between ECM harness connector terminal No. 33 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

4.CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

1. Check intake camshaft valve lift switchover actuator. Refer to EC-314, "Component Inspection (Intake Camshaft Valve Lift Switchover)".

Is the inspection result normal?

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

5.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 1 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 96 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

6. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 2 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 72 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

7. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake camshaft valve lift switchover harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake camshaft valve lift switchover harness connector and ground.

+		–	Voltage (Approx.)
Intake camshaft valve lift switchover			
Connector	Terminal		
F172	4	Ground	5 V
	6		Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for intake camshaft valve lift switchover power supply circuit.

8. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ECM harness connector and intake camshaft valve lift switchover harness connector.

ECM		Intake camshaft valve lift switchover		Continuity
Connector	Terminal	Connector	Terminal	
F149	11	F172	3	Existed

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake camshaft valve lift switchover. Refer to EC-27, "Component Parts Location".
NO >> Repair or replace error-detected parts.

P0040 A/F SENSOR

DTC Description

INFOID:0000000013609282

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
P0040	00	Oxygen sensor 1 bank 1/bank 2 (O2 Sensor Signals Swapped Bank 1 Sensor 1/Bank 2 Sensor 1)	NO SUBTYPE INFORMATION	Air fuel ratio (A/F) sensor have been swapped.

POSSIBLE CAUSE

- Harness and connectors [Air fuel ratio (A/F) sensor circuit is open or shorted.]
- Air fuel ratio (A/F) sensor

Diagnosis Procedure

INFOID:0000000013609283

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that #214 (10A) fuse is not blowing.

Is the fuse blown (open)?

YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]
NO >> GO TO 2.

2.CHECK A/F SENSOR POWER SUPPLY

1. Disconnect A/F sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor harness connector and ground.

+		−	Voltage
A/F sensor			
Connector	Terminal		
F143	4	Ground	Battery voltage

Is the inspection result normal?

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

3.CHECK A/F SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect the fuse and fusible link block 1 harness connector.
3. Check the continuity between A/F sensor harness connector and the fuse and fusible link block 1 harness connector.

+		−		Continuity
A/F sensor		Fuse and fusible link block 1		
Connector	Terminal	Connector	Terminal	
F143	4	E55	11	Existed

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

Is the inspection result normal?

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

4.CHECK A/F SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor harness connector and ECM harness connector.

+		–		Continuity
A/F sensor		ECM		
Connector	Terminal	Connector	Terminal	
F143	1	F149	63	Existed
	2		64	
	5		88	
	6		87	

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

Is the inspection result normal?

YES >> Replace A/F sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P0041 O2 SENSOR

DTC Description

INFOID:0000000013609284

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0041	00	Oxygen sensor 2 bank 1/bank 2 (O2 Sensor Signals Swapped Bank 1 Sensor 2/Bank 2 Sensor 2)	NO SUBTYPE INFORMATION	Oxygen sensors 2 (cylinder banks 1 and 2) have been swapped.

POSSIBLE CAUSE

- Harness and connectors
  (Heated oxygen sensor circuit is open or shorted.)
- Heated oxygen sensor

Diagnosis Procedure

INFOID:0000000013609285

1.CHECK HEATED OXYGEN SENSOR POWER SUPPLY

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

+		−	Voltage
Heated oxygen sensor			
Connector	Terminal		
F144	1	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK HEATED OXYGEN SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between heated oxygen sensor harness connector and fuse terminal.

+		−	Continuity
Heated oxygen sensor			
Connector	Terminal		
F144	1	#214 fuse terminal	Existed

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

Is the inspection result normal?

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

3.CHECK HEATED OXYGEN SENSOR HEATER CONTROL CIRCUIT

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

+		–		Continuity
Heated oxygen sensor		ECM		
Connector	Terminal	Connector	Terminal	
F144	2	F149	95	Existed
	3		13	
	4		37	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace heated oxygen sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P005A INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

DTC Description

INFOID:0000000013609286

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P005A	77	Camshaft B profile bank 1 (″B″ Camshaft Profile Control Performance/Stuck Off Bank 1)	COMMAND POSI NOT REACHABLE	The switchover of the CAMTRONIC (solenoid 2) to the small tilt position was not completed successfully. The commanded position cannot be reached.

POSSIBLE CAUSE

- Harness or connectors
  (Intake camshaft valve lift switchover actuator circuit)
- Intake camshaft valve lift switchover actuator

Diagnosis Procedure

INFOID:0000000013609287

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHING ACTUATOR”.
3. Perform Active Test.

Is the actuator actuated?

YES >> GO TO 9.
NO >> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

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

3.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR FUNCTION CHECK

Check signal between ECM harness connector terminal No. 33 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

4.CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

1. Check intake camshaft valve lift switchover actuator. Refer to EC-314, "Component Inspection (Intake Camshaft Valve Lift Switchover)".

Is the inspection result normal?

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

5.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 1 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 96 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

6.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 2 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 72 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

7. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake camshaft valve lift switchover harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake camshaft valve lift switchover harness connector and ground.

+		–	Voltage (Approx.)
Intake camshaft valve lift switchover			
Connector	Terminal		
F172	4	Ground	5 V
	6		Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for intake camshaft valve lift switchover power supply circuit.

8. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ECM harness connector and intake camshaft valve lift switchover harness connector.

ECM		Intake camshaft valve lift switchover		Continuity
Connector	Terminal	Connector	Terminal	
F149	11	F172	3	Existed

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake camshaft valve lift switchover. Refer to EC-27, "Component Parts Location".
NO >> Repair or replace error-detected parts.

P005B INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

DTC Description

INFOID:0000000013609288

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P005B	53	Camshaft B profile bank 1 (″B″ Camshaft Profile Control Stuck On Bank 1)	DEACTIVATED	The switchover of the CAMTRONIC (solenoid 2) from the small to the large tilt position was not completed successfully. The component is deactivated.

POSSIBLE CAUSE

- Harness or connectors
  (Intake camshaft valve lift switchover actuator circuit)
- Intake camshaft valve lift switchover actuator

Diagnosis Procedure

INFOID:0000000013609289

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHING ACTUATOR”.
3. Perform Active Test.

Is the actuator actuated?

YES >> GO TO 9.
NO >> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

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

3.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR FUNCTION CHECK

Check signal between ECM harness connector terminal No. 33 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

4.CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

1. Check intake camshaft valve lift switchover actuator. Refer to EC-314, "Component Inspection (Intake Camshaft Valve Lift Switchover)".

Is the inspection result normal?

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

5.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 1 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 96 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

6.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 2 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 72 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

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

7. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake camshaft valve lift switchover harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake camshaft valve lift switchover harness connector and ground.

+		–	Voltage (Approx.)
Intake camshaft valve lift switchover			
Connector	Terminal		
F172	4	Ground	5 V
	6		Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for intake camshaft valve lift switchover power supply circuit.

8. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ECM harness connector and intake camshaft valve lift switchover harness connector.

ECM		Intake camshaft valve lift switchover		Continuity
Connector	Terminal	Connector	Terminal	
F149	11	F172	3	Existed

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake camshaft valve lift switchover. Refer to EC-27, "Component Parts Location".
NO >> Repair or replace error-detected parts.

P0068 MANIFOLD PRESSURE - THROTTLE POSITION CORRELATION

Diagnosis Description

INFOID:0000000013609290

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0068	00	MAP/MAF - throttle pos correlation (MAP/MAF - Throttle Position Correlation)	NO SUBTYPE INFORMATION	The position of the throttle valve is implausible relative to the mass air flow or intake manifold pressure.

POSSIBLE CAUSE

- Harness and connectors
  (Throttle valve actuator circuit is open or shorted.)
  (Pressure sensor downstream of throttle valve circuit is open or shorted.)
- Throttle valve actuator
- Pressure sensor downstream of throttle valve

Diagnosis Procedure

INFOID:0000000013609291

1. CHECK THROTTLE VALVE ACTUATOR FUNCTION

With CONSULT

1. Start the engine and warm it up to coolant temperature reaches more than 80°C (176°F).
2. Turn ignition switch OFF.
3. Turn ignition switch ON (engine stopped).
4. Wait at least 60 seconds.
5. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK THROTTLE VALVE ACTUATOR”.
6. Perform Active Test.

- Check the value of monitor items as following condition

Item	Condition	Value
KICKDOWN	Accelerator pedal: fully released	NOT ACTIVE
ACCELERATOR PEDAL SEN 1		0.2 – 0.5 V
THRTL VALVE ACTUATOR1 V		0.6 – 1.0 V
THRTL VALVE ACTUATOR2 V		4.0 – 4.4 V

- Check the value of monitor items as following condition

Item	Condition	Value
KICKDOWN	Accelerator pedal: fully depressed	ACTIVE
ACCELERATOR PEDAL SEN 1		4.3 – 4.8 V
THRTL VALVE ACTUATOR1 V		3.8 – 4.6 V
THRTL VALVE ACTUATOR2 V		0.4 – 1.2 V

Is the inspection result normal?

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

2. CHECK THROTTLE VALVE ACTUATOR

Check throttle valve actuator. Refer to EC-410, "Component Inspection (Throttle Valve Actuator)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace throttle valve actuator. Refer to EM-29, "Removal and Installation".

3. CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between throttle valve actuator harness connector and ground.

+		–	Voltage (Approx.)
Throttle valve actuator			
Connector	Terminal		
F148	4	Ground	5 V

Is the inspection result normal?

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

4. CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	4	F149	17	Existed

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

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

5. CHECK THROTTLE VALVE POSITION SENSOR CIRCUIT

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

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	3	F149	38	Existed
	5		62	
	6		14	

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

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

6. CHECK PRESSURE SENSOR DOWNSTREAM OF THROTTLE VALVE OUTPUT VOLTAGE

With CONSULT

1. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “PRES/S D/STRM THRTL VLV V”.
2. Check the value as the following conditions.

Item	Condition	Value
PRES/S D/STRM THRTL VLV V	Ignition switch ON (engine stopped)	1 – 2 V
	Engine running at idle	0.5 – 0.8 V

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> GO TO 7.

7. CHECK PRESSURE SENSOR DOWNSTREAM OF THROTTLE VALVE CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and pressure sensor downstream of throttle valve harness connector.

+		–		Continuity
Pressure sensor downstream of throttle valve		ECM		
Connector	Terminal	Connector	Terminal	
F137	1	F149	91	Existed
	2		12	
	3		18	

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

Is the inspection result normal?

YES >> Replace pressure sensor downstream of throttle valve. Refer to EM-29, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0070 AMBIENT SENSOR

DTC Description

INFOID:0000000013609292

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0070	62	AMBIENT AIR TEMP SENSOR (Ambient Air Temperature Sensor Circuit ″A″)	SIGNAL COMPARE ERROR	The ambient sensor has an electrical malfunction. The signal comparison is malfunctioning.
	64		SIGNAL PLAUSIBILITY ERROR	The ambient sensor has an electrical malfunction. There is an implausible signal.

POSSIBLE CAUSE

Ambient sensor

Diagnosis Procedure

INFOID:0000000013609293

1.CHECK DTC IN ECM

With CONSULT

1. Check DTC in “ENGINE”.
2. Check that the DTC related to the following components is not detected.

- Engine coolant temperature sensor.
- Charge air temperature sensor upstream of throttle valve

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".

2.CHECK DTC OF A/C AUTO AMP.

With CONSULT

Check “Self-diagnostic result” of “HVAC”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".
NO >> GO TO 3.

3.ERASE DTC

With CONSULT

1. Erase DTC in all ECU.
2. Turn ignition switch OFF and wait at least 6.5 hour.
3. Start the engine and let it idle at least 60 seconds.
4. Check DTC in “ENGINE”.

Is the DTC detected again?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> INSPECTION END

P0071 AMBIENT SENSOR

DTC Description

INFOID:0000000013609294

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0071	26	AMBIENT AIR TEMP SENSOR A (Ambient air temperature sensor circuit “A” range/performance)	SIG RTE OF CHNG BLW THRESHLD	The ambient sensor has a malfunction. The signal change rate is below the permissible limit value.
	27		SIG RTE OF CHNG ABV THRESHLD	The ambient sensor has a malfunction. The signal change rate is above the permissible limit value.

POSSIBLE CAUSE

Ambient sensor

Diagnosis Procedure

INFOID:0000000013609295

1.CHECK DTC IN ECM

With CONSULT

1. Check DTC in “ENGINE”.
2. Check that the DTC related to the following components is not detected.

- Engine coolant temperature sensor.
- Charge air temperature sensor upstream of throttle valve

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".

2.CHECK DTC OF A/C AUTO AMP.

With CONSULT

Check “Self-diagnostic result” of “HVAC”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".
NO >> GO TO 3.

3.ERASE DTC

With CONSULT

1. Erase DTC in all ECU.
2. Turn ignition switch OFF and wait at least 6.5 hour.
3. Start the engine and let it idle at least 60 seconds.
4. Check DTC in “ENGINE”.

Is the DTC detected again?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> INSPECTION END

P0072 AMBIENT SENSOR

DTC Description

INFOID:0000000013609296

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0072	00	AMBIENT AIR TEMP SENSOR (Ambient Air Temperature Sensor Circuit ″A″ Low)	NO SUBTYPE INFORMATION	The ambient sensor has a short circuit to ground.
	11		CIRCUIT SHORT TO GROUND	The ambient sensor has a short circuit to ground. There is a short circuit to ground.

POSSIBLE CAUSE

Ambient sensor

Diagnosis Procedure

INFOID:0000000013609297

1.CHECK DTC IN ECM

With CONSULT

1. Check DTC in “ENGINE”.
2. Check that the DTC related to the following components is not detected.

- Engine coolant temperature sensor.
- Charge air temperature sensor upstream of throttle valve

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".

2.CHECK DTC OF A/C AUTO AMP.

With CONSULT

Check “Self-diagnostic result” of “HVAC”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".
NO >> GO TO 3.

3.ERASE DTC

With CONSULT

1. Erase DTC in all ECU.
2. Turn ignition switch OFF and wait at least 6.5 hour.
3. Start the engine and let it idle at least 60 seconds.
4. Check DTC in “ENGINE”.

Is the DTC detected again?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> INSPECTION END

P0073 AMBIENT SENSOR

DTC Description

INFOID:0000000013609298

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0073	00	AMBIENT AIR TEMP SENSOR (Ambient Air Temperature Sensor Circuit ″A″ High)	NO SUBTYPE INFORMATION	The ambient sensor has a short circuit to positive.
	12		CIRCUIT SHORT TO BATTERY	The ambient sensor has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

Ambient sensor

Diagnosis Procedure

INFOID:0000000013609299

1.CHECK DTC IN ECM

With CONSULT

1. Check DTC in “ENGINE”.
2. Check that the DTC related to the following components is not detected.

- Engine coolant temperature sensor.
- Charge air temperature sensor upstream of throttle valve

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".

2.CHECK DTC OF A/C AUTO AMP.

With CONSULT

Check “Self-diagnostic result” of “HVAC”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".
NO >> GO TO 3.

3.ERASE DTC

With CONSULT

1. Erase DTC in all ECU.
2. Turn ignition switch OFF and wait at least 6.5 hour.
3. Start the engine and let it idle at least 60 seconds.
4. Check DTC in “ENGINE”.

Is the DTC detected again?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> INSPECTION END

P007A CHARGE AIR TEMPERATURE SENSOR

DTC Description

INFOID:0000000013609300

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P007A	01	Charge air cooler temp sensor b1 (Charge Air Cooler Temperature Sensor Circuit Bank 1)	ELECTRICAL MALFUNCTION	The charge air temperature sensor (cylinder bank 1) has an electrical malfunction. There is a general electrical malfunction.

POSSIBLE CAUSE

- Harness or connectors
  (charge air temperature sensor upstream of throttle valve circuit is open or shorted.)
- Charge air temperature sensor upstream of throttle valve

Diagnosis Procedure

INFOID:0000000013609301

1.CHECK CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE SIGNAL-1

With CONSULT

1. Turn ignition switch OFF and leave the vehicle in a cool place. (soak the vehicle).
   NOTE:
   To perform this test correctly, the engine must be cooled until ambient temperature.
2. Turn ignition switch ON.
3. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “C/AIR TEMP/S U/STRM THRTL”, “COOLANT TEMPERATURE” and “AMBIENT TEMP (CAN)”.
4. Check that the displayed value of “C/AIR TEMP/S U/STRM THRTL” is between –5°C (23°F) and +15°C (59°F) of “AMBIENT TEMP (CAN)”.
   NOTE:
   When the charge air temperature sensor upstream of throttle valve harness connector is disconnected, –30°C (22°F) is displayed.

Is the inspection result normal?

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

2.CHECK POWER SUPPLY OF CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE

1. Turn ignition switch OFF.
2. Disconnect charge air temperature sensor upstream of throttle valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between charge air temperature sensor upstream of throttle valve harness connector and ground.

Charge air temperature sensor upstream of throttle valve			Voltage
Connector	+	–	
	Terminal		
F134	2	1	4.75 – 5.25 V

Is the measured value OK?

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

3.CHECK CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE POWER SUPPLY AND GROUND CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and charge air temperature sensor upstream of throttle valve harness connector.

+		–		Continuity
ECM		Charge air temperature sensor upstream of throttle valve		
Connector	Terminal	Connector	Terminal	
F149	11	F134	1	Existed
	61		2	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4.CHECK CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE

Check charge air temperature sensor upstream of throttle valve. Refer to EC-358, "Component Inspection (Charge Air Temperature Sensor Upstream of Throttle Valve)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Replace charge air temperature sensor upstream of throttle valve. Refer to EM-29, "Removal and Installation".

Component Inspection (Charge Air Temperature Sensor Upstream of Throttle Valve)

INFOID:0000000013609302

1.CHECK CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE

1. Turn ignition switch OFF.
2. Disconnect charge air temperature sensor upstream of throttle valve harness connector.
3. Check the resistance between charge air temperature sensor upstream of throttle valve harness connector terminals.

Charge air temperature sensor upstream of throttle valve		Temperature [°C (°F)]	Resistance (kΩ)
+	–		
Terminal			
1	2	0 (32)	31.00 – 34.00
		10 (50)	18.90 – 20.89
		20 (68)	11.87 – 13.11
		30 (86)	7.66 – 8.46
		40 (104)	5.06 – 5.59
		50 (122)	3.43 – 3.78
		60 (140)	2.37 – 2.61

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace charge air temperature sensor upstream of throttle valve. Refer to EM-29, "Removal and Installation".

P007B CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE

DTC Description

INFOID:0000000013609303

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P007B	00	CHARGE AIR COOLER TEMP SEN (Charge Air Cooler Temperature Sensor Circuit Range/Performance Bank 1)	NO SUBTYPE INFORMATION	The charge air temperature sensor (cylinder bank 1) has a malfunction.
	01		ELECTRICAL MALFUNCTION	The charge air temperature sensor (cylinder bank 1) has a malfunction. There is a general electrical malfunction.
	2A		SIGNAL STUCK IN RANGE	The charge air temperature sensor (cylinder bank 1) has a malfunction. There is no signal change.
	64		SIGNAL PLAUSIBILITY ERROR	The charge air temperature sensor (cylinder bank 1) has a malfunction. There is an implausible signal.
	84		SIG BELOW ALLOWABLE RANGE	The charge air temperature sensor (cylinder bank 1) has a malfunction. There is a signal below the permissible limit value.

POSSIBLE CAUSE

- Harness or connectors
  (charge air temperature sensor upstream of throttle valve circuit is open or shorted.)
- Charge air temperature sensor upstream of throttle valve

Diagnosis Procedure

INFOID:0000000013609304

1. CHECK CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE SIGNAL-1

With CONSULT

1. Turn ignition switch OFF and leave the vehicle in a cool place. (soak the vehicle).
   NOTE:
   To perform this test correctly, the engine must be cooled until ambient temperature.
2. Turn ignition switch ON.
3. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “C/AIR TEMP/S U/STRM THRTL”, “COOLANT TEMPERATURE” and “AMBIENT TEMP (CAN)”.
4. Check that the displayed value of “C/AIR TEMP/S U/STRM THRTL” is between –5°C (23°F) and +15°C (59°F) of “AMBIENT TEMP (CAN)”.
   NOTE:
   When the charge air temperature sensor upstream of throttle valve harness connector is disconnected, –30°C (22°F) is displayed.

Is the inspection result normal?

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

2. CHECK POWER SUPPLY OF CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE

1. Turn ignition switch OFF.
2. Disconnect charge air temperature sensor upstream of throttle valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between charge air temperature sensor upstream of throttle valve harness connector and ground.

Charge air temperature sensor upstream of throttle valve			Voltage
Connector	+	–	
	Terminal		
F134	2	1	4.75 – 5.25 V

Is the measured value OK?

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

3.CHECK CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE POWER SUPPLY AND GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and charge air temperature sensor upstream of throttle valve harness connector.

+		–		Continuity
ECM		Charge air temperature sensor upstream of throttle valve		
Connector	Terminal	Connector	Terminal	
F149	11	F134	1	Existed
	61		2	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4.CHECK CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE

Check charge air temperature sensor upstream of throttle valve. Refer to EC-360, "Component Inspection (Charge Air Temperature Sensor Upstream of Throttle Valve)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Replace charge air temperature sensor upstream of throttle valve. Refer to EM-29, "Removal and Installation".

Component Inspection (Charge Air Temperature Sensor Upstream of Throttle Valve)

INFOID:0000000013609305

1.CHECK CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE

1. Turn ignition switch OFF.
2. Disconnect charge air temperature sensor upstream of throttle valve harness connector.
3. Check the resistance between charge air temperature sensor upstream of throttle valve harness connector terminals.

Charge air temperature sensor upstream of throttle valve		Temperature [°C (°F)]	Resistance (kΩ)
+	–		
Terminal			
1	2	0 (32)	31.00 – 34.00
		10 (50)	18.90 – 20.89
		20 (68)	11.87 – 13.11
		30 (86)	7.66 – 8.46
		40 (104)	5.06 – 5.59
		50 (122)	3.43 – 3.78
		60 (140)	2.37 – 2.61

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace charge air temperature sensor upstream of throttle valve. Refer to EM-29, "Removal and Installation".

P007C CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE

DTC Description

INFOID:0000000013609306

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P007C	13	CHARGE AIR COOLER TEMP SEN (Charge Air Cooler Temperature Sensor Circuit Low Bank 1)	CIRCUIT OPEN	The charge air temperature sensor (cylinder bank 1) has a short circuit to ground. There is an open circuit.

POSSIBLE CAUSE

- Harness or connectors
  (charge air temperature sensor upstream of throttle valve circuit is open or shorted.)
- Charge air temperature sensor upstream of throttle valve

Diagnosis Procedure

INFOID:0000000013609307

1.CHECK CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE SIGNAL-1

With CONSULT

1. Turn ignition switch OFF and leave the vehicle in a cool place. (soak the vehicle).
   NOTE:
   To perform this test correctly, the engine must be cooled until ambient temperature.
2. Turn ignition switch ON.
3. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “C/AIR TEMP/S U/STRM THRTL”, “COOLANT TEMPERATURE” and “AMBIENT TEMP (CAN)”.
4. Check that the displayed value of “C/AIR TEMP/S U/STRM THRTL” is between –5°C (23°F) and +15°C (59°F) of “AMBIENT TEMP (CAN)”.
   NOTE:
   When the charge air temperature sensor upstream of throttle valve harness connector is disconnected, –30°C (22°F) is displayed.

Is the inspection result normal?

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

2.CHECK POWER SUPPLY OF CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE

1. Turn ignition switch OFF.
2. Disconnect charge air temperature sensor upstream of throttle valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between charge air temperature sensor upstream of throttle valve harness connector and ground.

Charge air temperature sensor upstream of throttle valve			Voltage
Connector	+	–	
	Terminal		
F134	2	1	4.75 – 5.25 V

Is the measured value OK?

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

3.CHECK CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE POWER SUPPLY

AND GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and charge air temperature sensor upstream of throttle valve harness connector.

+		–		Continuity
ECM		Charge air temperature sensor upstream of throttle valve		
Connector	Terminal	Connector	Terminal	
F149	11	F134	1	Existed
	61		2	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4. CHECK CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE

Check charge air temperature sensor upstream of throttle valve. Refer to EC-363, "Component Inspection (Charge Air Temperature Sensor Upstream of Throttle Valve)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Replace charge air temperature sensor upstream of throttle valve. Refer to EM-29, "Removal and Installation".

Component Inspection (Charge Air Temperature Sensor Upstream of Throttle Valve)

INFOID:0000000013609308

1. CHECK CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE

1. Turn ignition switch OFF.
2. Disconnect charge air temperature sensor upstream of throttle valve harness connector.
3. Check the resistance between charge air temperature sensor upstream of throttle valve harness connector terminals.

Charge air temperature sensor upstream of throttle valve		Temperature [°C (°F)]	Resistance (kΩ)
+	–		
Terminal			
1	2	0 (32)	31.00 – 34.00
		10 (50)	18.90 – 20.89
		20 (68)	11.87 – 13.11
		30 (86)	7.66 – 8.46
		40 (104)	5.06 – 5.59
		50 (122)	3.43 – 3.78
		60 (140)	2.37 – 2.61

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace charge air temperature sensor upstream of throttle valve. Refer to EM-29, "Removal and Installation".

P007E CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE

DTC Description

INFOID:0000000013609309

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P007E	27	Charge air cooler temp sensor b1 (Charge Air Cooler Temperature Sensor Circuit Intermittent/Erratic Bank 1)	SIG RTE OF CHNG ABV THRESHLD	The charge air temperature sensor upstream of throttle valve (cylinder bank 1) has a sporadic malfunction. The signal change rate is above the permissible limit value.
	2A		SIGNAL STUCK IN RANGE	The charge air temperature sensor upstream of throttle valve (cylinder bank 1) has a sporadic malfunction. There is no signal change.

POSSIBLE CAUSE

- Harness or connectors
  (charge air temperature sensor upstream of throttle valve circuit is open or shorted.)
- Charge air temperature sensor upstream of throttle valve

Diagnosis Procedure

INFOID:0000000013609310

1.CHECK CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE SIGNAL-1

With CONSULT

1. Turn ignition switch OFF and leave the vehicle in a cool place. (soak the vehicle).
   NOTE:
   To perform this test correctly, the engine must be cooled until ambient temperature.
2. Turn ignition switch ON.
3. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “C/AIR TEMP/S U/STRM THRTL”, “COOLANT TEMPERATURE” and “AMBIENT TEMP (CAN)”.
4. Check that the displayed value of “C/AIR TEMP/S U/STRM THRTL” is between –5°C (23°F) and +15°C (59°F) of “AMBIENT TEMP (CAN)”.
   NOTE:
   When the charge air temperature sensor upstream of throttle valve harness connector is disconnected, –30°C (22°F) is displayed.

Is the inspection result normal?

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

2.CHECK POWER SUPPLY OF CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE

1. Turn ignition switch OFF.
2. Disconnect charge air temperature sensor upstream of throttle valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between charge air temperature sensor upstream of throttle valve harness connector and ground.

Charge air temperature sensor upstream of throttle valve			Voltage
Connector	+	–	
	Terminal		
F134	2	1	4.75 – 5.25 V

Is the measured value OK?

YES >> GO TO 4.

NO >> GO TO 3.

3. CHECK CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE POWER SUPPLY AND GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and charge air temperature sensor upstream of throttle valve harness connector.

+		–		Continuity
ECM		Charge air temperature sensor upstream of throttle valve		
Connector	Terminal	Connector	Terminal	
F149	11	F134	1	Existed
	61		2	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4. CHECK CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE

Check charge air temperature sensor upstream of throttle valve. Refer to EC-365, "Component Inspection (Charge Air Temperature Sensor Upstream of Throttle Valve)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Replace charge air temperature sensor upstream of throttle valve. Refer to EM-29, "Removal and Installation".

Component Inspection (Charge Air Temperature Sensor Upstream of Throttle Valve)

INFOID:0000000013609311

1. CHECK CHARGE AIR TEMPERATURE SENSOR UPSTREAM OF THROTTLE VALVE

1. Turn ignition switch OFF.
2. Disconnect charge air temperature sensor upstream of throttle valve harness connector.
3. Check the resistance between charge air temperature sensor upstream of throttle valve harness connector terminals.

Charge air temperature sensor upstream of throttle valve		Temperature [°C (°F)]	Resistance (kΩ)
+	–		
Terminal			
1	2	0 (32)	31.00 – 34.00
		10 (50)	18.90 – 20.89
		20 (68)	11.87 – 13.11
		30 (86)	7.66 – 8.46
		40 (104)	5.06 – 5.59
		50 (122)	3.43 – 3.78
		60 (140)	2.37 – 2.61

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace charge air temperature sensor upstream of throttle valve. Refer to EM-29, "Removal and Installation".

P0087 FUEL SYSTEM
ECM
ECM : DTC Description

INFOID:0000000013609312

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0087	00	FUEL RAIL/SYSTEM PRESSURE (Fuel Rail/System Pressure - Too Low Bank 1)	NO SUBTYPE INFORMATION	The fuel pressure in the system is too low.
	92		PFM/INCORRECT OPERATN	The fuel pressure in the system is too low. The function or the instruction is malfunctioning.

POSSIBLE CAUSE
- Harness or connectors
  (Fuel pressure and temperature sensor circuit is open or shorted.)
  (Quantity control valve circuit is open or shorted.)
- High pressure fuel system leak
- Fuel pressure and temperature sensor
- Quantity control valve

ECM : Diagnosis Procedure

INFOID:0000000013609313

1.START ENGINE

Start the engine and let it idle.

Is it difficult to keep at idle?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL

With CONSULT
1. Warm the engine up to engine coolant temperature reaches 75°C (167°F).
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL PRESS AND TEMP SENSOR”.
3. Keep the engine speed between 500 – 1,000 rpm.
4. Perform the Active Test.
   NOTE:
   When start the test, fuel pump is activated and quantity control valve is not activated.
5. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 300 kPa (3 bar, 3.06 kg/cm^2, 43.5 psi) and 1200 kPa (12 bar, 12.24 kg-cm^2, 174 psi).

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 6.

3.ERASE DTC

1. Erase the DTC.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Start the engine and let it idle for 60 seconds.
4. Turn ignition switch OFF.
5. Turn ignition switch ON.
6. Check DTC.

Is the DTC detected again?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> INSPECTION END

4.PRECONDITIONING FOR CHECKING FUEL PRESSURE AND TEMPERATURE SENSOR OUTPUT SIG-

NAL

CAUTION:
Refer to EC-23, "Precaution for Risk of Explosion and Injury" for work in safety.

With CONSULT

1. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “RAIL PRES (ACTUAL VALUE)”.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Slightly loosen the threaded connection of the fuel line to the fuel rail to reduce the fuel pressure.
   CAUTION:
   Collect escaping fuel with several rags.
4. Wait at least 60 seconds.
5. Retighten the threaded connection of fuel line.
6. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 0 kPa (0 bar, 0 kg/cm^2, 0 psi) and 300 kPa (3 bar, 3.06 kg/cm^2, 43.5 psi).

>> GO TO 5.

5. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL PRESS AND TEMP SENSOR”.
   NOTE:
   When start the test, fuel pump is activated and quantity control valve is not activated.
3. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 300 kPa (3 bar, 3.06 kg/cm^2, 43.5 psi) and 1200 kPa (12 bar, 12.24 kg/cm^2, 174 psi).

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 6.

6. CHECK POWER SUPPLY OF FUEL PRESSURE AND TEMPERATURE SENSOR

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

Fuel pressure and temperature sensor			Voltage
Connector	+	–	
	Terminal		
F139	4	1	4.75 – 5.25 V

Is the measured value OK?

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

7. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR POWER SUPPLY AND GROUND CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	12	F139	1	Existed
	18		4	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

8. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	65	F139	3	Existed
	67		2	

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

Is the inspection result normal?

YES >> Replace fuel pressure and temperature sensor. Refer to EM-49, "Removal and Installation".
NO >> Repair or replace error-detected parts.

9. CHECK HIGH PRESSURE FUEL SYSTEM LEAK

With CONSULT

1. Start the engine and warm it up to engine coolant temperature reaches 75°C (167°F).
2. Turn ignition switch OFF.
3. Turn ignition switch ON.
4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL HI PRESS CIRC FOR LEAKTIGHTNESS”.
5. Connect charger to battery.
6. Set the vehicle to the following conditions.

Item	Condition
Engine coolant temperature	75 – 105°C (167 – 221°F)
Fuel temperature	40 – 80°C (104 – 176°F)
Engine speed	550 – 800 rpm
Electrical load	OFF

7. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 19 MPa (190 bar, 193.8 kg/cm^2, 2755 psi) and 21 MPa (210 bar, 214.2 kg/cm^2, 3045 psi).
8. Perform the Active Test.

CAUTION:
Never turn ignition switch OFF.
NOTE:
When the result is normal, the fuel rail pressure value must not drop below 10 MPa (100 bar, 102 kg/cm^2, 1450 psi) within 3 minutes.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Check high pressure fuel line for fuel leak.

10. CHECK QUANTITY CONTROL VALVE FUNCTION

With CONSULT

1. Check that low fuel pressure system is normal.
2. Set the vehicle to the following conditions.

Item	Condition
Engine coolant temperature	75 – 105°C (167 – 221°F)
Fuel temperature	40 – 80°C (104 – 176°F)
Engine speed	50 rpm or more
A/C	OFF

3. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK QUANTITY CONTROL VALVE”.
4. Perform the Active Test.
NOTE:
When the result is normal, the fuel rail pressure value is increased to approximately 20 MPa (200 bar, 204 kg/cm^2, 2900 psi).

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 11.

11. CHECK QUANTITY CONTROL VALVE

Check quantity control valve. Refer to EC-766, "Component Inspection (Quantity Control Valve)".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace high pressure fuel pump. Refer to EM-44, "Removal and Installation".

12. CHECK QUANTITY CONTROL VALVE CONTROL CIRCUIT

1. Disconnect ECM harness connector and quantity control valve harness connector.
2. Check the continuity between ECM harness connector and quantity control valve harness connector.

+		–		Continuity
ECM		Quantity control valve		
Connector	Terminal	Connector	Terminal	
F149	75	F169	1	Existed
	76		2	

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

13. ERASE DTC

1. Check the following.
- If the actuation angle of the quantity control valve matches the specified value exactly, synchronization between the camshaft and crankshaft must be checked. (Substitute value in emergency mode)
- If DTC related to camshaft is detected, perform trouble diagnosis for the detected DTC.
- If DTC related to crankshaft is detected, perform trouble diagnosis for the detected DTC.
2. Erase the DTC.
3. Turn ignition switch OFF and wait at least 30 seconds.
4. Start the engine and let it idle for 60 seconds.
5. Check DTC.

Is the DTC detected again?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> INSPECTION END

ECM : Component Inspection (Quantity Control Valve)

INFOID:0000000013609314

1. CHECK QUANTITY CONTROL VALVE-1

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

3. Check the resistance between ECM harness connector terminals.

ECM		Resistance (Ω)
+	–	
Terminal		
75	76	0.3 – 1.1

Is the inspection result normal?

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

2.CHECK QUANTITY CONTROL VALVE-2

1. Disconnect quantity control valve harness connector.
2. Check the resistance between quantity control valve terminals.

Quantity control valve		Resistance (Ω)
+	–	
Terminal		
1	2	0.3 – 1.1

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure fuel pump. Refer to EM-44, "Removal and Installation".

FUEL PUMP CONTROL MODULE (FPCM)

FUEL PUMP CONTROL MODULE (FPCM) : DTC Description

INFOID:0000000013609315

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0088	00	FUEL RAIL/SYSTEM PRESSURE (Fuel Rail/System Pressure - Too High Bank 1)	NO SUBTYPE INFORMATION	The fuel pressure in the system is too high.

POSSIBLE CAUSE

- Harness and connectors
  (High pressure fuel pump circuit is open or shorted.)
- High pressure fuel pump
- Out of fuel
- Fuel line open

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start the engine and let it idle at least 10 seconds.
2. Check self-diagnostic result of “FPCM”.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-370, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure

INFOID:0000000013609316

1.INSPECTION START

Check the following items.

- Out of gas
- Low fuel pressure line open

Is the inspection result normal?

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

2.COMPONENT FUNCTION CHECK

1. Turn ignition switch OFF and wait at least 30 seconds.
2. Listen to fuel level sensor unit and fuel pump operation sound for a few seconds after ignition switch is turned ON.

Is the inspection result normal?

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

3.CHECK FPCM POWER SUPPLY

Check FPCM power supply and ground circuit. Refer to EC-208, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

Is the inspection result normal?

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

4.CHECK FUEL PUMP CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect FPCM harness connector and fuel level sensor unit and fuel pump harness connector.
3. Check the continuity between FPCM harness connector and fuel level sensor unit and fuel pump harness connector.

2WD models

+		–		Continuity
FPCM		Fuel level sensor unit and fuel pump		
Connector	Terminal	Connector	Terminal	
M456	11	M370	3	Existed
	12		1	

4WD models

+		–		Continuity
FPCM		Fuel level sensor unit and fuel pump		
Connector	Terminal	Connector	Terminal	
M365	16	M370	3	Existed
	18		1	

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 FUEL PUMP

Check fuel pump. Refer to EC-372, "FUEL PUMP CONTROL MODULE (FPCM) : Component Inspection (Fuel Pump)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace fuel pump.

6.CHECK FUEL PUMP ACTIVATION SIGNAL CIRCUIT

1. Disconnect ECM harness connector.

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

2WD models

+		–		
FPCM		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M135	2	E48	127	Existed

4WD models

+		–		
FPCM		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M136	11	E48	127	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

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

FUEL PUMP CONTROL MODULE (FPCM) : Component Inspection (Fuel Pump)

INFOID:0000000013609317

1. CHECK FUEL LEVEL SENSOR UNIT AND FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Check resistance between fuel level sensor unit and fuel pump terminals.

Terminals	Condition	Resistance
1 and 3	Temperature: 25°C (77°F)	0.2 – 5.0 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel pump. Refer to FL-18, "Removal and Installation".

P0088 FUEL PRESSURE

DTC Description

INFOID:0000000013609318

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0088	00	FUEL RAIL/ SYSTEM PRESSURE (Fuel Rail/System Pressure - Too High Bank 1)	NO SUBTYPE INFORMATION	The fuel pressure in the system is too high.

POSSIBLE CAUSE

- Harness or connectors
  (Fuel pressure and temperature sensor circuit is open or shorted.)
- Fuel pressure and temperature sensor

Diagnosis Procedure

INFOID:0000000013609319

1.START ENGINE

Start the engine and let it idle.

Is it difficult to keep at idle?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL

With CONSULT

1. Warm the engine up to engine coolant temperature reaches 75°C (167°F).
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL PRESS AND TEMP SENSOR”.
3. Keep the engine speed between 500 – 1,000 rpm.
4. Perform the Active Test.
   NOTE:
   When start the test, fuel pump is activated and quantity control valve is not activated.
5. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 300 kPa (3 bar, 3.06 kg-cm^2, 43.5 psi) and 1200 kPa (12 bar, 12.24 kg-cm^2, 174 psi).

Is the inspection result normal?

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

3.ERASE DTC

1. Erase the DTC.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Start the engine and let it idle for 60 seconds.
4. Turn ignition switch OFF.
5. Turn ignition switch ON.
6. Check DTC.

Is the DTC detected again?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> INSPECTION END

4.CHECK POWER SUPPLY OF FUEL PRESSURE AND TEMPERATURE SENSOR

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

Fuel pressure and temperature sensor			Voltage
Connector	+	–	
	Terminal		
F139	4	1	4.75 – 5.25 V

Is the measured value OK?

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

5. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR POWER SUPPLY AND GROUND CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	12	F139	1	Existed
	18		4	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

6. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	65	F139	3	Existed
	67		2	

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

Is the inspection result normal?

YES >> Replace fuel pressure and temperature sensor. Refer to EM-49, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0089 QUANTITY CONTROL VALVE

DTC Description

INFOID:0000000013609320

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0089	00	Fuel pressure regulator 1 (Fuel Pressure Regulator 1 Performance)	NO SUBTYPE INFORMATION	Fuel pressure and temperature sensor has a malfunction.
	92		PFM/INCORRECT OPERATN	Fuel pressure and temperature sensor has a malfunction. The function or the instruction has a malfunction.
	94		UNEXPECTED OPERATION	Fuel pressure and temperature sensor has a malfunction. There is an unexpected instruction.

POSSIBLE CAUSE

- Harness or connectors
  (Fuel pressure and temperature sensor circuit is open or shorted.)
  (Quantity control valve circuit is open or shorted.)
- High pressure fuel system leak
- Fuel pressure and temperature sensor
- Quantity control valve

Diagnosis Procedure

INFOID:0000000013609321

1.START ENGINE

Start the engine and let it idle.

Is it difficult to keep at idle?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL

With CONSULT

1. Warm the engine up to engine coolant temperature reaches 75°C (167°F).
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL PRESS AND TEMP SENSOR”.
3. Keep the engine speed between 500 – 1,000 rpm.
4. Perform the Active Test.
   NOTE:
   When start the test, fuel pump is activated and quantity control valve is not activated.
5. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 300 kPa (3 bar, 3.06 kg/cm^2, 43.5 psi) and 1200 kPa (12 bar, 12.24 kg-cm^2, 174 psi).

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 6.

3.ERASE DTC

1. Erase the DTC.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Start the engine and let it idle for 60 seconds.
4. Turn ignition switch OFF.
5. Turn ignition switch ON.
6. Check DTC.

Is the DTC detected again?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> INSPECTION END

4. PRECONDITIONING FOR CHECKING FUEL PRESSURE AND TEMPERATURE SENSOR OUTPUT SIGNAL

CAUTION:
Refer to EC-23, "Precaution for Risk of Explosion and Injury" for work in safety.

With CONSULT

1. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “RAIL PRES (ACTUAL VALUE)”.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Slightly loosen the threaded connection of the fuel line to the fuel rail to reduce the fuel pressure.
   CAUTION:
   Collect escaping fuel with several rags.
4. Wait at least 60 seconds.
5. Retighten the threaded connection of fuel line.
6. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 0 kPa (0 bar, 0 kg/cm^2, 0 psi) and 300 kPa (3 bar, 3.06 kg/cm^2, 43.5 psi).

>> GO TO 5.

5. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL PRESS AND TEMP SENSOR”.
   NOTE:
   When start the test, fuel pump is activated and quantity control valve is not activated.
3. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 300 kPa (3 bar, 3.06 kg/cm^2, 43.5 psi) and 1200 kPa (12 bar, 12.24 kg/cm^2, 174 psi).

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 6.

6. CHECK POWER SUPPLY OF FUEL PRESSURE AND TEMPERATURE SENSOR

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

Fuel pressure and temperature sensor			Voltage
Connector	+	–	
	Terminal		
F139	4	1	4.75 – 5.25 V

Is the measured value OK?

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

7. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR POWER SUPPLY AND GROUND CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	12	F139	1	Existed
	18		4	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

8. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	65	F139	3	Existed
	67		2	

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

Is the inspection result normal?

YES >> Replace fuel pressure and temperature sensor. Refer to EM-49, "Removal and Installation".
NO >> Repair or replace error-detected parts.

9. CHECK HIGH PRESSURE FUEL SYSTEM LEAK

With CONSULT

1. Start the engine and warm it up to engine coolant temperature reaches 75°C (167°F).
2. Turn ignition switch OFF.
3. Turn ignition switch ON.
4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL HI PRESS CIRC FOR LEAKTIGHTNESS”.
5. Connect charger to battery.
6. Set the vehicle to the following conditions.

Item	Condition
Engine coolant temperature	75 – 105°C (167 – 221°F)
Fuel temperature	40 – 80°C (104 – 176°F)
Engine speed	550 – 800 rpm
Electrical load	OFF

7. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 19 MPa (190 bar, 193.8 kg/cm^2, 2755 psi) and 21 MPa (210 bar, 214.2 kg/cm^2, 3045 psi).
8. Perform the Active Test.

CAUTION:
Never turn ignition switch OFF.
NOTE:
When the result is normal, the fuel rail pressure value must not drop below 10 MPa (100 bar, 102 kg/cm^2, 1450 psi) within 3 minutes.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Check high pressure fuel line for fuel leak.

10. CHECK QUANTITY CONTROL VALVE FUNCTION

With CONSULT

1. Check that low fuel pressure system is normal.
2. Set the vehicle to the following conditions.

Item	Condition
Engine coolant temperature	75 – 105°C (167 – 221°F)
Fuel temperature	40 – 80°C (104 – 176°F)
Engine speed	50 rpm or more
A/C	OFF

3. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK QUANTITY CONTROL VALVE”.
4. Perform the Active Test.

NOTE:
When the result is normal, the fuel rail pressure value is increased to approximately 20 MPa (200 bar, 204 kg/cm^2, 2900 psi).

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 11.

11. CHECK QUANTITY CONTROL VALVE

Check quantity control valve. Refer to EC-766, "Component Inspection (Quantity Control Valve)".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace high pressure fuel pump. Refer to EM-44, "Removal and Installation".

12. CHECK QUANTITY CONTROL VALVE CONTROL CIRCUIT

1. Disconnect ECM harness connector and quantity control valve harness connector.
2. Check the continuity between ECM harness connector and quantity control valve harness connector.

+		–		Continuity
ECM		Quantity control valve		
Connector	Terminal	Connector	Terminal	
F149	75	F169	1	Existed
	76		2	

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

13. ERASE DTC

1. Check the following.

- If the actuation angle of the quantity control valve matches the specified value exactly, synchronization between the camshaft and crankshaft must be checked. (Substitute value in emergency mode)
- If DTC related to camshaft is detected, perform trouble diagnosis for the detected DTC.
- If DTC related to crankshaft is detected, perform trouble diagnosis for the detected DTC.

2. Erase the DTC.
3. Turn ignition switch OFF and wait at least 30 seconds.
4. Start the engine and let it idle for 60 seconds.
5. Check DTC.

Is the DTC detected again?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".

NO >> INSPECTION END

Component Inspection (Quantity Control Valve)

INFOID:0000000013609322

1. CHECK QUANTITY CONTROL VALVE-1

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

ECM		Resistance (Ω)
+	–	
Terminal		
75	76	0.3 – 1.1

Is the inspection result normal?

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

2. CHECK QUANTITY CONTROL VALVE-2

1. Disconnect quantity control valve harness connector.
2. Check the resistance between quantity control valve terminals.

Quantity control valve		Resistance (Ω)
+	–	
Terminal		
1	2	0.3 – 1.1

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure fuel pump. Refer to EM-44, "Removal and Installation".

P008A LOW FUEL PRESSURE CONTROL SYSTEM

ECM

ECM : DTC Description

INFOID:0000000013609323

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P008A	00	Low pressure fuel system pressure (Low Pressure Fuel System Pressure - Too Low)	NO SUBTYPE INFORMATION	The pressure in the fuel low pressure circuit is too low.

POSSIBLE CAUSE

- Low pressure fuel control system

ECM : Diagnosis Procedure

INFOID:0000000013609324

1.CHECK DTC IN FPCM

With CONSULT

Check DTC in “FPCM”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to EC-157, "2WD : DTC Index".
NO >> INSPECTION END

FUEL PUMP CONTROL MODULE (FPCM)

FUEL PUMP CONTROL MODULE (FPCM) : DTC Description

INFOID:0000000013609325

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
P008A	00	Low pressure fuel system pressure (Low pressure fuel system pressure - too low)	NO SUBTYPE INFORMATION	Fuel pressure deviates from the nominal pressure (below of the specified limit) or fuel pressure less than minimum pressure

POSSIBLE CAUSE

- Harness and connectors (Fuel pressure sensor circuit is open or shorted.)
- Fuel pressure sensor

FAIL-SAFE

Not application

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start the engine and let it idle at least 10 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check self-diagnostic result of “FPCM”.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-381, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure

INFOID:0000000013609326

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch OFF.
2. Connect pressure gauge.
3. Start the engine and let it idle.
4. On CONSULT screen, select “FSCM” >> ”DATA MONITOR” >> “FUEL PRESSSEN”.
5. Check that the indicated value is between 350 kPa (3.5 bar, 3.57 kg/cm^2, 50.75 psi) and 1000 kPA (10 bar, 10.2 kg/cm^2, 145 psi).

Is the inspection result normal?

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

2.CHECK FUEL PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect fuel pressure sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel pressure sensor harness connector terminals.

Fuel pressure sensor			Voltage
Connector	+	–	
	Terminal		
M390	1	3	4.75 – 5.25 V

Is the inspection result normal?

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

3.CHECK FUEL PRESSURE SENSOR POWER SUPPLY AND GROUND CIRCUIT

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

+		–		Continuity
FPCM		Fuel pressure sensor		
Connector	Terminal	Connector	Terminal	
M136	5	M390	3	Existed
	3		1	

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 FPCM POWER SUPPLY AND GROUND CIRCUIT

Check FPCM power supply and ground circuit. Refer to EC-208, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace FPCM. Refer to EC-964, "Removal and Installation".
NO >> Repair or replace error-detected parts.

5.CHECK FUEL PRESSURE SENSOR SIGNAL CIRCUIT

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

+		–		Continuity
FPCM		Fuel pressure sensor		
Connector	Terminal	Connector	Terminal	
M136	4	M390	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace fuel pressure sensor. Refer to EM-49, "Exploded View".
NO >> Repair or replace error-detected parts.

P008B LOW FUEL PRESSURE CONTROL SYSTEM

DTC Description

INFOID:0000000013609327

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P008B	00	Low pressure fuel system (Low Pressure Fuel System Pressure - Too High)	NO SUBTYPE INFORMATION	The pressure in the fuel low pressure circuit is too high.

POSSIBLE CAUSE

- Low pressure fuel control system

Diagnosis Procedure

INFOID:0000000013609328

1.CHECK DTC IN FPCM

With CONSULT

Check DTC in “FPCM”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to EC-157, "2WD : DTC Index".

NO >> INSPECTION END

P0096 CHARGE AIR TEMPERATURE SENSOR DOWNSTREAM OF THROTTLE VALVE

DTC Description

INFOID:0000000013609329

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0096	64	INTAKE AIR TEMP SENSOR 2 B1 (Intake Air Temperature Sensor 2 Circuit Range/Performance Bank 1)	SIGNAL PLAUSIBILITY ERROR	Charge air temperature sensor 2 (cylinder bank 1) has a malfunction. There is an implausible signal.
	84		SIG BELOW ALLOWABLE RANGE	Charge air temperature sensor 2 (cylinder bank 1) has a malfunction. There is a signal below the permissible limit value.

POSSIBLE CAUSE

- Harness or connectors
  (charge air temperature sensor downstream of throttle valve circuit is open or shorted.)
- Charge air temperature sensor downstream of throttle valve

Diagnosis Procedure

INFOID:0000000013609330

1. CHECK CHARGE AIR TEMPERATURE SENSOR DOWNSTREAM OF THROTTLE VALVE SIGNAL

With CONSULT

1. Start the engine and warm it up to engine coolant temperature reaches 65°C (149°F) – 140°C (284°F).
2. Turn ignition switch OFF and wait at least 60 seconds.
3. Turn ignition switch ON.
4. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “C/AIR TEMP/S U/STRM THRTL” and “C/AIR TEMP/S D/STRM THRTL”.
5. Check that “C/AIR TEMP/S U/STRM THRTL” and “C/AIR TEMP/S D/STRM THRTL” indicate about the same value.
   NOTE:
   When the charge air temperature sensor downstream of throttle valve harness connector is disconnected, −30°C (−22°F) is displayed.

Is the inspection result normal?

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

2. CHECK POWER SUPPLY OF CHARGE AIR TEMPERATURE SENSOR DOWNSTREAM OF THROTTLE VALVE

1. Turn ignition switch OFF.
2. Disconnect charge air temperature sensor downstream of throttle valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between charge air temperature sensor downstream of throttle valve harness connector and ground.

Charge air temperature sensor downstream of throttle valve			Voltage
Connector	+	−	
	Terminal		
F135	2	1	4.75 – 5.25 V

Is the measured value OK?

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

3. CHECK CHARGE AIR TEMPERATURE SENSOR DOWNSTREAM OF THROTTLE VALVE POWER SUP-

PLY AND GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and charge air temperature sensor downstream of throttle valve harness connector.

+		–		Continuity
ECM		Charge air temperature sensor downstream of throttle valve		
Connector	Terminal	Connector	Terminal	
F149	11	F135	1	Existed
	40		2	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4. CHECK CHARGE AIR TEMPERATURE SENSOR DOWNSTREAM OF THROTTLE VALVE

Check charge air temperature sensor downstream of throttle valve. Refer to EC-385, "Component Inspection (Charge Air Temperature Sensor Downstream of Throttle Valve)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Replace charge air temperature sensor downstream of throttle valve. Refer to EM-28, "Exploded View".

Component Inspection (Charge Air Temperature Sensor Downstream of Throttle Valve)

INFOID:0000000013609331

1. CHECK CHARGE AIR TEMPERATURE SENSOR DOWNSTREAM OF THROTTLE VALVE

1. Turn ignition switch OFF.
2. Disconnect charge air temperature sensor downstream of throttle valve harness connector.
3. Check the resistance between charge air temperature sensor downstream of throttle valve terminals.

Charge air temperature sensor downstream of throttle valve		Temperature [°C (°F)]	Resistance (kΩ)
+	–		
Terminal			
1	2	0 (32)	31.00 – 34.00
		10 (50)	18.90 – 20.89
		20 (68)	11.87 – 13.11
		30 (86)	7.66 – 8.46
		40 (104)	5.06 – 5.59
		50 (122)	3.43 – 3.78
		60 (140)	2.37 – 2.61

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace charge air temperature sensor downstream of throttle valve. Refer to EM-29, "Removal and Installation".

P0099 CHARGE AIR TEMPERATURE SENSOR DOWNSTREAM OF THROTTLE VALVE

DTC Description

INFOID:0000000013609332

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0099	2A	INTAKE AIR TEMP SENSOR 2 B1 (Intake Air Temperature Sensor 2 Circuit Intermittent/Erratic Bank 1)	SIGNAL STUCK IN RANGE	Intake air temperature sensor 2 (cylinder bank 1) has a sporadic malfunction. There is no signal change.

POSSIBLE CAUSE

- Harness or connectors
  (charge air temperature sensor downstream of throttle valve circuit is open or shorted.)
- Charge air temperature sensor downstream of throttle valve

Diagnosis Procedure

INFOID:0000000013609333

1.CHECK CHARGE AIR TEMPERATURE SENSOR DOWNSTREAM OF THROTTLE VALVE SIGNAL

With CONSULT

1. Start the engine and warm it up to engine coolant temperature reaches 65°C (149°F).
2. Turn ignition switch OFF and wait at least 60 seconds.
3. Turn ignition switch ON.
4. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “C/AIR TEMP/S U/STRM THRTL” and “C/AIR TEMP/S D/STRM THRTL”.
5. Check that “C/AIR TEMP/S U/STRM THRTL” and “C/AIR TEMP/S D/STRM THRTL” indicate about the same value.
   NOTE:
   When the charge air temperature sensor downstream of throttle valve harness connector is disconnected, −30°C (−22°F) is displayed.

Is the inspection result normal?

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

2.CHECK POWER SUPPLY OF CHARGE AIR TEMPERATURE SENSOR DOWNSTREAM OF THROTTLE VALVE

1. Turn ignition switch OFF.
2. Disconnect charge air temperature sensor downstream of throttle valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between charge air temperature sensor downstream of throttle valve harness connector and ground.

Charge air temperature sensor downstream of throttle valve			Voltage
Connector	+	−	
	Terminal		
F135	2	1	4.75 – 5.25 V

Is the measured value OK?

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

3.CHECK CHARGE AIR TEMPERATURE SENSOR DOWNSTREAM OF THROTTLE VALVE POWER SUPPLY AND GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and charge air temperature sensor downstream of throttle valve harness connector.

+		–		Continuity
ECM		Charge air temperature sensor downstream of throttle valve		
Connector	Terminal	Connector	Terminal	
F149	11	F135	1	Existed
	40		2	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4. CHECK CHARGE AIR TEMPERATURE SENSOR DOWNSTREAM OF THROTTLE VALVE

Check charge air temperature sensor downstream of throttle valve. Refer to EC-387, "Component Inspection (Charge Air Temperature Sensor Downstream of Throttle Valve)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Replace charge air temperature sensor downstream of throttle valve. Refer to EM-29, "Removal and Installation".

Component Inspection (Charge Air Temperature Sensor Downstream of Throttle Valve)

INFOID:0000000013609334

1. CHECK CHARGE AIR TEMPERATURE SENSOR DOWNSTREAM OF THROTTLE VALVE

1. Turn ignition switch OFF.
2. Disconnect charge air temperature sensor downstream of throttle valve harness connector.
3. Check the resistance between charge air temperature sensor downstream of throttle valve terminals.

Charge air temperature sensor downstream of throttle valve		Temperature [°C (°F)]	Resistance (kΩ)
+	–		
Terminal			
1	2	0 (32)	31.00 – 34.00
		10 (50)	18.90 – 20.89
		20 (68)	11.87 – 13.11
		30 (86)	7.66 – 8.46
		40 (104)	5.06 – 5.59
		50 (122)	3.43 – 3.78
		60 (140)	2.37 – 2.61

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace charge air temperature sensor downstream of throttle valve. Refer to EM-29, "Removal and Installation".

P0106 PRESSURE SENSOR DOWNSTREAM OF THROTTLE VALVE

DTC Description

INFOID:0000000013609335

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0106	00	MAP/BARO PRESSURE (Manifold Absolute Pressure/ Barometric Pressure Sensor Circuit Range/Performance)	NO SUBTYPE INFORMATION	The pressure sensor downstream of throttle valve has a malfunction.
	16		CIRC VOLT BELOW THRESH-OLD	The pressure sensor downstream of throttle valve has a malfunction. The limit value for electrical voltage has not been attained.
	17		CIRC VOLT ABOVE THRESH-OLD	The pressure sensor downstream of throttle valve has a malfunction. The limit value for electrical voltage has been exceeded.
	28		SG BS LVL O-OF RNG/ZR AJST ERR	The pressure sensor downstream of throttle valve has a malfunction. The signal offset is outside the permissible range.
	2A		SIGNAL STUCK IN RANGE	The pressure sensor downstream of throttle valve has a malfunction. There is no signal change.
	93		NO OPERATION	The pressure sensor downstream of throttle valve has a malfunction. There are no instructions.

POSSIBLE CAUSE

- Pressure sensor downstream of throttle valve

Diagnosis Procedure

INFOID:0000000013609336

1.REPLACE PRESSURE SENSOR DOWNSTREAM OF THROTTLE VALVE

Replace pressure sensor downstream of throttle valve. Refer to EM-29, "Removal and Installation".

>> INSPECTION END

P0107 PRESSURE SENSOR DOWNSTREAM OF THROTTLE VALVE

DTC Description

INFOID:0000000013609337

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0107	11	MNFLD ABSLT PRES/BAR PRES (Manifold Absolute Pressure/ Barometric Pressure Sensor Circuit Low)	CIRCUIT SHORT TO GROUND	The pressure sensor downstream of throttle valve has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

- Harness and connectors
  (Pressure sensor downstream of throttle valve circuit is open or shorted.)
- Pressure sensor downstream of throttle valve

Diagnosis Procedure

INFOID:0000000013609338

1.CHECK THROTTLE VALVE ACTUATOR FUNCTION

With CONSULT

1. Start the engine and warm it up to coolant temperature reaches more than 80°C (176°F).
2. Turn ignition switch OFF.
3. Turn ignition switch ON (engine stopped).
4. Wait at least 60 seconds.
5. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK THROTTLE VALVE ACTUATOR”.
6. Perform Active Test.

- Check the value of monitor items as following condition

Item	Condition	Value
KICKDOWN	Accelerator pedal: fully released	NOT ACTIVE
ACCELERATOR PEDAL SEN 1		0.2 – 0.5 V
THRTL VALVE ACTUATOR1 V		0.6 – 1.0 V
THRTL VALVE ACTUATOR2 V		4.0 – 4.4 V

- Check the value of monitor items as following condition

Item	Condition	Value
KICKDOWN	Accelerator pedal: fully depressed	ACTIVE
ACCELERATOR PEDAL SEN 1		4.3 – 4.8 V
THRTL VALVE ACTUATOR1 V		3.8 – 4.6 V
THRTL VALVE ACTUATOR2 V		0.4 – 1.2 V

Is the inspection result normal?

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

2.CHECK THROTTLE VALVE ACTUATOR

Check throttle valve actuator. Refer to EC-410, "Component Inspection (Throttle Valve Actuator)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace throttle valve actuator. Refer to EM-29, "Removal and Installation".

3.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between throttle valve actuator harness connector and ground.

+		–	Voltage (Approx.)
Throttle valve actuator			
Connector	Terminal		
F148	4	Ground	5 V

Is the inspection result normal?

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

4. CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	4	F149	17	Existed

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

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

5. CHECK THROTTLE VALVE POSITION SENSOR CIRCUIT

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

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	3	F149	38	Existed
	5		62	
	6		14	

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

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

6. CHECK PRESSURE SENSOR DOWNSTREAM OF THROTTLE VALVE OUTPUT VOLTAGE

With CONSULT

1. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “PRES/S D/STRM THRTL VLV V”.
2. Check the value as the following conditions.

Item	Condition	Value
PRES/S D/STRM THRTL VLV V	Ignition switch ON (engine stopped)	1 – 2 V
	Engine running at idle	0.5 – 0.8 V

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> GO TO 7.

7. CHECK PRESSURE SENSOR DOWNSTREAM OF THROTTLE VALVE CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and pressure sensor downstream of throttle valve harness connector.

+		–		Continuity
Pressure sensor downstream of throttle valve		ECM		
Connector	Terminal	Connector	Terminal	
F137	1	F149	91	Existed
	2		12	
	3		18	

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

Is the inspection result normal?

YES >> Replace pressure sensor downstream of throttle valve. Refer to EM-29, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0108 PRESSURE SENSOR DOWNSTREAM OF THROTTLE VALVE

DTC Description

INFOID:0000000013609339

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	Malfunction type	
P0108	12	MNFLD ABSLT PRES/BAR PRES (Manifold absolute pressure/ barometric pressure sensor circuit high)	CIRCUIT SHORT TO BATTERY	The pressure sensor downstream of throttle valve has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

- Harness and connectors
  (Pressure sensor downstream of throttle valve circuit is open or shorted.)
- Pressure sensor downstream of throttle valve

Diagnosis Procedure

INFOID:0000000013609340

1.CHECK THROTTLE VALVE ACTUATOR FUNCTION

With CONSULT

1. Start the engine and warm it up to coolant temperature reaches more than 80°C (176°F).
2. Turn ignition switch OFF.
3. Turn ignition switch ON (engine stopped).
4. Wait at least 60 seconds.
5. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK THROTTLE VALVE ACTUATOR”.
6. Perform Active Test.

- Check the value of monitor items as following condition

Item	Condition	Value
KICKDOWN	Accelerator pedal: fully released	NOT ACTIVE
ACCELERATOR PEDAL SEN 1		0.2 – 0.5 V
THRTL VALVE ACTUATOR1 V		0.6 – 1.0 V
THRTL VALVE ACTUATOR2 V		4.0 – 4.4 V

- Check the value of monitor items as following condition

Item	Condition	Value
KICKDOWN	Accelerator pedal: fully depressed	ACTIVE
ACCELERATOR PEDAL SEN 1		4.3 – 4.8 V
THRTL VALVE ACTUATOR1 V		3.8 – 4.6 V
THRTL VALVE ACTUATOR2 V		0.4 – 1.2 V

Is the inspection result normal?

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

2.CHECK THROTTLE VALVE ACTUATOR

Check throttle valve actuator. Refer to EC-410, "Component Inspection (Throttle Valve Actuator)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace throttle valve actuator. Refer to EM-29, "Removal and Installation".

3. CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between throttle valve actuator harness connector and ground.

+		–	Voltage (Approx.)
Throttle valve actuator			
Connector	Terminal		
F148	4	Ground	5 V

Is the inspection result normal?

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

4. CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	4	F149	17	Existed

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

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

5. CHECK THROTTLE VALVE POSITION SENSOR CIRCUIT

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

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	3	F149	38	Existed
	5		62	
	6		14	

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

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

6. CHECK PRESSURE SENSOR DOWNSTREAM OF THROTTLE VALVE OUTPUT VOLTAGE

With CONSULT

1. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “PRES/S D/STRM THRTL VLV V”.
2. Check the value as the following conditions.

Item	Condition	Value
PRES/S D/STRM THRTL VLV V	Ignition switch ON (engine stopped)	1 – 2 V
	Engine running at idle	0.5 – 0.8 V

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> GO TO 7.

7. CHECK PRESSURE SENSOR DOWNSTREAM OF THROTTLE VALVE CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and pressure sensor downstream of throttle valve harness connector.

+		–		Continuity
Pressure sensor downstream of throttle valve		ECM		
Connector	Terminal	Connector	Terminal	
F137	1	F149	91	Existed
	2		12	
	3		18	

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

Is the inspection result normal?

YES >> Replace pressure sensor downstream of throttle valve. Refer to EM-29, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0115 ENGINE COOLANT TEMPERATURE SENSOR

DTC Description

INFOID:0000000013609341

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0115	00	Engine coolant temp sensor 1 (Engine Coolant Temperature Sensor 1 Circuit)	NO SUBTYPE INFORMATION	Engine coolant temperature sensor has an electrical malfunction.

POSSIBLE CAUSE

- Harness and connectors
  (Engine coolant temperature sensor circuit is open or shorted.)
- Engine coolant temperature sensor

Diagnosis Procedure

INFOID:0000000013609342

1.INSPECTION START

Does the coolant temperature rise too quickly and become too high?

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

2.CHECK COOLANT THERMOSTAT HEATING ELEMENT

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK COOLANT THERMOSTAT HEATING ELEMENT”.
3. Set the vehicle under the following conditions:
   CAUTION:
   During the test, cooling fan is activated at maximum speed.

Item	Condition
Vehicle speed	At idle
Engine coolant temperature	Less then 100°C (122°F)
A/C	OFF

4. Perform the Active Test.
   NOTE:
   - When a coolant temperature reaches between 92°C (198°F) and 100°C (212°F), the test is started automatically.
   - The test takes up to approximately 10 minutes.

Is the inspection result normal?

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

3.CHECK COOLANT THERMOSTAT HEATING ELEMENT

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK COOLANT THERMOSTAT HEATING ELEMENT”.
3. Set the vehicle under the following conditions:
   CAUTION:
   During the test, cooling fan is activated at maximum speed.

Item	Condition
Vehicle speed	At idle
Engine coolant temperature	Less then 50°C (122°F)
A/C	OFF

4. Perform the Active Test.
NOTE:
- When a coolant temperature reaches between 65°C (149°F) and 70°C (158°F), the test is started automatically.
- The test takes up to approximately 10 minutes.

Is the inspection result normal?

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

4. CHECK COOLANT THERMOSTAT HEATER ELEMENT

Check engine coolant thermostat heating element. Refer to EC-417, "Component Inspection (Coolant Thermostat Heater Element)".

Is the inspection result normal?

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

5. CHECK ENGINE COOLANT THERMOSTAT HEARTER ELEMENT POWER SUPPLY

1. Check that the #214 fuse is not blowing.
2. Disconnect coolant thermostat heater element harness connector.
3. Turn ignition switch ON.
4. Check the voltage between coolant thermostat heater element harness connector and ground.

+		–	Voltage
Coolant thermostat heater element			
Connector	Terminal		
F151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check engine coolant thermostat heating element power supply circuit.

6. CHECK COOLANT THERMOSTAT HEATER ELEMENT CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and coolant thermostat heater element harness connector.

+		–		Continuity
ECM		Coolant thermostat heater element		
Connector	Terminal	Connector	Terminal	
F149	4	F151	1	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

7. CHECK ENGINE COOLANT TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.

3. Turn ignition switch ON.
4. Check the voltage between engine coolant temperature sensor harness connector terminals.

Engine coolant temperature sensor			Voltage
Connector	+	–	
	Terminal		
F133	2	1	4.75 – 5.25 V

Is the inspection result normal?

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

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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine coolant temperature sensor harness connector and ECM harness connector.

+		–		Continuity
ECM		Engine coolant temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	11	F133	1	Existed
	86		2	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

9. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-418, "Component Inspection (Engine Coolant Temperature Sensor)".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace engine coolant temperature sensor. Refer to EC-27, "Component Parts Location".

10. CHECK INTERMITTENT INCIDENT

Refer to GI-56, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Coolant Thermostat Heater Element)

INFOID:0000000013609343

1. CHECK COOLANT THERMOSTAT HEATER ELEMENT

1. Turn ignition switch OFF.
2. Disconnect coolant thermostat heater element harness connector.
3. Check the resistance between coolant thermostat heater element terminals.

Coolant thermostat heater element		Condition	Resistance (Ω)
+	–		
Terminal			
1	2	25°C (77°F)	8.5 – 10.5

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace coolant thermostat (built-in engine coolant thermostat heating element). Refer to CO-21, "Removal and Installation".

Component Inspection (Engine Coolant Temperature Sensor)

INFOID:0000000013609344

1. TEST INTERNAL RESISTANCE OF COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Remove engine coolant temperature sensor.
3. Check the resistance between coolant temperature sensor terminals.

+	–	Temperature [°C (°F)]	Resistance (Ω)
Terminal			
1	2	20°C (68°F)	3,010 – 3,220
		30°C (86°F)	1,950 – 2,070
		40°C (104°F)	1,290 – 1,370
		50°C (122°F)	880 – 930
		60°C (140°F)	610 – 650
		70°C (158°F)	430 – 460
		80°C (176°F)	310 – 330
		90°C (194°F)	230 – 240
		100°C (212°F)	170 – 180

Is the measured value OK?

YES >> INSPECTION END
NO >> Replace coolant temperature sensor. Refer to EC-27, "Component Parts Location".

P0116 ENGINE COOLANT TEMPERATURE SENSOR

DTC Description

INFOID:0000000013609345

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0116	28	ENG COOLANT TEMP SENSOR 1 (Engine Coolant Temperature Sensor 1 Circuit Range/Performance)	SG BS LVL O-OF RNG/ZR AJST ERR	Engine coolant temperature sensor has a malfunction. The signal offset is outside the permissible range.
	62		SIGNAL COMPARE ERROR	Engine coolant temperature sensor has a malfunction. The signal comparison has a malfunction.
	64		SIGNAL PLAUSIBILITY ERROR	Engine coolant temperature sensor has a malfunction. There is an implausible signal.
	84		SIG BELOW ALLOWABLE RANGE	Engine coolant temperature sensor has a malfunction. There is a signal below the permissible limit value.
	85		SIG ABOVE ALLOWABLE RANGE	Engine coolant temperature sensor has a malfunction. There is a signal above the permissible limit value.
	86		SIGNAL INVALID	Engine coolant temperature sensor has a malfunction. There is an incorrect signal.

POSSIBLE CAUSE

- Harness and connectors
  (Engine coolant temperature sensor circuit is open or shorted.)
  (Coolant thermostat heater element circuit is open or shorted.)
- Engine coolant temperature sensor
- Coolant thermostat heater element

Diagnosis Procedure

INFOID:0000000013609346

1.INSPECTION START

Does the coolant temperature rise too quickly and become too high?

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

2.CHECK COOLANT THERMOSTAT HEATING ELEMENT

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK COOLANT THERMOSTAT HEATING ELEMENT”.
3. Set the vehicle under the following conditions:
   CAUTION:
   During the test, cooling fan is activated at maximum speed.

Item	Condition
Vehicle speed	At idle
Engine coolant temperature	Less then 100°C (122°F)
A/C	OFF

4. Perform the Active Test.
   NOTE:
   - When a coolant temperature reaches between 92°C (198°F) and 100°C (212°F), the test is started automatically.

- The test takes up to approximately 10 minutes.

Is the inspection result normal?

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

3. CHECK COOLANT THERMOSTAT HEATING ELEMENT

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK COOLANT THERMOSTAT HEATING ELEMENT”.
3. Set the vehicle under the following conditions:
   CAUTION:
   During the test, cooling fan is activated at maximum speed.

Item	Condition
Vehicle speed	At idle
Engine coolant temperature	Less then 50°C (122°F)
A/C	OFF

4. Perform the Active Test.
   NOTE:
   - When a coolant temperature reaches between 65°C (149°F) and 70°C (158°F), the test is started automatically.
   - The test takes up to approximately 10 minutes.

Is the inspection result normal?

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

4. CHECK COOLANT THERMOSTAT HEATER ELEMENT

Check engine coolant thermostat heating element. Refer to EC-402, "Component Inspection (Coolant Thermostat Heater Element)".

Is the inspection result normal?

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

5. CHECK ENGINE COOLANT THERMOSTAT HEARTER ELEMENT POWER SUPPLY

1. Check that the #214 fuse is not blowing.
2. Disconnect coolant thermostat heater element harness connector.
3. Turn ignition switch ON.
4. Check the voltage between coolant thermostat heater element harness connector and ground.

+		–	Voltage
Coolant thermostat heater element			
Connector	Terminal		
F151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check engine coolant thermostat heating element power supply circuit.

6. CHECK COOLANT THERMOSTAT HEATER ELEMENT CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and coolant thermostat heater element harness connector.

+		–		Continuity
ECM		Coolant thermostat heater element		
Connector	Terminal	Connector	Terminal	
F149	4	F151	1	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

7. CHECK ENGINE COOLANT TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between engine coolant temperature sensor harness connector terminals.

Engine coolant temperature sensor			Voltage
Connector	+	–	
	Terminal		
F133	2	1	4.75 – 5.25 V

Is the inspection result normal?

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

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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine coolant temperature sensor harness connector and ECM harness connector.

+		–		Continuity
ECM		Engine coolant temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	11	F133	1	Existed
	86		2	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

9. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-402, "Component Inspection (Engine Coolant Temperature Sensor)".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace engine coolant temperature sensor. Refer to EC-27, "Component Parts Location".

10. CHECK INTERMITTENT INCIDENT

Refer to GI-56, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Coolant Thermostat Heater Element)

INFOID:0000000013609347

1. CHECK COOLANT THERMOSTAT HEATER ELEMENT

1. Turn ignition switch OFF.
2. Disconnect coolant thermostat heater element harness connector.
3. Check the resistance between coolant thermostat heater element terminals.

Coolant thermostat heater element		Condition	Resistance (Ω)
+	–		
Terminal			
1	2	25°C (77°F)	8.5 – 10.5

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace coolant thermostat (built-in engine coolant thermostat heating element). Refer to CO-21, "Removal and Installation".

Component Inspection (Engine Coolant Temperature Sensor)

INFOID:0000000013609348

1. TEST INTERNAL RESISTANCE OF COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Remove engine coolant temperature sensor.
3. Check the resistance between coolant temperature sensor terminals.

+	–	Temperature [°C (°F)]	Resistance (Ω)
Terminal			
1	2	20°C (68°F)	3,010 – 3,220
		30°C (86°F)	1,950 – 2,070
		40°C (104°F)	1,290 – 1,370
		50°C (122°F)	880 – 930
		60°C (140°F)	610 – 650
		70°C (158°F)	430 – 460
		80°C (176°F)	310 – 330
		90°C (194°F)	230 – 240
		100°C (212°F)	170 – 180

Is the measured value OK?

YES >> INSPECTION END
NO >> Replace coolant temperature sensor. Refer to EC-27, "Component Parts Location".

P0117, P0118 ENGINE COOLANT TEMPERATURE SENSOR

DTC Description

INFOID:0000000013609349

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P0117	11	ENG COOLANT TEMP SENSOR 1 (Engine coolant temperature sensor 1 circuit low)	CIRCUIT SHORT TO GROUND	Engine coolant temperature sensor has a short circuit to ground. There is a short circuit to ground.
P0118	12	ENGINE COOLANT TEMP SEN 1 (Engine coolant temperature sensor 1 circuit high)	CIRCUIT SHORT TO BATTERY	Engine coolant temperature sensor has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

- Harness and connectors
  (Engine coolant temperature sensor circuit is open or shorted.)
- Engine coolant temperature sensor

Diagnosis Procedure

INFOID:0000000013609350

1.INSPECTION START

Does the coolant temperature rise too quickly and become too high?

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

2.CHECK COOLANT THERMOSTAT HEATING ELEMENT

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK COOLANT THERMOSTAT HEATING ELEMENT”.
3. Set the vehicle under the following conditions:
   CAUTION:
   During the test, cooling fan is activated at maximum speed.

Item	Condition
Vehicle speed	At idle
Engine coolant temperature	Less then 100°C (122°F)
A/C	OFF

4. Perform the Active Test.
   NOTE:
   - When a coolant temperature reaches between 92°C (198°F) and 100°C (212°F), the test is started automatically.
   - The test takes up to approximately 10 minutes.

Is the inspection result normal?

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

3.CHECK COOLANT THERMOSTAT HEATING ELEMENT

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK COOLANT THERMOSTAT HEATING ELEMENT”.

3. Set the vehicle under the following conditions:
CAUTION:
During the test, cooling fan is activated at maximum speed.

Item	Condition
Vehicle speed	At idle
Engine coolant temperature	Less then 50°C (122°F)
A/C	OFF

4. Perform the Active Test.
NOTE:
- When a coolant temperature reaches between 65°C (149°F) and 70°C (158°F), the test is started automatically.
- The test takes up to approximately 10 minutes.

Is the inspection result normal?

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

4. CHECK COOLANT THERMOSTAT HEATER ELEMENT

Check engine coolant thermostat heating element. Refer to EC-417, "Component Inspection (Coolant Thermostat Heater Element)".

Is the inspection result normal?

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

5. CHECK ENGINE COOLANT THERMOSTAT HEARTER ELEMENT POWER SUPPLY

1. Check that the #214 fuse is not blowing.
2. Disconnect coolant thermostat heater element harness connector.
3. Turn ignition switch ON.
4. Check the voltage between coolant thermostat heater element harness connector and ground.

+		−	Voltage
Coolant thermostat heater element			
Connector	Terminal		
F151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check engine coolant thermostat heating element power supply circuit.

6. CHECK COOLANT THERMOSTAT HEATER ELEMENT CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and coolant thermostat heater element harness connector.

+		−		Continuity
ECM		Coolant thermostat heater element		
Connector	Terminal	Connector	Terminal	
F149	4	F151	1	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

7. CHECK ENGINE COOLANT TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between engine coolant temperature sensor harness connector terminals.

Engine coolant temperature sensor			Voltage
Connector	+	–	
	Terminal		
F133	2	1	4.75 – 5.25 V

Is the inspection result normal?

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

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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine coolant temperature sensor harness connector and ECM harness connector.

+		–		Continuity
ECM		Engine coolant temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	11	F133	1	Existed
	86		2	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

9. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-418, "Component Inspection (Engine Coolant Temperature Sensor)".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace engine coolant temperature sensor. Refer to EC-27, "Component Parts Location".

10. CHECK INTERMITTENT INCIDENT

Refer to GI-56, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Coolant Thermostat Heater Element)

INFOID:0000000013609351

1. CHECK COOLANT THERMOSTAT HEATER ELEMENT

1. Turn ignition switch OFF.
2. Disconnect coolant thermostat heater element harness connector.
3. Check the resistance between coolant thermostat heater element terminals.

Coolant thermostat heater element		Condition	Resistance (Ω)
+	–		
Terminal			
1	2	25°C (77°F)	8.5 – 10.5

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace coolant thermostat (built-in engine coolant thermostat heating element). Refer to CO-21, "Removal and Installation".

Component Inspection (Engine Coolant Temperature Sensor)

INFOID:0000000013609352

1. TEST INTERNAL RESISTANCE OF COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Remove engine coolant temperature sensor.
3. Check the resistance between coolant temperature sensor terminals.

+	–	Temperature [°C (°F)]	Resistance (Ω)
Terminal			
1	2	20°C (68°F)	3,010 – 3,220
		30°C (86°F)	1,950 – 2,070
		40°C (104°F)	1,290 – 1,370
		50°C (122°F)	880 – 930
		60°C (140°F)	610 – 650
		70°C (158°F)	430 – 460
		80°C (176°F)	310 – 330
		90°C (194°F)	230 – 240
		100°C (212°F)	170 – 180

Is the measured value OK?

YES >> INSPECTION END
NO >> Replace coolant temperature sensor. Refer to EC-27, "Component Parts Location".

P0119 ENGINE COOLANT TEMPERATURE SENSOR

DTC Description

INFOID:0000000013609353

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0119	00	Engine coolant temp sensor 1 (Engine Coolant Temperature Sensor 1 Circuit Intermittent)	NO SUBTYPE INFORMATION	Engine coolant temperature sensor has an electrical malfunction.
	27		SIG RTE OF CHNG ABV THRESHLD	Engine coolant temperature sensor has an electrical malfunction. The signal change rate is above the permissible limit value.

POSSIBLE CAUSE

- Harness and connectors
  (Coolant temperature sensor circuit is open or shorted.)
- Coolant temperature sensor

Diagnosis Procedure

INFOID:0000000013609354

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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

Engine coolant temperature sensor			Voltage
Connector	+	–	
	Terminal		
F133	2	1	4.75 – 5.25 V

Is the inspection result normal?

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

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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine coolant temperature sensor harness connector and ECM harness connector.

+		–		Continuity
ECM		Engine coolant temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	11	F133	1	Existed
	86		2	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

3.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-408, "Component Inspection (Engine Coolant Temperature Sensor)".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace engine coolant temperature sensor. Refer to EC-27, "Component Parts Location".

4.CHECK INTERMITTENT INCIDENT

Refer to GI-56, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Engine Coolant Temperature Sensor)

INFOID:0000000013609355

1.TEST INTERNAL RESISTANCE OF COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Remove engine coolant temperature sensor.
3. Check the resistance between coolant temperature sensor terminals.

+	–	Temperature [°C (°F)]	Resistance (Ω)
Terminal			
1	2	20°C (68°F)	3050 – 3150
		30°C (86°F)	1950 – 2050
		40°C (104°F)	1275 – 1375
		50°C (122°F)	850 – 950
		60°C (140°F)	600 – 650
		70°C (158°F)	425 – 465
		80°C (176°F)	305 – 335
		90°C (194°F)	225 – 245
		100°C (212°F)	165 – 185
		110°C (230°F)	120 – 140

Is the measured value OK?

YES >> INSPECTION END
NO >> Replace coolant temperature sensor. Refer to EC-27, "Component Parts Location".

P0122 THROTTLE POSITION SENSOR

Diagnosis Description

INFOID:0000000013609356

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0122	00	THRTTL/PEDAL POSI SEN/ SW A (Throttle/Pedal Position Sensor/ Switch "A" Circuit Low)	NO SUBTYPE INFORMATION	Position sensor 1 for the throttle valve has a short circuit to ground.

POSSIBLE CAUSE

- Harness and connectors
  (Throttle valve actuator circuit is open or shorted.)
- Throttle valve actuator

Diagnosis Procedure

INFOID:0000000013609357

1.CHECK THROTTLE VALVE POSITION

With CONSULT

1. Start the engine and warm it up to coolant temperature reaches more than 80°C (176°F).
2. Turn ignition switch OFF.
3. Turn ignition switch ON (engine stopped).
4. Wait at least 60 seconds.
5. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK THROTTLE VALVE ACTUATOR”.
6. Perform Active Test.

- Check the value of monitor items as following condition

Item	Condition	Value
KICKDOWN	Accelerator pedal: fully released	NOT ACTIVE
ACCELERATOR PEDAL SEN 1		0.2 – 0.5 V
THRTL VALVE ACTUATOR1 V		0.6 – 1.0 V
THRTL VALVE ACTUATOR2 V		4.0 – 4.4 V

- Check the value of monitor items as following condition

Item	Condition	Value
KICKDOWN	Accelerator pedal: fully depressed	ACTIVE
ACCELERATOR PEDAL SEN 1		4.3 – 4.8 V
THRTL VALVE ACTUATOR1 V		3.8 – 4.6 V
THRTL VALVE ACTUATOR2 V		0.4 – 1.2 V

Is the inspection result normal?

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

2.CHECK THROTTLE VALVE ACTUATOR

Check throttle valve actuator. Refer to EC-410, "Component Inspection (Throttle Valve Actuator)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace throttle valve actuator. Refer to EM-37, "Removal and Installation".

3.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between throttle valve actuator harness connector and ground.

+		–	Voltage (Approx.)
Throttle valve actuator			
Connector	Terminal		
F148	4	Ground	5 V

Is the inspection result normal?

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

4. CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	4	F149	17	Existed

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

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

5. CHECK THROTTLE VALVE POSITION SENSOR CIRCUIT

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

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	3	F149	38	Existed
	5		62	
	6		14	

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

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Throttle Valve Actuator)

INFOID:0000000013609358

1. CHECK THROTTLE VALVE MOTOR

1. Turn ignition switch OFF.
2. Disconnect throttle valve actuator harness connector.
3. Check the resistance between throttle valve actuator terminals.

Terminal	Resistance
1 and 2	1 – 10 Ω

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace throttle valve actuator. Refer to EM-37, "Removal and Installation".

2.CHECK THROTTLE VALVE

1. Remove throttle valve actuator.
2. Operate throttle valve slowly by hand as far as the wide open position.
3. Check that the throttle valve does not stick and returning to closed position by spring force.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace throttle valve actuator. Refer to EM-37, "Removal and Installation".

P0123 THROTTLE POSITION SENSOR

Diagnosis Description

INFOID:0000000013609359

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0123	00	THROTTLE/PEDAL POS SEN/SW A (Throttle/Pedal Position Sensor/Switch ″A″ Circuit High)	NO SUBTYPE INFORMATION	Position sensor 1 for the throttle valve has a short circuit to positive.

POSSIBLE CAUSE

- Harness and connectors
  (Throttle valve actuator circuit is open or shorted.)
- Throttle valve actuator

Diagnosis Procedure

INFOID:0000000013609360

1.CHECK THROTTLE VALVE POSITION

With CONSULT

1. Start the engine and warm it up to coolant temperature reaches more than 80°C (176°F).
2. Turn ignition switch OFF.
3. Turn ignition switch ON (engine stopped).
4. Wait at least 60 seconds.
5. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK THROTTLE VALVE ACTUATOR”.
6. Perform Active Test.

- Check the value of monitor items as following condition

Item	Condition	Value
KICKDOWN	Accelerator pedal: fully released	NOT ACTIVE
ACCELERATOR PEDAL SEN 1		0.2 – 0.5 V
THRTL VALVE ACTUATOR1 V		0.6 – 1.0 V
THRTL VALVE ACTUATOR2 V		4.0 – 4.4 V

- Check the value of monitor items as following condition

Item	Condition	Value
KICKDOWN	Accelerator pedal: fully depressed	ACTIVE
ACCELERATOR PEDAL SEN 1		4.3 – 4.8 V
THRTL VALVE ACTUATOR1 V		3.8 – 4.6 V
THRTL VALVE ACTUATOR2 V		0.4 – 1.2 V

Is the inspection result normal?

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

2.CHECK THROTTLE VALVE ACTUATOR

Check throttle valve actuator. Refer to EC-413, "Component Inspection (Throttle Valve Actuator)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace throttle valve actuator. Refer to EM-37, "Removal and Installation".

3.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between throttle valve actuator harness connector and ground.

+		–	Voltage (Approx.)
Throttle valve actuator			
Connector	Terminal		
F148	4	Ground	5 V

Is the inspection result normal?

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

4.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	4	F149	17	Existed

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

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

5.CHECK THROTTLE VALVE POSITION SENSOR CIRCUIT

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

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	3	F149	38	Existed
	5		62	
	6		14	

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

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Throttle Valve Actuator)

INFOID:0000000013609361

1.CHECK THROTTLE VALVE MOTOR

1. Turn ignition switch OFF.
2. Disconnect throttle valve actuator harness connector.
3. Check the resistance between throttle valve actuator terminals.

Terminal	Resistance
1 and 2	1 – 10 Ω

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace throttle valve actuator. Refer to EM-37, "Removal and Installation".

2.CHECK THROTTLE VALVE

1. Remove throttle valve actuator.
2. Operate throttle valve slowly by hand as far as the wide open position.
3. Check that the throttle valve does not stick and returning to closed position by spring force.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace throttle valve actuator. Refer to EM-37, "Removal and Installation".

P0128 THERMOSTAT FUNCTION

DTC Description

INFOID:0000000013609362

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P0128	00	Coolant thermostat [Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)]	NO SUBTYPE INFORMATION	The coolant temperature is below the coolant thermostat specified temperature.

POSSIBLE CAUSE

- Harness and connectors
  (Coolant thermostat heater element circuit is open or shorted.)
- Coolant thermostat heater element

Diagnosis Procedure

INFOID:0000000013609363

1.INSPECTION START

Does the coolant temperature rise too quickly and become too high?

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

2.CHECK COOLANT THERMOSTAT HEATING ELEMENT

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK COOLANT THERMOSTAT HEATING ELEMENT”.
3. Set the vehicle under the following conditions:
   CAUTION:
   During the test, cooling fan is activated at maximum speed.

Item	Condition
Vehicle speed	At idle
Engine coolant temperature	Less then 100°C (122°F)
A/C	OFF

4. Perform the Active Test.
   NOTE:
   - When a coolant temperature reaches between 92°C (198°F) and 100°C (212°F), the test is started automatically.
   - The test takes up to approximately 10 minutes.

Is the inspection result normal?

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

3.CHECK COOLANT THERMOSTAT HEATING ELEMENT

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK COOLANT THERMOSTAT HEATING ELEMENT”.
3. Set the vehicle under the following conditions:
   CAUTION:
   During the test, cooling fan is activated at maximum speed.

Item	Condition
Vehicle speed	At idle
Engine coolant temperature	Less then 50°C (122°F)
A/C	OFF

4. Perform the Active Test.
NOTE:
- When a coolant temperature reaches between 65°C (149°F) and 70°C (158°F), the test is started automatically.
- The test takes up to approximately 10 minutes.

Is the inspection result normal?

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

4.CHECK COOLANT THERMOSTAT HEATER ELEMENT

Check engine coolant thermostat heating element. Refer to EC-417, "Component Inspection (Coolant Thermostat Heater Element)".

Is the inspection result normal?

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

5.CHECK ENGINE COOLANT THERMOSTAT HEARTER ELEMENT POWER SUPPLY

1. Check that the #214 fuse is not blowing.
2. Disconnect coolant thermostat heater element harness connector.
3. Turn ignition switch ON.
4. Check the voltage between coolant thermostat heater element harness connector and ground.

+		–	Voltage
Coolant thermostat heater element			
Connector	Terminal		
F151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check engine coolant thermostat heating element power supply circuit.

6.CHECK COOLANT THERMOSTAT HEATER ELEMENT CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and coolant thermostat heater element harness connector.

+		–		Continuity
ECM		Coolant thermostat heater element		
Connector	Terminal	Connector	Terminal	
F149	4	F151	1	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

7.CHECK ENGINE COOLANT TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.

3. Turn ignition switch ON.
4. Check the voltage between engine coolant temperature sensor harness connector terminals.

Engine coolant temperature sensor			Voltage
Connector	+	–	
	Terminal		
F133	2	1	4.75 – 5.25 V

Is the inspection result normal?

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

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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine coolant temperature sensor harness connector and ECM harness connector.

+		–		Continuity
ECM		Engine coolant temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	11	F133	1	Existed
	86		2	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

9. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-418, "Component Inspection (Engine Coolant Temperature Sensor)".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace engine coolant temperature sensor. Refer to EC-27, "Component Parts Location".

10. CHECK INTERMITTENT INCIDENT

Refer to GI-56, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Coolant Thermostat Heater Element)

INFOID:0000000013609364

1. CHECK COOLANT THERMOSTAT HEATER ELEMENT

1. Turn ignition switch OFF.
2. Disconnect coolant thermostat heater element harness connector.
3. Check the resistance between coolant thermostat heater element terminals.

Coolant thermostat heater element		Condition	Resistance (Ω)
+	–		
Terminal			
1	2	25°C (77°F)	8.5 – 10.5

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace coolant thermostat (built-in engine coolant thermostat heating element). Refer to CO-21, "Removal and Installation".

Component Inspection (Engine Coolant Temperature Sensor)

INFOID:0000000013609365

1. TEST INTERNAL RESISTANCE OF COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Remove engine coolant temperature sensor.
3. Check the resistance between coolant temperature sensor terminals.

+	–	Temperature [°C (°F)]	Resistance (Ω)
Terminal			
1	2	20°C (68°F)	3,010 – 3,220
		30°C (86°F)	1,950 – 2,070
		40°C (104°F)	1,290 – 1,370
		50°C (122°F)	880 – 930
		60°C (140°F)	610 – 650
		70°C (158°F)	430 – 460
		80°C (176°F)	310 – 330
		90°C (194°F)	230 – 240
		100°C (212°F)	170 – 180

Is the measured value OK?

YES >> INSPECTION END
NO >> Replace coolant temperature sensor. Refer to EC-27, "Component Parts Location".

P0130 A/F SENSOR

DTC Description

INFOID:0000000013609366

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0130	11	O2 SENSOR B1 SEN1 (O2 Sensor Circuit Bank 1 Sensor 1)	CIRCUIT SHORT TO GROUND	Oxygen sensor 1 (cylinder bank 1) has an electrical malfunction. There is a short circuit to ground.
	12		CIRCUIT SHORT TO BATTERY	Oxygen sensor 1 (cylinder bank 1) has an electrical malfunction. There is a short circuit to positive.
	84		SIG BELOW ALLOWABLE RANGE	Oxygen sensor 1 (cylinder bank 1) has an electrical malfunction. There is a signal below the permissible limit value.

POSSIBLE CAUSE

- Harness and connectors
  [Air fuel ratio (A/F) sensor circuit is open or shorted.]
- Air fuel ratio (A/F) sensor

Diagnosis Procedure

INFOID:0000000013609367

1.CHECK A/F SENSOR POWER SUPPLY

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

+		−	Voltage
A/F sensor			
Connector	Terminal		
F143	4	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK A/F SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 (10A) fuse is not fusing.
3. Check the continuity between A/F sensor harness connector and fuse terminal.

+		−	Continuity
A/F sensor			
Connector	Terminal		
F143	4	#214 (10A) fuse terminal	Existed

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

Is the inspection result normal?

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

3.CHECK A/F SENSOR HEATER CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

3. Check the continuity between A/F sensor harness connector and ECM harness connector.

+		–		Continuity
A/F sensor		ECM		
Connector	Terminal	Connector	Terminal	
F143	1	F149	63	Existed
	2		64	
	3		77	
	5		88	
	6		87	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace A/F sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P0133 A/F SENSOR

DTC Description

INFOID:0000000013609368

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0133	00	O2 SENSOR B1 SEN1 (O2 Sensor Circuit Slow Response Bank 1 Sensor 1)	NO SUBTYPE INFORMATION	Air fuel ratio (A/F) sensor has a delayed reaction.

POSSIBLE CAUSE

- Harness and connectors
  [Air fuel ratio (A/F) sensor circuit is open or shorted.]
- Air fuel ratio (A/F) sensor

Diagnosis Procedure

INFOID:0000000013609369

1.CHECK A/F SENSOR POWER SUPPLY

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

+		–	Voltage
A/F sensor			
Connector	Terminal		
F143	4	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK A/F SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 (10A) fuse is not fusing.
3. Check the continuity between A/F sensor harness connector and fuse terminal.

+		–	Continuity
A/F sensor			
Connector	Terminal		
F143	4	#214 (10A) fuse terminal	Existed

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

Is the inspection result normal?

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

3.CHECK A/F SENSOR HEATER CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor harness connector and ECM harness connector.

+		–		Continuity
A/F sensor		ECM		
Connector	Terminal	Connector	Terminal	
F143	1	F149	63	Existed
	2		64	
	3		77	
	5		88	
	6		87	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace A/F sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P0135 A/F SENSOR HEATER

DTC Description

INFOID:0000000013609370

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0135	04	O2 SENSOR HEATER B1 SENSOR 1 (O2 sensor heater circuit bank 1 sensor 1)	SYSTEM INTERNAL MALFUNCTN	The air fuel ratio (A/F) sensor has an electrical malfunction. There is an internal malfunction.
	84		SIG BELOW ALLOWABLE RANGE	The air fuel ratio (A/F) sensor has an electrical malfunction. There is a signal below the permissible limit value.

POSSIBLE CAUSE

- Harness and connectors
  [Air fuel ratio (A/F) sensor heater circuit is open or shorted.]
- Air fuel ratio (A/F) sensor

Diagnosis Procedure

INFOID:0000000013609371

1.CHECK A/F SENSOR POWER SUPPLY

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

+		–	Voltage
A/F sensor			
Connector	Terminal		
F143	4	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK A/F SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 (10A) fuse is not fusing.
3. Check the continuity between A/F sensor harness connector and fuse terminal.

+		–	Continuity
A/F sensor			
Connector	Terminal		
F143	4	#214 (10A) fuse terminal	Existed

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

Is the inspection result normal?

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

3.CHECK A/F SENSOR HEATER CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor harness connector and ECM harness connector.

+		–		Continuity
A/F sensor		ECM		
Connector	Terminal	Connector	Terminal	
F143	1	F149	63	Existed
	2		64	
	3		77	
	5		88	
	6		87	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace A/F sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P0136 O2 SENSOR

DTC Description

INFOID:0000000013609372

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0136	00	O2 SENSOR B1 SEN2 (O2 Sensor Circuit Bank 1 Sensor 2)	NO SUBTYPE INFORMATION	Oxygen sensor 2 (cylinder bank 1) has an electrical malfunction.

POSSIBLE CAUSE

- Harness and connectors
  (Heated oxygen sensor circuit is open or shorted.)
- Heated oxygen sensor

Diagnosis Procedure

INFOID:0000000013609373

1.CHECK HEATED OXYGEN SENSOR POWER SUPPLY

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

+		−	Voltage
Heated oxygen sensor			
Connector	Terminal		
F144	1	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK HEATED OXYGEN SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between heated oxygen sensor harness connector and fuse terminal.

+		−	Continuity
Heated oxygen sensor			
Connector	Terminal		
F144	1	#214 fuse terminal	Existed

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

Is the inspection result normal?

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

3.CHECK HEATED OXYGEN SENSOR HEATER CONTROL CIRCUIT

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

+		–		Continuity
Heated oxygen sensor		ECM		
Connector	Terminal	Connector	Terminal	
F144	2	F149	95	Existed
	3		13	
	4		37	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace heated oxygen sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P0137 O2 SENSOR

DTC Description

INFOID:0000000013609374

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0137	11	Oxygen sensor bank1 sensor 2 (O2 Sensor Circuit Low Voltage Bank 1 Sensor 2)	CIRCUIT SHORT TO GROUND	Oxygen sensor 2 (cylinder bank 1) has a short circuit to ground. There is a short circuit to ground.

POSSIBLE CAUSE

- Harness and connectors
  (Heated oxygen sensor circuit is open or shorted.)
- Heated oxygen sensor

Diagnosis Procedure

INFOID:0000000013609375

1.CHECK HEATED OXYGEN SENSOR POWER SUPPLY

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

+		–	Voltage
Heated oxygen sensor			
Connector	Terminal		
F144	1	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK HEATED OXYGEN SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between heated oxygen sensor harness connector and fuse terminal.

+		–	Continuity
Heated oxygen sensor			
Connector	Terminal		
F144	1	#214 fuse terminal	Existed

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

Is the inspection result normal?

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

3.CHECK HEATED OXYGEN SENSOR HEATER CONTROL CIRCUIT

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

+		–		Continuity
Heated oxygen sensor		ECM		
Connector	Terminal	Connector	Terminal	
F144	2	F149	95	Existed
	3		13	
	4		37	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace heated oxygen sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P0138 O2 SENSOR

DTC Description

INFOID:0000000013609376

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0138	12	Oxygen sensor bank1 sensor 2 (O2 Sensor Circuit High Voltage Bank 1 Sensor 2)	CIRCUIT SHORT TO BATTERY	Oxygen sensor has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

- Harness and connectors
  (Heated oxygen sensor circuit is open or shorted.)
- Heated oxygen sensor

Diagnosis Procedure

INFOID:0000000013609377

1.CHECK HEATED OXYGEN SENSOR POWER SUPPLY

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

+		–	Voltage
Heated oxygen sensor			
Connector	Terminal		
F144	1	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK HEATED OXYGEN SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between heated oxygen sensor harness connector and fuse terminal.

+		–	Continuity
Heated oxygen sensor			
Connector	Terminal		
F144	1	#214 fuse terminal	Existed

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

Is the inspection result normal?

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

3.CHECK HEATED OXYGEN SENSOR HEATER CONTROL CIRCUIT

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

+		–		Continuity
Heated oxygen sensor		ECM		
Connector	Terminal	Connector	Terminal	
F144	2	F149	95	Existed
	3		13	
	4		37	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace heated oxygen sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P013A O2 SENSOR

DTC Description

INFOID:0000000013609378

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P013A	00	O2 SENSOR B1 SEN2 (O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 2)	NO SUBTYPE INFORMATION	The rich/lean switchover of oxygen sensor is too slow

POSSIBLE CAUSE

- Harness and connectors
  (Heated oxygen sensor circuit is open or shorted.)
- Heated oxygen sensor

Diagnosis Procedure

INFOID:0000000013609379

1.CHECK HEATED OXYGEN SENSOR POWER SUPPLY

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

+		–	Voltage
Heated oxygen sensor			
Connector	Terminal		
F144	1	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK HEATED OXYGEN SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between heated oxygen sensor harness connector and fuse terminal.

+		–	Continuity
Heated oxygen sensor			
Connector	Terminal		
F144	1	#214 fuse terminal	Existed

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

Is the inspection result normal?

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

3.CHECK HEATED OXYGEN SENSOR HEATER CONTROL CIRCUIT

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

+		–		Continuity
Heated oxygen sensor		ECM		
Connector	Terminal	Connector	Terminal	
F144	2	F149	95	Existed
	3		13	
	4		37	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace heated oxygen sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P013B O2 SENSOR

DTC Description

INFOID:0000000013609380

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P013B	00	Oxygen sensor bank1 sensor 2 (O2 Sensor Slow Response - Lean to Rich Bank 1 Sensor 2)	NO SUBTYPE INFORMATION	The lean/rich switchover of oxygen sensor is too slow.

POSSIBLE CAUSE

- Harness and connectors
  (Heated oxygen sensor circuit is open or shorted.)
- Heated oxygen sensor

Diagnosis Procedure

INFOID:0000000013609381

1.CHECK HEATED OXYGEN SENSOR POWER SUPPLY

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

+		–	Voltage
Heated oxygen sensor			
Connector	Terminal		
F144	1	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK HEATED OXYGEN SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between heated oxygen sensor harness connector and fuse terminal.

+		–	Continuity
Heated oxygen sensor			
Connector	Terminal		
F144	1	#214 fuse terminal	Existed

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

Is the inspection result normal?

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

3.CHECK HEATED OXYGEN SENSOR HEATER CONTROL CIRCUIT

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

+		–		Continuity
Heated oxygen sensor		ECM		
Connector	Terminal	Connector	Terminal	
F144	2	F149	95	Existed
	3		13	
	4		37	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace heated oxygen sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P013E O2 SENSOR

DTC Description

INFOID:0000000013609382

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	Malfunction type	DTC detecting condition
P013E	00	Oxygen sensor bank1 sensor 2 (O2 Sensor Delayed Response - Rich to Lean Bank 1 Sensor 2)	NO SUBTYPE INFORMATION	The lean/rich switchover of oxygen sensor is too slow.

POSSIBLE CAUSE

- Harness and connectors
  (Heated oxygen sensor circuit is open or shorted.)
- Heated oxygen sensor

Diagnosis Procedure

INFOID:0000000013609383

1.CHECK HEATED OXYGEN SENSOR POWER SUPPLY

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

+		−	Voltage
Heated oxygen sensor			
Connector	Terminal		
F144	1	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK HEATED OXYGEN SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between heated oxygen sensor harness connector and fuse terminal.

+		−	Continuity
Heated oxygen sensor			
Connector	Terminal		
F144	1	#214 fuse terminal	Existed

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

Is the inspection result normal?

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

3.CHECK HEATED OXYGEN SENSOR HEATER CONTROL CIRCUIT

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

+		–		Continuity
Heated oxygen sensor		ECM		
Connector	Terminal	Connector	Terminal	
F144	2	F149	95	Existed
	3		13	
	4		37	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace heated oxygen sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P013F O2 SENSOR

DTC Description

INFOID:0000000013609384

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P013F	00	Oxygen sensor bank1 sensor 2 (O2 Sensor Delayed Response - Lean to Rich Bank 1 Sensor 2)	NO SUBTYPE INFORMATION	The lean/rich switchover of oxygen sensor is delayed.

POSSIBLE CAUSE

- Harness and connectors
  (Heated oxygen sensor circuit is open or shorted.)
- Heated oxygen sensor

Diagnosis Procedure

INFOID:0000000013609385

1.CHECK HEATED OXYGEN SENSOR POWER SUPPLY

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

+		−	Voltage
Heated oxygen sensor			
Connector	Terminal		
F144	1	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK HEATED OXYGEN SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between heated oxygen sensor harness connector and fuse terminal.

+		−	Continuity
Heated oxygen sensor			
Connector	Terminal		
F144	1	#214 fuse terminal	Existed

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

Is the inspection result normal?

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

3.CHECK HEATED OXYGEN SENSOR HEATER CONTROL CIRCUIT

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

+		–		Continuity
Heated oxygen sensor		ECM		
Connector	Terminal	Connector	Terminal	
F144	2	F149	95	Existed
	3		13	
	4		37	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace heated oxygen sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P0140 O2 SENSOR

DTC Description

INFOID:0000000013609386

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P0140	13	Oxygen sensor bank1 sensor 2 (O2 Sensor Circuit No Activity Detected Bank 1 Sensor 2)	CIRCUIT OPEN	The signal of oxygen sensor does not change. There is an open circuit.

POSSIBLE CAUSE

- Harness and connectors
  (Heated oxygen sensor circuit is open or shorted.)
- Heated oxygen sensor

Diagnosis Procedure

INFOID:0000000013609387

1.CHECK HEATED OXYGEN SENSOR POWER SUPPLY

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

+		−	Voltage
Heated oxygen sensor			
Connector	Terminal		
F144	1	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK HEATED OXYGEN SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between heated oxygen sensor harness connector and fuse terminal.

+		−	Continuity
Heated oxygen sensor			
Connector	Terminal		
F144	1	#214 fuse terminal	Existed

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

Is the inspection result normal?

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

3.CHECK HEATED OXYGEN SENSOR HEATER CONTROL CIRCUIT

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

+		–		Continuity
Heated oxygen sensor		ECM		
Connector	Terminal	Connector	Terminal	
F144	2	F149	95	Existed
	3		13	
	4		37	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace heated oxygen sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P0141 HO2S2 HEATER

DTC Description

INFOID:0000000013609388

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0141	00	O2 SENSOR HEATER B1 SEN2 (O2 Sensor Heater Circuit Bank 1 Sensor 2)	NO SUBTYPE INFORMATION	The heater for oxygen sensor has an electrical malfunction.

POSSIBLE CAUSE

- Harness and connectors
  (Heated oxygen sensor heater circuit is open or shorted.)
- Heated oxygen sensor heater

Diagnosis Procedure

INFOID:0000000013609389

1.CHECK HEATED OXYGEN SENSOR POWER SUPPLY

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

+		–	Voltage
Heated oxygen sensor			
Connector	Terminal		
F144	1	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK HEATED OXYGEN SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between heated oxygen sensor harness connector and fuse terminal.

+		–	Continuity
Heated oxygen sensor			
Connector	Terminal		
F144	1	#214 fuse terminal	Existed

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

Is the inspection result normal?

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

3.CHECK HEATED OXYGEN SENSOR HEATER CONTROL CIRCUIT

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

+		–		Continuity
Heated oxygen sensor		ECM		
Connector	Terminal	Connector	Terminal	
F144	2	F149	95	Existed
	3		13	
	4		37	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace heated oxygen sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P0170 AIR-FUEL RATIO

DTC Description

INFOID:0000000013609390

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0170	04	FUEL TRIM B1 (Fuel trim bank 1)	SYSTEM INTERNAL MALFUNCTN	The mixture formation (cylinder bank 1) has a malfunction. There is an internal malfunction.

POSSIBLE CAUSE

Mixture adaptation

Diagnosis Procedure

INFOID:0000000013609391

1.PERFORM ACTIVE TEST

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “MIXTURE ADAPTATION”.
3. Set the vehicle under the following conditions:

Monitor item	Condition
ENGINE SPEED	400 – 800 rpm
C/AIR TEMP/S U/STRM THRTL	40 – 80°C (104 –176°F)
ENGINE LOAD	30% or less
COOLANT TEMPERATURE	80°C (176°F) or more
L/CONT STAT U/STRM RH CAT	ACTIVE
GEAR RANGE ENGAGED	P/N

4. Perform the Active Test.
   NOTE:
   The test takes up to approximately 60 seconds.
5. Check that “CMPLT” is displayed.

>> GO TO 2.

2.CHECK CONDITION

With CONSULT

Check that all items fill each conditions as follows.

Item	Condition
SELF ADJ LWR P/LOAD RANGE	0.85 – 1.15
IN/MNFLD P CRR VL (STRTFD)	Less then 25 hPa (0.025 bar, 0.0255 kg-cm^2, 0.3625 psi)
MASS AIR FLOW CRRCTN VAL	0 – 15 kg/h

>> INSPECTION END

P0171 AIR-FUEL RATIO

DTC Description

INFOID:0000000013609392

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0171	00	SYSTEM TOO LEAN B1 (System Too Lean Bank 1)	NO SUBTYPE INFORMATION	The mixture (cylinder bank 1) is too lean.
	84		SIG BELOW ALLOWABLE RANGE	The mixture (cylinder bank 1) is too lean. There is a signal below the permissible limit value.

POSSIBLE CAUSE

Mixture adaptation

Diagnosis Procedure

INFOID:0000000013609393

1.PERFORM ACTIVE TEST

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “MIXTURE ADAPTATION”.
3. Set the vehicle under the following conditions:

Monitor item	Condition
ENGINE SPEED	400 – 800 rpm
C/AIR TEMP/S U/STRM THRTL	40 – 80°C (104 –176°F)
ENGINE LOAD	30% or less
COOLANT TEMPERATURE	80°C (176°F) or more
L/CONT STAT U/STRM RH CAT	ACTIVE
GEAR RANGE ENGAGED	P/N

4. Perform the Active Test.
   NOTE:
   The test takes up to approximately 60 seconds.
5. Check that “CMPLT” is displayed.

>> GO TO 2.

2.CHECK CONDITION

With CONSULT

Check that all items fill each conditions as follows.

Item	Condition
SELF ADJ LWR P/LOAD RANGE	0.85 – 1.15
IN/MNFLD P CRR VL (STRTFD)	Less then 25 hPa (0.025 bar, 0.0255 kg-cm^2, 0.3625 psi)
MASS AIR FLOW CRRCTN VAL	0 – 15 kg/h

>> INSPECTION END

P0172 AIR-FUEL RATIO

DTC Description

INFOID:0000000013609394

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0172	00	SYSTEM TOO RICH B1 (System Too Rich Bank 1)	NO SUBTYPE INFORMATION	The mixture (cylinder bank 1) is too rich.
	85		SIG ABOVE ALLOWABLE RANGE	The mixture (cylinder bank 1) is too rich. There is a signal above the permissible limit value.

POSSIBLE CAUSE

Mixture adaptation

Diagnosis Procedure

INFOID:0000000013609395

1.PERFORM ACTIVE TEST

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “MIXTURE ADAPTATION”.
3. Set the vehicle under the following conditions:

Monitor item	Condition
ENGINE SPEED	400 – 800 rpm
C/AIR TEMP/S U/STRM THRTL	40 – 80°C (104 –176°F)
ENGINE LOAD	30% or less
COOLANT TEMPERATURE	80°C (176°F) or more
L/CONT STAT U/STRM RH CAT	ACTIVE
GEAR RANGE ENGAGED	P/N

4. Perform the Active Test.
   NOTE:
   The test takes up to approximately 60 seconds.
5. Check that “CMPLT” is displayed.

>> GO TO 2.

2.CHECK CONDITION

With CONSULT

Check that all items fill each conditions as follows.

Item	Condition
SELF ADJ LWR P/LOAD RANGE	0.85 – 1.15
IN/MNFLD P CRR VL (STRTFD)	Less then 25 hPa (0.025 bar, 0.0255 kg-cm^2, 0.3625 psi)
MASS AIR FLOW CRRCTN VAL	0 – 15 kg/h

>> INSPECTION END

P0181 FUEL TEMPERATURE SENSOR

DTC Description

INFOID:0000000013609396

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0181	16	FUEL TEMPERATURE SENSOR A (Fuel Temperature Sensor "A" Circuit Range/Performance)	CIRC VOLT BELOW THRESHOLD	The fuel temperature sensor has a malfunction. The limit value for electrical voltage has not been attained.
	17		CIRC VOLT ABOVE THRESHOLD	The fuel temperature sensor has a malfunction. The limit value for electrical voltage has been exceeded.
	28		SG BS LVL O-OF RNG/ZR AJST ERR	The fuel temperature sensor has a malfunction. The signal offset is outside the permissible range.
	2A		SIGNAL STUCK IN RANGE	The fuel temperature sensor has a malfunction. There is no signal change.
	84		SIG BELOW ALLOWABLE RANGE	The fuel temperature sensor has a malfunction. There is a signal below the permissible limit value.
	85		SIG ABOVE ALLOWABLE RANGE	The fuel temperature sensor has a malfunction. There is a signal above the permissible limit value.

POSSIBLE CAUSE

- Harness or connectors
  (Fuel pressure and temperature sensor circuit is open or shorted.)
- Fuel pressure and temperature sensor

Diagnosis Procedure

INFOID:0000000013609397

1.CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL

With CONSULT

1. Turn ignition switch OFF.
2. Leave the vehicle in a cool place at least 5 hours (soak the vehicle).
   CAUTION:
   Always perform this step to obtain correct results.
3. Turn ignition switch ON.
4. Turn OFF all electrical load.
5. On CONSULT screen, select "ENGINE" >> "ACTIVE TEST" >> "COOLANT TEMPERATURE" and "FUEL TEMPERATURE".
6. Start the engine and warm it up until the following conditions are met.

Item	Condition
COOLANT TEMPERATURE	75 – 105°C (167 – 221°F)
FUEL TEMPERATURE	40 – 80°C (104 – 176°F)

7. Turn ignition switch OFF.
8. Turn ignition switch ON.
9. Check that the difference between "COOLANT TEMPERATURE" and "FUEL TEMPERATURE" is within 10°C (50°F).

Is the inspection result normal?

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

2.CHECK POWER SUPPLY OF FUEL PRESSURE AND TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect fuel pressure and temperature sensor harness connector.

3. Turn ignition switch ON.
4. Check the voltage between fuel pressure and temperature sensor harness connector and ground.

Fuel pressure and temperature sensor			Voltage
Connector	+	–	
	Terminal		
F139	4	1	4.75 – 5.25 V

Is the measured value OK?

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

3. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR POWER SUPPLY AND GROUND CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	12	F139	1	Existed
	18		4	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4. CHECK FUEL TEMPERATURE SENSOR

Check fuel temperature sensor. Refer to EC-448, "Component Inspection (Fuel Temperature Sensor)".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace fuel pressure and temperature sensor. Refer to EM-58, "Removal and Installation".

5. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	65	F139	3	Existed
	67		2	

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

Is the inspection result normal?

YES >> Replace fuel pressure and temperature sensor. Refer to EM-49, "Removal and Installation".
NO >> Repair or replace error-detected parts.

6. ERASE DTC

1. Erase the DTC.

2. Turn ignition switch OFF and wait at least 30 seconds.
3. Start the engine and let it idle for 60 seconds.
4. Turn ignition switch OFF.
5. Turn ignition switch ON.
6. Check DTC.

Is the DTC detected again?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> INSPECTION END

Component Inspection (Fuel Temperature Sensor)

INFOID:0000000013609398

1. CHECK FUEL TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect fuel pressure and temperature sensor harness connector.
3. Check the resistance between fuel pressure and temperature sensor terminals.

Fuel pressure and temperature sensor		Condition	Resistance (Approx.)
+	–		
Terminal			
3	4	Temperature: 25°C (77°F)	10 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel pressure and temperature sensor. Refer to EM-49, "Removal and Installation".

P0182 FUEL TEMPERATURE SENSOR

DTC Description

INFOID:0000000013609399

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0182	11	FUEL TEMPERATURE SENSOR A (Fuel Temperature Sensor "A" Circuit Low)	CIRCUIT SHORT TO GROUND	The fuel temperature sensor has a short circuit to ground. There is a short circuit to ground.

POSSIBLE CAUSE

- Harness or connectors
  (Fuel pressure and temperature sensor circuit is open or shorted.)
- Fuel pressure and temperature sensor

Diagnosis Procedure

INFOID:0000000013609400

1.CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL

With CONSULT

1. Turn ignition switch OFF.
2. Leave the vehicle in a cool place at least 5 hours (soak the vehicle).
   CAUTION:
   Always perform this step to obtain correct results.
3. Turn ignition switch ON.
4. Turn OFF all electrical load.
5. On CONSULT screen, select "ENGINE" >> "ACTIVE TEST" >> "COOLANT TEMPERATURE" and "FUEL TEMPERATURE".
6. Start the engine and warm it up until the following conditions are met.

Item	Condition
COOLANT TEMPERATURE	75 – 105°C (167 – 221°F)
FUEL TEMPERATURE	40 – 80°C (104 – 176°F)

7. Turn ignition switch OFF.
8. Turn ignition switch ON.
9. Check that the difference between "COOLANT TEMPERATURE" and "FUEL TEMPERATURE" is within 10°C (50°F).

Is the inspection result normal?

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

2.CHECK POWER SUPPLY OF FUEL PRESSURE AND TEMPERATURE SENSOR

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

Fuel pressure and temperature sensor			Voltage
Connector	+	–	
	Terminal		
F139	4	1	4.75 – 5.25 V

Is the measured value OK?

YES >> GO TO 4.

NO >> GO TO 3.

3. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR POWER SUPPLY AND GROUND CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	12	F139	1	Existed
	18		4	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4. CHECK FUEL TEMPERATURE SENSOR

Check fuel temperature sensor. Refer to EC-457, "Component Inspection (Fuel Temperature Sensor)".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace fuel pressure and temperature sensor. Refer to EM-49, "Removal and Installation".

5. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	65	F139	3	Existed
	67		2	

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

Is the inspection result normal?

YES >> Replace fuel pressure and temperature sensor. Refer to EM-49, "Removal and Installation".
NO >> Repair or replace error-detected parts.

6. ERASE DTC

1. Erase the DTC.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Start the engine and let it idle for 60 seconds.
4. Turn ignition switch OFF.
5. Turn ignition switch ON.
6. Check DTC.

Is the DTC detected again?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> INSPECTION END

Component Inspection (Fuel Temperature Sensor)

INFOID:0000000013609401

1.CHECK FUEL TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect fuel pressure and temperature sensor harness connector.
3. Check the resistance between fuel pressure and temperature sensor terminals.

Fuel pressure and temperature sensor		Condition	Resistance (Approx.)
+	–		
Terminal			
3	4	Temperature: 25°C (77°F)	10 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel pressure and temperature sensor. Refer to EM-49, "Removal and Installation".

P0183 FUEL TEMPERATURE SENSOR

DTC Description

INFOID:0000000013609402

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0183	12	FUEL TEMPERATURE SENSOR A (Fuel Temperature Sensor ″A″ Circuit High)	CIRCUIT SHORT TO BATTERY	The fuel temperature sensor has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Fuel pressure and temperature sensor circuit is open or shorted.)
- Fuel pressure and temperature sensor

Diagnosis Procedure

INFOID:0000000013609403

1.CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL

With CONSULT

1. Turn ignition switch OFF.
2. Leave the vehicle in a cool place at least 5 hours (soak the vehicle).
   CAUTION:
   Always perform this step to obtain correct results.
3. Turn ignition switch ON.
4. Turn OFF all electrical load.
5. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “COOLANT TEMPERATURE” and “FUEL TEMPERATURE”.
6. Start the engine and warm it up until the following conditions are met.

Item	Condition
COOLANT TEMPERATURE	75 – 105°C (167 – 221°F)
FUEL TEMPERATURE	40 – 80°C (104 – 176°F)

7. Turn ignition switch OFF.
8. Turn ignition switch ON.
9. Check that the difference between “COOLANT TEMPERATURE” and “FUEL TEMPERATURE” is within 10°C (50°F).

Is the inspection result normal?

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

2.CHECK POWER SUPPLY OF FUEL PRESSURE AND TEMPERATURE SENSOR

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

Fuel pressure and temperature sensor			Voltage
Connector	+	–	
	Terminal		
F139	4	1	4.75 – 5.25 V

Is the measured value OK?

YES >> GO TO 4.

NO >> GO TO 3.

3. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR POWER SUPPLY AND GROUND CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	12	F139	1	Existed
	18		4	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4. CHECK FUEL TEMPERATURE SENSOR

Check fuel temperature sensor. Refer to EC-457, "Component Inspection (Fuel Temperature Sensor)".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace fuel pressure and temperature sensor. Refer to EM-49, "Removal and Installation".

5. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	65	F139	3	Existed
	67		2	

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

Is the inspection result normal?

YES >> Replace fuel pressure and temperature sensor. Refer to EM-49, "Removal and Installation".
NO >> Repair or replace error-detected parts.

6. ERASE DTC

1. Erase the DTC.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Start the engine and let it idle for 60 seconds.
4. Turn ignition switch OFF.
5. Turn ignition switch ON.
6. Check DTC.

Is the DTC detected again?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> INSPECTION END

Component Inspection (Fuel Temperature Sensor)

INFOID:0000000013609404

1.CHECK FUEL TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect fuel pressure and temperature sensor harness connector.
3. Check the resistance between fuel pressure and temperature sensor terminals.

Fuel pressure and temperature sensor		Condition	Resistance (Approx.)
+	–		
Terminal			
3	4	Temperature: 25°C (77°F)	10 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel pressure and temperature sensor. Refer to EM-49, "Removal and Installation".

P0184 FUEL TEMPERATURE SENSOR

DTC Description

INFOID:0000000013609405

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0184	27	Fuel temperature sensor A (Fuel Temperature Sensor "A" Circuit Intermittent)	SIG RTE OF CHNG ABV THRESHLD	The fuel temperature sensor has a sporadic malfunction. The signal change rate is above the permissible limit value.

POSSIBLE CAUSE

- Harness or connectors
  (Fuel pressure and temperature sensor circuit is open or shorted.)
- Fuel pressure and temperature sensor

Diagnosis Procedure

INFOID:0000000013609406

1.CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL

With CONSULT

1. Turn ignition switch OFF.
2. Leave the vehicle in a cool place at least 5 hours (soak the vehicle).
   CAUTION:
   Always perform this step to obtain correct results.
3. Turn ignition switch ON.
4. Turn OFF all electrical load.
5. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “COOLANT TEMPERATURE” and “FUEL TEMPERATURE”.
6. Start the engine and warm it up until the following conditions are met.

Item	Condition
COOLANT TEMPERATURE	75 – 105°C (167 – 221°F)
FUEL TEMPERATURE	40 – 80°C (104 – 176°F)

7. Turn ignition switch OFF.
8. Turn ignition switch ON.
9. Check that the difference between “COOLANT TEMPERATURE” and “FUEL TEMPERATURE” is within 10°C (50°F).

Is the inspection result normal?

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

2.CHECK POWER SUPPLY OF FUEL PRESSURE AND TEMPERATURE SENSOR

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

Fuel pressure and temperature sensor			Voltage
Connector	+	–	
	Terminal		
F139	4	1	4.75 – 5.25 V

Is the measured value OK?

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

3.CHECK FUEL PRESSURE AND TEMPERATURE SENSOR POWER SUPPLY AND GROUND CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	12	F139	1	Existed
	18		4	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4.CHECK FUEL TEMPERATURE SENSOR

Check fuel temperature sensor. Refer to EC-457, "Component Inspection (Fuel Temperature Sensor)".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace fuel pressure and temperature sensor. Refer to EM-49, "Removal and Installation".

5.CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	65	F139	3	Existed
	67		2	

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

Is the inspection result normal?

YES >> Replace fuel pressure and temperature sensor. Refer to EM-49, "Removal and Installation".
NO >> Repair or replace error-detected parts.

6.ERASE DTC

1. Erase the DTC.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Start the engine and let it idle for 60 seconds.
4. Turn ignition switch OFF.
5. Turn ignition switch ON.
6. Check DTC.

Is the DTC detected again?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> INSPECTION END

Component Inspection (Fuel Temperature Sensor)

INFOID:0000000013609407

1.CHECK FUEL TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect fuel pressure and temperature sensor harness connector.
3. Check the resistance between fuel pressure and temperature sensor terminals.

Fuel pressure and temperature sensor		Condition	Resistance (Approx.)
+	–		
Terminal			
3	4	Temperature: 25°C (77°F)	10 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel pressure and temperature sensor. Refer to EM-58, "Removal and Installation".

P0190 FUEL RAIL PRESSURE SENSOR

DTC Description

INFOID:0000000013609408

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0190	00	FUEL RAIL PRESSURE SENSOR A (Fuel Rail Pressure Sensor Circuit Bank 1)	NO SUBTYPE INFORMATION	The fuel pressure and temperature sensor has an electrical malfunction.
	16		CIRC VOLT BELOW THRESHOLD	The fuel pressure and temperature sensor has an electrical malfunction. The limit value for electrical voltage has not been attained.
	17		CIRC VOLT ABOVE THRESHOLD	The fuel pressure and temperature sensor has an electrical malfunction. The limit value for electrical voltage has been exceeded.

POSSIBLE CAUSE

- Harness or connectors
  (Fuel pressure and temperature sensor circuit is open or shorted.)
- Fuel pressure and temperature sensor

Diagnosis Procedure

INFOID:0000000013609409

1.START ENGINE

Start the engine and let it idle.

Is it difficult to keep at idle?

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

2.CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL

With CONSULT

1. Warm the engine up to engine coolant temperature reaches 75°C (167°F) – 105° (221°F).
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL PRESS AND TEMP SENSOR”.
3. Keep the engine speed between 500 – 1,000 rpm.
4. Perform the Active Test.
   NOTE:
   When start the test, fuel pump is activated and quantity control valve is not activated.
5. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 300 kPa (3 bar, 3.06 kg-cm^2, 43.5 psi) and 1200 kPa (12 bar, 12.24 kg-cm^2, 174 psi).

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 6.

3.PRECONDITIONING FOR CHECKING FUEL PRESSURE AND TEMPERATURE SENSOR OUTPUT SIGNAL

CAUTION:
Refer to EC-23, "Precaution for Risk of Explosion and Injury" for work in safety.

With CONSULT

1. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “RAIL PRES (ACTUAL VALUE)”.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Slightly loosen the threaded connection of the fuel line to the fuel rail to reduce the fuel pressure.
   CAUTION:
   Collect escaping fuel with several rags.
4. Wait at least 60 seconds.
5. Retighten the threaded connection of fuel line.

6. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 0 kPa (0 bar, 0 kg-cm^2, 0 psi) and 300 kPa (3 bar, 3.06 kg-cm^2, 43.5 psi).
NOTE:
The pressure must drop within 60 seconds.

>> GO TO 4.

4. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL

With CONSULT
1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL PRESS AND TEMP SENSOR”.
NOTE:
When start the test, fuel pump is activated and quantity control valve is not activated.
3. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” and is between 300 kPa (3 bar, 3.06 kg-cm^2, 43.5 psi) and 1200 kPa (12 bar, 12.24 kg-cm^2, 174 psi).

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 5.

5. CHECK POWER SUPPLY OF FUEL PRESSURE AND TEMPERATURE SENSOR

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

Fuel pressure and temperature sensor			Voltage
Connector	+	–	
	Terminal		
F139	4	1	4.75 – 5.25 V

Is the measured value OK?

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

6. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR POWER SUPPLY AND GROUND CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	12	F139	1	Existed
	18		4	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

7. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

3. Check the continuity between ECM harness connector and fuel pressure and temperature sensor harness connector.

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	65	F139	3	Existed
	67		2	

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

Is the inspection result normal?

YES >> Replace fuel pressure and temperature sensor. Refer to EM-49, "Exploded View".
NO >> Repair or replace error-detected parts.

8. ERASE DTC

1. Erase the DTC.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Start the engine and let it idle for 60 seconds.
4. Turn ignition switch OFF.
5. Turn ignition switch ON.
6. Check DTC.

Is the DTC detected again?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> INSPECTION END

P0191 FUEL RAIL PRESSURE SENSOR

DTC Description

INFOID:0000000013609410

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0191	16	FUEL RAIL PRESSURE SENSOR A (Fuel Rail Pressure Sensor Circuit Range/Performance Bank 1)	CIRC VOLT BELOW THRESHOLD	The fuel pressure and temperature sensor has a malfunction. The limit value for electrical voltage has not been attained.
	17		CIRC VOLT ABOVE THRESHOLD	The fuel pressure and temperature sensor has a malfunction. The limit value for electrical voltage has been exceeded.

POSSIBLE CAUSE

- Harness or connectors
  (Fuel pressure and temperature sensor circuit is open or shorted.)
- Fuel pressure and temperature sensor

Diagnosis Procedure

INFOID:0000000013609411

1.START ENGINE

Start the engine and let it idle.

Is it difficult to keep at idle?

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

2.CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL

With CONSULT

1. Warm the engine up to engine coolant temperature reaches 75°C (167°F) – 105° (221°F).
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL PRESS AND TEMP SENSOR”.
3. Keep the engine speed between 500 – 1,000 rpm.
4. Perform the Active Test.
   NOTE:
   When start the test, fuel pump is activated and quantity control valve is not activated.
5. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 300 kPa (3 bar, 3.06 kg-cm^2, 43.5 psi) and 1200 kPa (12 bar, 12.24 kg-cm^2, 174 psi).

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 6.

3.PRECONDITIONING FOR CHECKING FUEL PRESSURE AND TEMPERATURE SENSOR OUTPUT SIGNAL

CAUTION:
Refer to EC-23, "Precaution for Risk of Explosion and Injury" for work in safety.

With CONSULT

1. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “RAIL PRES (ACTUAL VALUE)”.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Slightly loosen the threaded connection of the fuel line to the fuel rail to reduce the fuel pressure.
   CAUTION:
   Collect escaping fuel with several rags.
4. Wait at least 60 seconds.
5. Retighten the threaded connection of fuel line.
6. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 0 kPa (0 bar, 0 kg-cm^2, 0 psi) and 300 kPa (3 bar, 3.06 kg-cm^2, 43.5 psi).

NOTE:
The pressure must drop within 60 seconds.

>> GO TO 4.

4. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL

With CONSULT
1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL PRESS AND TEMP SENSOR”.
   NOTE:
   When start the test, fuel pump is activated and quantity control valve is not activated.
3. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” and is between 300 kPa (3 bar, 3.06 kg-cm^2, 43.5 psi) and 1200 kPa (12 bar, 12.24 kg-cm^2, 174 psi).

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 5.

5. CHECK POWER SUPPLY OF FUEL PRESSURE AND TEMPERATURE SENSOR

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

Fuel pressure and temperature sensor			Voltage
Connector	+	–	
	Terminal		
F139	4	1	4.75 – 5.25 V

Is the measured value OK?

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

6. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR POWER SUPPLY AND GROUND CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	12	F139	1	Existed
	18		4	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

7. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	65	F139	3	Existed
	67		2	

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

Is the inspection result normal?

YES >> Replace fuel pressure and temperature sensor. Refer to EM-49, "Exploded View".
NO >> Repair or replace error-detected parts.

8. ERASE DTC

1. Erase the DTC.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Start the engine and let it idle for 60 seconds.
4. Turn ignition switch OFF.
5. Turn ignition switch ON.
6. Check DTC.

Is the DTC detected again?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> INSPECTION END

P0192 FUEL RAIL PRESSURE SENSOR

DTC Description

INFOID:0000000013609412

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0192	11	FUEL RAIL PRESSURE SENSOR A (Fuel Rail Pressure Sensor Circuit Low Bank 1)	CIRCUIT SHORT TO GROUND	The fuel pressure and temperature sensor has a short circuit to ground. There is a short circuit to ground.

POSSIBLE CAUSE

- Harness or connectors
  (Fuel pressure and temperature sensor circuit is open or shorted.)
- Fuel pressure and temperature sensor

Diagnosis Procedure

INFOID:0000000013609413

1.START ENGINE

Start the engine and let it idle.

Is it difficult to keep at idle?

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

2.CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL

With CONSULT

1. Warm the engine up to engine coolant temperature reaches 75°C (167°F) – 105° (221°F).
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL PRESS AND TEMP SENSOR”.
3. Keep the engine speed between 500 – 1,000 rpm.
4. Perform the Active Test.
   NOTE:
   When start the test, fuel pump is activated and quantity control valve is not activated.
5. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 300 kPa (3 bar, 3.06 kg-cm^2, 43.5 psi) and 1200 kPa (12 bar, 12.24 kg-cm^2, 174 psi).

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 6.

3.PRECONDITIONING FOR CHECKING FUEL PRESSURE AND TEMPERATURE SENSOR OUTPUT SIGNAL

CAUTION:
Refer to EC-23, "Precaution for Risk of Explosion and Injury" for work in safety.

With CONSULT

1. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “RAIL PRES (ACTUAL VALUE)”.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Slightly loosen the threaded connection of the fuel line to the fuel rail to reduce the fuel pressure.
   CAUTION:
   Collect escaping fuel with several rags.
4. Wait at least 60 seconds.
5. Retighten the threaded connection of fuel line.
6. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 0 kPa (0 bar, 0 kg-cm^2, 0 psi) and 300 kPa (3 bar, 3.06 kg-cm^2, 43.5 psi).
   NOTE:
   The pressure must drop within 60 seconds.

>> GO TO 4.

4. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL PRESS AND TEMP SENSOR”.
   NOTE:
   When start the test, fuel pump is activated and quantity control valve is not activated.
3. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” and is between 300 kPa (3 bar, 3.06 kg-cm^2, 43.5 psi) and 1200 kPa (12 bar, 12.24 kg-cm^2, 174 psi).

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 5.

5. CHECK POWER SUPPLY OF FUEL PRESSURE AND TEMPERATURE SENSOR

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

Fuel pressure and temperature sensor			Voltage
Connector	+	–	
	Terminal		
F139	4	1	4.75 – 5.25 V

Is the measured value OK?

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

6. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR POWER SUPPLY AND GROUND CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	12	F139	1	Existed
	18		4	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

7. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	65	F139	3	Existed
	67		2	

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

Is the inspection result normal?

YES >> Replace fuel pressure and temperature sensor. Refer to EM-49, "Exploded View".
NO >> Repair or replace error-detected parts.

8.ERASE DTC

1. Erase the DTC.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Start the engine and let it idle for 60 seconds.
4. Turn ignition switch OFF.
5. Turn ignition switch ON.
6. Check DTC.

Is the DTC detected again?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> INSPECTION END

P0193 FUEL RAIL PRESSURE SENSOR

DTC Description

INFOID:0000000013609414

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0193	12	FUEL RAIL PRESSURE SENSOR A (Fuel Rail Pressure Sensor Circuit High Bank 1)	CIRCUIT SHORT TO BATTERY	The fuel pressure and temperature sensor has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Fuel pressure and temperature sensor circuit is open or shorted.)
- Fuel pressure and temperature sensor

Diagnosis Procedure

INFOID:0000000013609415

1.START ENGINE

Start the engine and let it idle.

Is it difficult to keep at idle?

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

2.CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL

With CONSULT

1. Warm the engine up to engine coolant temperature reaches 75°C (167°F) – 105° (221°F).
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL PRESS AND TEMP SENSOR”.
3. Keep the engine speed between 500 – 1,000 rpm.
4. Perform the Active Test.
   NOTE:
   When start the test, fuel pump is activated and quantity control valve is not activated.
5. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 300 kPa (3 bar, 3.06 kg-cm^2, 43.5 psi) and 1200 kPa (12 bar, 12.24 kg-cm^2, 174 psi).

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 6.

3.PRECONDITIONING FOR CHECKING FUEL PRESSURE AND TEMPERATURE SENSOR OUTPUT SIGNAL

CAUTION:
Refer to EC-23, "Precaution for Risk of Explosion and Injury" for work in safety.

With CONSULT

1. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “RAIL PRES (ACTUAL VALUE)”.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Slightly loosen the threaded connection of the fuel line to the fuel rail to reduce the fuel pressure.
   CAUTION:
   Collect escaping fuel with several rags.
4. Wait at least 60 seconds.
5. Retighten the threaded connection of fuel line.
6. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 0 kPa (0 bar, 0 kg-cm^2, 0 psi) and 300 kPa (3 bar, 3.06 kg-cm^2, 43.5 psi).
   NOTE:
   The pressure must drop within 60 seconds.

>> GO TO 4.

4. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL PRESS AND TEMP SENSOR”.
   NOTE:
   When start the test, fuel pump is activated and quantity control valve is not activated.
3. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” and is between 300 kPa (3 bar, 3.06 kg-cm^2, 43.5 psi) and 1200 kPa (12 bar, 12.24 kg-cm^2, 174 psi).

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 5.

5. CHECK POWER SUPPLY OF FUEL PRESSURE AND TEMPERATURE SENSOR

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

Fuel pressure and temperature sensor			Voltage
Connector	+	–	
	Terminal		
F139	4	1	4.75 – 5.25 V

Is the measured value OK?

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

6. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR POWER SUPPLY AND GROUND CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	12	F139	1	Existed
	18		4	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

7. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	65	F139	3	Existed
	67		2	

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

Is the inspection result normal?

YES >> Replace fuel pressure and temperature sensor. Refer to EM-49, "Exploded View".
NO >> Repair or replace error-detected parts.

8.ERASE DTC

1. Erase the DTC.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Start the engine and let it idle for 60 seconds.
4. Turn ignition switch OFF.
5. Turn ignition switch ON.
6. Check DTC.

Is the DTC detected again?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> INSPECTION END

P0196 ENGINE OIL TEMPERATURE SENSOR

Diagnosis Description

INFOID:0000000013609416

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P0197 ENGINE OIL TEMPERATURE SENSOR

Diagnosis Description

INFOID:0000000013609417

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P0198 ENGINE OIL TEMPERATURE SENSOR

Diagnosis Description

INFOID:0000000013609418

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P0201 FUEL INJECTOR (CYLINDER 1)

DTC Description

INFOID:0000000013609419

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0201	01	INJECTOR CYL1 (Cylinder 1 injector “A” circuit)	ELECTRICAL MALFUNCTION	The fuel injector (cylinder 1) has an electrical malfunction or an open circuit. There is a general electrical malfunction.
	11		CIRCUIT SHORT TO GROUND	The fuel injector (cylinder 1) has an electrical malfunction or an open circuit. There is a short circuit to ground.
	13		CIRCUIT OPEN	The fuel injector (cylinder 1) has an electrical malfunction or an open circuit. There is an open circuit.
	19		CIRC CRRNT ABOVE THRESHOLD	The fuel injector (cylinder 1) has an electrical malfunction or an open circuit. The limit value for current has been exceeded.
	1F		CIRCUIT INTERMITTENT	The fuel injector (cylinder 1) has an electrical malfunction or an open circuit. There is a sporadic malfunction.
	49		INTERNAL ELECTRONIC ERROR	The fuel injector (cylinder 1) has an electrical malfunction or an open circuit. There is an internal electrical malfunction.
	92		PFM/INCORRECT OPERATN	The fuel injector (cylinder 1) has an electrical malfunction or an open circuit. The function or the instruction has malfunction.

POSSIBLE CAUSE

- Harness or connectors
  (Fuel injector circuit is open or shorted.)
- Fuel injector
- Fuel leak (fuel injector)

Diagnosis Procedure

INFOID:0000000013609420

1.CHECK FUEL INJECTOR FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL INJECTORS”.
3. Start the engine and let it idle.
4. Set the vehicle to the following conditions:

Monitor item	Condition
ENGINE SPEED	Idle
SMOOTH OPR OF CYL 1	2 or less
SMOOTH OPR OF CYL 2	2 or less
SMOOTH OPR OF CYL 3	2 or less
SMOOTH OPR OF CYL 4	2 or less
COOLANT TEMPERATURE	80°C (176°F)

5. Perform Active Test.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK FUEL INJECTOR

Check cylinder 1 fuel injector. Refer to EC-474, "Component Inspection (Fuel Injector)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace fuel injector. Refer to EM-49, "Removal and Installation".

3.CHECK FUEL INJECTOR CONTROL CIRCUIT

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

+		–		Continuity
ECM		Fuel injector		
Connector	Terminal	Connector	Terminal	
F149	1	F164	2	Existed
	2		1	

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

Is the inspection result normal?

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

4.CHECK INJECTOR LEAKAGE

NOTE:
During this test, the fuel rail pressure is increased.

1. Remove spark plug.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL HIGH PRESSURE CIRCUIT”.
5. Set the vehicle the following conditions.

- Engine stopped
- Parking brake: applied
- Selector lever: P or N

6. Start the Active Test.
   CAUTION:
   Never turn OFF ignition switch.
   NOTE:
   Fuel injectors are turned OFF.
7. Depress and hold down brake pedal.
8. Actuate the starter for several seconds.
9. Stop starter.
10. Check combustion chamber and fuel injector for fuel leakage by using suitable tool (e.g. endoscope light probe).

Is the inspection result normal?

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

Component Inspection (Fuel Injector)

INFOID:0000000013609421

1.CHECK FUEL INJECTOR

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

Cylinder	Injector		Resistance
	+	–	
	Terminal		
1	1	2	198 – 242 kΩ
2			
3			
4			

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning fuel injector(s). Refer to EM-49, "Removal and Installation".

P0202 FUEL INJECTOR (CYLINDER 2)

DTC Description

INFOID:0000000013609422

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0202	01	INJECTOR CYL2 (Cylinder 2 injector “A” circuit)	ELECTRICAL MALFUNCTION	The fuel injector (cylinder 2) has an electrical malfunction or an open circuit. There is a general electrical malfunction.
	11		CIRCUIT SHORT TO GROUND	The fuel injector (cylinder 2) has an electrical malfunction or an open circuit. There is a short circuit to ground.
	13		CIRCUIT OPEN	The fuel injector (cylinder 2) has an electrical malfunction or an open circuit. There is an open circuit.
	19		CIRC CRRNT ABOVE THRESHOLD	The fuel injector (cylinder 2) has an electrical malfunction or an open circuit. The limit value for current has been exceeded.
	1F		CIRCUIT INTERMITTENT	The fuel injector (cylinder 2) has an electrical malfunction or an open circuit. There is a sporadic malfunction.
	49		INTERNAL ELECTRONIC ERROR	The fuel injector (cylinder 2) has an electrical malfunction or an open circuit. There is an internal electrical malfunction.
	92		PFM/INCORRECT OPERATN	The fuel injector (cylinder 2) has an electrical malfunction or an open circuit. The function or the instruction has malfunction.

POSSIBLE CAUSE

- Harness or connectors
  (Fuel injector circuit is open or shorted.)
- Fuel injector
- Fuel leak (fuel injector)

Diagnosis Procedure

INFOID:0000000013609423

1.CHECK FUEL INJECTOR FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL INJECTORS”.
3. Start the engine and let it idle.
4. Set the vehicle to the following conditions:

Monitor item	Condition
ENGINE SPEED	Idle
SMOOTH OPR OF CYL 1	2 or less
SMOOTH OPR OF CYL 2	2 or less
SMOOTH OPR OF CYL 3	2 or less
SMOOTH OPR OF CYL 4	2 or less
COOLANT TEMPERATURE	80°C (176°F)

5. Perform Active Test.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK FUEL INJECTOR

Check cylinder 2 fuel injector. Refer to EC-507, "Component Inspection (Fuel Injector)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace fuel injector. Refer to EM-49, "Removal and Installation".

3.CHECK FUEL INJECTOR CONTROL CIRCUIT

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

+		–		Continuity
ECM		Fuel injector		
Connector	Terminal	Connector	Terminal	
F149	73	F165	2	Existed
	74		1	

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

Is the inspection result normal?

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

4.CHECK INJECTOR LEAKAGE

NOTE:
During this test, the fuel rail pressure is increased.

1. Remove spark plug.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL HIGH PRESSURE CIRCUIT”.
5. Set the vehicle the following conditions.

- Engine stopped
- Parking brake: applied
- Selector lever: P or N

6. Start the Active Test.
   CAUTION:
   Never turn OFF ignition switch.
   NOTE:
   Fuel injectors are turned OFF.
7. Depress and hold down brake pedal.
8. Actuate the starter for several seconds.
9. Stop starter.
10. Check combustion chamber and fuel injector for fuel leakage by using suitable tool (e.g. endoscope light probe).

Is the inspection result normal?

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

Component Inspection (Fuel Injector)

INFOID:0000000013609424

1.CHECK FUEL INJECTOR

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

Cylinder	Injector		Resistance
	+	–	
	Terminal		
1	1	2	198 – 242 kΩ
2			
3			
4			

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning fuel injector(s). Refer to EM-49, "Removal and Installation".

P0203 FUEL INJECTOR (CYLINDER 3)

DTC Description

INFOID:0000000013609425

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0203	01	INJECTOR CYL3 (Cylinder 3 injector “A” circuit)	ELECTRICAL MALFUNCTION	The fuel injector (cylinder 3) has an electrical malfunction or an open circuit. There is a general electrical malfunction.
	11		CIRCUIT SHORT TO GROUND	The fuel injector (cylinder 3) has an electrical malfunction or an open circuit. There is a short circuit to ground.
	13		CIRCUIT OPEN	The fuel injector (cylinder 3) has an electrical malfunction or an open circuit. There is an open circuit.
	19		CIRC CRRNT ABOVE THRESHOLD	The fuel injector (cylinder 3) has an electrical malfunction or an open circuit. The limit value for current has been exceeded.
	1F		CIRCUIT INTERMITTENT	The fuel injector (cylinder 3) has an electrical malfunction or an open circuit. There is a sporadic malfunction.
	49		INTERNAL ELECTRONIC ERROR	The fuel injector (cylinder 3) has an electrical malfunction or an open circuit. There is an internal electrical malfunction.
	92		PFM/INCORRECT OPERATN	The fuel injector (cylinder 3) has an electrical malfunction or an open circuit. The function or the instruction has malfunction.

POSSIBLE CAUSE

- Harness or connectors
  (Fuel injector circuit is open or shorted.)
- Fuel injector
- Fuel leak (fuel injector)

Diagnosis Procedure

INFOID:0000000013609426

1.CHECK FUEL INJECTOR FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL INJECTORS”.
3. Start the engine and let it idle.
4. Set the vehicle to the following conditions:

Monitor item	Condition
ENGINE SPEED	Idle
SMOOTH OPR OF CYL 1	2 or less
SMOOTH OPR OF CYL 2	2 or less
SMOOTH OPR OF CYL 3	2 or less
SMOOTH OPR OF CYL 4	2 or less
COOLANT TEMPERATURE	80°C (176°F)

5. Perform Active Test.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK FUEL INJECTOR

Check cylinder 3 fuel injector. Refer to EC-507, "Component Inspection (Fuel Injector)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace fuel injector. Refer to EM-49, "Removal and Installation".

3.CHECK FUEL INJECTOR CONTROL CIRCUIT

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

+		–		Continuity
ECM		Fuel injector		
Connector	Terminal	Connector	Terminal	
F149	49	F166	2	Existed
	50		1	

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

Is the inspection result normal?

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

4.CHECK INJECTOR LEAKAGE

NOTE:
During this test, the fuel rail pressure is increased.

1. Remove spark plug.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL HIGH PRESSURE CIRCUIT”.
5. Set the vehicle the following conditions.

- Engine stopped
- Parking brake: applied
- Selector lever: P or N

6. Start the Active Test.
   CAUTION:
   Never turn OFF ignition switch.
   NOTE:
   Fuel injectors are turned OFF.
7. Depress and hold down brake pedal.
8. Actuate the starter for several seconds.
9. Stop starter.
10. Check combustion chamber and fuel injector for fuel leakage by using suitable tool (e.g. endoscope light probe).

Is the inspection result normal?

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

Component Inspection (Fuel Injector)

INFOID:0000000013609427

1.CHECK FUEL INJECTOR

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

Cylinder	Injector		Resistance
	+	–	
	Terminal		
1	1	2	198 – 242 kΩ
2			
3			
4			

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning fuel injector(s). Refer to EM-49, "Removal and Installation".

P0204 FUEL INJECTOR (CYLINDER 4)

DTC Description

INFOID:0000000013609428

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0204	01	INJECTOR CYL4 (Cylinder 4 injector “A” circuit)	ELECTRICAL MALFUNCTION	The fuel injector (cylinder 4) has an electrical malfunction or an open circuit. There is a general electrical malfunction.
	11		CIRCUIT SHORT TO GROUND	The fuel injector (cylinder 4) has an electrical malfunction or an open circuit. There is a short circuit to ground.
	13		CIRCUIT OPEN	The fuel injector (cylinder 4) has an electrical malfunction or an open circuit. There is an open circuit.
	19		CIRC CRRNT ABOVE THRESHOLD	The fuel injector (cylinder 4) has an electrical malfunction or an open circuit. The limit value for current has been exceeded.
	1F		CIRCUIT INTERMITTENT	The fuel injector (cylinder 4) has an electrical malfunction or an open circuit. There is a sporadic malfunction.
	49		INTERNAL ELECTRONIC ERROR	The fuel injector (cylinder 4) has an electrical malfunction or an open circuit. There is an internal electrical malfunction.
	92		PFM/INCORRECT OPERATN	The fuel injector (cylinder 4) has an electrical malfunction or an open circuit. The function or the instruction has malfunction.

POSSIBLE CAUSE

- Harness or connectors
  (Fuel injector circuit is open or shorted.)
- Fuel injector
- Fuel leak (fuel injector)

Diagnosis Procedure

INFOID:0000000013609429

1.CHECK FUEL INJECTOR FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL INJECTORS”.
3. Start the engine and let it idle.
4. Set the vehicle to the following conditions:

Monitor item	Condition
ENGINE SPEED	Idle
SMOOTH OPR OF CYL 1	2 or less
SMOOTH OPR OF CYL 2	2 or less
SMOOTH OPR OF CYL 3	2 or less
SMOOTH OPR OF CYL 4	2 or less
COOLANT TEMPERATURE	80°C (176°F)

5. Perform Active Test.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK FUEL INJECTOR

Check cylinder 4 fuel injector. Refer to EC-507, "Component Inspection (Fuel Injector)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace fuel injector. Refer to EM-49, "Removal and Installation".

3.CHECK FUEL INJECTOR CONTROL CIRCUIT

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

+		–		Continuity
ECM		Fuel injector		
Connector	Terminal	Connector	Terminal	
F149	25	F167	2	Existed
	26		1	

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

Is the inspection result normal?

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

4.CHECK INJECTOR LEAKAGE

NOTE:
During this test, the fuel rail pressure is increased.

1. Remove spark plug.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL HIGH PRESSURE CIRCUIT”.
5. Set the vehicle the following conditions.

- Engine stopped
- Parking brake: applied
- Selector lever: P or N

6. Start the Active Test.
   CAUTION:
   Never turn OFF ignition switch.
   NOTE:
   Fuel injectors are turned OFF.
7. Depress and hold down brake pedal.
8. Actuate the starter for several seconds.
9. Stop starter.
10. Check combustion chamber and fuel injector for fuel leakage by using suitable tool (e.g. endoscope light probe).

Is the inspection result normal?

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

Component Inspection (Fuel Injector)

INFOID:0000000013609430

1.CHECK FUEL INJECTOR

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

Cylinder	Injector		Resistance
	+	–	
	Terminal		
1	1	2	198 – 242 kΩ
2			
3			
4			

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning fuel injector(s). Refer to EM-49, "Removal and Installation".

P0217 ENGINE OVER TEMPERATURE

DTC Description

INFOID:0000000013609431

DTC DETECTION LOGIC

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	Malfunction type	
P0217	00	Engine coolant over temperature (Engine Coolant Over Temperature Condition)	NO SUBTYPE INFORMATION	The coolant temperature of the engine is too high.

POSSIBLE CAUSE

- Radiator hose
- Radiator
- Radiator cap
- Thermostat
- Cooling fan motor
- ECM

Diagnosis Procedure

INFOID:0000000013609432

1.CHECK DTC

With CONSULT
Check DTC in “ENGINE”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".
NO >> GO TO 2.

2.CHECK COOLANT LEVEL AND LEAK

Check cooling system. Refer to CO-7, "Inspection".

Is leakage detected?

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

3.CHECK RADIATOR CAP AND RADIATOR

1. Check radiator cap. Refer to CO-12, "RESERVOIR TANK CAP : Inspection".
2. Check radiator. Refer to CO-12, "RADIATOR : Inspection".

Is the inspection result normal?

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

4.CHECK COMPONENT

Check the following.

- Thermostat
- Cooling fan

Is the inspection result normal?

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

P0219 ENGINE SPEED

DTC Description

INFOID:0000000013609433

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0219	00	ENGINE OVERSPEED CONDITION (Engine overspeed condition)	NO SUBTYPE INFORMATION	The engine speed is too high.
	35		SIGNAL HIGH TIME > MAX	The engine speed is too high. The on-time of the signal frequency is too long.

POSSIBLE CAUSE

- Engine overreving has occurred.

Diagnosis Procedure

INFOID:0000000013609434

1.INSPECTION START

NOTE:
This DTC is displayed when the accelerator pedal is pressed in full-load position in neutral for 2 minutes or more.

>> INSPECTION END

P0222, P0223 THROTTLE POSITION SENSOR

Diagnosis Description

INFOID:0000000013609435

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0222	00	Throttle/Pedal position sen/sw B (Throttle/Pedal Position Sensor/ Switch "B" Circuit Low)	NO SUBTYPE INFORMATION	Position sensor 2 for the throttle valve has a short circuit to ground.
P0223	00	THROTTLE/PEDAL POS SEN/ SW B (Throttle/Pedal Position Sensor/ Switch "B" Circuit High)	NO SUBTYPE INFORMATION	Position sensor 2 for the throttle valve has a short circuit to positive.

POSSIBLE CAUSE

- Harness and connectors
  (Throttle valve actuator circuit is open or shorted.)
- Throttle valve actuator

Diagnosis Procedure

INFOID:0000000013609436

1.CHECK THROTTLE VALVE POSITION

With CONSULT

1. Start the engine and warm it up to coolant temperature reaches more than 80°C (176°F).
2. Turn ignition switch OFF.
3. Turn ignition switch ON (engine stopped).
4. Wait at least 60 seconds.
5. On CONSULT screen, select "ENGINE" >> "ACTIVE TEST" >> "CHECK THROTTLE VALVE ACTUATOR".
6. Perform Active Test.

- Check the value of monitor items as following condition

Item	Condition	Value
KICKDOWN	Accelerator pedal: fully released	NOT ACTIVE
ACCELERATOR PEDAL SEN 1		0.2 – 0.5 V
THRTL VALVE ACTUATOR1 V		0.6 – 1.0 V
THRTL VALVE ACTUATOR2 V		4.0 – 4.4 V

- Check the value of monitor items as following condition

Item	Condition	Value
KICKDOWN	Accelerator pedal: fully depressed	ACTIVE
ACCELERATOR PEDAL SEN 1		4.3 – 4.8 V
THRTL VALVE ACTUATOR1 V		3.8 – 4.6 V
THRTL VALVE ACTUATOR2 V		0.4 – 1.2 V

Is the inspection result normal?

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

2.CHECK THROTTLE VALVE ACTUATOR

Check throttle valve actuator. Refer to EC-488, "Component Inspection (Throttle Valve Actuator)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace throttle valve actuator. Refer to EM-29, "Removal and Installation".

3.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between throttle valve actuator harness connector and ground.

+		–	Voltage (Approx.)
Throttle valve actuator			
Connector	Terminal		
F148	4	Ground	5 V

Is the inspection result normal?

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

4.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	4	F149	17	Existed

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

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

5.CHECK THROTTLE VALVE POSITION SENSOR CIRCUIT

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

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	3	F149	38	Existed
	5		62	
	6		14	

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

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Throttle Valve Actuator)

INFOID:0000000013609437

1.CHECK THROTTLE VALVE MOTOR

1. Turn ignition switch OFF.
2. Disconnect throttle valve actuator harness connector.
3. Check the resistance between throttle valve actuator terminals.

Terminal	Resistance
1 and 2	1 – 10 Ω

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace throttle valve actuator. Refer to EM-29, "Removal and Installation".

2.CHECK THROTTLE VALVE

1. Remove throttle valve actuator.
2. Operate throttle valve slowly by hand as far as the wide open position.
3. Check that the throttle valve does not stick and returning to closed position by spring force.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace throttle valve actuator. Refer to EM-29, "Removal and Installation".

P0234 TURBOCHARGER BOOST PRESSURE

DTC Description

INFOID:0000000013609438

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
P0234	22	TC/SC A (Turbocharger/supercharger "A" overboost condition)	SIG AMPLTUDE > MAX	The boost pressure of turbocharger 1 is too high. The signal amplitude is greater than the maximum amplitude.

POSSIBLE CAUSE

- Low pressure EGR system
- Intake air leak

Diagnosis Procedure

INFOID:0000000013609439

1.CHECK COMPONENT FUNCTION-1

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select "ENGINE" >> "ACTIVE TEST" >> "BOOST PRESSURE CONTROL".
3. Start the engine and let it idle.
4. Check that the value of "BOOST PRES POSITNR DUTY" is between 87% and 100%.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Pull out #214 (10A) fuse.
3. Check that the fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER POWER SUPPLY

1. Reinsert the fuse which pulled out.
2. Disconnect boost pressure control vacuum transducer harness connector.
3. Turn ignition switch ON.
4. Check the voltage between boost pressure control vacuum transducer harness connector and ground.

+		−	Voltage
Boost pressure control vacuum transducer			
Connector	Terminal		
F168	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out #214 (10 A) fuse.
3. Check the continuity between boost pressure control vacuum transducer harness connector and fuse terminal.

+		–	Continuity
Boost pressure control vacuum transducer			
Connector	Terminal		
F168	1	#214 fuse terminal	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5.CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER

Check boost pressure control vacuum transducer. Refer to EC-492, "Component Inspection (Boost Pressure Control Vacuum Transducer)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace boost pressure control vacuum transducer.

6.CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and boost pressure control vacuum transducer harness connector.

+		–		Continuity
ECM		Boost pressure control vacuum transducer		
Connector	Terminal	Connector	Terminal	
F149	51	F168	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

7.CHECK COMPONENT FUNCTION-2

With CONSULT

1. Set the vehicle to the following conditions.

Item	Condition
Engine speed	Idle
Engine coolant temperature	Less than 75°C (167°F)
Electrical load	OFF

2. Perform Active Test.
3. Check that the turbocharger control rod moves smoothly by visually check.

CAUTION:
Never operate the control rod by hand.

Is the inspection result normal?

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

8.CHECK VACUUM PRESSURE

1. Turn ignition switch OFF.
2. Disconnect vacuum hose at boost pressure control vacuum transducer.

3. Connect vacuum tester.
4. Start the engine and let it idle.
5. Check that the vacuum pressure is more than −75 kPa (−750 mbar, −0.765 kg/cm^2, −10.9 psi).

Is the inspection result normal?

YES >> GO TO 9.
NO >> Check vacuum line leakage, or vacuum pump performance.

9.CHECK COMPONENT

Check the following.
- Pressure sensor upstream of throttle valve (foreign matter is caught.)
- Turbocharger (obstructed movement)
- Exhaust gas pressure
- Charge air leakage
- Divert air switchover valve diaphragm

>> INSPECTION END

Component Inspection (Boost Pressure Control Vacuum Transducer)

INFOID:0000000013609440

1.CHECK BOOST PRESSRUE CONTROL VACUUM TRANSDUCER

1. Turn ignition switch OFF.
2. Disconnect boost pressure control vacuum transducer harness connector.
3. Check the resistance between boost pressure control vacuum transducer terminals.

Boost pressure control vacuum transducer	Resistance
Terminal	
1 and 2	9.8 – 11.2 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace boost pressure control vacuum transducer. Refer to EC-27, "Component Parts Location".

P0236 PRESSURE SENSOR UPSTREAM OF THROTTLE VALVE

DTC Description

INFOID:0000000013609441

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0236	00	TC/SC BOOST SENSOR A (Turbocharger/Supercharger Boost Sensor ″A″ Circuit Range/Performance)	NO SUBTYPE INFORMATION	The boost pressure sensor has a malfunction.
	28		SG BS LVL O-OF RNG/ZR AJST ERR	The pressure sensor upstream of throttle valve has a malfunction. The signal offset is outside the permissible range.
	2A		SIGNAL STUCK IN RANGE	The pressure sensor upstream of throttle valve has a malfunction. There is no signal change.
	64		SIGNAL PLAUSIBILITY ERROR	The pressure sensor upstream of throttle valve has a malfunction. There is an implausible signal.

POSSIBLE CAUSE

Pressure sensor upstream of throttle valve

Diagnosis Procedure

INFOID:0000000013609442

1.REPLACE PRESSURE SENSOR UPSTREAM OF THROTTLE VALVE

Replace pressure sensor upstream of throttle valve. Refer to EM-29, "Removal and Installation".

>> INSPECTION END

P0237, P0238 PRESSURE SENSOR UPSTREAM OF THROTTLE VALVE

DTC Description

INFOID:0000000013609443

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0237	11	TC/SC BOOST SENSOR A (Turbocharger/Supercharger Boost Sensor ″A″ Circuit Low)	CIRCUIT SHORT TO GROUND	The pressure sensor upstream of throttle valve has a short circuit to ground. There is a short circuit to ground.
P0238	12	TC/SC BOOST SENSOR A (Turbocharger/Supercharger Boost Sensor ″A″ Circuit High)	CIRCUIT SHORT TO BATTERY	The pressure sensor upstream of throttle valve has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

- Harness and connectors
  (Pressure sensor upstream of throttle valve circuit is open or shorted.)
- Pressure sensor upstream of throttle valve

Diagnosis Procedure

INFOID:0000000013609444

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “PRS SEN U/STRM THRTL VLV”.
3. Check the indicated value as the following conditions.

Monitor item	Condition	Value
PRS SEN U/STRM THRTL VLV	Ignition switch ON (engine stopped)	1 – 2 V
	• At idle • Accelerator pedal: quickly depress	2 V or more

Is the inspection result normal?

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

2.CHECK POWER SUPPLY OF PRESSURE SENSOR UPSTREAM OF THROTTLE VALVE

1. Turn ignition switch OFF.
2. Disconnect pressure sensor upstream of throttle valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between pressure sensor upstream of throttle valve harness connector and ground.

+		–	Voltage
Pressure sensor upstream of throttle valve			
Connector	Terminal		
F138	3	Ground	4.75 – 5.25 V

Is the inspection result normal?

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

3.CHECK PRESSURE SENSOR UPSTREAM OF THROTTLE VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

3. Check the continuity between ECM harness connector and pressure sensor upstream of throttle valve harness connector.

+		–		Continuity
ECM		Pressure sensor upstream of throttle valve		
Connector	Terminal	Connector	Terminal	
F149	16	F138	3	Existed

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4. CHECK PRESSURE SENSOR UPSTREAM OF THROTTLE VALVE CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and pressure sensor upstream of throttle valve harness connector.

+		–		Continuity
ECM		Pressure sensor upstream of throttle valve		
Connector	Terminal	Connector	Terminal	
F149	11	F138	2	Existed
	41		1	

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

Is the inspection result normal?

YES >> Replace pressure sensor upstream of throttle valve. Refer to EM-29, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0243 BOOST PRESSURE CONTROL VACUUM TRANSDUCER

DTC Description

INFOID:0000000013609445

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0243	13	TC/SC wastegate solenoid A (Turbocharger/Supercharger Wastegate Solenoid ″A″)	CIRCUIT OPEN	The output for the low-pressure turbocharger has an electrical malfunction. There is an open circuit.

POSSIBLE CAUSE

- Harness or connectors
  (Boost pressure control vacuum transducer circuit)
- Boost pressure control vacuum transducer

Diagnosis Procedure

INFOID:0000000013609446

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “BOOST PRESSURE”.
3. Start the engine and let it idle.
4. Perform Active Test.
5. Check that the indicated value of “BOOST PRES POSITNR DUTY” is between 87% and 100%.

Is the actuator actuated?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that #214 (10 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect boost pressure control vacuum transducer harness connector.
3. Turn ignition switch ON.
4. Check the voltage between boost pressure control vacuum transducer harness connector and ground.

+		−	Voltage
Boost pressure control vacuum transducer			
Connector	Terminal		
F168	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out #214 (10 A) fuse.

3. Check the continuity between boost pressure control vacuum transducer harness connector and fuse terminal.

+		–	Continuity
Boost pressure control vacuum transducer			
Connector	Terminal		
F168	1	#214 fuse terminal	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5. CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER

Check boost pressure control vacuum transducer. Refer to EC-499, "Component Inspection (Boost Pressure Control Vacuum Transducer)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace boost pressure control vacuum transducer. Refer to EC-27, "Component Parts Location".

6. CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and boost pressure control vacuum transducer harness connector.

+		–		Continuity
ECM		Boost pressure control vacuum transducer		
Connector	Terminal	Connector	Terminal	
F149	51	F168	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

Component Inspection (Boost Pressure Control Vacuum Transducer)

INFOID:0000000013609447

1. CHECK BOOST PRESSRUE CONTROL VACUUM TRANSDUCER

1. Turn ignition switch OFF.
2. Disconnect boost pressure control vacuum transducer harness connector.
3. Check the resistance between boost pressure control vacuum transducer terminals.

Boost pressure control vacuum transducer	Resistance
Terminal	
1 and 2	9.5 – 13.5 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace boost pressure control vacuum transducer. Refer to EC-27, "Component Parts Location".

P0245 BOOST PRESSURE CONTROL VACUUM TRANSDUCER

DTC Description

INFOID:0000000013609448

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0245	11	TC/SC WASTEGATE SOL A (Turbocharger/Supercharger Wastegate Solenoid ″A″ Low)	CIRCUIT SHORT TO GROUND	The output for the low-pressure turbocharger has a short circuit to ground. There is a short circuit to ground.

POSSIBLE CAUSE

- Harness or connectors
  (Boost pressure control vacuum transducer circuit)
- Boost pressure control vacuum transducer

Diagnosis Procedure

INFOID:0000000013609449

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “BOOST PRESSURE”.
3. Start the engine and let it idle.
4. Perform Active Test.
5. Check that the indicated value of “BOOST PRES POSITNR DUTY” is between 87% and 100%.

Is the actuator actuated?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that #214 (10 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect boost pressure control vacuum transducer harness connector.
3. Turn ignition switch ON.
4. Check the voltage between boost pressure control vacuum transducer harness connector and ground.

+		−	Voltage
Boost pressure control vacuum transducer			
Connector	Terminal		
F168	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out #214 (10 A) fuse.

3. Check the continuity between boost pressure control vacuum transducer harness connector and fuse terminal.

+		–	Continuity
Boost pressure control vacuum transducer			
Connector	Terminal		
F168	1	#214 fuse terminal	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5. CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER

Check boost pressure control vacuum transducer. Refer to EC-499, "Component Inspection (Boost Pressure Control Vacuum Transducer)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace boost pressure control vacuum transducer. Refer to EC-27, "Component Parts Location".

6. CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and boost pressure control vacuum transducer harness connector.

+		–		Continuity
ECM		Boost pressure control vacuum transducer		
Connector	Terminal	Connector	Terminal	
F149	51	F168	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

Component Inspection (Boost Pressure Control Vacuum Transducer)

INFOID:0000000013609450

1. CHECK BOOST PRESSRUE CONTROL VACUUM TRANSDUCER

1. Turn ignition switch OFF.
2. Disconnect boost pressure control vacuum transducer harness connector.
3. Check the resistance between boost pressure control vacuum transducer terminals.

Boost pressure control vacuum transducer	Resistance
Terminal	
1 and 2	9.5 – 13.5 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace boost pressure control vacuum transducer. Refer to EC-27, "Component Parts Location".

P0246 BOOST PRESSURE CONTROL VACUUM TRANSDUCER

DTC Description

INFOID:0000000013609451

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0246	12	TC/SC WASTEGATE SOL A (Turbocharger/Supercharger Wastegate Solenoid ″A″ High)	CIRCUIT SHORT TO BATTERY	The output for the low-pressure turbocharger has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Boost pressure control vacuum transducer circuit is open or shorted.)
- Boost pressure control vacuum transducer

Diagnosis Procedure

INFOID:0000000013609452

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “BOOST PRESSURE”.
3. Start the engine and let it idle.
4. Perform Active Test.
5. Check that the indicated value of “BOOST PRES POSITNR DUTY” is between 87% and 100%.

Is the actuator actuated?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that #214 (10 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect boost pressure control vacuum transducer harness connector.
3. Turn ignition switch ON.
4. Check the voltage between boost pressure control vacuum transducer harness connector and ground.

+		−	Voltage
Boost pressure control vacuum transducer			
Connector	Terminal		
F168	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out #214 (10 A) fuse.

3. Check the continuity between boost pressure control vacuum transducer harness connector and fuse terminal.

+		–	Continuity
Boost pressure control vacuum transducer			
Connector	Terminal		
F168	1	#214 fuse terminal	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5. CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER

Check boost pressure control vacuum transducer. Refer to EC-501, "Component Inspection (Boost Pressure Control Vacuum Transducer)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace boost pressure control vacuum transducer. Refer to EC-27, "Component Parts Location".

6. CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and boost pressure control vacuum transducer harness connector.

+		–		Continuity
ECM		Boost pressure control vacuum transducer		
Connector	Terminal	Connector	Terminal	
F149	51	F168	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

Component Inspection (Boost Pressure Control Vacuum Transducer)

INFOID:0000000013609453

1. CHECK BOOST PRESSRUE CONTROL VACUUM TRANSDUCER

1. Turn ignition switch OFF.
2. Disconnect boost pressure control vacuum transducer harness connector.
3. Check the resistance between boost pressure control vacuum transducer terminals.

Boost pressure control vacuum transducer	Resistance
Terminal	
1 and 2	9.5 – 13.5 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace boost pressure control vacuum transducer. Refer to EC-27, "Component Parts Location".

P0262 FUEL INJECTOR (CYLINDER 1)

DTC Description

INFOID:0000000013609454

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0262	12	Cylinder 1 fuel injector (Cylinder 1 Injector "A" Circuit High)	CIRCUIT SHORT TO BATTERY	The fuel injector (cylinder 1) has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Fuel injector circuit is open or shorted.)
- Fuel injector
- Fuel leak (fuel injector)

Diagnosis Procedure

INFOID:0000000013609455

1.CHECK FUEL INJECTOR FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL INJECTORS”.
3. Start the engine and let it idle.
4. Set the vehicle to the following conditions:

Monitor item	Condition
ENGINE SPEED	Idle
SMOOTH OPR OF CYL 1	2 or less
SMOOTH OPR OF CYL 2	2 or less
SMOOTH OPR OF CYL 3	2 or less
SMOOTH OPR OF CYL 4	2 or less
COOLANT TEMPERATURE	80°C (176°F)

5. Perform Active Test.

Is the inspection result normal?

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

2.CHECK FUEL INJECTOR

Check cylinder 1 fuel injector. Refer to EC-507, "Component Inspection (Fuel Injector)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace fuel injector. Refer to EM-49, "Removal and Installation".

3.CHECK FUEL INJECTOR CONTROL CIRCUIT

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

+		–		Continuity
ECM		Fuel injector		
Connector	Terminal	Connector	Terminal	
F149	1	F164	2	Existed
	2		1	

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

Is the inspection result normal?

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

4. CHECK INJECTOR LEAKAGE

NOTE:
During this test, the fuel rail pressure is increased.

1. Remove spark plug.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL HIGH PRESSURE CIRCUIT”.
5. Set the vehicle the following conditions.

- Engine stopped
- Parking brake: applied
- Selector lever: P or N

6. Start the Active Test.

CAUTION:
Never turn OFF ignition switch.
NOTE:
Fuel injectors are turned OFF.

7. Depress and hold down brake pedal.
8. Actuate the starter for several seconds.
9. Stop starter.
10. Check combustion chamber and fuel injector for fuel leakage by using suitable tool (e.g. endoscope light probe).

Is the inspection result normal?

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

Component Inspection (Fuel Injector)

INFOID:0000000013609456

1. CHECK FUEL INJECTOR

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

Cylinder	Injector		Resistance
	+	–	
	Terminal		
1	1	2	198 – 242 kΩ
2			
3			
4			

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning fuel injector(s). Refer to EM-49, "Removal and Installation".

P0265 FUEL INJECTOR (CYLINDER 2)

DTC Description

INFOID:0000000013609457

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P0265	12	Cylinder 2 fuel injector (Cylinder 2 Injector ″A″ Circuit High)	CIRCUIT SHORT TO BATTERY	The fuel injector (cylinder 2) has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Fuel injector circuit is open or shorted.)
- Fuel injector
- Fuel leak (fuel injector)

Diagnosis Procedure

INFOID:0000000013609458

1.CHECK FUEL INJECTOR FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL INJECTORS”.
3. Start the engine and let it idle.
4. Set the vehicle to the following conditions:

Monitor item	Condition
ENGINE SPEED	Idle
SMOOTH OPR OF CYL 1	2 or less
SMOOTH OPR OF CYL 2	2 or less
SMOOTH OPR OF CYL 3	2 or less
SMOOTH OPR OF CYL 4	2 or less
COOLANT TEMPERATURE	80°C (176°F)

5. Perform Active Test.

Is the inspection result normal?

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

2.CHECK FUEL INJECTOR

Check cylinder 2 fuel injector. Refer to EC-507, "Component Inspection (Fuel Injector)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace fuel injector. Refer to EM-49, "Removal and Installation".

3.CHECK FUEL INJECTOR CONTROL CIRCUIT

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

+		–		Continuity
ECM		Fuel injector		
Connector	Terminal	Connector	Terminal	
F149	1	F165	2	Existed
	2		1	

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

Is the inspection result normal?

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

4. CHECK INJECTOR LEAKAGE

NOTE:
During this test, the fuel rail pressure is increased.

1. Remove spark plug.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL HIGH PRESSURE CIRCUIT”.
5. Set the vehicle the following conditions.

- Engine stopped
- Parking brake: applied
- Selector lever: P or N

6. Start the Active Test.

CAUTION:
Never turn OFF ignition switch.
NOTE:
Fuel injectors are turned OFF.

7. Depress and hold down brake pedal.
8. Actuate the starter for several seconds.
9. Stop starter.
10. Check combustion chamber and fuel injector for fuel leakage by using suitable tool (e.g. endoscope light probe).

Is the inspection result normal?

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

Component Inspection (Fuel Injector)

INFOID:0000000013609459

1. CHECK FUEL INJECTOR

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

Cylinder	Injector		Resistance
	+	–	
	Terminal		
1	1	2	198 – 242 kΩ
2			
3			
4			

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning fuel injector(s). Refer to EM-49, "Removal and Installation".

P0268 FUEL INJECTOR (CYLINDER 3)

DTC Description

INFOID:0000000013609460

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0268	12	Cylinder 3 fuel injector (Cylinder 3 Injector ″A″ Circuit High)	CIRCUIT SHORT TO BATTERY	The fuel injector (cylinder 3) has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Fuel injector circuit is open or shorted.)
- Fuel injector
- Fuel leak (fuel injector)

Diagnosis Procedure

INFOID:0000000013609461

1.CHECK FUEL INJECTOR FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL INJECTORS”.
3. Start the engine and let it idle.
4. Set the vehicle to the following conditions:

Monitor item	Condition
ENGINE SPEED	Idle
SMOOTH OPR OF CYL 1	2 or less
SMOOTH OPR OF CYL 2	2 or less
SMOOTH OPR OF CYL 3	2 or less
SMOOTH OPR OF CYL 4	2 or less
COOLANT TEMPERATURE	80°C (176°F)

5. Perform Active Test.

Is the inspection result normal?

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

2.CHECK FUEL INJECTOR

Check cylinder 3 fuel injector. Refer to EC-507, "Component Inspection (Fuel Injector)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace fuel injector. Refer to EM-49, "Removal and Installation".

3.CHECK FUEL INJECTOR CONTROL CIRCUIT

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

+		–		Continuity
ECM		Fuel injector		
Connector	Terminal	Connector	Terminal	
F149	1	F166	2	Existed
	2		1	

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

Is the inspection result normal?

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

4. CHECK INJECTOR LEAKAGE

NOTE:
During this test, the fuel rail pressure is increased.

1. Remove spark plug.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL HIGH PRESSURE CIRCUIT”.
5. Set the vehicle the following conditions.

- Engine stopped
- Parking brake: applied
- Selector lever: P or N

6. Start the Active Test.

CAUTION:
Never turn OFF ignition switch.
NOTE:
Fuel injectors are turned OFF.

7. Depress and hold down brake pedal.
8. Actuate the starter for several seconds.
9. Stop starter.
10. Check combustion chamber and fuel injector for fuel leakage by using suitable tool (e.g. endoscope light probe).

Is the inspection result normal?

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

Component Inspection (Fuel Injector)

INFOID:0000000013609462

1. CHECK FUEL INJECTOR

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

Cylinder	Injector		Resistance
	+	–	
	Terminal		
1	1	2	198 – 242 kΩ
2			
3			
4			

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning fuel injector(s). Refer to EM-49, "Removal and Installation".

P026A TC SYSTEM

DTC Description

INFOID:0000000013609463

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
P026A	00	Charge air cooler efficiency (The efficiency of the charge air cooler is not sufficient)	NO SUBTYPE INFORMATION	The efficiency of the charge air cooler is not sufficient.

POSSIBLE CAUSE

- Charge air cooler
- Coolant circulation pump

Diagnosis Procedure

INFOID:0000000013609464

1.CHECK CHARGE AIR COOLER

Check charge air cooler for unobstructed movement. Refer to EM-38, "Inspection".

Is the inspection result normal?

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

P0271 FUEL INJECTOR (CYLINDER 4)

DTC Description

INFOID:0000000013609465

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0271	12	Cylinder 4 fuel injector (Cylinder 4 Injector ″A″ Circuit High)	CIRCUIT SHORT TO BATTERY	The fuel injector (cylinder 4) has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Fuel injector circuit is open or shorted.)
- Fuel injector
- Fuel leak (fuel injector)

Diagnosis Procedure

INFOID:0000000013609466

1.CHECK FUEL INJECTOR FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL INJECTORS”.
3. Start the engine and let it idle.
4. Set the vehicle to the following conditions:

Monitor item	Condition
ENGINE SPEED	500 – 950 rpm
SMOOTH OPR OF CYL 1	2 or less
SMOOTH OPR OF CYL 2	2 or less
SMOOTH OPR OF CYL 3	2 or less
SMOOTH OPR OF CYL 4	2 or less
COOLANT TEMPERATURE	80°C (176°F)

5. Perform Active Test.

Is the inspection result normal?

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

2.CHECK FUEL INJECTOR

Check cylinder 4 fuel injector. Refer to EC-510, "Component Inspection (Fuel Injector)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace fuel injector. Refer to EM-49, "Removal and Installation".

3.CHECK FUEL INJECTOR CONTROL CIRCUIT

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

+		–		Continuity
ECM		Fuel injector		
Connector	Terminal	Connector	Terminal	
F149	25	F167	2	Existed
	26		1	

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

Is the inspection result normal?

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

4.CHECK INJECTOR LEAKAGE

NOTE:
During this test, the fuel rail pressure is increased.

1. Remove spark plug.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL HIGH PRESSURE CIRCUIT”.
5. Set the vehicle the following conditions.

- Engine stopped
- Parking brake: applied
- Selector lever: P or N

6. Start the Active Test.
   CAUTION:
   Never turn OFF ignition switch.
   NOTE:
   Fuel injectors are turned OFF.
7. Depress and hold down brake pedal.
8. Actuate the starter for several seconds.
9. Stop starter.
10. Check combustion chamber and fuel injector for fuel leakage by using suitable tool (e.g. endoscope light probe).

Is the inspection result normal?

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

Component Inspection (Fuel Injector)

INFOID:0000000013609467

1.CHECK FUEL INJECTOR

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

Cylinder	Injector		Resistance
	+	–	
	Terminal		
1	1	2	198 – 242 kΩ
2			
3			
4			

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning fuel injector(s). Refer to EM-49, "Removal and Installation".

P0299 TC SYSTEM

DTC Description

INFOID:0000000013609468

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
P0299	21	TC/SC A (Turbocharger/Supercharger "A" Underboost Condition)	SIGNAL AMPLTUDE < MIN	The boost pressure of turbocharger is too low. The signal amplitude is less than the minimum amplitude.

POSSIBLE CAUSE

- Low pressure EGR system
- Intake air leak

Diagnosis Procedure

INFOID:0000000013609469

1.CHECK COMPONENT FUNCTION-1

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select "ENGINE" >> "ACTIVE TEST" >> "BOOST PRESSURE CONTROL".
3. Start the engine and let it idle.
4. Check that the value of "BOOST PRES POSITNR DUTY" is between 87% and 100%.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Pull out #214 (10A) fuse.
3. Check that the fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER POWER SUPPLY

1. Reinsert the fuse which pulled out.
2. Disconnect boost pressure control vacuum transducer harness connector.
3. Turn ignition switch ON.
4. Check the voltage between boost pressure control vacuum transducer harness connector and ground.

+		−	Voltage
Boost pressure control vacuum transducer			
Connector	Terminal		
F168	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out #214 (10 A) fuse.
3. Check the continuity between boost pressure control vacuum transducer harness connector and fuse terminal.

+		–	Continuity
Boost pressure control vacuum transducer			
Connector	Terminal		
F168	1	#214 fuse terminal	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5.CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER

Check boost pressure control vacuum transducer. Refer to EC-513, "Component Inspection (Boost Pressure Control Vacuum Transducer)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace boost pressure control vacuum transducer.

6.CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and boost pressure control vacuum transducer harness connector.

+		–		Continuity
ECM		Boost pressure control vacuum transducer		
Connector	Terminal	Connector	Terminal	
F149	51	F168	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

7.CHECK COMPONENT FUNCTION-2

With CONSULT

1. Set the vehicle to the following conditions.

Item	Condition
Engine speed	Idle
Engine coolant temperature	Less than 75°C (167°F)
Electrical load	OFF

2. Perform Active Test.
3. Check that the turbocharger control rod moves smoothly by visually check.

CAUTION:
Never operate the control rod by hand.

Is the inspection result normal?

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

8.CHECK VACUUM PRESSURE

1. Turn ignition switch OFF.
2. Disconnect vacuum hose at boost pressure control vacuum transducer.

3. Connect vacuum tester.
4. Start the engine and let it idle.
5. Check that the vacuum pressure is more than −75 kPa (−750 mbar, −0.765 kg/cm^2, −10.9 psi).

Is the inspection result normal?

YES >> GO TO 9.
NO >> Check vacuum line leakage, or vacuum pump performance.

9.CHECK COMPONENT

Check the following.
- Pressure sensor upstream of throttle valve (foreign matter is caught.)
- Turbocharger (obstructed movement)
- Exhaust gas pressure
- Charge air leakage
- Divert air switchover valve diaphragm

>> INSPECTION END

Component Inspection (Boost Pressure Control Vacuum Transducer)

INFOID:0000000013609470

1.CHECK BOOST PRESSRUE CONTROL VACUUM TRANSDUCER

1. Turn ignition switch OFF.
2. Disconnect boost pressure control vacuum transducer harness connector.
3. Check the resistance between boost pressure control vacuum transducer terminals.

Boost pressure control vacuum transducer	Resistance
Terminal	
1 and 2	9.8 – 11.2 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace boost pressure control vacuum transducer. Refer to EC-27, "Component Parts Location".

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Description

INFOID:0000000013609471

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	Malfunction type	
P0300	85	RANDOM/MULTIPLE CYL MISFIRE (Random/multiple cylinder misfire detected)	SIG ABOVE ALLOWABLE RANGE	Combustion misfiring has been detected. There is a signal above the permissible limit value.
P0301	85	CYLINDER 1 MISFIRE (Cylinder 1 misfire detected)	SIG ABOVE ALLOWABLE RANGE	Combustion misfiring of cylinder 1 has been detected. There is a signal above the permissible limit value.
P0302	85	CYLINDER 2 MISFIRE (Cylinder 2 misfire detected)	SIG ABOVE ALLOWABLE RANGE	Combustion misfiring of cylinder 2 has been detected. There is a signal above the permissible limit value.
P0303	85	CYLINDER 1 MISFIRE (Cylinder 3 misfire detected)	SIG ABOVE ALLOWABLE RANGE	Combustion misfiring of cylinder 3 has been detected. There is a signal above the permissible limit value.
P0304	85	CYLINDER 1 MISFIRE (Cylinder 4 misfire detected)	SIG ABOVE ALLOWABLE RANGE	Combustion misfiring of cylinder 4 has been detected. There is a signal above the permissible limit value.

POSSIBLE CAUSE

- Improper spark plug
- Insufficient compression
- Intake air leak
- Lack of fuel

Diagnosis Procedure

INFOID:0000000013609472

1.CHECK FOR EXHAUST SYSTEM CLOGGING

There are no malfunction codes for this test. Erase the DTC.

>> INSPECTION END

P0324 KNOCK CONTROL

DTC Description

INFOID:0000000013609473

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0324	00	KNOCK CONTROL SYSTEM (Knock/Combustion Vibration Control System Error)	NO SUBTYPE INFORMATION	The knock control has a malfunction.
	27		SIG RTE OF CHNG ABV THRESHLD	The knock control has a malfunction. The signal change rate is above the permissible limit value.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609474

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P0327 KNOCK SENSOR 1

DTC Description

INFOID:0000000013609475

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P0327	11	Knock/Combustion vibration s1 b1 (Knock/Combustion Vibration Sensor 1 Circuit Low Bank 1 or Single Sensor)	CIRCUIT SHORT TO GROUND	Knock sensor 1 (cylinder bank 1) has a short circuit to ground. There is a short circuit to ground.
	14		CIRC SHORT TO GRND OR OPEN	Knock sensor 1 (cylinder bank 1) has a short circuit to ground. There is a short circuit to ground or an open circuit.
	84		SIG BELOW ALLOWABLE RANGE	Knock sensor 1 (cylinder bank 1) has a short circuit to ground. There is a signal below the permissible limit value.

POSSIBLE CAUSE

- Harness or connectors
  (Knock sensor 1 circuit is open or shorted.)
- Knock sensor 1

Diagnosis Procedure

INFOID:0000000013609476

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and warm it up to engine coolant temperature reaches 80°C (176°F).
2. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “COOLANT TEMPERATURE”, “ENGINE SPEED” and “KNOCK CONTROL ENABLE”.
3. Set the vehicle to the following conditions.

Item	Condition
ENGINE SPEED	Idle
COOLANT TEMPERATURE	80°C (176°F)

4. Check the indicated value of “KNOCK CONTROL ENABLE” as the following condition.

Item	Condition	Value
KNOCK CONTROL ENABLE	Fully depress accelerator pedal for a short time.	NO ⇔ YES

NOTE:
The status changes instantaneously.

Is the inspection result normal?

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

2.CHECK KNOCK SENSOR 1

Check knock sensor 1. Refer to EC-517, "Component Inspection (Knock Sensor)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace knock sensor 1.

3.CHECK KNOCK SENSOR 1 CIRCUIT

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

+		–		Continuity
ECM		Knock sensor 1		
Connector	Terminal	Connector	Terminal	
F149	60	F130	2	Existed
	84		1	

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

Is the inspection result normal?

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

Component Inspection (Knock Sensor)

INFOID:0000000013609477

1.CHECK KNOCK SENSOR-1

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

Item	ECM			Resistance
	Connector	+	–	
		Terminal		
Knock sensor 1	F149	60	84	10 kΩ
Knock sensor 2		59	83	

Is the inspection result normal?

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

2.CHECK KNOCK SENSOR-2

1. Disconnect knock sensor harness connector.
2. Check the resistance between knock sensor terminals.

Knock sensor 1 Knock sensor 2		Resistance
+	–	
Terminal		
1	2	10 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace knock sensor.

P0328 KNOCK SENSOR 1

DTC Description

INFOID:0000000013609478

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0328	12	Knock/Combustion vibration sen1 b1 (Knock/Combustion Vibration Sensor 1 Circuit High Bank 1 or Single Sensor)	CIRCUIT SHORT TO BATTERY	Knock sensor 1 (cylinder bank 1) has a short circuit to positive. There is a short circuit to positive.
	15		CIRC SHORT TO BATT OR OPEN	Knock sensor 1 (cylinder bank 1) has a short circuit to positive. There is a short circuit to positive or an open circuit.
	85		SIG ABOVE ALLOWABLE RANGE	Knock sensor 1 (cylinder bank 1) has a short circuit to positive. There is a signal above the permissible limit value.

POSSIBLE CAUSE

- Harness or connectors
  (Knock sensor 1 circuit is open or shorted.)
- Knock sensor 1

Diagnosis Procedure

INFOID:0000000013609479

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and warm it up to engine coolant temperature reaches 80°C (176°F).
2. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “COOLANT TEMPERATURE”, “ENGINE SPEED” and “KNOCK CONTROL ENABLE”.
3. Set the vehicle to the following conditions.

Item	Condition
ENGINE SPEED	Idle
COOLANT TEMPERATURE	80°C (176°F)

4. Check the indicated value of “KNOCK CONTROL ENABLE” as the following condition.

Item	Condition	Value
KNOCK CONTROL ENABLE	Fully depress accelerator pedal for a short time.	NO ⇔ YES

NOTE:
The status changes instantaneously.

Is the inspection result normal?

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

2.CHECK KNOCK SENSOR 1

Check knock sensor 1. Refer to EC-519, "Component Inspection (Knock Sensor)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace knock sensor 1.

3.CHECK KNOCK SENSOR 1 CIRCUIT

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

+		–		Continuity
ECM		Knock sensor 1		
Connector	Terminal	Connector	Terminal	
F149	60	F130	2	Existed
	84		1	

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

Is the inspection result normal?

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

Component Inspection (Knock Sensor)

INFOID:0000000013609480

1.CHECK KNOCK SENSOR-1

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

Item	ECM			Resistance
	Connector	+	–	
		Terminal		
Knock sensor 1	F149	60	84	10 kΩ
Knock sensor 2		59	83	

Is the inspection result normal?

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

2.CHECK KNOCK SENSOR-2

1. Disconnect knock sensor harness connector.
2. Check the resistance between knock sensor terminals.

Knock sensor 1 Knock sensor 2		Resistance
+	–	
Terminal		
1	2	10 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace knock sensor.

P032C KNOCK SENSOR 2

DTC Description

INFOID:0000000013609481

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P032C	11	Knock/Combustion vibration s3 b1 (Knock/Combustion Vibration Sensor 3 Circuit Low Bank 1)	CIRCUIT SHORT TO GROUND	Knock sensor 2 (cylinder bank 1) has a short circuit to ground. There is a short circuit to ground.
	14		CIRC SHORT TO GRND OR OPEN	Knock sensor 2 (cylinder bank 1) has a short circuit to ground. There is a short circuit to ground or an open circuit.
	84		SIG BELOW ALLOWABLE RANGE	Knock sensor 2 (cylinder bank 1) has a short circuit to ground. There is a signal below the permissible limit value.

POSSIBLE CAUSE

- Harness or connectors
  (Knock sensor 2 circuit is open or shorted.)
- Knock sensor 2

Diagnosis Procedure

INFOID:0000000013609482

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and warm it up to engine coolant temperature reaches 80°C (176°F).
2. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “COOLANT TEMPERATURE”, “ENGINE SPEED” and “KNOCK CONTROL ENABLE”.
3. Set the vehicle to the following conditions.

Item	Condition
ENGINE SPEED	Idle
COOLANT TEMPERATURE	80°C (176°F)

4. Check the indicated value of “KNOCK CONTROL ENABLE” as the following condition.

Item	Condition	Value
KNOCK CONTROL ENABLE	Fully depress accelerator pedal for a short time.	NO ⇔ YES

NOTE:
The status changes instantaneously.

Is the inspection result normal?

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

2.CHECK KNOCK SENSOR 2

Check knock sensor 2. Refer to EC-521, "Component Inspection (Knock Sensor)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace knock sensor 2.

3.CHECK KNOCK SENSOR 2 CIRCUIT

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

+		–		Continuity
ECM		Knock sensor 2		
Connector	Terminal	Connector	Terminal	
F149	59	F131	2	Existed
	83		1	

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

Is the inspection result normal?

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

Component Inspection (Knock Sensor)

INFOID:0000000013609483

1.CHECK KNOCK SENSOR-1

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

Item	ECM			Resistance
	Connector	+	–	
		Terminal		
Knock sensor 1	F149	60	84	10 kΩ
Knock sensor 2		59	83	

Is the inspection result normal?

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

2.CHECK KNOCK SENSOR-2

1. Disconnect knock sensor harness connector.
2. Check the resistance between knock sensor terminals.

Knock sensor 1 Knock sensor 2		Resistance
+	–	
Terminal		
1	2	10 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace knock sensor.

P032D KNOCK SENSOR 2

DTC Description

INFOID:0000000013609484

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P032D	12	Knock/Combustion vibration s3 b1 (Knock/Combustion Vibration Sensor 3 Circuit High Bank 1)	CIRCUIT SHORT TO BATTERY	Knock sensor 2 (cylinder bank 1) has a short circuit to positive. There is a short circuit to positive.
	15		CIRC SHORT TO BATT OR OPEN	Knock sensor 2 (cylinder bank 1) has a short circuit to positive. There is a short circuit to positive or an open circuit.
	85		SIG ABOVE ALLOWABLE RANGE	Knock sensor 2 (cylinder bank 1) has a short circuit to positive. There is a signal above the permissible limit value.

POSSIBLE CAUSE

- Harness or connectors
  (Knock sensor 2 circuit is open or shorted.)
- Knock sensor 2

Diagnosis Procedure

INFOID:0000000013609485

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and warm it up to engine coolant temperature reaches 80°C (176°F).
2. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “COOLANT TEMPERATURE”, “ENGINE SPEED” and “KNOCK CONTROL ENABLE”.
3. Set the vehicle to the following conditions.

Item	Condition
ENGINE SPEED	Idle
COOLANT TEMPERATURE	80°C (176°F)

4. Check the indicated value of “KNOCK CONTROL ENABLE” as the following condition.

Item	Condition	Value
KNOCK CONTROL ENABLE	Fully depress accelerator pedal for a short time.	NO ⇔ YES

NOTE:
The status changes instantaneously.

Is the inspection result normal?

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

2.CHECK KNOCK SENSOR 2

Check knock sensor 2. Refer to EC-523, "Component Inspection (Knock Sensor)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace knock sensor 2.

3.CHECK KNOCK SENSOR 2 CIRCUIT

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

+		–		Continuity
ECM		Knock sensor 2		
Connector	Terminal	Connector	Terminal	
F149	59	F131	2	Existed
	83		1	

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

Is the inspection result normal?

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

Component Inspection (Knock Sensor)

INFOID:0000000013609486

1.CHECK KNOCK SENSOR-1

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

Item	ECM			Resistance
	Connector	+	–	
		Terminal		
Knock sensor 1	F149	60	84	10 kΩ
Knock sensor 2		59	83	

Is the inspection result normal?

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

2.CHECK KNOCK SENSOR-2

1. Disconnect knock sensor harness connector.
2. Check the resistance between knock sensor terminals.

Knock sensor 1 Knock sensor 2		Resistance
+	–	
Terminal		
1	2	10 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace knock sensor.

P0335 CRANKSHAFT POSITION SENSOR

DTC Description

INFOID:0000000013609487

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0335	00	CRANKSHAFT POSITION SENSOR A (Crankshaft Position Sensor "A" Circuit)	NO SUBTYPE INFORMATION	Position sensor 1 for the crankshaft has an electrical malfunction.
	02		GENERAL ELEC MALFUNCTN	Position sensor 1 for the crankshaft has an electrical malfunction. There is a general signal malfunction.
	03		FM/PWM ERROR	Position sensor 1 for the crankshaft has an electrical malfunction. There is a frequency or pulse width modulation malfunction.

POSSIBLE CAUSE

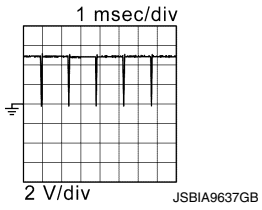
- Harness or connectors
  (Crankshaft position sensor circuit)
- Crankshaft position sensor

Diagnosis Procedure

INFOID:0000000013609488

1.COMPONENT FUNCTION CHECK

1. Start the engine and let it idle.
2. Check signal between ECM harness connector terminals.

ECM			Reference value
Connector	+	–	
	Terminal		
F149	81	12	

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK CRANKSHAFT POSITION SENSOR POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect crankshaft position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between crankshaft position sensor harness connector terminals.

Crankshaft position sensor			Voltage
Connector	+	–	
	Terminal		
F146	3	1	4.8 – 5.3 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 3.

3. CHECK CRANKSHAFT POSITION SENSOR POWER SUPPLY-2

Check the voltage between crankshaft position sensor harness connector and ground.

+		–	Voltage
Crankshaft position sensor			
Connector	Terminal		
F146	3	Ground	4.8 – 5.3 V

Is the inspection result normal?

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

4. CHECK CRANKSHAFT POSITION SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
ECM		Crankshaft position sensor		
Connector	Terminal	Connector	Terminal	
F149	18	F146	3	Existed

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

Is the inspection result normal?

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

5. CHECK CRANKSHAFT POSITION SENSOR GROUND CIRCUIT

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

+		–		Continuity
ECM		Crankshaft position sensor		
Connector	Terminal	Connector	Terminal	
F149	12	F146	1	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

6. CHECK CRANKSHAFT POSITION SENSOR CIRCUIT

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

+		–		Continuity
ECM		Crankshaft position sensor		
Connector	Terminal	Connector	Terminal	
F149	81	F146	2	Existed

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

Is the inspection result normal?

YES >> Replace crankshaft position sensor. Refer to EM-100, "Removal and Installation".
NO >> Repair or replace error-detected parts.

7.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

>> INSPECTION END

P0339 CRANKSHAFT POSITION SENSOR

DTC Description

INFOID:0000000013609489

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0339	00	CRANKSHAFT POSITION SENSOR A (Crankshaft Position Sensor "A" Circuit Intermittent)	NO SUBTYPE INFORMATION	Position sensor 1 for the crankshaft has a sporadic malfunction.
	01		ELECTRICAL MALFUNCTION	Position sensor 1 for the crankshaft has a sporadic malfunction. There is a general electrical malfunction.
	02		GENERAL ELEC MALFUNCTN	Position sensor 1 for the crankshaft has a sporadic malfunction. There is a general signal malfunction.
	03		FM/PWM ERROR	Position sensor 1 for the crankshaft has an electrical malfunction. There is a frequency or pulse width modulation malfunction.
	04		SYSTEM INTERNAL MALFUNCTN	Position sensor 1 for the crankshaft has a sporadic malfunction. There is an internal malfunction.
	05		SYSTEM PROGRAMMING ERROR	Position sensor 1 for the crankshaft has a sporadic malfunction. There is a programming malfunction.
	06		ALGORITHM BASED ERROR	Position sensor 1 for the crankshaft has a sporadic malfunction. There is an algorithm malfunction.

POSSIBLE CAUSE

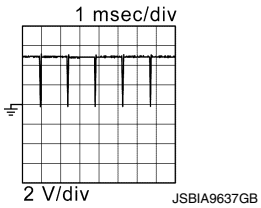
- Harness or connectors
  (Crankshaft position sensor circuit)
- Crankshaft position sensor

Diagnosis Procedure

INFOID:0000000013609490

1.COMPONENT FUNCTION CHECK

1. Start the engine and let it idle.
2. Check signal between ECM harness connector terminals.

ECM			Reference value
Connector	+	–	
	Terminal		
F149	81	12	

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK CRANKSHAFT POSITION SENSOR POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect crankshaft position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between crankshaft position sensor harness connector terminals.

Crankshaft position sensor			Voltage
Connector	+	–	
	Terminal		
F146	3	1	4.8 – 5.3 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK CRANKSHAFT POSITION SENSOR POWER SUPPLY-2

Check the voltage between crankshaft position sensor harness connector and ground.

+		–	Voltage
Crankshaft position sensor			
Connector	Terminal		
F146	3	Ground	4.8 – 5.3 V

Is the inspection result normal?

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

4.CHECK CRANKSHAFT POSITION SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
ECM		Crankshaft position sensor		
Connector	Terminal	Connector	Terminal	
F149	18	F146	3	Existed

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

Is the inspection result normal?

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

5.CHECK CRANKSHAFT POSITION SENSOR GROUND CIRCUIT

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

+		–		Continuity
ECM		Crankshaft position sensor		
Connector	Terminal	Connector	Terminal	
F149	12	F146	1	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

6.CHECK CRANKSHAFT POSITION SENSOR CIRCUIT

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

+		–		
ECM		Crankshaft position sensor		Continuity
Connector	Terminal	Connector	Terminal	
F149	81	F146	2	Existed

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

Is the inspection result normal?

YES >> Replace crankshaft position sensor. Refer to EM-100, "Removal and Installation".
NO >> Repair or replace error-detected parts.

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

>> INSPECTION END

P0341 INTAKE CAMSHAFT POSITION SENSOR

DTC Description

INFOID:0000000013609491

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	Malfunction type	
P0341	00	CAMSHAFT POSITION SENSOR A (Camshaft Position Sensor ″A″ Circuit Range/Performance Bank 1 or Single Sensor)	NO SUBTYPE INFORMATION	The position sensor for the intake camshaft (cylinder bank 1) has a malfunction.

POSSIBLE CAUSE

- Harness or connectors
  (Intake camshaft position sensor circuit)
- Intake camshaft position sensor

Diagnosis Procedure

INFOID:0000000013609492

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Perform intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> INSPECTION END

P0342 INTAKE CAMSHAFT POSITION SENSOR

DTC Description

INFOID:0000000013609493

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0342	00	Camshaft position sensor A bank 1 (Camshaft Position Sensor ″A″ Circuit Low Bank 1 or Single Sensor)	NO SUBTYPE INFORMATION	The position sensor of the intake camshaft (cylinder bank 1) has a short circuit to ground.

POSSIBLE CAUSE

- Harness or connectors
  (Intake camshaft position sensor circuit)
- Intake camshaft position sensor

Diagnosis Procedure

INFOID:0000000013609494

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CAMSHAFT POSITIONER”.
3. Perform Active Test.

Is the actuator actuated?

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

2.CHECK INTAKE CAMSHAFT POSITION SENSOR POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect intake camshaft position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake camshaft position sensor harness connector terminals.

Intake camshaft position sensor			Voltage
Connector	+	–	
	Terminal		
F140	1	3	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK INTAKE CAMSHAFT POSITION SENSOR POWER SUPPLY-2

Check the voltage between intake camshaft position sensor harness connector and ground.

+		–	Voltage
Intake camshaft position sensor			
Connector	Terminal		
F140	1	Ground	Battery voltage

Is the inspection result normal?

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

4. CHECK INTAKE CAMSHAFT POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake camshaft position sensor harness connector and fuse terminal.

+		–		Continuity
Intake camshaft position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F140	1	F149	16	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.

5. CHECK INTAKE CAMSHAFT POSITION SENSOR GROUND CIRCUIT

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

+		–		Continuity
ECM		Intake camshaft position sensor		
Connector	Terminal	Connector	Terminal	
F149	10	F140	3	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

6. CHECK INTAKE CAMSHAFT POSITION SENSOR CIRCUIT

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

+		–		Continuity
ECM		Intake camshaft position sensor		
Connector	Terminal	Connector	Terminal	
F149	58	F140	2	Existed

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

Is the inspection result normal?

YES >> Replace intake camshaft position sensor. Refer to EM-59, "Exploded View".
NO >> Repair or replace error-detected parts.

P0343 INTAKE CAMSHAFT POSITION SENSOR

DTC Description

INFOID:0000000013609495

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0343	00	Camshaft position sensor A bank 1 (Camshaft Position Sensor ″A″ Circuit High Bank 1 or Single Sensor)	NO SUBTYPE INFORMATION	The position sensor of the intake camshaft (cylinder bank 1) has a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Intake camshaft position sensor circuit)
- Intake camshaft position sensor

Diagnosis Procedure

INFOID:0000000013609496

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CAMSHAFT POSITIONER”.
3. Perform Active Test.

Is the actuator actuated?

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

2.CHECK INTAKE CAMSHAFT POSITION SENSOR POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect intake camshaft position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake camshaft position sensor harness connector terminals.

Intake camshaft position sensor			Voltage
Connector	+	–	
	Terminal		
F140	1	3	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK INTAKE CAMSHAFT POSITION SENSOR POWER SUPPLY-2

Check the voltage between intake camshaft position sensor harness connector and ground.

+		–	Voltage
Intake camshaft position sensor			
Connector	Terminal		
F140	1	Ground	Battery voltage

Is the inspection result normal?

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

4. CHECK INTAKE CAMSHAFT POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake camshaft position sensor harness connector and fuse terminal.

+		–		Continuity
Intake camshaft position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F140	1	F149	16	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.

5. CHECK INTAKE CAMSHAFT POSITION SENSOR GROUND CIRCUIT

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

+		–		Continuity
ECM		Intake camshaft position sensor		
Connector	Terminal	Connector	Terminal	
F149	10	F140	3	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

6. CHECK INTAKE CAMSHAFT POSITION SENSOR CIRCUIT

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

+		–		Continuity
ECM		Intake camshaft position sensor		
Connector	Terminal	Connector	Terminal	
F149	58	F140	2	Existed

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

Is the inspection result normal?

YES >> Replace intake camshaft position sensor. Refer to EM-59, "Exploded View".
NO >> Repair or replace error-detected parts.

P0351 IGNITION COIL (CYLINDER 1)

DTC Description

INFOID:0000000013609497

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0351	07	Ignition coil A primary control (Ignition Coil "A" Primary Control Circuit/Open)	MECHANICAL MALFUNCTION	The actuation of ignition coil 1 has an electrical malfunction or open circuit. There is a mechanical malfunction.
	13		CIRCUIT OPEN	The actuation of ignition coil 1 has an electrical malfunction or open circuit. There is an open circuit.
	49		INTERNAL ELECTRONIC ERROR	The actuation of ignition coil 1 has an electrical malfunction or open circuit. There is an internal electrical malfunction.
	96		CMPNENT INTERNAL MLFNCTN	The actuation of ignition coil 1 has an electrical malfunction or open circuit. There is an internal component malfunction.

POSSIBLE CAUSE

- Harness or connectors
  (Ignition coil circuit is open or shorted.)
- Ignition coil

Diagnosis Procedure

INFOID:0000000013609498

1.INSPECTION START

CAUTION:
Refer to EC-23, "Precaution for Risk of Explosion and Injury" for work in safety.
NOTE:
When the power supply of ignition coil is abnormal, ECM detects DTC P0351 [CIRCUIT OPEN].

>> GO TO 2.

2.CHECK IGNITION COIL POWER SUPPLY

1. Turn ignition switch OFF.
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 (No. 1)			
Connector	Terminal		
F153	1	Ground	Battery voltage

Is the inspection result normal?

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

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between ignition coil harness connector and fuse terminal.

+		–	Continuity
Ignition coil (No. 1)			
Connector	Terminal		
F153	1	#214 fuse terminal	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.

4.CHECK IGNITION COIL GROUND CIRCUIT

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

+		–	Continuity
Ignition coil (No. 1)			
Connector	Terminal		
F153	2	Ground	Existed
	4		

Is the inspection result normal?

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

5.CHECK IGNITION COIL CIRCUIT

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

+		–		Continuity
ECM		Ignition coil (No. 1)		
Connector	Terminal	Connector	Terminal	
F149	79	F153	3	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

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

6.CHECK IGNITION COIL

Check ignition coil (No. 1). Refer to EC-536, "Component Inspection (Ignition Coil)".

Is the inspection result normal?

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

Component Inspection (Ignition Coil)

INFOID:0000000013609499

1.CHECK IGNITION COIL

1. Turn ignition switch OFF.
2. Check the resistance between ignition coil terminals.

Terminal	Resistance
3 and ground	200 kΩ or more

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning ignition coil. Refer to EM-58, "Removal and Installation".

P0352 IGNITION COIL (CYLINDER 2)

DTC Description

INFOID:0000000013609500

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0352	07	Ignition coil B primary control (Ignition Coil ″B″ Primary Control Circuit/Open)	MECHANICAL MALFUNCTION	The actuation of ignition coil 2 has an electrical malfunction or open circuit. There is a mechanical malfunction.
	13		CIRCUIT OPEN	The actuation of ignition coil 2 has an electrical malfunction or open circuit. There is an open circuit.
	49		INTERNAL ELECTRONIC ERROR	The actuation of ignition coil 2 has an electrical malfunction or open circuit. There is an internal electrical malfunction.
	96		CMPNENT INTERNAL MLFNCTN	The actuation of ignition coil 2 has an electrical malfunction or open circuit. There is an internal component malfunction.

POSSIBLE CAUSE

- Harness or connectors
  (Ignition coil circuit is open or shorted.)
- Ignition coil

Diagnosis Procedure

INFOID:0000000013609501

1.INSPECTION START

CAUTION:
Refer to EC-23, "Precaution for Risk of Explosion and Injury" for work in safety.
NOTE:
When the power supply of ignition coil is abnormal, ECM detects DTC P0352 [CIRCUIT OPEN].

>> GO TO 2.

2.CHECK IGNITION COIL POWER SUPPLY

1. Turn ignition switch OFF.
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 (No. 2)			
Connector	Terminal		
F154	1	Ground	Battery voltage

Is the inspection result normal?

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

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between ignition coil harness connector and fuse terminal.

+		–	Continuity
Ignition coil (No. 2)			
Connector	Terminal		
F154	1	#214 fuse terminal	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.

4.CHECK IGNITION COIL GROUND CIRCUIT

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

+		–	Continuity
Ignition coil (No. 2)			
Connector	Terminal		
F154	2	Ground	Existed
	4		

Is the inspection result normal?

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

5.CHECK IGNITION COIL CIRCUIT

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

+		–		Continuity
ECM		Ignition coil (No. 2)		
Connector	Terminal	Connector	Terminal	
F149	7	F154	3	Existed

Is the inspection result normal?

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

6.CHECK IGNITION COIL

Check ignition coil (No. 2). Refer to EC-539, "Component Inspection (Ignition Coil)".

Is the inspection result normal?

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

Component Inspection (Ignition Coil)

INFOID:0000000013609502

1.CHECK IGNITION COIL

1. Turn ignition switch OFF.
2. Check the resistance between ignition coil terminals.

Terminal	Resistance
3 and ground	200 kΩ or more

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning ignition coil. Refer to EM-58, "Removal and Installation".

P0353 IGNITION COIL (CYLINDER 3)

DTC Description

INFOID:0000000013609503

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0353	07	Ignition coil C primary control (Ignition Coil "C" Primary Control Circuit/Open)	MECHANICAL MALFUNCTION	The actuation of ignition coil 3 has an electrical malfunction or open circuit. There is a mechanical malfunction.
	13		CIRCUIT OPEN	The actuation of ignition coil 3 has an electrical malfunction or open circuit. There is an open circuit.
	49		INTERNAL ELECTRONIC ERROR	The actuation of ignition coil 3 has an electrical malfunction or open circuit. There is an internal electrical malfunction.
	96		CMPNENT INTERNAL MLFNCTN	The actuation of ignition coil 3 has an electrical malfunction or open circuit. There is an internal component malfunction.

POSSIBLE CAUSE

- Harness or connectors
  (Ignition coil circuit is open or shorted.)
- Ignition coil

Diagnosis Procedure

INFOID:0000000013609504

1.INSPECTION START

CAUTION:
Refer to EC-23, "Precaution for Risk of Explosion and Injury" for work in safety.
NOTE:
When the power supply of ignition coil is abnormal, ECM detects DTC P0353 [CIRCUIT OPEN].

>> GO TO 2.

2.CHECK IGNITION COIL POWER SUPPLY

1. Turn ignition switch OFF.
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 (No. 3)			
Connector	Terminal		
F155	1	Ground	Battery voltage

Is the inspection result normal?

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

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between ignition coil harness connector and fuse terminal.

+		–	Continuity
Ignition coil (No. 3)			
Connector	Terminal		
F155	1	#214 fuse terminal	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.

4.CHECK IGNITION COIL GROUND CIRCUIT

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

+		–	Continuity
Ignition coil (No. 3)			
Connector	Terminal		
F155	2	Ground	Existed
	4		

Is the inspection result normal?

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

5.CHECK IGNITION COIL CIRCUIT

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

+		–		Continuity
ECM		Ignition coil (No. 3)		
Connector	Terminal	Connector	Terminal	
F149	55	F155	3	Existed

Is the inspection result normal?

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

6.CHECK IGNITION COIL

Check ignition coil (No. 3). Refer to EC-542, "Component Inspection (Ignition Coil)".

Is the inspection result normal?

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

Component Inspection (Ignition Coil)

INFOID:0000000013609505

1.CHECK IGNITION COIL

1. Turn ignition switch OFF.
2. Check the resistance between ignition coil terminals.

Terminal	Resistance
3 and ground	200 kΩ or more

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning ignition coil. Refer to EM-58, "Removal and Installation".

P0354 IGNITION COIL (CYLINDER 4)

DTC Description

INFOID:0000000013609506

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0354	07	Ignition coil D primary control (Ignition Coil ″D″ Primary Control Circuit/Open)	MECHANICAL MALFUNCTION	The actuation of ignition coil 4 has an electrical malfunction or open circuit. There is a mechanical malfunction.
	13		CIRCUIT OPEN	The actuation of ignition coil 4 has an electrical malfunction or open circuit. There is an open circuit.
	49		INTERNAL ELECTRONIC ERROR	The actuation of ignition coil 4 has an electrical malfunction or open circuit. There is an internal electrical malfunction.
	96		CMPNENT INTERNAL MLFNCTN	The actuation of ignition coil 4 has an electrical malfunction or open circuit. There is an internal component malfunction.

POSSIBLE CAUSE

- Harness or connectors
  (Ignition coil circuit is open or shorted.)
- Ignition coil

Diagnosis Procedure

INFOID:0000000013609507

1.INSPECTION START

CAUTION:
Refer to EC-23, "Precaution for Risk of Explosion and Injury" for work in safety.
NOTE:
When the power supply of ignition coil is abnormal, ECM detects DTC P0354 [CIRCUIT OPEN].

>> GO TO 2.

2.CHECK IGNITION COIL POWER SUPPLY

1. Turn ignition switch OFF.
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 (No. 4)			
Connector	Terminal		
F156	1	Ground	Battery voltage

Is the inspection result normal?

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

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between ignition coil harness connector and fuse terminal.

+		–	Continuity
Ignition coil (No. 4)			
Connector	Terminal		
F156	1	#214 fuse terminal	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.

4.CHECK IGNITION COIL GROUND CIRCUIT

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

+		–	Continuity
Ignition coil (No. 4)			
Connector	Terminal		
F156	2	Ground	Existed
	4		

Is the inspection result normal?

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

5.CHECK IGNITION COIL CIRCUIT

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

+		–		Continuity
ECM		Ignition coil (No. 4)		
Connector	Terminal	Connector	Terminal	
F149	31	F156	3	Existed

Is the inspection result normal?

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

6.CHECK IGNITION COIL

Check ignition coil (No. 4). Refer to EC-545, "Component Inspection (Ignition Coil)".

Is the inspection result normal?

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

Component Inspection (Ignition Coil)

INFOID:0000000013609508

1.CHECK IGNITION COIL

1. Turn ignition switch OFF.
2. Check the resistance between ignition coil terminals.

Terminal	Resistance
3 and ground	200 kΩ or more

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning ignition coil. Refer to EM-58, "Removal and Installation".

P0363 MISFIRE

DTC Description

INFOID:0000000013609509

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0363	00	Misfire (Misfire Detected - Fueling Disabled)	NO SUBTYPE INFORMATION	Injector shutoff was activated due to a combustion misfire.
	85		SIG ABOVE ALLOWABLE RANGE	Injector shutoff was activated due to a combustion misfire. There is a signal above the permissible limit value.

POSSIBLE CAUSE

- Improper spark plug
- Insufficient compression
- Intake air leak
- Lack of fuel

Diagnosis Procedure

INFOID:0000000013609510

1.CHECK FOR EXHAUST SYSTEM CLOGGING

There are no malfunction codes for this test. Erase the DTC.

>> INSPECTION END

P0366 EXHAUST CAMSHAFT POSITION SENSOR

Diagnosis Description

INFOID:0000000013609511

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P0367 EXHAUST CAMSHAFT POSITION SENSOR

DTC Description

INFOID:0000000013609512

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0367	00	Camshaft position sensor B bank 1 (Camshaft Position Sensor ″B″ Circuit Low Bank 1)	NO SUBTYPE INFORMATION	The position sensor of the exhaust camshaft (cylinder bank 1) has a short circuit to ground.

POSSIBLE CAUSE

- Harness or connectors
  (Exhaust camshaft position sensor circuit)
- Exhaust camshaft position sensor

Diagnosis Procedure

INFOID:0000000013609513

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CAMSHAFT POSITIONER”.
3. Perform Active Test.

Is the actuator actuated?

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

2.CHECK EXHAUST CAMSHAFT POSITION SENSOR POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect exhaust camshaft position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust camshaft position sensor harness connector terminals.

Exhaust camshaft position sensor			Voltage
Connector	+	–	
	Terminal		
F141	1	3	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK EXHAUST CAMSHAFT POSITION SENSOR POWER SUPPLY-2

Check the voltage between exhaust camshaft position sensor harness connector and ground.

+		–	Voltage
Exhaust camshaft position sensor			
Connector	Terminal		
F141	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK EXHAUST CAMSHAFT POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust camshaft position sensor harness connector and fuse terminal.

+		–		Continuity
Exhaust camshaft position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F141	1	F149	16	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.

5.CHECK EXHAUST CAMSHAFT POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and exhaust camshaft position sensor harness connector.

+		–		Continuity
ECM		Exhaust camshaft position sensor		
Connector	Terminal	Connector	Terminal	
F149	10	F141	3	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

6.CHECK EXHAUST CAMSHAFT POSITION SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and exhaust camshaft position sensor harness connector.

+		–		Continuity
ECM		Exhaust camshaft position sensor		
Connector	Terminal	Connector	Terminal	
F149	34	F141	2	Existed

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

Is the inspection result normal?

YES >> Replace exhaust camshaft position sensor. Refer to EM-59, "Exploded View".
NO >> Repair or replace error-detected parts.

P0368 EXHAUST CAMSHAFT POSITION SENSOR

DTC Description

INFOID:0000000013609514

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0368	00	Camshaft position sensor B bank 1 (Camshaft Position Sensor ″B″ Circuit High Bank 1)	NO SUBTYPE INFORMATION	The position sensor of the exhaust camshaft (cylinder bank 1) has a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Exhaust camshaft position sensor circuit)
- Exhaust camshaft position sensor

Diagnosis Procedure

INFOID:0000000013609515

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CAMSHAFT POSITIONER”.
3. Perform Active Test.

Is the actuator actuated?

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

2.CHECK EXHAUST CAMSHAFT POSITION SENSOR POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect exhaust camshaft position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust camshaft position sensor harness connector terminals.

Exhaust camshaft position sensor			Voltage
Connector	+	–	
	Terminal		
F141	1	3	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK EXHAUST CAMSHAFT POSITION SENSOR POWER SUPPLY-2

Check the voltage between exhaust camshaft position sensor harness connector and ground.

+		–	Voltage
Exhaust camshaft position sensor			
Connector	Terminal		
F141	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK EXHAUST CAMSHAFT POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust camshaft position sensor harness connector and fuse terminal.

+		–		Continuity
Exhaust camshaft position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F141	1	F149	16	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.

5.CHECK EXHAUST CAMSHAFT POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and exhaust camshaft position sensor harness connector.

+		–		Continuity
ECM		Exhaust camshaft position sensor		
Connector	Terminal	Connector	Terminal	
F149	10	F141	3	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

6.CHECK EXHAUST CAMSHAFT POSITION SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and exhaust camshaft position sensor harness connector.

+		–		Continuity
ECM		Exhaust camshaft position sensor		
Connector	Terminal	Connector	Terminal	
F149	34	F141	2	Existed

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

Is the inspection result normal?

YES >> Replace exhaust camshaft position sensor. Refer to EM-71, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0420 EFFICIENCY OF THE CATALYTIC CONVERTER

DTC Description

INFOID:0000000013609516

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0420	00	Catalyst system efficiency bank 1 (Catalyst System Efficiency Below Threshold Bank 1)	NO SUBTYPE INFORMATION	The efficiency of the catalytic converter (cylinder bank 1) is not sufficient.

POSSIBLE CAUSE

- Harness and connectors
  (A/F sensor circuit is open or shorted.)
  (Heated oxygen sensor circuit is open or shorted.)
- A/F sensor
- Heated oxygen sensor

Diagnosis Procedure

INFOID:0000000013609517

1.CHECK A/F SENSOR POWER SUPPLY

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

+		–	Voltage
A/F sensor			
Connector	Terminal		
F143	4	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK A/F SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between A/F sensor harness connector and fuse terminal.

+		–	Continuity
A/F sensor			
Connector	Terminal		
F143	4	#214 fuse terminal	Existed

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

Is the inspection result normal?

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

3.CHECK A/F SENSOR HEATER CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

3. Check the continuity between A/F sensor harness connector and ECM harness connector.

+		–		Continuity
A/F sensor		ECM		
Connector	Terminal	Connector	Terminal	
F143	1	F149	63	Existed
	2		64	
	3		77	
	5		88	
	6		87	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

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

4.CHECK HEATED OXYGEN SENSOR POWER SUPPLY

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

+		–	Voltage
Heated oxygen sensor			
Connector	Terminal		
F144	1	Ground	Battery voltage

Is the inspection result normal?

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

5.CHECK HEATED OXYGEN SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between heated oxygen sensor harness connector and fuse terminal.

+		–	Continuity
Heated oxygen sensor			
Connector	Terminal		
F144	1	#214 fuse terminal	Existed

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

Is the inspection result normal?

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

6.CHECK HEATED OXYGEN SENSOR HEATER CONTROL CIRCUIT

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

+		–		Continuity
Heated oxygen sensor		ECM		
Connector	Terminal	Connector	Terminal	
F144	2	F149	95	Existed
	3		13	
	4		37	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace heated oxygen sensor or A/F sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P0442 EVAP CONTROL SYSTEM

DTC Description

INFOID:0000000013609518

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	Malfunction type	
P0442	00	Evaporation system leak [EVAP System Leak Detected (small leak)]	NO SUBTYPE INFORMATION	A fine leak in the evaporative emission control system was detected.

POSSIBLE CAUSE

- Incorrect fuel filler cap is used
- Fuel filler cap remains open.
- Poor installation of fuel filler cap
- Foreign matter caught in fuel filler cap.

Diagnosis Procedure

INFOID:0000000013609519

1.CHECK FUEL FILLER CAP

Check the following.
- Proper fuel filler cap is used.
- Fuel filler cap installation condition
- Foreign matter is not attached.

>> INSPECTION END

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Description

INFOID:0000000013609520

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0444	00	EVAP system purge control valve A (EVAP System Purge Control Valve ″A″ Circuit Open)	NO SUBTYPE INFORMATION	The purge valve of the evaporative emission control system has an open circuit.

POSSIBLE CAUSE

- Harness or connectors (EVAP purge control valve circuit)
- EVAP purge control valve

Diagnosis Procedure

INFOID:0000000013609521

1.CHECK COMPONENT FUNCTION

With CONSULT

1. Turn ignition switch ON. (Engine stopped.)
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK PURGING SWITCHOVER VALVE”.
3. Perform the Active Test.
4. Check that the indicated value of “PWR CSMN (PURG SWOVR/V)” is between 390 – 495 mA.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that No. 213 (15 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK EVAP PURGE CONTROL VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect EVAP purge control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP purge control valve harness connector and ground.

+		−	Voltage
EVAP purge control valve			
Connector	Terminal		
E101	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK EVAP PURGE CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out No. 213 fuse.
3. Check the continuity between EVAP purge control valve harness connector and fuse terminal.

+		–	Continuity
EVAP purge control valve			
Connector	Terminal		
E101	1	No. 213 fuse terminal	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.

5.CHECK EVAP PURGE CONTROL VALVE

Check EVAP purge control valve. Refer to EC-573, "Component Inspection (EVAP Purge Control Valve)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP purge control valve. Refer to EC-27, "Component Parts Location".

6.CHECK EVAP PURGE CONTROL VALVE CONTROL CIRCUIT

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

+		–		Continuity
ECM		EVAP purge control valve		
Connector	Terminal	Connector	Terminal	
E48	153	E101	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

7.CHECK EVAP PURGE CIRUIT LEAKAGE

Check leakage of the following components.
- Hose and tube
- EVAP canister
- EVAP purge control valve (mechanical malfunction)

>> INSPECTION END

Component Inspection (EVAP Purge Control Valve)

INFOID:0000000013609522

1.CHECK EVAP PURGE CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect EVAP purge control valve harness connector.
3. Check the resistance between EVAP purge control valve terminals.

EVAP purge control valve		Condition	Resistance (Approx.)
+	–		
Terminal			
2	1	Temperature: 25°C (77°F)	14.2 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP purge control valve. Refer to EC-27, "Component Parts Location".

P0446 EVAP CANISTER VENT CONTROL VALVE

DTC Description

INFOID:0000000013748606

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0446	00	EVAP system vent control (EVAP system vent control circuit)	NO SUBTYPE INFORMATION	The EVAP canister vent control valve of the activated EVAP canister has an electrical circuit

POSSIBLE CAUSE

- Harness or connectors (EVAP canister vent control valve circuit)
- EVAP canister vent control valve
- EVAP canister
- EVAP line

Diagnosis Procedure

INFOID:0000000013748607

1.CHECK COMPONENT FUNCTION

With CONSULT

1. Turn ignition switch ON. (Engine stopped.)
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK PURGING SWITCHOVER VALVE”.
3. Perform the Active Test.
4. Check that the indicated value of “PWR CSMN (PURG SWOVR/V)” is between 300 – 600 mA.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that No. 214 (10 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect EVAP canister vent control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister vent control valve harness connector and ground.

+		–	Voltage
EVAP canister vent control valve			
Connector	Terminal		
M710	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out No. 214 fuse.

3. Check the continuity between EVAP canister vent control valve harness connector and fuse terminal.

+		–	Continuity
EVAP canister vent control valve			
Connector	Terminal		
M710	1	No. 214 fuse terminal	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.

5.CHECK EVAP CANISTER VENT CONTROL VALVE

1. Clean the air passage of EVAP canister vent control valve using an air blower.
2. Check air passage continuity and operation delay time under the following conditions.
Make sure that new O-ring is installed properly.

Condition	Air passage continuity
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP canister (with EVAP canister vent control valve). Refer to FL-13, "Exploded View".

6.CHECK EVAP CANISTER VENT CONTROL VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EVAP canister vent control valve harness connector.

+		–		Continuity
ECM		EVAP canister vent control valve		
Connector	Terminal	Connector	Terminal	
E48	152	M710	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

7.CHECK EVAP PURGE CIRUIT LEAKAGE

Check leakage of the following components.
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection
- EVAP canister for damage
- EVAP canister vent control valve (mechanical malfunction)

>> INSPECTION END

P0447 EVAP CANISTER VENT CONTROL VALVE

DTC Description

INFOID:0000000013748166

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P0447	00	Evaporation system vent control (EVAP system vent control circuit open)	NO SUBTYPE INFORMATION	The EVAP canister vent control valve of the activated EVAP canister has an open circuit

POSSIBLE CAUSE

- Harness or connectors
  (EVAP canister vent control valve circuit)
- EVAP canister vent control valve
- EVAP canister
- EVAP line

Diagnosis Procedure

INFOID:0000000013748167

1.CHECK COMPONENT FUNCTION

With CONSULT

1. Turn ignition switch ON. (Engine stopped.)
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK PURGING SWITCHOVER VALVE”.
3. Perform the Active Test.
4. Check that the indicated value of “PWR CSMN (PURG SWOVR/V)” is between 300 – 600 mA.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that No. 214 (10 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect EVAP canister vent control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister vent control valve harness connector and ground.

+		–	Voltage
EVAP canister vent control valve			
Connector	Terminal		
M710	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out No. 214 fuse.

3. Check the continuity between EVAP canister vent control valve harness connector and fuse terminal.

+		–	Continuity
EVAP canister vent control valve			
Connector	Terminal		
M710	1	No. 214 fuse terminal	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.

5.CHECK EVAP CANISTER VENT CONTROL VALVE

1. Clean the air passage of EVAP canister vent control valve using an air blower.
2. Check air passage continuity and operation delay time under the following conditions.
Make sure that new O-ring is installed properly.

Condition	Air passage continuity
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP canister (with EVAP canister vent control valve). Refer to FL-13, "Exploded View".

6.CHECK EVAP CANISTER VENT CONTROL VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EVAP canister vent control valve harness connector.

+		–		Continuity
ECM		EVAP canister vent control valve		
Connector	Terminal	Connector	Terminal	
E48	152	M710	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

7.CHECK EVAP PURGE CIRUIT LEAKAGE

Check leakage of the following components.
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection
- EVAP canister for damage
- EVAP canister vent control valve (mechanical malfunction)

>> INSPECTION END

P0448 EVAP CANISTER VENT CONTROL VALVE

DTC Description

INFOID:0000000013748608

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P0448	00	EVAP system vent control (EVAP system vent control circuit shorted)	NO SUBTYPE INFORMATION	The EVAP canister vent control valve of the activated EVAP canister has an short circuit

POSSIBLE CAUSE

- Harness or connectors (EVAP canister vent control valve circuit)
- EVAP canister vent control valve
- EVAP canister
- EVAP line

Diagnosis Procedure

INFOID:0000000013748609

1.CHECK COMPONENT FUNCTION

With CONSULT

1. Turn ignition switch ON. (Engine stopped.)
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK PURGING SWITCHOVER VALVE”.
3. Perform the Active Test.
4. Check that the indicated value of “PWR CSMN (PURG SWOVR/V)” is between 300 – 600 mA.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that No. 214 (10 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect EVAP canister vent control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister vent control valve harness connector and ground.

+		–	Voltage
EVAP canister vent control valve			
Connector	Terminal		
M710	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out No. 214 fuse.

3. Check the continuity between EVAP canister vent control valve harness connector and fuse terminal.

+		–	Continuity
EVAP canister vent control valve			
Connector	Terminal		
M710	1	No. 214 fuse terminal	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.

5.CHECK EVAP CANISTER VENT CONTROL VALVE

1. Clean the air passage of EVAP canister vent control valve using an air blower.
2. Check air passage continuity and operation delay time under the following conditions.
Make sure that new O-ring is installed properly.

Condition	Air passage continuity
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP canister (with EVAP canister vent control valve). Refer to FL-13, "Exploded View".

6.CHECK EVAP CANISTER VENT CONTROL VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EVAP canister vent control valve harness connector.

+		–		Continuity
ECM		EVAP canister vent control valve		
Connector	Terminal	Connector	Terminal	
E48	152	M710	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

7.CHECK EVAP PURGE CIRUIT LEAKAGE

Check leakage of the following components.
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection
- EVAP canister for damage
- EVAP canister vent control valve (mechanical malfunction)

>> INSPECTION END

P0451 FUEL PRESSURE SENSOR

DTC Description

INFOID:0000000013609523

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P0451	00	EVAP system pressure sensor/sw (EVAP System Pressure Sensor/Switch Circuit Range/Performance)	NO SUBTYPE INFORMATION	The pressure sensor/pressure switch of the evaporative emission control system has a malfunction.
	09		COMPONENT MALFUNCTION	The pressure sensor/pressure switch of the evaporative emission control system has a malfunction. There is a component malfunction.
	16		CIRC VOLT BELOW THRESHOLD	The pressure sensor/pressure switch of the evaporative emission control system has a malfunction. The limit value for electrical voltage has not been attained.
	17		CIRC VOLT ABOVE THRESHOLD	The pressure sensor/pressure switch of the evaporative emission control system has a malfunction. The limit value for electrical voltage has been exceeded.
	24		SIGNAL STUCK HIGH	The pressure sensor/pressure switch of the evaporative emission control system has a malfunction. No signal change: Voltage level is too high.
	26		SIG RTE OF CHNG BLW THRESHLD	The pressure sensor/pressure switch of the evaporative emission control system has a malfunction. The signal change rate is below the permissible limit value.
	28		SG BS LVL O-OF RNG/ZR AJST ERR	The pressure sensor/pressure switch of the evaporative emission control system has a malfunction. The signal offset is outside the permissible range.

POSSIBLE CAUSE

Low pressure fuel control system

Diagnosis Procedure

INFOID:0000000013609524

1.CHECK DTC IN FPCM

With CONSULT

Check DTC in “FPCM”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to EC-157, "2WD : DTC Index" (2WD models) or EC-161, "AWD : DTC Index" (AWD models).

NO >> INSPECTION END

P0452 FUEL PRESSURE SENSOR

DTC Description

INFOID:0000000013609525

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0452	00	EVAP system pressure sensor/sw (EVAP System Pressure Sensor/Switch Circuit Low)	NO SUBTYPE INFORMATION	The pressure sensor/pressure switch of the evaporative emission control system has a malfunction.
	11		CIRCUIT SHORT TO GROUND	The pressure sensor/pressure switch of the evaporative emission control system has a short circuit to ground. There is a short circuit to ground.
	16		CIRC VOLT BELOW THRESHOLD	The pressure sensor/pressure switch of the evaporative emission control system has a malfunction. The limit value for electrical voltage has not been attained.

POSSIBLE CAUSE

Low pressure fuel control system

Diagnosis Procedure

INFOID:0000000013609526

1.CHECK DTC IN FPCM

With CONSULT

Check DTC in “FPCM”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to EC-157, "2WD : DTC Index" (2WD models) or EC-161, "AWD : DTC Index" (AWD models).

NO >> INSPECTION END

P0453 FUEL PRESSURE SENSOR

DTC Description

INFOID:0000000013609527

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P0453	00	EVAP system pressure sensor/sw (EVAP System Pressure Sensor/Switch Circuit High)	NO SUBTYPE INFORMATION	The pressure sensor/pressure switch of the evaporative emission control system has a malfunction.
	12		CIRCUIT SHORT TO BATTERY	The pressure sensor/pressure switch of the evaporative emission control system has a short circuit to positive. There is a short circuit to positive.
	17		CIRC VOLT ABOVE THRESHOLD	The pressure sensor/pressure switch of the evaporative emission control system has a malfunction. The limit value for electrical voltage has been exceeded.

POSSIBLE CAUSE

Low pressure fuel control system

Diagnosis Procedure

INFOID:0000000013609528

1.CHECK DTC IN FPCM

With CONSULT

Check DTC in “FPCM”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to EC-157, "2WD : DTC Index" (2WD models) or EC-161, "AWD : DTC Index" (AWD models).

NO >> INSPECTION END

P0455 EVAP CONTROL SYSTEM

DTC Description

INFOID:0000000013609529

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0455	00	Evaporation system leak [EVAP System Leak Detected (large leak)]	NO SUBTYPE INFORMATION	A gross leak in the evaporative emission control system was detected.

POSSIBLE CAUSE

- Incorrect fuel filler cap is used
- Fuel filler cap remains open.
- Poor installation of fuel filler cap
- Foreign matter caught in fuel filler cap.

Diagnosis Procedure

INFOID:0000000013609530

1.CHECK FUEL FILLER CAP

Check the following.
- Proper fuel filler cap is used.
- Fuel filler cap installation condition
- Foreign matter is not attached.

>> INSPECTION END

P0456 EVAP CONTROL SYSTEM

DTC Description

INFOID:0000000013609531

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P0456	00	Evaporation system leak [EVAP System Leak Detected (very small leak)]	NO SUBTYPE INFORMATION	A very fine leak in the evaporative emission control system was detected.

POSSIBLE CAUSE

- Incorrect fuel filler cap is used
- Fuel filler cap remains open.
- Poor installation of fuel filler cap
- Foreign matter caught in fuel filler cap.

Diagnosis Procedure

INFOID:0000000013609532

1.CHECK FUEL FILLER CAP

Check the following.

- Proper fuel filler cap is used.
- Fuel filler cap installation condition
- Foreign matter is not attached.

>> INSPECTION END

P0457 EVAP SYSTEM LEAK

DTC Description

INFOID:0000000013609533

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P0457	00	Evaporation system leak [EVAP System Leak Detected (fuel cap loose/off)]	NO SUBTYPE INFORMATION	Leakage in the evaporative emission control system was detected (tank cap missing).

POSSIBLE CAUSE

- Incorrect fuel filler cap is used
- Fuel filler cap remains open.
- Poor installation of fuel filler cap
- Foreign matter caught in fuel filler cap.

Diagnosis Procedure

INFOID:0000000013609534

1.CHECK FUEL FILLER CAP

Check the following.
- Proper fuel filler cap is used.
- Fuel filler cap installation condition
- Foreign matter is not attached.

>> INSPECTION END

P0458 EVAP PURGE CONTROL VALVE

DTC Description

INFOID:0000000013609535

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0458	00	EVAP purge control valve A (EVAP System Purge Control Valve ″A″ Circuit Low)	NO SUBTYPE INFORMATION	The purge valve of the evaporative emission control system has a short circuit to ground.

POSSIBLE CAUSE

- Harness or connectors (EVAP purge control valve circuit)
- EVAP purge control valve

Diagnosis Procedure

INFOID:0000000013609536

1.CHECK COMPONENT FUNCTION

With CONSULT

1. Turn ignition switch ON. (Engine stopped.)
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK PURGING SWITCHOVER VALVE”.
3. Perform the Active Test.
4. Check that the indicated value of “PWR CSMN (PURG SWOVR/V)” is between 390 – 495 mA.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that No. 213 (15 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK EVAP PURGE CONTROL VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect EVAP purge control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP purge control valve harness connector and ground.

+		−	Voltage
EVAP purge control valve			
Connector	Terminal		
E101	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK EVAP PURGE CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out No. 213 fuse.
3. Check the continuity between EVAP purge control valve harness connector and fuse terminal.

+		–	Continuity
EVAP purge control valve			
Connector	Terminal		
E101	1	No. 213 fuse terminal	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.

5.CHECK EVAP PURGE CONTROL VALVE

Check EVAP purge control valve. Refer to EC-573, "Component Inspection (EVAP Purge Control Valve)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP purge control valve. Refer to EC-27, "Component Parts Location".

6.CHECK EVAP PURGE CONTROL VALVE CONTROL CIRCUIT

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

+		–		Continuity
ECM		EVAP purge control valve		
Connector	Terminal	Connector	Terminal	
E48	153	E101	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

7.CHECK EVAP PURGE CIRUIT LEAKAGE

Check leakage of the following components.
- Hose and tube
- EVAP canister
- EVAP purge control valve (mechanical malfunction)

>> INSPECTION END

Component Inspection (EVAP Purge Control Valve)

INFOID:0000000013609537

1.CHECK EVAP PURGE CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect EVAP purge control valve harness connector.
3. Check the resistance between EVAP purge control valve terminals.

EVAP purge control valve		Condition	Resistance (Approx.)
+	–		
Terminal			
2	1	Temperature: 25°C (77°F)	14.2 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP purge control valve. Refer to EC-27, "Component Parts Location".

P0459 EVAP PURGE CONTROL VALVE

DTC Description

INFOID:0000000013609538

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0459	00	EVAP purge control valve A (EVAP System Purge Control Valve ″A″ Circuit High)	NO SUBTYPE INFORMATION	The purge valve of the evaporative emission control system has a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors (EVAP purge control valve circuit)
- EVAP purge control valve

Diagnosis Procedure

INFOID:0000000013609539

1.CHECK COMPONENT FUNCTION

With CONSULT

1. Turn ignition switch ON. (Engine stopped.)
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK PURGING SWITCHOVER VALVE”.
3. Perform the Active Test.
4. Check that the indicated value of “PWR CSMN (PURG SWOVR/V)” is between 390 – 495 mA.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that No. 213 (15 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK EVAP PURGE CONTROL VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect EVAP purge control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP purge control valve harness connector and ground.

+		−	Voltage
EVAP purge control valve			
Connector	Terminal		
E101	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK EVAP PURGE CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out No. 213 fuse.
3. Check the continuity between EVAP purge control valve harness connector and fuse terminal.

+		–	Continuity
EVAP purge control valve			
Connector	Terminal		
E101	1	No. 213 fuse terminal	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.

5.CHECK EVAP PURGE CONTROL VALVE

Check EVAP purge control valve. Refer to EC-576, "Component Inspection (EVAP Purge Control Valve)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP purge control valve. Refer to EC-27, "Component Parts Location".

6.CHECK EVAP PURGE CONTROL VALVE CONTROL CIRCUIT

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

+		–		Continuity
ECM		EVAP purge control valve		
Connector	Terminal	Connector	Terminal	
E48	153	E101	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

7.CHECK EVAP PURGE CIRUIT LEAKAGE

Check leakage of the following components.
- Hose and tube
- EVAP canister
- EVAP purge control valve (mechanical malfunction)

>> INSPECTION END

Component Inspection (EVAP Purge Control Valve)

INFOID:0000000013609540

1.CHECK EVAP PURGE CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect EVAP purge control valve harness connector.
3. Check the resistance between EVAP purge control valve terminals.

EVAP purge control valve		Condition	Resistance (Approx.)
+	–		
Terminal			
2	1	Temperature: 25°C (77°F)	14.2 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP purge control valve. Refer to EC-27, "Component Parts Location".

P0460 FUEL LEVEL SENSOR

DTC Description

INFOID:0000000013609541

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0460	8F	Fuel level sensor lh (Fuel Level Sensor ″A″ Circuit)	ERRATIC	The left fuel level sensor has an electrical malfunction. The signal or message is erratic.

POSSIBLE CAUSE

Fuel level sensor

Diagnosis Procedure

INFOID:0000000013609542

1.CHECK “SELF-DIAGNOSTIC RESULT” OF “BCM”

With CONSULT

Check “Self-diagnostic result” of “BCM”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BCS-51, "DTC Index".

NO >> Replace BCM. Refer to BCS-248, "Removal and Installation".

P0461 FUEL LEVEL SENSOR

DTC Description

INFOID:0000000013609543

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0461	00	FUEL LEVEL SENSOR A (Fuel Level Sensor "A" Circuit Range/Performance)	NO SUBTYPE INFORMATION	The left fuel level sensor has a malfunction.
	2A		SIGNAL STUCK IN RANGE	The left fuel level sensor has a malfunction. There is no signal change.
	84		SIG BELOW ALLOWABLE RANGE	The left fuel level sensor has a malfunction. There is a signal below the permissible limit value.
	85		SIG ABOVE ALLOWABLE RANGE	The left fuel level sensor has a malfunction. There is a signal above the permissible limit value.

POSSIBLE CAUSE

Fuel level sensor

Diagnosis Procedure

INFOID:0000000013609544

1. CHECK "SELF-DIAGNOSTIC RESULT" OF "BCM"

With CONSULT

Check "Self-diagnostic result" of "BCM".

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BCS-51, "DTC Index".

NO >> Replace BCM. Refer to BCS-248, "Removal and Installation".

P0463 FUEL LEVEL SENSOR

DTC Description

INFOID:0000000013609545

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P0463	12	Fuel level sensor A (Fuel Level Sensor ″A″ Circuit High)	CIRCUIT SHORT TO BATTERY	The left fuel level sensor has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

Fuel level sensor

Diagnosis Procedure

INFOID:0000000013609546

1. CHECK “SELF-DIAGNOSTIC RESULT” OF “BCM”

With CONSULT

Check “Self-diagnostic result” of “BCM”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BCS-51, "DTC Index".

NO >> Replace BCM. Refer to BCS-248, "Removal and Installation".

P0480 COOLING FAN

DTC Description

INFOID:0000000013609547

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0480	13	FAN 1 (Fan 1 Control Circuit)	CIRCUIT OPEN	The output of electric fan 1 has an electrical malfunction or an open circuit. There is an open circuit.

POSSIBLE CAUSE

- Harness and connectors
- Cooling fan motor
- Cooling fan control module

Diagnosis Procedure

INFOID:0000000013609548

1.CHECK DTC

With CONSULT

1. Turn ignition switch ON.
2. Check “Self-diagnostic result”.
3. Check that ECM does not detect the engine coolant temperature sensor related DTC.

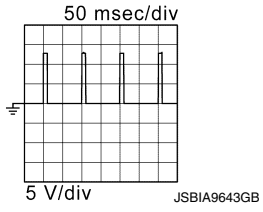
Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".

2.COMPONENT FUNCTION CHECK-1

With CONSULT

Check signal between ECM harness connector terminals.

ECM Connector	ECM Terminal +	ECM Terminal –	Condition	Value (Approx.)
E48	103	98	[Ignition switch: ON] • Cooling fan: Not operates	

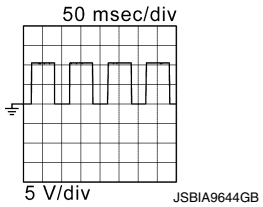
Is the inspection result normal?

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

3.COMPONENT FUNCTION CHECK-2

With CONSULT

Check signal between ECM harness connector terminals.

ECM			Condition	Value (Approx.)
Connector	+	–		
	Terminal			
E48	103	98	[Ignition switch: ON] • Perform “CK ENG AND WITH INTEGRATED CONT FAN MOTOR” in “ACTIVE TEST” mode. • Touch “START” • Cooling fan: 60% operates	

Is the inspection result normal?

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

4. CHECK COOLING FAN CONTROL SIGNAL CIRCUIT

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

+		–		Continuity
ECM		Cooling fan motor		
Connector	Terminal	Connector	Terminal	
E48	103	E22	3	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5. CHECK COOLING FAN MOTOR POWER SUPPLY CIRCUIT

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

+		–	Voltage
Cooling fan motor			
Connector	Terminal		
E22	1	Ground	Battery voltage
	2		

Is the inspection result normal?

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

6. CHECK COOLING FAN MOTOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between cooling fan motor harness connector and ground.

+		–	Continuity
Cooling fan motor			
Connector	Terminal		
E22	4	Ground	Existed

Is the inspection result normal?

YES >> Replace cooling fan assembly. Refer to CO-16, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0483 COOLING FAN

DTC Description

INFOID:0000000013609549

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0483	09	FAN RATIONALITY CHECK (Fan Rationality Check)	COMPONENT MALFUNCTION	The electric fan has a malfunction. There is a component malfunction.

POSSIBLE CAUSE

- Harness and connectors
- Cooling fan motor
- Cooling fan control module

Diagnosis Procedure

INFOID:0000000013609550

1.CHECK DTC

With CONSULT

1. Turn ignition switch ON.
2. Check “Self-diagnostic result”.
3. Check that ECM does not detect the engine coolant temperature sensor related DTC.

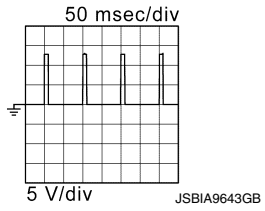
Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".

2.COMPONENT FUNCTION CHECK-1

With CONSULT

Check signal between ECM harness connector terminals.

ECM Connector	ECM Terminal +	ECM Terminal –	Condition	Value (Approx.)
E48	103	98	[Ignition switch: ON] • Cooling fan: Not operates	

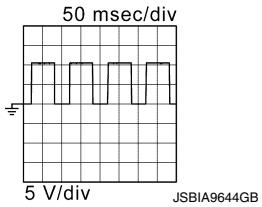
Is the inspection result normal?

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

3.COMPONENT FUNCTION CHECK-2

With CONSULT

Check signal between ECM harness connector terminals.

ECM			Condition	Value (Approx.)
Connector	+	–		
	Terminal			
E48	103	98	[Ignition switch: ON] • Perform “CK ENG AND WITH INTEGRATED CONT FAN MOTOR” in “ACTIVE TEST” mode. • Touch “START” • Cooling fan: 60% operates	

Is the inspection result normal?

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

4. CHECK COOLING FAN CONTROL SIGNAL CIRCUIT

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

+		–		Continuity
ECM		Cooling fan motor		
Connector	Terminal	Connector	Terminal	
E48	103	E22	3	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5. CHECK COOLING FAN MOTOR POWER SUPPLY CIRCUIT

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

+		–	Voltage
Cooling fan motor			
Connector	Terminal		
E22	1	Ground	Battery voltage
	2		

Is the inspection result normal?

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

6. CHECK COOLING FAN MOTOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between cooling fan motor harness connector and ground.

+		–	Continuity
Cooling fan motor			
Connector	Terminal		
E22	4	Ground	Existed

Is the inspection result normal?

YES >> Replace cooling fan assembly. Refer to CO-16, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0484 COOLING FAN

DTC Description

INFOID:0000000013609551

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0484	00	Fan (Fan Circuit Current High)	NO SUBTYPE INFORMATION	The output of electric fan has a short circuit to positive.

POSSIBLE CAUSE

- Harness and connectors
- Cooling fan motor
- Cooling fan control module

Diagnosis Procedure

INFOID:0000000013609552

1.CHECK DTC

With CONSULT

1. Turn ignition switch ON.
2. Check “Self-diagnostic result”.
3. Check that ECM does not detect the engine coolant temperature sensor related DTC.

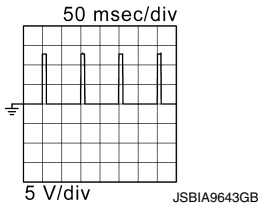
Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".

2.COMPONENT FUNCTION CHECK-1

With CONSULT

Check signal between ECM harness connector terminals.

ECM Connector	ECM Terminal +	ECM Terminal –	Condition	Value (Approx.)
E48	103	98	[Ignition switch: ON] • Cooling fan: Not operates	 JSBIA9643GB

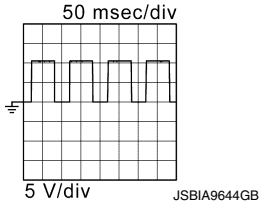
Is the inspection result normal?

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

3.COMPONENT FUNCTION CHECK-2

With CONSULT

Check signal between ECM harness connector terminals.

ECM			Condition	Value (Approx.)
Connector	+	–		
	Terminal			
E48	103	98	[Ignition switch: ON] • Perform “CK ENG AND WITH INTEGRATED CONT FAN MOTOR” in “ACTIVE TEST” mode. • Touch “START” • Cooling fan: 60% operates	

Is the inspection result normal?

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

4. CHECK COOLING FAN CONTROL SIGNAL CIRCUIT

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

+		–		Continuity
ECM		Cooling fan motor		
Connector	Terminal	Connector	Terminal	
E48	103	E22	3	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5. CHECK COOLING FAN MOTOR POWER SUPPLY CIRCUIT

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

+		–	Voltage
Cooling fan motor			
Connector	Terminal		
E22	1	Ground	Battery voltage
	2		

Is the inspection result normal?

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

6. CHECK COOLING FAN MOTOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between cooling fan motor harness connector and ground.

+		–	Continuity
Cooling fan motor			
Connector	Terminal		
E22	4	Ground	Existed

Is the inspection result normal?

YES >> Replace cooling fan assembly. Refer to CO-16, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0485 COOLING FAN

DTC Description

INFOID:0000000013609553

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0485	68	FAN POWER/GROUND (Fan Power/Ground Circuit)	EVENT INFORMATION	The power supply of the electric fan has a malfunction. There is incomplete information.

POSSIBLE CAUSE

- Harness and connectors
- Cooling fan motor
- Cooling fan control module

Diagnosis Procedure

INFOID:0000000013609554

1.CHECK DTC

With CONSULT

1. Turn ignition switch ON.
2. Check “Self-diagnostic result”.
3. Check that ECM does not detect the engine coolant temperature sensor related DTC.

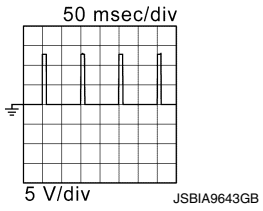
Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".

2.COMPONENT FUNCTION CHECK-1

With CONSULT

Check signal between ECM harness connector terminals.

ECM Connector	ECM Terminal +	ECM Terminal –	Condition	Value (Approx.)
E48	103	98	[Ignition switch: ON] • Cooling fan: Not operates	 JSBIA9643GB

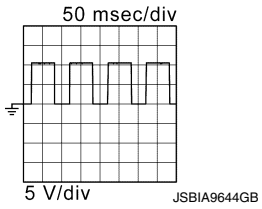
Is the inspection result normal?

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

3.COMPONENT FUNCTION CHECK-2

With CONSULT

Check signal between ECM harness connector terminals.

ECM			Condition	Value (Approx.)
Connector	+	–		
	Terminal			
E48	103	98	[Ignition switch: ON] • Perform “CK ENG AND WITH INTEGRATED CONT FAN MOTOR” in “ACTIVE TEST” mode. • Touch “START” • Cooling fan: 60% operates	

Is the inspection result normal?

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

4. CHECK COOLING FAN CONTROL SIGNAL CIRCUIT

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

+		–		Continuity
ECM		Cooling fan motor		
Connector	Terminal	Connector	Terminal	
E48	103	E22	3	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5. CHECK COOLING FAN MOTOR POWER SUPPLY CIRCUIT

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

+		–	Voltage
Cooling fan motor			
Connector	Terminal		
E22	1	Ground	Battery voltage
	2		

Is the inspection result normal?

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

6. CHECK COOLING FAN MOTOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between cooling fan motor harness connector and ground.

+		–	Continuity
Cooling fan motor			
Connector	Terminal		
E22	4	Ground	Existed

Is the inspection result normal?

YES >> Replace cooling fan assembly. Refer to CO-16, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0496 EVAP PURGE CONTROL VALVE

DTC Description

INFOID:0000000013609555

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0496	00	Evaporation system (EVAP System High Purge Flow)	NO SUBTYPE INFORMATION	The purge flow of the evaporative emission control system is too high.
	97		CMP/SYS OPR OBST OR BLKD	The purge flow of the evaporative emission control system is too high. The system function is restricted.

POSSIBLE CAUSE

- Harness or connectors
  (EVAP purge control valve circuit)
- EVAP purge control valve

Diagnosis Procedure

INFOID:0000000013609556

1.CHECK COMPONENT FUNCTION

With CONSULT

1. Turn ignition switch ON. (Engine stopped.)
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK PURGING SWITCHOVER VALVE”.
3. Perform the Active Test.
4. Check that the indicated value of “PWR CSMN (PURG SWOVR/V)” is between 390 – 495 mA.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that No. 213 (15 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK EVAP PURGE CONTROL VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect EVAP purge control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP purge control valve harness connector and ground.

+		–	Voltage
EVAP purge control valve			
Connector	Terminal		
E101	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK EVAP PURGE CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out No. 213 fuse.

3. Check the continuity between EVAP purge control valve harness connector and fuse terminal.

+		–	Continuity
EVAP purge control valve			
Connector	Terminal		
E101	1	No. 213 fuse terminal	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.

5.CHECK EVAP PURGE CONTROL VALVE

Check EVAP purge control valve. Refer to EC-594, "Component Inspection (EVAP Purge Control Valve)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP purge control valve. Refer to EC-27, "Component Parts Location".

6.CHECK EVAP PURGE CONTROL VALVE CONTROL CIRCUIT

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

+		–		Continuity
ECM		EVAP purge control valve		
Connector	Terminal	Connector	Terminal	
E48	153	E101	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

7.CHECK EVAP PURGE CIRUIT LEAKAGE

Check leakage of the following components.
- Hose and tube
- EVAP canister
- EVAP purge control valve (mechanical malfunction)

>> INSPECTION END

Component Inspection (EVAP Purge Control Valve)

INFOID:0000000013609557

1.CHECK EVAP PURGE CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect EVAP purge control valve harness connector.
3. Check the resistance between EVAP purge control valve terminals.

EVAP purge control valve		Condition	Resistance (Approx.)
+	–		
Terminal			
1	2	Temperature: 25°C (77°F)	14.2 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP purge control valve. Refer to EC-27, "Component Parts Location".

P0497 EVAP PURGE CONTROL VALVE

DTC Description

INFOID:0000000013609558

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0497	00	Evaporation system (EVAP System Low Purge Flow)	NO SUBTYPE INFORMATION	The purge flow of the evaporative emission control system is too low.
	92		PFM/INCORRECT OPERATN	The purge flow of the evaporative emission control system is too low. The function or the instruction has malfunction.

POSSIBLE CAUSE

- Harness or connectors
  (EVAP purge control valve circuit)
- EVAP purge control valve

Diagnosis Procedure

INFOID:0000000013609559

1.CHECK COMPONENT FUNCTION

With CONSULT

1. Turn ignition switch ON. (Engine stopped.)
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK PURGING SWITCHOVER VALVE”.
3. Perform the Active Test.
4. Check that the indicated value of “PWR CSMN (PURG SWOVR/V)” is between 390 – 495 mA.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that No. 213 (15 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK EVAP PURGE CONTROL VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect EVAP purge control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP purge control valve harness connector and ground.

+		−	Voltage
EVAP purge control valve			
Connector	Terminal		
E101	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK EVAP PURGE CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out No. 213 fuse.

3. Check the continuity between EVAP purge control valve harness connector and fuse terminal.

+		–	Continuity
EVAP purge control valve			
Connector	Terminal		
E101	1	No. 213 fuse terminal	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.

5.CHECK EVAP PURGE CONTROL VALVE

Check EVAP purge control valve. Refer to EC-597, "Component Inspection (EVAP Purge Control Valve)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP purge control valve. Refer to EC-27, "Component Parts Location".

6.CHECK EVAP PURGE CONTROL VALVE CONTROL CIRCUIT

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

+		–		Continuity
ECM		EVAP purge control valve		
Connector	Terminal	Connector	Terminal	
E48	153	E101	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

7.CHECK EVAP PURGE CIRUIT LEAKAGE

Check leakage of the following components.
- Hose and tube
- EVAP canister
- EVAP purge control valve (mechanical malfunction)

>> INSPECTION END

Component Inspection (EVAP Purge Control Valve)

INFOID:0000000013609560

1.CHECK EVAP PURGE CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect EVAP purge control valve harness connector.
3. Check the resistance between EVAP purge control valve terminals.

EVAP purge control valve		Condition	Resistance (Approx.)
+	–		
Terminal			
1	2	Temperature: 25°C (77°F)	14.2 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP purge control valve. Refer to EC-27, "Component Parts Location".

P0498 EVAP CANISTER VENT CONTROL VALVE

DTC Description

INFOID:0000000013748168

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0498	00	Evaporation system vent valve (EVAP system vent valve control circuit low)	NO SUBTYPE INFORMATION	The EVAP canister vent control valve of the activated EVAP canister has an open circuit

POSSIBLE CAUSE

- Harness or connectors
  (EVAP canister vent control valve circuit)
- EVAP canister vent control valve
- EVAP canister
- EVAP line

Diagnosis Procedure

INFOID:0000000013748610

1.CHECK COMPONENT FUNCTION

With CONSULT

1. Turn ignition switch ON. (Engine stopped.)
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK PURGING SWITCHOVER VALVE”.
3. Perform the Active Test.
4. Check that the indicated value of “PWR CSMN (PURG SWOVR/V)” is between 300 – 600 mA.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that No. 214 (10 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect EVAP canister vent control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister vent control valve harness connector and ground.

+		–	Voltage
EVAP canister vent control valve			
Connector	Terminal		
M710	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out No. 214 fuse.

3. Check the continuity between EVAP canister vent control valve harness connector and fuse terminal.

+		–	Continuity
EVAP canister vent control valve			
Connector	Terminal		
M710	1	No. 214 fuse terminal	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.

5.CHECK EVAP CANISTER VENT CONTROL VALVE

1. Clean the air passage of EVAP canister vent control valve using an air blower.
2. Check air passage continuity and operation delay time under the following conditions.
Make sure that new O-ring is installed properly.

Condition	Air passage continuity
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP canister (with EVAP canister vent control valve). Refer to FL-13, "Exploded View".

6.CHECK EVAP CANISTER VENT CONTROL VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EVAP canister vent control valve harness connector.

+		–		Continuity
ECM		EVAP canister vent control valve		
Connector	Terminal	Connector	Terminal	
E48	152	M710	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

7.CHECK EVAP PURGE CIRUIT LEAKAGE

Check leakage of the following components.
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection
- EVAP canister for damage
- EVAP canister vent control valve (mechanical malfunction)

>> INSPECTION END

P0499 EVAP CANISTER VENT CONTROL VALVE

DTC Description

INFOID:0000000013748170

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0499	00	Evaporation system vent valve (EVAP system vent valve control circuit high)	NO SUBTYPE INFORMATION	The EVAP canister vent control valve of the activated EVAP canister has an open circuit

POSSIBLE CAUSE

- Harness or connectors (EVAP canister vent control valve circuit)
- EVAP canister vent control valve
- EVAP canister
- EVAP line

Diagnosis Procedure

INFOID:0000000013748611

1.CHECK COMPONENT FUNCTION

With CONSULT

1. Turn ignition switch ON. (Engine stopped.)
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK PURGING SWITCHOVER VALVE”.
3. Perform the Active Test.
4. Check that the indicated value of “PWR CSMN (PURG SWOVR/V)” is between 300 – 600 mA.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that No. 214 (10 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect EVAP canister vent control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister vent control valve harness connector and ground.

+		–	Voltage
EVAP canister vent control valve			
Connector	Terminal		
M710	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out No. 214 fuse.

3. Check the continuity between EVAP canister vent control valve harness connector and fuse terminal.

+		–	Continuity
EVAP canister vent control valve			
Connector	Terminal		
M710	1	No. 214 fuse terminal	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.

5.CHECK EVAP CANISTER VENT CONTROL VALVE

1. Clean the air passage of EVAP canister vent control valve using an air blower.
2. Check air passage continuity and operation delay time under the following conditions.
Make sure that new O-ring is installed properly.

Condition	Air passage continuity
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP canister (with EVAP canister vent control valve). Refer to FL-13, "Exploded View".

6.CHECK EVAP CANISTER VENT CONTROL VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EVAP canister vent control valve harness connector.

+		–		Continuity
ECM		EVAP canister vent control valve		
Connector	Terminal	Connector	Terminal	
E48	152	M710	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

7.CHECK EVAP PURGE CIRUIT LEAKAGE

Check leakage of the following components.
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection
- EVAP canister for damage
- EVAP canister vent control valve (mechanical malfunction)

>> INSPECTION END

P04DB CRANKCASE VENTILATION SYSTEM

DTC Description

INFOID:0000000013609561

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P04DB	79	Crankcase ventilation system (Crankcase Ventilation System Disconnected)	MECHANCL LINKAGE MALFNCTN	The crankcase ventilation system is interrupted. The mechanical connection has malfunctioned.

POSSIBLE CAUSE

Partial load operation crankcase ventilation valve

Diagnosis Procedure

INFOID:0000000013609562

1.CHECK FOR CRANKCASE VENTILATION COMPONENT PARTS

Check the following parts installation condition.
- Partial load operation crankcase ventilation valve
- Engine coolant temperature sensor
- Coolant thermostat heater element
- Knock sensor 1
- Knock sensor 2
- Starter motor
- Pressure sensor upstream of throttle valve
- Throttle valve actuator

Is the inspection result normal?

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

2.CHECK PARTIAL LOAD OPERATION CRANKCASE VENTILATION VALVE

Check the partial load operation crankcase ventilation valve. Refer to EC-959, "Diagnosis Procedure".

Is the inspection result normal?

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

P04F0 EVAP SYS HIGH PRESSURE PURGE LINE

DTC Description

INFOID:0000000013785650

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P04F0	00	EVAP sys high pressure purge line (EVAP system high pressure purge line performance)	NO SUBTYPE INFORMATION	Wide open throttle regeneration of the activated EVAP canister has a malfunction.

POSSIBLE CAUSE

- Harness and connectors (EVAP control system pressure sensor)
- EVAP control system pressure sensor
- Purging (At full load)

Diagnosis Procedure

INFOID:0000000013785651

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIV TEST” >> “Check purging pressure control”.
3. Select “OPEN”.
4. Check that the indicated value of purge pressure sensor is between (–)1 – (+)1 kPa [(–)0.01 – (+)0.01 bar, (–)0.01 – (+)0.01 kg-cm2, (–)0.145 – (+)0.145 psi]

Is the inspection result normal?

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

2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect EVAP control system pressure sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP control system pressure sensor harness connector and ground.

+		–	Voltage
EVAP control system pressure sensor			
Connector	Terminal		
F154	3	Ground	Battery voltage

Is the inspection result normal?

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

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
ECM		EVAP control system pressure sensor		
Connector	Terminal	Connector	Terminal	
F150	16	F154	3	Existed

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CIRCUIT

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

+		–		Continuity
ECM		EVAP control system pressure sensor		
Connector	Terminal	Connector	Terminal	
F150	36	F154	1	Existed
	11		2	

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

Is the inspection result normal?

YES >> Replace EVAP control system pressure sensor. Refer to EM-34, "Exploded View".
NO >> Repair or replace error-detected parts.

5. CHECK EVAP PURGE CIRUIT LEAKAGE

Check leakage of the following components.
- Hose, tube, and check valve
- EVAP canister
- EVAP purge control valve (mechanical malfunction)

>> INSPECTION END

P0500 VEHICLE SPEED SIGNAL

DTC Description

INFOID:0000000013609563

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0500	00	VEHICLE SPEED SENSOR A (Vehicle Speed Sensor ″A″ Circuit)	NO SUBTYPE INFORMATION	Speed sensor has a malfunction.
	08		BUS SIGNAL/MESSAGE ERROR	Speed sensor 1 has a malfunction. There is a signal malfunction or the message is malfunctioning.

POSSIBLE CAUSE

- Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609564

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

With CONSULT

Check “Self-diagnostic result” in “ABS”.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

P0505 IDLE SPEED CONTROL

DTC Description

INFOID:0000000013609565

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P0505	00	Idle control system (Idle Control System)	NO SUBTYPE INFORMATION	The idle speed control has a malfunction.

POSSIBLE CAUSE

Intake air leak

Diagnosis Procedure

INFOID:0000000013609566

1.CHECK INTAKE AIR LEAKAGE

1. Start the engine.
2. Listen for an intake air leak.

Is intake air leak detected?

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

P0506 IDLE SPEED CONTROL

DTC Description

INFOID:0000000013609567

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0506	00	Idle control system rpm (Idle Control System RPM - Lower Than Expected)	NO SUBTYPE INFORMATION	Idle speed is too low when engine is warm.

POSSIBLE CAUSE

- Harness and connectors
  (Throttle valve actuator circuit is open or shorted.)
  (Pressure sensor downstream of throttle valve circuit is open or shorted.)
- Throttle valve actuator
- Pressure sensor downstream of throttle valve
- Intake air leak

Diagnosis Procedure

INFOID:0000000013609568

1.CHECK THROTTLE VALVE ACTUATOR

Check throttle valve actuator. Refer to EC-611, "Component Inspection (Throttle Valve Actuator)".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace throttle valve actuator. Refer to EM-28, "Exploded View".

2.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between throttle valve actuator harness connector and ground.

+		–	Voltage (Approx.)
Throttle valve actuator			
Connector	Terminal		
F148	4	Ground	5 V

Is the inspection result normal?

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

3.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	4	F149	17	Existed

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

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE VALVE POSITION SENSOR CIRCUIT

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

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	3	F149	38	Existed
	5		62	
	6		14	

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

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Throttle Valve Actuator)

INFOID:0000000013609569

1.CHECK THROTTLE VALVE MOTOR

1. Turn ignition switch OFF.
2. Disconnect throttle valve actuator harness connector.
3. Check the resistance between throttle valve actuator terminals.

Terminal	Resistance
1 and 2	1 – 10 Ω

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace throttle valve actuator. Refer to EM-29, "Removal and Installation".

2.CHECK THROTTLE VALVE

1. Remove throttle valve actuator.
2. Operate throttle valve slowly by hand as far as the wide open position.
3. Check that the throttle valve does not stick and returning to closed position by spring force.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace throttle valve actuator. Refer to EM-29, "Removal and Installation".

P0507 IDLE SPEED CONTROL

DTC Description

INFOID:0000000013609570

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0507	00	Idle control system rpm (Idle Control System RPM - Higher Than Expected)	NO SUBTYPE INFORMATION	Idle speed is too high when engine is warm.

POSSIBLE CAUSE

Intake air leak

Diagnosis Procedure

INFOID:0000000013609571

1.CHECK THROTTLE VALVE ACTUATOR

Check throttle valve actuator. Refer to EC-611, "Component Inspection (Throttle Valve Actuator)".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace throttle valve actuator. Refer to EM-28, "Exploded View".

2.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between throttle valve actuator harness connector and ground.

+		–	Voltage (Approx.)
Throttle valve actuator			
Connector	Terminal		
F148	4	Ground	5 V

Is the inspection result normal?

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

3.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	4	F149	17	Existed

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

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE VALVE POSITION SENSOR CIRCUIT

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

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	3	F149	38	Existed
	5		62	
	6		14	

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

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Throttle Valve Actuator)

INFOID:0000000013609572

1. CHECK THROTTLE VALVE MOTOR

1. Turn ignition switch OFF.
2. Disconnect throttle valve actuator harness connector.
3. Check the resistance between throttle valve actuator terminals.

Terminal	Resistance
1 and 2	1 – 10 Ω

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace throttle valve actuator. Refer to EM-29, "Removal and Installation".

2. CHECK THROTTLE VALVE

1. Remove throttle valve actuator.
2. Operate throttle valve slowly by hand as far as the wide open position.
3. Check that the throttle valve does not stick and returning to closed position by spring force.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace throttle valve actuator. Refer to EM-29, "Removal and Installation".

P050A COLD START IDLE SPEED CONTROL

Diagnosis Description

INFOID:0000000013609573

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P050A	00	COLD START IDLE CONT SYSTEM (Cold start idle control system performance)	NO SUBTYPE INFORMATION	Idle speed control has a malfunction during a cold start.
	92		PFM/INCORRECT OPERATN	Idle speed control has a malfunction during a cold start. The function or the instruction has malfunction.
	94		UNEXPECTED OPERATION	Idle speed control has a malfunction during a cold start. There is an unexpected instruction.

POSSIBLE CAUSE

Intake air leak

Diagnosis Procedure

INFOID:0000000013609574

1.CHECK INTAKE AIR LEAKAGE

1. Start the engine.
2. Listen for an intake air leak.

Is intake air leak detected?

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

P050B IGNITION TIMING

Diagnosis Description

INFOID:0000000013609575

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P050B	00	Cold start ignition timing (Cold Start Ignition Timing Performance)	NO SUBTYPE INFORMATION	The ignition angle setting has a malfunction when cold starting.

POSSIBLE CAUSE

Ignition timing

Diagnosis Procedure

INFOID:0000000013609576

1.CHECK DTC

With CONSULT

Check DTC.

Is any DTC other than P050B detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".

NO >> Erase DTC.

P050D COLD START ROUGH IDLE

Diagnosis Description

INFOID:0000000013609577

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	Malfunction type	
P050D	00	Cold start rough idle (Cold Start Rough Idle)	NO SUBTYPE INFORMATION	The combustion engine idles roughly after a cold start.

POSSIBLE CAUSE

Intake air leak

Diagnosis Procedure

INFOID:0000000013609578

1.CHECK INTAKE AIR LEAKAGE

1. Start the engine.
2. Listen for an intake air leak.

Is intake air leak detected?

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

P0511

Diagnosis Description

INFOID:0000000013609579

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P0512 STARTER REQUEST CIRCUIT

DTC Description

INFOID:0000000013609580

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
P0512	00	Starter request circuit (Starter Request Circuit)	NO SUBTYPE INFORMATION	The start enable has a malfunction.

POSSIBLE CAUSE

Drive authorization

Diagnosis Procedure

INFOID:0000000013609581

Perform the trouble diagnosis for CAN communication system. Refer to LAN-58, "Trouble Diagnosis Flow Chart".

P0513 IMMOBILIZER

DTC Description

INFOID:0000000013609582

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
P0513	00	Immobilizer (Incorrect Immobilizer Key)	NO SUBTYPE INFORMATION	The start enable was not issued.
	01		ELECTRICAL MALFUNCTION	The start enable was not issued. There is a general electrical malfunction.
	02		GENERAL ELEC MALFUNCTN	The start enable was not issued. There is a general signal malfunction.
	03		FM/PWM ERROR	The start enable was not issued. There is a frequency or pulse width modulation malfunction.
	04		SYSTEM INTERNAL MALFUNCTN	The start enable was not issued. There is an internal malfunction.
	05		SYSTEM PROGRAMMING ERROR	The start enable was not issued. There is a programming malfunction.
	06		ALGORITHM BASED ERROR	The start enable was not issued. There is an algorithm malfunction.
	07		MECHANICAL MALFUNCTION	The start enable was not issued. There is a mechanical malfunction.
	08		BUS SIGNAL/MESSAGE ERROR	The start enable was not issued. There is a signal malfunction or the message is malfunctioning.
	09		COMPONENT MALFUNCTION	The start enable was not issued. There is a component malfunction.
	10		—	The start enable was not issued. Reserved for ISO/SAE
	11		CIRCUIT SHORT TO GROUND	The start enable was not issued. There is a short circuit to ground.
	12		CIRCUIT SHORT TO BATTERY	The start enable was not issued. There is a short circuit to positive.
	13		CIRCUIT OPEN	The start enable was not issued. There is an open circuit.
	14		CIRC SHORT TO GRND OR OPEN	The start enable was not issued. There is a short circuit to ground or an open circuit.
	15		CIRC SHORT TO BATT OR OPEN	The start enable was not issued. There is a short circuit to positive or an open circuit.
	16		CIRC VOLT BELOW THRESHOLD	The start enable was not issued. The limit value for electrical voltage has not been attained.

POSSIBLE CAUSE

Drive authorization

Diagnosis Procedure

INFOID:0000000013609583

Perform the trouble diagnosis for CAN communication system. Refer to LAN-58, "Trouble Diagnosis Flow Chart".

P052A INTAKE CAMSHAFT POSITION CONTROL

DTC Description

INFOID:0000000013609584

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P052A	00	Cold start camshaft A pos timing b1 (Cold Start “A” Camshaft Position Timing Over-Advanced bank 1)	NO SUBTYPE INFORMATION	The position of the intake camshaft (cylinder bank 1) deviates from the specified value in direction ADVANCED during cold start.

POSSIBLE CAUSE
- Intake camshaft
- Exhaust camshaft

Diagnosis Procedure

INFOID:0000000013609585

1.COMPONENT FUNCTION CHECK

With CONSULT
1. Apply parking brake.
2. Shift the selector lever to P or N position.
3. Start the engine and let it idle.
4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CAMSHAFT POSITIONER”.
5. Keep the engine speed between 2,700 – 3,500 rpm.
6. Perform Active Test.
   NOTE:
   Start the Active Test immediately after that engine speed reaches to specified range.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace the malfunctioning camshaft. Refer to EM-63, "Removal and Installation".

P052E VENT LINE HEATER ELEMENT

DTC Description

INFOID:0000000013609586

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P052E	11	POSITV C/CASE VENTILTN REG VLV (Positive crankcase ventilation valve performance)	CIRCUIT SHORT TO GROUND	The valve for crankcase ventilation has a malfunction. There is a short circuit to ground.
	12		CIRCUIT SHORT TO BATTERY	The valve for crankcase ventilation has a malfunction. There is a short circuit to positive.
	13		CIRCUIT OPEN	The valve for crankcase ventilation has a malfunction. There is an open circuit.
	71		ACTUATOR STUCK	The valve for crankcase ventilation has a malfunction. The actuator is blocked.

POSSIBLE CAUSE

- Partial load operation crankcase ventilation valve
- Engine coolant temperature sensor
- Coolant thermostat heater element
- Knock sensor 1
- Knock sensor 2
- Starter motor
- Pressure sensor upstream of throttle valve
- Throttle valve actuator

Diagnosis Procedure

INFOID:0000000013609587

1.CHECK FOR CRANKCASE VENTILATION COMPONENT PARTS

Check the following parts installation condition.
- Partial load operation crankcase ventilation valve
- Engine coolant temperature sensor
- Coolant thermostat heater element
- Knock sensor 1
- Knock sensor 2
- Starter motor
- Pressure sensor upstream of throttle valve
- Throttle valve actuator

Is the inspection result normal?

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

2.CHECK PARTIAL LOAD OPERATION CRANKCASE VENTILATION VALVE

Check the partial load operation crankcase ventilation valve. Refer to EC-959, "Diagnosis Procedure".

Is the inspection result normal?

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

P0536 A/C EVAPORATOR TEMPERATURE SENSOR

Diagnosis Description

INFOID:0000000013609588

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P0537 A/C EVAPORATOR TEMPERATURE SENSOR

Diagnosis Description

INFOID:0000000013609589

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P0538 A/C EVAPORATOR TEMPERATURE SENSOR

Diagnosis Description

INFOID:0000000013609590

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P053A VENT LINE HEATER ELEMENT

DTC Description

INFOID:0000000013609591

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P053A	00	POSTV CRNK/C VENTLTN HTR CONT (PCV Heater Control Circuit / Open)	NO SUBTYPE INFORMATION	The output for the heating element of the vent line Crankcase has an electrical malfunction or an open circuit.

POSSIBLE CAUSE

- Harness and connectors
  (Full-load operation vent line heater element circuit is open or shorted.)
- Full-load operation vent line heater element

Diagnosis Procedure

INFOID:0000000013609592

1.CHECK FULL-LOAD OPERATION VENT LINE HEATER ELEMENT

Check full-load operation vent line heater element. Refer to EC-624, "Component Inspection (Full-load Operation Vent Line Heater Element)".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace full-load operation vent line heater element. Refer to EM-23, "Removal and Installation".

2.CHECK FULL-LOAD OPERATION VENT LINE HEATER ELEMENT POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect full-load operation vent line heater element harness connector.
3. Turn ignition switch ON.
4. Check the voltage between full-load operation vent line heater element harness connector and ground.

+		–	Voltage
Full-load operation vent line heater element			
Connector	Terminal		
F157	1	Ground	Battery voltage

Is the inspection result normal?

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

3.CHECK FUSE

1. Turn ignition switch OFF.
2. Pull out #214 (10 A) fuse.
3. Check that the fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace the fuse after repairing the applicable circuit.

4.CHECK FULL-LOAD OPERATION VENT LINE HEATER ELEMENT POWER SUPPLY CIRCUIT

1. Check the continuity between full-load operation vent line heater element harness connector and fuse terminal.

+		–	Continuity
Full-load operation vent line heater element			
Connector	Terminal		
F157	1	#214 fuse terminal	Existed

2. 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.

5.CHECK FULL-LOAD OPERATION VENT LINE HEATER ELEMENT CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and full-load operation vent line heater element harness connector.

+		–		Continuity
ECM		Full-load operation vent line heater element		
Connector	Terminal	Connector	Terminal	
F149	78	F157	2	Existed

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

Is the inspection result normal?

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

6.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		–	Continuity
ECM			
Connector	Terminal		
E48	98	Ground	Existed
	100		
	102		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Full-load Operation Vent Line Heater Element)

INFOID:0000000013609593

1.CHECK FULL-LOAD OPERATION VENT LINE HEATER ELEMENT

1. Turn ignition switch OFF.
2. Disconnect full-load operation vent line heater element harness connector.
3. Check the resistance between full-load operation vent line heater element terminals.

Full-load operation vent line heater element		Resistance (Approx.)
+	–	
Terminal		
1	2	9.5 – 13.5 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace full-load operation vent line heater element. Refer to EM-23, "Removal and Installation".

P053B VENT LINE HEATER ELEMENT

DTC Description

INFOID:0000000013609594

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P053B	00	POSTV CRNK/C VENTLTN HTR CONT (PCV Heater Control Circuit Low)	NO SUBTYPE INFORMATION	The output for the heating element of the vent line Crankcase has a short circuit to ground.

POSSIBLE CAUSE

- Harness and connectors
  (Full-load operation vent line heater element circuit is open or shorted.)
- Full-load operation vent line heater element

Diagnosis Procedure

INFOID:0000000013609595

1.CHECK FULL-LOAD OPERATION VENT LINE HEATER ELEMENT

Check full-load operation vent line heater element. Refer to EC-627, "Component Inspection (Full-load Operation Vent Line Heater Element)".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace full-load operation vent line heater element. Refer to EM-23, "Removal and Installation".

2.CHECK FULL-LOAD OPERATION VENT LINE HEATER ELEMENT POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect full-load operation vent line heater element harness connector.
3. Turn ignition switch ON.
4. Check the voltage between full-load operation vent line heater element harness connector and ground.

+		–	Voltage
Full-load operation vent line heater element			
Connector	Terminal		
F157	1	Ground	Battery voltage

Is the inspection result normal?

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

3.CHECK FUSE

1. Turn ignition switch OFF.
2. Pull out #214 (10 A) fuse.
3. Check that the fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace the fuse after repairing the applicable circuit.

4.CHECK FULL-LOAD OPERATION VENT LINE HEATER ELEMENT POWER SUPPLY CIRCUIT

1. Check the continuity between full-load operation vent line heater element harness connector and fuse terminal.

+		–	Continuity
Full-load operation vent line heater element			
Connector	Terminal		
F157	1	#214 fuse terminal	Existed

2. 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.

5.CHECK FULL-LOAD OPERATION VENT LINE HEATER ELEMENT CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and full-load operation vent line heater element harness connector.

+		–		Continuity
ECM		Full-load operation vent line heater element		
Connector	Terminal	Connector	Terminal	
F149	78	F157	2	Existed

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

Is the inspection result normal?

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

6.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		–	Continuity
ECM			
Connector	Terminal		
E48	98	Ground	Existed
	100		
	102		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Full-load Operation Vent Line Heater Element)

INFOID:0000000013609596

1.CHECK FULL-LOAD OPERATION VENT LINE HEATER ELEMENT

1. Turn ignition switch OFF.
2. Disconnect full-load operation vent line heater element harness connector.
3. Check the resistance between full-load operation vent line heater element terminals.

Full-load operation vent line heater element		Resistance (Approx.)
+	–	
Terminal		
1	2	9.5 – 13.5 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace full-load operation vent line heater element. Refer to EM-23, "Removal and Installation".

P053C VENT LINE HEATER ELEMENT

DTC Description

INFOID:0000000013609597

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P053C	00	POSTV CRNK/C VENTLTN HTR CONT (PCV Heater Control Circuit High)	NO SUBTYPE INFORMATION	The output for the heating element of the vent line 'Crankcase' has a short circuit to positive.

POSSIBLE CAUSE

- Harness and connectors
  (Full-load operation vent line heater element circuit is open or shorted.)
- Full-load operation vent line heater element

Diagnosis Procedure

INFOID:0000000013609598

1.CHECK FULL-LOAD OPERATION VENT LINE HEATER ELEMENT

Check full-load operation vent line heater element. Refer to EC-630, "Component Inspection (Full-load Operation Vent Line Heater Element)".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace full-load operation vent line heater element. Refer to EM-23, "Removal and Installation".

2.CHECK FULL-LOAD OPERATION VENT LINE HEATER ELEMENT POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect full-load operation vent line heater element harness connector.
3. Turn ignition switch ON.
4. Check the voltage between full-load operation vent line heater element harness connector and ground.

+		–	Voltage
Full-load operation vent line heater element			
Connector	Terminal		
F157	1	Ground	Battery voltage

Is the inspection result normal?

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

3.CHECK FUSE

1. Turn ignition switch OFF.
2. Pull out #214 (10 A) fuse.
3. Check that the fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace the fuse after repairing the applicable circuit.

4.CHECK FULL-LOAD OPERATION VENT LINE HEATER ELEMENT POWER SUPPLY CIRCUIT

1. Check the continuity between full-load operation vent line heater element harness connector and fuse terminal.

+		–	Continuity
Full-load operation vent line heater element			
Connector	Terminal		
F157	1	#214 fuse terminal	Existed

2. 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.

5.CHECK FULL-LOAD OPERATION VENT LINE HEATER ELEMENT CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and full-load operation vent line heater element harness connector.

+		–		Continuity
ECM		Full-load operation vent line heater element		
Connector	Terminal	Connector	Terminal	
F149	78	F157	2	Existed

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

Is the inspection result normal?

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

6.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		–	Continuity
ECM			
Connector	Terminal		
E48	98	Ground	Existed
	100		
	102		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Full-load Operation Vent Line Heater Element)

INFOID:0000000013609599

1.CHECK FULL-LOAD OPERATION VENT LINE HEATER ELEMENT

1. Turn ignition switch OFF.
2. Disconnect full-load operation vent line heater element harness connector.
3. Check the resistance between full-load operation vent line heater element terminals.

Full-load operation vent line heater element		Resistance (Approx.)
+	–	
Terminal		
1	2	9.5 – 13.5 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace full-load operation vent line heater element. Refer to EM-23, "Removal and Installation".

P053F COLD START FUEL PRESSURE PERFORMANCE

DTC Description

INFOID:0000000013609600

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P053F	92	Cold start fuel pressure (Cold Start Fuel Pressure Performance)	PFM/INCORRECT OPERATN	The fuel pressure during a cold start is implausible. There is an unexpected instruction.
	94		UNEXPECTED OPERATION	The fuel pressure during a cold start is implausible. There is an unexpected instruction.

POSSIBLE CAUSE

- Harness or connectors
  (Fuel pressure and temperature sensor circuit is open or shorted.)
  (Quantity control valve circuit is open or shorted.)
- High pressure fuel system leak
- Fuel pressure and temperature sensor
- Quantity control valve

Diagnosis Procedure

INFOID:0000000013609601

1.START ENGINE

Start the engine and let it idle.

Is it difficult to keep at idle?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL

With CONSULT

1. Warm the engine up to engine coolant temperature reaches 75°C (167°F).
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL PRESS AND TEMP SENSOR”.
3. Keep the engine speed between 500 – 1,000 rpm.
4. Perform the Active Test.
   NOTE:
   When start the test, fuel pump is activated and quantity control valve is not activated.
5. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 300 kPa (3 bar, 3.06 kg/cm^2, 43.5 psi) and 1200 kPa (12 bar, 12.24 kg-cm^2, 174 psi).

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 6.

3.ERASE DTC

1. Erase the DTC.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Start the engine and let it idle for 60 seconds.
4. Turn ignition switch OFF.
5. Turn ignition switch ON.
6. Check DTC.

Is the DTC detected again?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> INSPECTION END

4.PRECONDITIONING FOR CHECKING FUEL PRESSURE AND TEMPERATURE SENSOR OUTPUT SIGNAL

CAUTION:
Refer to EC-23, "Precaution for Risk of Explosion and Injury" for work in safety.

With CONSULT
1. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “RAIL PRES (ACTUAL VALUE)”.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Slightly loosen the threaded connection of the fuel line to the fuel rail to reduce the fuel pressure.
   CAUTION:
   Collect escaping fuel with several rags.
4. Wait at least 60 seconds.
5. Retighten the threaded connection of fuel line.
6. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 0 kPa (0 bar, 0 kg/cm^2, 0 psi) and 300 kPa (3 bar, 3.06 kg/cm^2, 43.5 psi).

>> GO TO 5.

5. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL

With CONSULT
1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL PRESS AND TEMP SENSOR”.
   NOTE:
   When start the test, fuel pump is activated and quantity control valve is not activated.
3. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 300 kPa (3 bar, 3.06 kg/cm^2, 43.5 psi) and 1200 kPa (12 bar, 12.24 kg/cm^2, 174 psi).

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 6.

6. CHECK POWER SUPPLY OF FUEL PRESSURE AND TEMPERATURE SENSOR

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

Fuel pressure and temperature sensor			Voltage
Connector	+	–	
	Terminal		
F139	4	1	4.75 – 5.25 V

Is the measured value OK?

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

7. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR POWER SUPPLY AND GROUND CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	12	F139	1	Existed
	18		4	

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

8. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL CIRCUIT

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

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	65	F139	3	Existed
	67		2	

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

Is the inspection result normal?

YES >> Replace fuel pressure and temperature sensor. Refer to EM-49, "Removal and Installation".
NO >> Repair or replace error-detected parts.

9. CHECK HIGH PRESSURE FUEL SYSTEM LEAK

With CONSULT

1. Start the engine and warm it up to engine coolant temperature reaches 75°C (167°F).
2. Turn ignition switch OFF.
3. Turn ignition switch ON.
4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL HI PRESS CIRC FOR LEAKTIGHTNESS”.
5. Connect charger to battery.
6. Set the vehicle to the following conditions.

Item	Condition
Engine coolant temperature	75 – 105°C (167 – 221°F)
Fuel temperature	40 – 80°C (104 – 176°F)
Engine speed	550 – 800 rpm
Electrical load	OFF

7. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 19 MPa (190 bar, 193.8 kg/cm^2, 2755 psi) and 21 MPa (210 bar, 214.2 kg/cm^2, 3045 psi).
8. Perform the Active Test.

CAUTION:
Never turn ignition switch OFF.
NOTE:

When the result is normal, the fuel rail pressure value must not drop below 10 MPa (100 bar, 102 kg/cm^2, 1450 psi) within 3 minutes.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Check high pressure fuel line for fuel leak.

10. CHECK QUANTITY CONTROL VALVE FUNCTION

With CONSULT

1. Check that low fuel pressure system is normal.
2. Set the vehicle to the following conditions.

Item	Condition
Engine coolant temperature	75 – 105°C (167 – 221°F)
Fuel temperature	40 – 80°C (104 – 176°F)
Engine speed	50 rpm or more
A/C	OFF

3. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK QUANTITY CONTROL VALVE”.
4. Perform the Active Test.
NOTE:
When the result is normal, the fuel rail pressure value is increased to approximately 20 MPa (200 bar, 204 kg/cm^2, 2900 psi).

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 11.

11. CHECK QUANTITY CONTROL VALVE

Check quantity control valve. Refer to EC-766, "Component Inspection (Quantity Control Valve)".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace high pressure fuel pump. Refer to EM-44, "Removal and Installation".

12. CHECK QUANTITY CONTROL VALVE CONTROL CIRCUIT

1. Disconnect ECM harness connector and quantity control valve harness connector.
2. Check the continuity between ECM harness connector and quantity control valve harness connector.

+		–		Continuity
ECM		Quantity control valve		
Connector	Terminal	Connector	Terminal	
F149	75	F169	1	Existed
	76		2	

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

13. ERASE DTC

1. Check the following.
- If the actuation angle of the quantity control valve matches the specified value exactly, synchronization between the camshaft and crankshaft must be checked. (Substitute value in emergency mode)
- If DTC related to camshaft is detected, perform trouble diagnosis for the detected DTC.
- If DTC related to crankshaft is detected, perform trouble diagnosis for the detected DTC.
2. Erase the DTC.
3. Turn ignition switch OFF and wait at least 30 seconds.
4. Start the engine and let it idle for 60 seconds.
5. Check DTC.

Is the DTC detected again?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> INSPECTION END

Component Inspection (Quantity Control Valve)

INFOID:0000000013609602

1. CHECK QUANTITY CONTROL VALVE-1

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

3. Check the resistance between ECM harness connector terminals.

ECM		Resistance (Ω)
+	–	
Terminal		
75	76	0.3 – 1.1

Is the inspection result normal?

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

2. CHECK QUANTITY CONTROL VALVE-2

1. Disconnect quantity control valve harness connector.
2. Check the resistance between quantity control valve terminals.

Quantity control valve		Resistance (Ω)
+	–	
Terminal		
1	2	0.3 – 1.1

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure fuel pump. Refer to EM-44, "Removal and Installation".

P054A EXHAUST CAMSHAFT POSITION CONTROL

DTC Description

INFOID:0000000013609603

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P054A	00	Cold start camshaft B pos timing b1 (Cold Start ″B″ Camshaft Position Timing Over-Advanced Bank 1)	NO SUBTYPE INFORMATION	The position of the exhaust camshaft (cylinder bank 1) deviates from the specified value in direction Advanced during cold start.

POSSIBLE CAUSE

- Intake camshaft
- Exhaust camshaft

Diagnosis Procedure

INFOID:0000000013609604

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Apply parking brake.
2. Shift the selector lever to P or N position.
3. Start the engine and let it idle.
4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CAMSHAFT POSITIONER”.
5. Keep the engine speed between 2,700 – 3,500 rpm.
6. Perform Active Test.

   NOTE:

   Start the Active Test immediately after that engine speed reaches to specified range.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning camshaft. Refer to EM-63, "Removal and Installation".

P0562 POWER SUPPLY

DTC Description

INFOID:0000000013609605

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0562	00	SYSTEM VOLTAGE (System Voltage Low)	NO SUBTYPE INFORMATION	The ECM power supply voltage is too low.
	16		CIRC VOLT BELOW THRESH-OLD	The ECM power supply voltage is too low. The limit value for electrical voltage has not been attained.

POSSIBLE CAUSE

- Harness or connectors
  (ECM power supply circuit)
- Charging system (ECM power supply voltage is 19 V or more.)

Diagnosis Procedure

INFOID:0000000013609606

1.CHECK CHARGING SYSTEM

Check charging system. Refer to CHG-21, "Work Flow (With EXP-800 NI or GR8-1200 NI)" (With EXP-800 NI or GR8-1200 NI) or CHG-25, "Work Flow (Without EXP-800 NI or GR8-1200 NI)" (Without EXP-800 NI or GR8-1200 NI).

Is the inspection result normal?

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

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

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

P0563 POWER SUPPLY

DTC Description

INFOID:0000000013609607

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0563	00	SYSTEM VOLTAGE (System Voltage High)	NO SUBTYPE INFORMATION	The ECM power supply voltage is too high.
	17		CIRC VOLT ABOVE THRESHOLD	The ECM power supply voltage is too high. The limit value for electrical voltage has been exceeded.

POSSIBLE CAUSE

- Harness or connectors
  (ECM power supply circuit)
- Charging system (ECM power supply voltage is 19 V or more.)

Diagnosis Procedure

INFOID:0000000013609608

1.CHECK CHARGING SYSTEM

Check charging system. Refer to CHG-21, "Work Flow (With EXP-800 NI or GR8-1200 NI)" (With EXP-800 NI or GR8-1200 NI) or CHG-25, "Work Flow (Without EXP-800 NI or GR8-1200 NI)" (Without EXP-800 NI or GR8-1200 NI).

Is the inspection result normal?

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

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

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

P0571 BRAKE SWITCH

DTC Description

INFOID:0000000013609609

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0571	08	BRAKE SWITCH A (Brake Switch ″A″ Circuit)	BUS SIGNAL/MESSAGE ERROR	The switch Brake light has a malfunction. There is a signal malfunction or the message is malfunctioning.
	29		SIGNAL INVALID	The switch Brake light has a malfunction. There is an invalid signal.
	64		SIGNAL PLAUSIBILITY ERROR	The switch Brake light has a malfunction. There is an implausible signal.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609610

1.CHECK DTC OF ELECTRONIC STABILITY PROGRAM CONTROL UNIT

With CONSULT

Check “Self-diagnostic result” of “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".

NO >> Replace electronic stability program control unit. Refer to BRC-975, "Removal and Installation".

P0575 CRUISE CONTROL

DTC Description

INFOID:0000000013609611

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0575	29	Cruise control input circuit (Cruise Control Input Circuit)	SIGNAL INVALID	The input Cruise Control has an electrical malfunction. There is an invalid signal.

POSSIBLE CAUSE

Electronic stability program control unit

Diagnosis Procedure

INFOID:0000000013609612

1.CHECK DTC IN ADAS

With CONSULT

Check “Self-diagnostic result” in “ICC/ADAS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to CCS-42, "DTC Index".
NO >> GO TO 2.

2.CHECK DTC IN ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

With CONSULT

Check “Self-diagnostic result” in “ABS”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BRC-59, "DTC Index".
NO >> INSPECTION END

P0597 COOLANT THERMOSTAT HEATER ELEMENT

DTC Description

INFOID:0000000013609613

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0597	00	THERMOSTAT HEATER CONTROL (Thermostat Heater Control Circuit/Open}	NO SUBTYPE INFORMATION	The coolant thermostat has an electrical malfunction or open circuit.

POSSIBLE CAUSE

- Harness and connectors
  (Engine coolant thermostat heater element circuit is open or shorted.)
- Engine coolant thermostat heater element

Diagnosis Procedure

INFOID:0000000013609614

1.INSPECTION START

Does the coolant temperature rise too quickly and become too high?

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

2.CHECK COOLANT THERMOSTAT HEATING ELEMENT

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK COOLANT THERMOSTAT HEATING ELEMENT”.
3. Set the vehicle under the following conditions:
   CAUTION:
   During the test, cooling fan is activated at maximum speed.
   NOTE:
   - When a coolant temperature reaches specified temperature, the test is started automatically.
   - The test takes up to approximately 10 minutes.

Item	Condition
Engine speed	At idle
Engine coolant temperature	Less then 100°C (212°F)
A/C	OFF

4. Perform the Active Test.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> GO TO 4.

3.CHECK COOLANT THERMOSTAT HEATING ELEMENT

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK COOLANT THERMOSTAT HEATING ELEMENT”.
3. Set the vehicle under the following conditions:
   CAUTION:
   During the test, cooling fan is activated at maximum speed.
   NOTE:
   - When a coolant temperature reaches specified temperature, the test is started automatically.

- The test takes up to approximately 10 minutes.

Item	Condition
Engine speed	At idle
Engine coolant temperature	Less then 50°C (122°F)
A/C	OFF

4. Perform the Active Test.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> GO TO 4.

4. CHECK COOLANT THERMOSTAT HEATER ELEMENT

Check engine coolant thermostat heating element. Refer to EC-643, "Component Inspection (Coolant Thermostat Heater Element)".

Is the inspection result normal?

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

5. CHECK ENGINE COOLANT THERMOSTAT HEARTER ELEMENT POWER SUPPLY

1. Check that the #98 fuse is not fusing.
2. Disconnect coolant thermostat heater element harness connector.
3. Turn ignition switch ON.
4. Check the voltage between coolant thermostat heater element harness connector and ground.

+		–	Voltage
Coolant thermostat heater element			
Connector	Terminal		
F151	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check engine coolant thermostat heating element power supply circuit.

6. CHECK COOLANT THERMOSTAT HEATER ELEMENT CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and coolant thermostat heater element harness connector.

+		–		Continuity
ECM		Coolant thermostat heater element		
Connector	Terminal	Connector	Terminal	
F149	4	F151	1	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Coolant Thermostat Heater Element)

INFOID:0000000013609615

1. CHECK COOLANT THERMOSTAT HEATER ELEMENT

1. Turn ignition switch OFF.
2. Disconnect coolant thermostat heater element harness connector.

3. Check the resistance between coolant thermostat heater element terminals.

Coolant thermostat heater element		Condition	Resistance (Ω)
+	–		
Terminal			
1	2	25°C (77°F)	8.5 – 10.5

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace coolant thermostat (built-in engine coolant thermostat heating element). Refer to CO-21, "Removal and Installation".

P0598 COOLANT THERMOSTAT HEATER ELEMENT

DTC Description

INFOID:0000000013609616

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0598	00	THERMOSTAT HEATER CONTROL (Thermostat Heater Control Circuit Low)	NO SUBTYPE INFORMATION	The coolant thermostat has a short circuit to ground.

POSSIBLE CAUSE

- Harness and connectors
  (Engine coolant thermostat heater element circuit is open or shorted.)
- Engine coolant thermostat heater element

Diagnosis Procedure

INFOID:0000000013609617

1.INSPECTION START

Does the coolant temperature rise too quickly and become too high?

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

2.CHECK COOLANT THERMOSTAT HEATING ELEMENT

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK COOLANT THERMOSTAT HEATING ELEMENT”.
3. Set the vehicle under the following conditions:
   CAUTION:
   During the test, cooling fan is activated at maximum speed.
   NOTE:
   - When a coolant temperature reaches specified temperature, the test is started automatically.
   - The test takes up to approximately 10 minutes.

Item	Condition
Engine speed	At idle
Engine coolant temperature	Less then 100°C (212°F)
A/C	OFF

4. Perform the Active Test.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> GO TO 4.

3.CHECK COOLANT THERMOSTAT HEATING ELEMENT

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK COOLANT THERMOSTAT HEATING ELEMENT”.
3. Set the vehicle under the following conditions:
   CAUTION:
   During the test, cooling fan is activated at maximum speed.
   NOTE:
   - When a coolant temperature reaches specified temperature, the test is started automatically.

- The test takes up to approximately 10 minutes.

Item	Condition
Engine speed	At idle
Engine coolant temperature	Less then 50°C (122°F)
A/C	OFF

4. Perform the Active Test.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> GO TO 4.

4.CHECK COOLANT THERMOSTAT HEATER ELEMENT

Check engine coolant thermostat heating element. Refer to EC-646, "Component Inspection (Coolant Thermostat Heater Element)".

Is the inspection result normal?

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

5.CHECK ENGINE COOLANT THERMOSTAT HEARTER ELEMENT POWER SUPPLY

1. Check that the #98 fuse is not fusing.
2. Disconnect coolant thermostat heater element harness connector.
3. Turn ignition switch ON.
4. Check the voltage between coolant thermostat heater element harness connector and ground.

+		–	Voltage
Coolant thermostat heater element			
Connector	Terminal		
F151	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check engine coolant thermostat heating element power supply circuit.

6.CHECK COOLANT THERMOSTAT HEATER ELEMENT CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and coolant thermostat heater element harness connector.

+		–		Continuity
ECM		Coolant thermostat heater element		
Connector	Terminal	Connector	Terminal	
F149	4	F151	1	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Coolant Thermostat Heater Element)

INFOID:0000000013609618

1.CHECK COOLANT THERMOSTAT HEATER ELEMENT

1. Turn ignition switch OFF.
2. Disconnect coolant thermostat heater element harness connector.

3. Check the resistance between coolant thermostat heater element terminals.

Coolant thermostat heater element		Condition	Resistance (Ω)
+	–		
Terminal			
1	2	25°C (77°F)	8.5 – 10.5

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace coolant thermostat (built-in engine coolant thermostat heating element). Refer to CO-21, "Removal and Installation".

P0599 COOLANT THERMOSTAT HEATER ELEMENT

DTC Description

INFOID:0000000013609619

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0599	00	THERMOSTAT HEATER CONTROL (Thermostat Heater Control Circuit High)	NO SUBTYPE INFORMATION	The coolant thermostat has a short circuit to positive.

POSSIBLE CAUSE

- Harness and connectors
  (Engine coolant thermostat heater element circuit is open or shorted.)
- Engine coolant thermostat heater element

Diagnosis Procedure

INFOID:0000000013609620

1.INSPECTION START

Does the coolant temperature rise too quickly and become too high?

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

2.CHECK COOLANT THERMOSTAT HEATING ELEMENT

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK COOLANT THERMOSTAT HEATING ELEMENT”.
3. Set the vehicle under the following conditions:
   CAUTION:
   During the test, cooling fan is activated at maximum speed.
   NOTE:
   - When a coolant temperature reaches specified temperature, the test is started automatically.
   - The test takes up to approximately 10 minutes.

Item	Condition
Engine speed	At idle
Engine coolant temperature	Less then 100°C (212°F)
A/C	OFF

4. Perform the Active Test.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> GO TO 4.

3.CHECK COOLANT THERMOSTAT HEATING ELEMENT

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK COOLANT THERMOSTAT HEATING ELEMENT”.
3. Set the vehicle under the following conditions:
   CAUTION:
   During the test, cooling fan is activated at maximum speed.
   NOTE:
   - When a coolant temperature reaches specified temperature, the test is started automatically.

- The test takes up to approximately 10 minutes.

Item	Condition
Engine speed	At idle
Engine coolant temperature	Less then 50°C (122°F)
A/C	OFF

4. Perform the Active Test.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> GO TO 4.

4.CHECK COOLANT THERMOSTAT HEATER ELEMENT

Check engine coolant thermostat heating element. Refer to EC-649, "Component Inspection (Coolant Thermostat Heater Element)".

Is the inspection result normal?

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

5.CHECK ENGINE COOLANT THERMOSTAT HEARTER ELEMENT POWER SUPPLY

1. Check that the #98 fuse is not fusing.
2. Disconnect coolant thermostat heater element harness connector.
3. Turn ignition switch ON.
4. Check the voltage between coolant thermostat heater element harness connector and ground.

+		–	Voltage
Coolant thermostat heater element			
Connector	Terminal		
F151	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check engine coolant thermostat heating element power supply circuit.

6.CHECK COOLANT THERMOSTAT HEATER ELEMENT CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and coolant thermostat heater element harness connector.

+		–		Continuity
ECM		Coolant thermostat heater element		
Connector	Terminal	Connector	Terminal	
F149	4	F151	1	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Coolant Thermostat Heater Element)

INFOID:0000000013609621

1.CHECK COOLANT THERMOSTAT HEATER ELEMENT

1. Turn ignition switch OFF.
2. Disconnect coolant thermostat heater element harness connector.

3. Check the resistance between coolant thermostat heater element terminals.

Coolant thermostat heater element		Condition	Resistance (Ω)
+	–		
Terminal			
1	2	25°C (77°F)	8.5 – 10.5

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace coolant thermostat (built-in engine coolant thermostat heating element). Refer to CO-21, "Removal and Installation".

P0604 ECM

DTC Description

INFOID:0000000013609622

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P0604	00	CONTROL MODULE [Internal control module Random Access Memory (RAM) error]	NO SUBTYPE INFORMATION	There is an internal control unit malfunction in the RAM memory.
	16		CIRC VOLT BELOW THRESHOLD	There is an internal control unit malfunction in the RAM memory. The limit value for electrical voltage has not been attained.
	17		CIRC VOLT ABOVE THRESHOLD	There is an internal control unit malfunction in the RAM memory. The limit value for electrical voltage has been exceeded.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609623

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P0606 ECM

DTC Description

INFOID:0000000013609624

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	Malfunction type	
P0606	00	Siren control unit (Control Module Processor)	NO SUBTYPE INFORMATION	There is an internal control unit fault in the processor.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609625

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P0607 CONTROL MODULE

DTC Description

INFOID:0000000013609626

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0607	04	CONTROL MODULE (Control module performance)	SYSTEM INTERNAL MALFUNCTN	The control unit has a malfunction. There is an internal malfunction.
	09		COMPONENT MALFUNCTION	The control unit has a malfunction. There is a component malfunction.
	10		—	The control unit has a malfunction. Reserved for ISO/SAE
	12		CIRCUIT SHORT TO BATTERY	The control unit has a malfunction. There is a short circuit to positive.
	14		CIRC SHORT TO GRND OR OPEN	The control unit has a malfunction. There is a short circuit to ground or an open circuit.
	16		CIRC VOLT BELOW THRESHOLD	The control unit has a malfunction. The limit value for electrical voltage has not been attained.
	18		CIRC CRRNT BELOW THRESHLD	The control unit has a malfunction. The limit value for current has not been attained.
	41		GENERAL CHECKSUM ERROR	The control unit has a malfunction. There is a general checksum error.
	48		SUPERVISION SOFTWARE ERROR	The control unit has a malfunction. There is an error in the control memory.
	62		SIGNAL COMPARE ERROR	The control unit has a malfunction. The signal comparison is malfunctioning.
	64		SIGNAL PLAUSIBILITY ERROR	The control unit has a malfunction. There is an implausible signal.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609627

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P060B ECM

DTC Description

INFOID:0000000013609628

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P060B	00	CONTROL MODULE (Internal control module A/D processing performance)	NO SUBTYPE INFORMATION	There is an internal control unit malfunction in the analog/digital converter.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609629

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P060C ECM

DTC Description

INFOID:0000000013609630

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P060C	02	CONTROL MODULE (Internal Control Module Main Processor Performance)	GENERAL ELEC MALFUNCTN	There is an internal control unit malfunction in the central processing unit. There is a general signal error.
	04		SYSTEM INTERNAL MAL-FUNCTN	There is an internal control unit malfunction in the central processing unit. There is an internal malfunction.
	09		COMPONENT MALFUNCTION	There is an internal control unit malfunction in the central processing unit. There is a component malfunction.
	17		CIRC VOLT ABOVE THRESHOLD	There is an internal control unit malfunction in the central processing unit. The limit value for electrical voltage has been exceeded.
	29		SIGNAL INVALID	There is an internal control unit malfunction in the central processing unit. There is an invalid signal.
	47		WATCHDOG/SAFETY ÉþC ERROR	There is an internal control unit malfunction in the central processing unit. There is a runtime error.

POSSIBLE CAUSE
ECM

Diagnosis Procedure

INFOID:0000000013609631

1.ERASE DTC

With CONSULT
1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P060D ECM

DTC Description

INFOID:0000000013609632

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P060D	00	CONTROL MODULE (Internal control module accelerator pedal position Performance)	NO SUBTYPE INFORMATION	There is an internal control unit malfunction affecting the calculation of the accelerator pedal position.
	64		SIGNAL PLAUSIBILITY ERROR	There is an internal control unit malfunction affecting the calculation of the accelerator pedal position. There is an implausible signal.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609633

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P0611 ECM

DTC Description

INFOID:0000000013609634

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0611	00	Fuel injector control module (Fuel Injector Control Module Performance)	NO SUBTYPE INFORMATION	Control unit (Fuel injector) has a malfunction (output stage error of engine control unit).
	02		GENERAL ELEC MALFUNCTN	Control unit (Fuel injector) has a malfunction (output stage error of engine control unit). There is a general signal error.
	03		FM/PWM ERROR	Control unit (Fuel injector) has a malfunction (output stage error of engine control unit). There is a frequency or pulse width modulation error.
	04		SYSTEM INTERNAL MALFUNCTN	Control unit (Fuel injector) has a malfunction (output stage error of engine control unit). There is an internal malfunction.
	05		SYSTEM PROGRAMMING ERROR	Control unit (Fuel injector) has a malfunction (output stage error of engine control unit). There is a programming error.
	13		CIRCUIT OPEN	Control unit (Fuel injector) has a malfunction (output stage error of engine control unit). There is an open circuit.
	16		CIRC VOLT BELOW THRESHOLD	Control unit (Fuel injector) has a malfunction (output stage error of engine control unit). The limit value for electrical voltage has not been attained.
	17		CIRC VOLT ABOVE THRESHOLD	Control unit (Fuel injector) has a malfunction (output stage error of engine control unit). The limit value for electrical voltage has been exceeded.
	42		MEMORY ERROR	Control unit (Fuel injector) has a malfunction (output stage error of engine control unit). There is a general memory error.
	49		INTERNAL ELECTRONIC ERROR	Control unit (Fuel injector) has a malfunction (output stage error of engine control unit). There is an internal electrical error.
	4A		INCRRCT COMPNT INSTALLED	The control unit 'fuel injector' has a malfunction (output stage malfunction of control unit combustion engine). The wrong component is installed.
	65		INCRRCT COMPNT INSTALLED	Control unit (Fuel injector) has a malfunction (output stage error of engine control unit). The wrong component is installed.
	67		SIG HAS TOO FEW TRNSIT/EVNTS	Control unit (Fuel injector) has a malfunction (output stage error of engine control unit). The signal has too few transitions or events.
	88		SIGNAL INCORRECT AFTER EVENT	Control unit (Fuel injector) has a malfunction (output stage error of engine control unit). The signal is impermissible after an event.
	92		BUS OFF	Control unit (Fuel injector) has a malfunction (output stage error of engine control unit). Bus OFF.
	94		PFM/INCORRECT OPERATN	Control unit (Fuel injector) has a malfunction (output stage error of engine control unit). The function or the instruction has malfunction.
	96		CMPNENT INTERNAL MLFNCTN	Control unit (Fuel injector) has a malfunction (output stage error of engine control unit). There is an internal component malfunction.

POSSIBLE CAUSE
ECM

Diagnosis Procedure

INFOID:0000000013609635

1.PERFORM INJECTOR INJECTION QUANTITY ADJUSTMENT VALUE REGISTRATION

With CONSULT

Perform INJECTOR INJECTION QUANTITY ADJUSTMENT. Refer to EC-189, "Description".

>> INSPECTION END

P0615 STARTER RELAY

DTC Description

INFOID:0000000013609636

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0615	13	STARTER RELAY (Starter Relay “A” Circuit)	CIRCUIT OPEN	The starter relay has an electrical malfunction. There is an open circuit.

POSSIBLE CAUSE

- Harness and connector (starter relay circuit is open)
- Starter relay

Diagnosis Procedure

INFOID:0000000013609637

1.CHECK ECM POWER SUPPLY

Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

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

2.CHECK STARTER RELAY

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

+		–		Continuity
ECM		FUSE AND FUSIBLE LINK BLOCK 1		
Connector	Terminal	Connector	Terminal	
E48	116	E64	41	Existed
	148	E65	49	

Is the inspection result normal?

YES >> Replace starter relay.
NO >> Repair or replace error-detected parts.

P0616 STARTER RELAY

DTC Description

INFOID:0000000013609638

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0616	05	STARTER RELAY (Starter relay “A” circuit low)	SYSTEM PROGRAMMING ERROR	The starter relay has a short circuit to ground. There is a programming malfunction.
	06		ALGORITHM BASED ERROR	The starter relay has a short circuit to ground. There is an algorithm malfunction.
	14		CIRC SHORT TO GRND OR OPEN	The starter relay has a short circuit to ground. There is a short circuit to ground or an open circuit.

POSSIBLE CAUSE

- Harness and connector (starter relay circuit is short to ground)
- Starter relay

Diagnosis Procedure

INFOID:0000000013609639

1.CHECK ECM POWER SUPPLY

Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

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

2.CHECK STARTER RELAY

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

+		–		Continuity
ECM		FUSE AND FUSIBLE LINK BLOCK 1		
Connector	Terminal	Connector	Terminal	
E48	116	E64	41	Existed
	148	E65	49	

Is the inspection result normal?

YES >> Replace starter relay.
NO >> Repair or replace error-detected parts.

P0617 STARTER RELAY

DTC Description

INFOID:0000000013609640

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0617	03	STARTER RELAY (Starter Relay “A” Circuit High)	FM/PWM ERROR	The starter relay has a short circuit to positive. There is a frequency or pulse width modulation malfunction.
	04		SYSTEM INTERNAL MALFUNCTN	The starter relay has a short circuit to positive. There is an internal malfunction.
	15		CIRC SHORT TO BATT OR OPEN	The starter relay has a short circuit to positive. There is an internal malfunction.

POSSIBLE CAUSE

- Harness and connector (starter relay circuit is short to power)
- Starter relay

Diagnosis Procedure

INFOID:0000000013609641

1.CHECK ECM POWER SUPPLY

Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

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

2.CHECK STARTER RELAY

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

+		–		Continuity
ECM		FUSE AND FUSIBLE LINK BLOCK 1		
Connector	Terminal	Connector	Terminal	
E48	116	E64	41	Existed
	148	E65	49	

Is the inspection result normal?

YES >> Replace starter relay.
NO >> Repair or replace error-detected parts.

P061A ECM

DTC Description

INFOID:0000000013609642

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P061A	28	CONTROL MODULE (Internal control module torque performance)	SG BS LVL O-OF RNG/ZR AJST ERR	The torque control of the control unit has a malfunction. The signal offset is outside the permissible range.
	00		NO SUBTYPE INFORMATION	The torque control of the control unit has a malfunction.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609643

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P061B ECM

DTC Description

INFOID:0000000013609644

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P061B	00	CONTROL MODULE (Internal control module torque calculation performance)	NO SUBTYPE INFORMATION	The torque calculation of the control unit has a malfunction.
	01		ELECTRICAL MALFUNCTION	The torque calculation of the control unit has a malfunction. There is a general electrical malfunction.
	05		SYSTEM PROGRAMMING ERROR	The torque calculation of the control unit has a malfunction. There is a programming malfunction.
	06		ALGORITHM BASED ERROR	The torque calculation of the control unit has a malfunction. There is an algorithm malfunction.
	08		BUS SIGNAL/MESSAGE ERROR	The torque calculation of the control unit has a malfunction. There is a signal malfunction or the message is malfunction.
	85		SIG ABOVE ALLOWABLE RANGE	The torque calculation of the control unit has a malfunction. There is a signal above the permissible limit value.

POSSIBLE CAUSE
ECM

Diagnosis Procedure

INFOID:0000000013609645

1.ERASE DTC

With CONSULT
1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P061C ECM

DTC Description

INFOID:0000000013609646

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P061C	00	CONTROL MODULE (Internal control module engine RPM performance)	NO SUBTYPE INFORMATION	There is an internal control unit malfunction affecting the calculation of the engine speed.
	02		GENERAL ELEC MALFUNCTN	There is an internal control unit malfunction affecting the calculation of the engine speed. There is an internal malfunction.
	04		SYSTEM INTERNAL MALFUNCTN	There is an internal control unit malfunction affecting the calculation of the engine speed. There is a general signal malfunction.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609647

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P061D ECM

DTC Description

INFOID:0000000013609648

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P061D	00	CONTROL MODULE (Internal control module engine air mass performance)	NO SUBTYPE INFORMATION	There is an internal control unit malfunction in the monitoring function for the air mass.
	46		CALIB/PRMTER MEMORY ERROR	There is an internal control unit malfunction in the monitoring function for the air mass. There is an error in the calibration or parameterization memory.
	64		SIGNAL PLAUSIBILITY ERROR	There is an internal control unit malfunction in the monitoring function for the air mass. There is an implausible signal.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609649

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P0627 FUEL PUMP CONTROL

ECM

ECM : DTC Description

INFOID:0000000013609650

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0627	00	FUEL PUMP A CONTROL (Fuel pump “A” control circuit/ open)	NO SUBTYPE INFORMATION	The output for the fuel pump has an electrical malfunction or open circuit.
	13		CIRCUIT OPEN	The output for the fuel pump has an electrical malfunction or open circuit. There is an open circuit.

POSSIBLE CAUSE

- Harness and connector (FPCM power supply circuit is open or shorted.)
- FPCM

ECM : Diagnosis Procedure

INFOID:0000000013609651

1.CHECK FPCM POWER SUPPLY

Check FPCM power supply circuit. Refer to EC-208, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

Is the inspection result normal?

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

FUEL PUMP CONTROL MODULE (FPCM)

FUEL PUMP CONTROL MODULE (FPCM) : DTC Description

INFOID:0000000013609652

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0627	00	FUEL PUMP A CONTROL (Fuel Pump ″A″ Control Circuit/ Open)	NO SUBTYPE INFORMATION	The output for the fuel pump has an electrical fault or open circuit.

POSSIBLE CAUSE

- Harness and connectors (fuel pump control circuit)
- Fuel pump

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start engine and let it idle for 5 seconds.
2. Check “Self Diagnostic Result” of “FPCM”.

Is DTC “P0627” detected?

YES >> Proceed to EC-667, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".
NO >> INSPECTION END

FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure

INFOID:0000000013609653

1.INSPECTION START

Check the following items.
- Out of gas
- Low fuel pressure line open

Is the inspection result normal?

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

2.COMPONENT FUNCTION CHECK

1. Turn ignition switch OFF and wait at least 30 seconds.
2. Listen to fuel pump operation sound for a few seconds after ignition switch is turned ON.

Is the inspection result normal?

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

3.CHECK FPCM POWER SUPPLY

Check FPCM power supply and ground circuit. Refer to EC-208, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

Is the inspection result normal?

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

4.CHECK FUEL PUMP CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect FPCM harness connector and fuel level sensor unit and fuel pump harness connector.
3. Check the continuity between FPCM harness connector and fuel level sensor unit and fuel pump harness connector.

2WD models

+		–		Continuity
FPCM		Fuel level sensor unit and fuel pump		
Connector	Terminal	Connector	Terminal	
M456	11	M370	3	Existed
	12		1	

AWD models

+		–		Continuity
FPCM		Fuel level sensor unit and fuel pump		
Connector	Terminal	Connector	Terminal	
M365	16	M370	3	Existed
	18		1	

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 FUEL PUMP

Check fuel pump. Refer to EC-669, "FUEL PUMP CONTROL MODULE (FPCM) : Component Inspection (Fuel Pump)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace fuel pump.

6.CHECK FUEL PUMP ACTIVATION SIGNAL CIRCUIT

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

2WD models

+		–		
FPCM		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M135	2	E48	127	Existed

AWD models

+		–		
FPCM		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M136	11	E48	127	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

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

FUEL PUMP CONTROL MODULE (FPCM) : Component Inspection (Fuel Pump)

INFOID:0000000013609654

1.CHECK FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Check resistance between fuel level sensor unit and fuel pump terminals.

Terminals	Condition	Resistance
1 and 3	Temperature: 25°C (77°F)	0.2 – 5.0 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel pump. Refer to FL-17, "Exploded View".

P0628 FUEL PUMP CONTROL

ECM

ECM : DTC Description

INFOID:0000000013609655

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0628	00	FUEL PUMP A CONTROL (Fuel pump “A” control circuit low)	NO SUBTYPE INFORMATION	The output for the fuel pump has a short circuit to ground.
	11		CIRCUIT SHORT TO GROUND	The output for the fuel pump has a short circuit to ground. There is a short circuit to ground.

POSSIBLE CAUSE

- FPCM
- Harness and connector
  (FPCM power supply circuit is open or shorted.)

ECM : Diagnosis Procedure

INFOID:0000000013609656

1.CHECK FPCM POWER SUPPLY

Check FPCM power supply circuit. Refer to EC-208, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

Is the inspection result normal?

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

FUEL PUMP CONTROL MODULE (FPCM)

FUEL PUMP CONTROL MODULE (FPCM) : DTC Description

INFOID:0000000013609657

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0628	00	FUEL PUMP A CONTROL (Fuel Pump ″A″ Control Circuit Low)	NO SUBTYPE INFORMATION	The output for the fuel pump has a short circuit to ground.

POSSIBLE CAUSE

- Harness and connectors
  (fuel pump circuit is open or shorted.)
- Fuel pump
- Out of fuel
- Fuel line open

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start the engine and let it idle at least 10 seconds.
2. Check self-diagnostic result of “FPCM”.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-671, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure

INFOID:0000000013609658

1.INSPECTION START

Check the following items.
- Out of gas
- Low fuel pressure line open

Is the inspection result normal?

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

2.COMPONENT FUNCTION CHECK

1. Turn ignition switch OFF and wait at least 30 seconds.
2. Listen to fuel pump operation sound for a few seconds after ignition switch is turned ON.

Is the inspection result normal?

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

3.CHECK FPCM POWER SUPPLY

Check FPCM power supply and ground circuit. Refer to EC-208, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

Is the inspection result normal?

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

4.CHECK FUEL PUMP CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect FPCM harness connector and fuel level sensor unit and fuel pump harness connector.
3. Check the continuity between FPCM harness connector and fuel level sensor unit and fuel pump harness connector.

2WD models

+		–		Continuity
FPCM		Fuel level sensor unit and fuel pump		
Connector	Terminal	Connector	Terminal	
M456	11	M370	3	Existed
	12		1	

AWD models

+		–		Continuity
FPCM		Fuel level sensor unit and fuel pump		
Connector	Terminal	Connector	Terminal	
M365	16	M370	3	Existed
	18		1	

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 FUEL PUMP

Check fuel pump. Refer to EC-672, "FUEL PUMP CONTROL MODULE (FPCM) : Component Inspection (Fuel Pump)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace fuel pump.

6.CHECK FUEL PUMP ACTIVATION SIGNAL CIRCUIT

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

2WD models

+		–		Continuity
FPCM		ECM		
Connector	Terminal	Connector	Terminal	
M135	2	E48	127	Existed

AWD models

+		–		Continuity
FPCM		ECM		
Connector	Terminal	Connector	Terminal	
M136	11	E48	127	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

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

FUEL PUMP CONTROL MODULE (FPCM) : Component Inspection (Fuel Pump)

INFOID:0000000013609659

1.CHECK FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Check resistance between fuel level sensor unit and fuel pump terminals.

Terminals	Condition	Resistance
1 and 3	Temperature: 25°C (77°F)	0.2 – 5.0 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel pump. Refer to FL-17, "Exploded View".

P0629 FUEL PUMP CONTROL
ECM
ECM : DTC Description

INFOID:0000000013609660

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0629	00	FUEL PUMP A CONTROL (Fuel pump “A” control circuit high)	NO SUBTYPE INFORMATION	The output for the fuel pump has a short circuit to positive.

POSSIBLE CAUSE
- FPCM
- Harness and connector
  (FPCM power supply circuit is open or shorted.)

ECM : Diagnosis Procedure

INFOID:0000000013609661

1.CHECK FPCM POWER SUPPLY

Check FPCM power supply circuit. Refer to EC-208, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

Is the inspection result normal?

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

FUEL PUMP CONTROL MODULE (FPCM)
FUEL PUMP CONTROL MODULE (FPCM) : DTC Description

INFOID:0000000013609662

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0629	00	FUEL PUMP A CONTROL (Fuel Pump ″A″ Control Circuit High)	NO SUBTYPE INFORMATION	The output for the fuel pump has a short circuit to positive.

POSSIBLE CAUSE
- Harness and connectors
  (fuel pump circuit is open or shorted.)
- Fuel pump
- Out of fuel
- Fuel line open

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Start the engine and let it idle at least 10 seconds.
2. Check self-diagnostic result of “FPCM”.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-674, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure

INFOID:0000000013609663

1.INSPECTION START

Check the following items.
- Out of gas
- Low fuel pressure line open

Is the inspection result normal?

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

2.COMPONENT FUNCTION CHECK

1. Turn ignition switch OFF and wait at least 30 seconds.
2. Listen to fuel pump operation sound for a few seconds after ignition switch is turned ON.

Is the inspection result normal?

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

3.CHECK FPCM POWER SUPPLY

Check FPCM power supply and ground circuit. Refer to EC-208, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

Is the inspection result normal?

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

4.CHECK FUEL PUMP CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect FPCM harness connector and fuel level sensor unit and fuel pump harness connector.
3. Check the continuity between FPCM harness connector and fuel level sensor unit and fuel pump harness connector.

2WD models

+		–		Continuity
FPCM		Fuel level sensor unit and fuel pump		
Connector	Terminal	Connector	Terminal	
M456	11	M370	3	Existed
	12		1	

AWD models

+		–		Continuity
FPCM		Fuel level sensor unit and fuel pump		
Connector	Terminal	Connector	Terminal	
M365	16	M370	3	Existed
	18		1	

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 FUEL PUMP

Check fuel pump. Refer to EC-675, "FUEL PUMP CONTROL MODULE (FPCM) : Component Inspection (Fuel Pump)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace fuel pump.

6.CHECK FUEL PUMP ACTIVATION SIGNAL CIRCUIT

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

2WD models

+		–		
FPCM		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M135	2	E48	127	Existed

AWD models

+		–		
FPCM		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M136	11	E48	127	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

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

FUEL PUMP CONTROL MODULE (FPCM) : Component Inspection (Fuel Pump)

INFOID:0000000013609664

1.CHECK FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Check resistance between fuel level sensor unit and fuel pump terminals.

Terminals	Condition	Resistance
1 and 3	Temperature: 25°C (77°F)	0.2 – 5.0 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel pump. Refer to FL-17, "Exploded View".

P062A FUEL PUMP CONTROL
ECM
ECM : DTC Description

INFOID:0000000013609665

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P062A	00	FUEL PUMP A CONTROL (Fuel Pump “A” Control Circuit Range/Performance)	NO SUBTYPE INFORMATION	The output of the fuel pump is implausible.

POSSIBLE CAUSE
- FPCM
- Harness and connector
  (FPCM power supply circuit is open or shorted.)

ECM : Diagnosis Procedure

INFOID:0000000013609666

1.CHECK FPCM POWER SUPPLY

Check FPCM power supply circuit. Refer to EC-208, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

Is the inspection result normal?

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

FUEL PUMP CONTROL MODULE (FPCM)
FUEL PUMP CONTROL MODULE (FPCM) : DTC Description

INFOID:0000000013609667

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P062A	00	FUEL PUMP A CONTROL (Fuel Pump ″A″ Control Circuit/Open)	NO SUBTYPE INFORMATION	The output of the fuel pump is implausible.

POSSIBLE CAUSE
- Harness and connectors (fuel pump)
- Fuel pump

DTC CONFIRMATION PROCEDURE
1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Drive the vehicle at least 30 minutes or more.
2. Check “Self Diagnostic Result” of “FPCM”.

Is DTC “P062A” detected?

YES >> Proceed to EC-676, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".
NO >> INSPECTION END

FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure

INFOID:0000000013609668

1.INSPECTION START

Check the following items.
- Out of gas
- Low fuel pressure line open

Is the inspection result normal?

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

2.COMPONENT FUNCTION CHECK

1. Turn ignition switch OFF and wait at least 30 seconds.
2. Listen to fuel pump operation sound for a few seconds after ignition switch is turned ON.

Is the inspection result normal?

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

3.CHECK FPCM POWER SUPPLY

Check FPCM power supply and ground circuit. Refer to EC-208, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

Is the inspection result normal?

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

4.CHECK FUEL PUMP CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect FPCM harness connector and fuel level sensor unit and fuel pump harness connector.
3. Check the continuity between FPCM harness connector and fuel level sensor unit and fuel pump harness connector.

+		–		Continuity
FPCM		Fuel level sensor unit and fuel pump		
Connector	Terminal	Connector	Terminal	
M456	11	M370	3	Existed
	12		1	

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 FUEL PUMP

Check fuel pump. Refer to EC-678, "FUEL PUMP CONTROL MODULE (FPCM) : Component Inspection (Fuel Pump)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace fuel pump.

6.CHECK FUEL PUMP ACTIVATION SIGNAL CIRCUIT

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

+		–		Continuity
FPCM		ECM		
Connector	Terminal	Connector	Terminal	
M135	2	E48	127	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

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

FUEL PUMP CONTROL MODULE (FPCM) : Component Inspection (Fuel Pump)

INFOID:0000000013609669

1.CHECK FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Check resistance between fuel level sensor unit and fuel pump terminals.

Terminals	Condition	Resistance
1 and 3	Temperature: 25°C (77°F)	0.2 – 5.0 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel pump. Refer to FL-17, "Exploded View".

P062B ECM

DTC Description

INFOID:0000000013609670

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P062B	00	CONTROL MODULE (Internal control module fuel injector control performance)	NO SUBTYPE INFORMATION	There is an internal control unit malfunction in the monitoring function for the fuel injectors.
	62		SIGNAL COMPARE ERROR	There is an internal control unit malfunction in the monitoring function for the fuel injectors. The signal comparison is malfunction.
	63		CIRC/COMP PROTECTN TIMEOUT	There is an internal control unit malfunction in the monitoring function for the fuel injectors. The duration of the actuation was exceeded: overload protection is active.
	64		SIGNAL PLAUSIBILITY ERROR	There is an internal control unit malfunction in the monitoring function for the fuel injectors. There is an implausible signal.
	66		SIG HAS TOO MANY TRNSIT/EVNTS	There is an internal control unit malfunction in the monitoring function for the fuel injectors. The signal has too many transitions or events.
	68		EVENT INFORMATION	There is an internal control unit malfunction in the monitoring function for the fuel injectors. There is incomplete information.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609671

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P062C ECM

DTC Description

INFOID:0000000013609672

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P062C	00	CONTROL MODULE (Internal control module vehicle speed performance)	NO SUBTYPE INFORMATION	There is an internal control unit malfunction in the monitoring function for the vehicle speed.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609673

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P062F ECM

DTC Description

INFOID:0000000013609674

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P062F	04	CONTROL MODULE (Internal control module EEPROM error)	SYSTEM INTERNAL MALFUNCTN	There is an internal error in the EEPROM of the control unit. There is an internal error.
	05		SYSTEM PROGRAMMING ERROR	There is an internal error in the EEPROM of the control unit. There is an internal malfunction.
	06		ALGORITHM BASED ERROR	There is an internal error in the EEPROM of the control unit. There is an algorithm malfunction.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609675

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P0634 ECM TEMPERATURE

DTC Description

INFOID:0000000013609676

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0634	00	CONT MODULE INTERNAL TEMP A (Control module internal temperature “A” too high)	NO SUBTYPE INFORMATION	The temperature in the control unit is too high.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609677

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P0638 THROTTLE VALVE ACTUATOR CONTROL

DTC Description

INFOID:0000000013609678

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0638	84	THROTTLE ACTUATOR B1 (Throttle actuator control range/performance bank 1)	SIG BELOW ALLOWABLE RANGE	The output for the throttle valve actuator (cylinder bank 1) has a malfunction. There is a signal below the permissible limit value.
	85		SIG ABOVE ALLOWABLE RANGE	The output for the throttle valve actuator (cylinder bank 1) has a malfunction. There is a signal above the permissible limit value.

POSSIBLE CAUSE

- Harness and connectors
  (Throttle valve actuator circuit is open or shorted.)
- Throttle valve actuator

Diagnosis Procedure

INFOID:0000000013609679

1.CHECK THROTTLE VALVE ACTUATOR

Check throttle valve actuator. Refer to EC-684, "Component Inspection (Throttle Valve Actuator)".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace throttle valve actuator. Refer to EM-28, "Exploded View".

2.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between throttle valve actuator harness connector and ground.

+		–	Voltage (Approx.)
Throttle valve actuator			
Connector	Terminal		
F148	4	Ground	5 V

Is the inspection result normal?

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

3.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	4	F149	17	Existed

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

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE VALVE POSITION SENSOR CIRCUIT

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

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	3	F149	38	Existed
	5		62	
	6		14	

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

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Throttle Valve Actuator)

INFOID:0000000013609680

1.CHECK THROTTLE VALVE MOTOR

1. Turn ignition switch OFF.
2. Disconnect throttle valve actuator harness connector.
3. Check the resistance between throttle valve actuator terminals.

Terminal	Resistance
1 and 2	1 – 10 Ω

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace throttle valve actuator. Refer to EM-29, "Removal and Installation".

2.CHECK THROTTLE VALVE

1. Remove throttle valve actuator.
2. Operate throttle valve slowly by hand as far as the wide open position.
3. Check that the throttle valve does not stick and returning to closed position by spring force.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace throttle valve actuator. Refer to EM-29, "Removal and Installation".

P063E THROTTLE VALVE ACTUATOR CONTROL

Diagnosis Description

INFOID:0000000013609681

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P063E	07	AUTO CONFIGURATION THROTTLE INPUT (Auto configuration throttle input not present bank 1)	MECHANICAL MALFUNCTION	The throttle valve adaptation has a malfunction. There is a mechanical malfunction.

POSSIBLE CAUSE

- Harness and connectors
  (Throttle valve actuator circuit is open or shorted.)
- Throttle valve actuator

Diagnosis Procedure

INFOID:0000000013609682

1.CHECK THROTTLE VALVE ACTUATOR

Check throttle valve actuator. Refer to EC-686, "Component Inspection (Throttle Valve Actuator)".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace throttle valve actuator. Refer to EM-28, "Exploded View".

2.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between throttle valve actuator harness connector and ground.

+		–	Voltage (Approx.)
Throttle valve actuator			
Connector	Terminal		
F148	4	Ground	5 V

Is the inspection result normal?

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

3.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	4	F149	17	Existed

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

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE VALVE POSITION SENSOR CIRCUIT

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

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	3	F149	38	Existed
	5		62	
	6		14	

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

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Throttle Valve Actuator)

INFOID:0000000013609683

1.CHECK THROTTLE VALVE MOTOR

1. Turn ignition switch OFF.
2. Disconnect throttle valve actuator harness connector.
3. Check the resistance between throttle valve actuator terminals.

Terminal	Resistance
1 and 2	1 – 10 Ω

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace throttle valve actuator. Refer to EM-29, "Removal and Installation".

2.CHECK THROTTLE VALVE

1. Remove throttle valve actuator.
2. Operate throttle valve slowly by hand as far as the wide open position.
3. Check that the throttle valve does not stick and returning to closed position by spring force.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace throttle valve actuator. Refer to EM-29, "Removal and Installation".

P0641 SENSOR POWER SUPPLY

DTC Description

INFOID:0000000013609684

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0641	04	SENSOR REFERENCE VOLT A (Sensor reference voltage "A" circuit/open)	SYSTEM INTERNAL MAL-FUNCTN	Output 1 for the reference voltage of the sensors has an electrical malfunction or an open circuit. There is an internal malfunction.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609685

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P0642 SENSOR POWER SUPPLY

DTC Description

INFOID:0000000013609686

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0642	00	SENSOR REFERENCE VOLT A (Sensor reference voltage “A” circuit low)	NO SUBTYPE INFORMATION	Output 1 for the reference voltage of the sensors has a short circuit to ground.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609687

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P0643 SENSOR POWER SUPPLY

DTC Description

INFOID:0000000013609688

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0643	00	SENSOR REFERENCE VOLT A (Sensor reference voltage “A” circuit high)	NO SUBTYPE INFORMATION	Output 1 for the reference voltage of the sensors has a short circuit to positive.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609689

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P064D ECM

DTC Description

INFOID:0000000013609690

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P064D	04	CONTROL MODULE (Internal control module O2 sensor processor performance bank 1)	SYSTEM INTERNAL MALFUNCTN	The processor of the oxygen sensor (cylinder bank 1) in the control unit has a malfunction. There is an internal malfunction.
	84		SIG BELOW ALLOWABLE RANGE	The processor of the oxygen sensor (cylinder bank 1) in the control unit has a malfunction. There is a signal below the permissible limit value.
	85		SIG ABOVE ALLOWABLE RANGE	The processor of the oxygen sensor (cylinder bank 1) in the control unit has a malfunction. There is a signal above the permissible limit value.
	86		SIGNAL INVALID	The processor of the oxygen sensor (cylinder bank 1) in the control unit has a malfunction. There is an incorrect signal.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609691

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P0651 SENSOR POWER SUPPLY 2

DTC Description

INFOID:0000000013609692

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0651	00	SENSOR REFERENCE VOLT B (Sensor reference voltage “B” circuit/open)	NO SUBTYPE INFORMATION	Output 2 for the reference voltage of the sensors has an electrical malfunction or an open circuit.
	04		SYSTEM INTERNAL MALFUNCTN	Output 2 for the reference voltage of the sensors has an electrical malfunction or an open circuit. There is an internal malfunction.
	16		CIRC VOLT BELOW THRESHOLD	Output 2 for the reference voltage of the sensors has an electrical malfunction or an open circuit. The limit value for electrical voltage has not been attained.
	17		CIRC VOLT ABOVE THRESHOLD	Output 2 for the reference voltage of the sensors has an electrical malfunction or an open circuit. The limit value for electrical voltage has been exceeded.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609693

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P065B ALTERNATOR

DTC Description

INFOID:0000000013609694

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P065B	00	GENERATOR CONTROL CIRCUIT (Generator control circuit range/performance)	NO SUBTYPE INFORMATION	The alternator has a malfunction.

POSSIBLE CAUSE

Alternator

Diagnosis Procedure

INFOID:0000000013609695

1.CHECK CHARGING SYSTEM

Check charging system. Refer to CHG-21, "Work Flow (With EXP-800 NI or GR8-1200 NI)" (With EXP-800 NI or GR8-1200 NI) or CHG-25, "Work Flow (Without EXP-800 NI or GR8-1200 NI)" (Without EXP-800 NI or GR8-1200 NI).

Is the inspection result normal?

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

2.CHECK LIN CIRCUIT

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

+		–		Continuity
Alternator		ECM		
Connector	Terminal	Connector	Terminal	
F142	1	F149	45	Existed

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

Is the inspection result normal?

YES >> Replace alternator. Refer to CHG-35, "1.6L/2.0L TURBO ENGINE : Removal and Installation".
NO >> Repair or replace error-detected parts.

P0667 CONTROL MODULE INTERNAL TEMPERATURE SENSOR

DTC Description

INFOID:0000000013609696

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0667	00	CONT MODULE INTRNL TEMP SEN A (Control module internal temperature sensor “A” range/performance)	NO SUBTYPE INFORMATION	The internal temperature sensor of the control unit has a malfunction.
	16		CIRC VOLT BELOW THRESHOLD	The internal temperature sensor of the control unit has a malfunction. The limit value for electrical voltage has not been attained.
	17		CIRC VOLT ABOVE THRESHOLD	The internal temperature sensor of the control unit has a malfunction. The limit value for electrical voltage has been exceeded.
	29		SIGNAL INVALID	The internal temperature sensor of the control unit has a malfunction. There is an invalid signal.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609697

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P0691 COOLING FAN

DTC Description

INFOID:0000000013609698

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0691	11	FAN 1 (Fan 1 control circuit low)	CIRCUIT SHORT TO GROUND	The output of electric fan 1 has a short circuit to ground. There is a short circuit to ground.

POSSIBLE CAUSE

- Harness and connectors
- Cooling fan motor

Diagnosis Procedure

INFOID:0000000013609699

1.CHECK DTC

With CONSULT

1. Turn ignition switch ON.
2. Check “Self-diagnostic result”.
3. Check that ECM does not detect the engine coolant temperature sensor related DTC.

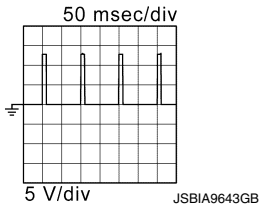
Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".

2.COMPONENT FUNCTION CHECK-1

With CONSULT

Check signal between ECM harness connector terminals.

ECM			Condition	Value (Approx.)
Connector	+	–		
	Terminal			
E48	103	98	[Ignition switch: ON] • Cooling fan: Not operates	 JSBIA9643GB

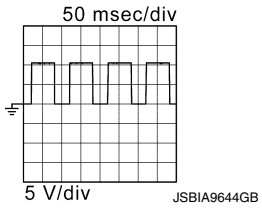
Is the inspection result normal?

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

3.COMPONENT FUNCTION CHECK-2

With CONSULT

Check signal between ECM harness connector terminals.

ECM			Condition	Value (Approx.)
Connector	+	–		
	Terminal			
E48	103	98	[Ignition switch: ON] • Perform “CK ENG AND WITH INTEGRATED CONT FAN MOTOR” in “ACTIVE TEST” mode. • Touch “START” • Cooling fan: 60% operates	

Is the inspection result normal?

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

4. CHECK COOLING FAN CONTROL SIGNAL CIRCUIT

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

+		–		Continuity
ECM		Cooling fan motor		
Connector	Terminal	Connector	Terminal	
E48	103	E22	3	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5. CHECK COOLING FAN MOTOR POWER SUPPLY CIRCUIT

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

+		–	Voltage
Cooling fan motor			
Connector	Terminal		
E22	1	Ground	Battery voltage
	2		

Is the inspection result normal?

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

6. CHECK COOLING FAN MOTOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between cooling fan motor harness connector and ground.

+		–	Continuity
Cooling fan motor			
Connector	Terminal		
E22	4	Ground	Existed

Is the inspection result normal?

YES >> Replace cooling fan assembly. Refer to CO-16, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0692 COOLING FAN

DTC Description

INFOID:0000000013609700

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0692	12	FAN 1 (Fan 1 control circuit high)	CIRCUIT SHORT TO BATTERY	The output of electric fan 1 has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

- Harness and connectors
- Cooling fan motor

Diagnosis Procedure

INFOID:0000000013609701

1.CHECK DTC

With CONSULT

1. Turn ignition switch ON.
2. Check “Self-diagnostic result”.
3. Check that ECM does not detect the engine coolant temperature sensor related DTC.

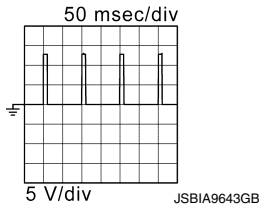
Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".

2.COMPONENT FUNCTION CHECK-1

With CONSULT

Check signal between ECM harness connector terminals.

ECM			Condition	Value (Approx.)
Connector	+	–		
	Terminal			
E48	103	98	[Ignition switch: ON] • Cooling fan: Not operates	 JSBIA9643GB

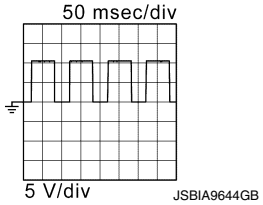
Is the inspection result normal?

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

3.COMPONENT FUNCTION CHECK-2

With CONSULT

Check signal between ECM harness connector terminals.

ECM			Condition	Value (Approx.)
Connector	+	–		
	Terminal			
E48	103	98	[Ignition switch: ON] • Perform “CK ENG AND WITH INTEGRATED CONT FAN MOTOR” in “ACTIVE TEST” mode. • Touch “START” • Cooling fan: 60% operates	

Is the inspection result normal?

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

4. CHECK COOLING FAN CONTROL SIGNAL CIRCUIT

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

+		–		Continuity
ECM		Cooling fan motor		
Connector	Terminal	Connector	Terminal	
E48	103	E22	3	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5. CHECK COOLING FAN MOTOR POWER SUPPLY CIRCUIT

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

+		–	Voltage
Cooling fan motor			
Connector	Terminal		
E22	1	Ground	Battery voltage
	2		

Is the inspection result normal?

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

6. CHECK COOLING FAN MOTOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between cooling fan motor harness connector and ground.

+		–	Continuity
Cooling fan motor			
Connector	Terminal		
E22	4	Ground	Existed

Is the inspection result normal?

YES >> Replace cooling fan assembly. Refer to CO-16, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0697 SENSOR POWER SUPPLY 3

DTC Description

INFOID:0000000013609702

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0697	04	SENSOR REFERENCE VOLT C (Sensor reference voltage “C” circuit/open)	SYSTEM INTERNAL MAL-FUNCTN	Output 3 for the reference voltage of the sensors has an electrical malfunction or an open circuit. There is an internal malfunction.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609703

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P06AF ECM

DTC Description

INFOID:0000000013609704

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P06AF	00	TORQUE MANAGEMENT SYSTEM (Torque management system - forced engine shutdown)	NO SUBTYPE INFORMATION	The torque control system has triggered torque limitation or shutoff of the combustion engine.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609705

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P06DA OIL PUMP VALVE

Diagnosis Description

INFOID:0000000013609706

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P06DA	00	ENGINE OIL PRESSURE CONTROL (Engine oil pressure control circuit/open)	NO SUBTYPE INFORMATION	The actuation of the valve of the oil pump in the combustion engine has an electrical malfunction or open circuit.

POSSIBLE CAUSE

- Harness and connector
  (Engine oil pump valve circuit is open or shorted.)
- Engine oil pump valve

Diagnosis Procedure

INFOID:0000000013609707

1.CHECK COMPONENT FUNCTION

With CONSULT

1. Turn ignition switch ON. (Engine stopped.)
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK ENGINE OIL PUMP VALVE”.
3. Check that the indicated valve of “ENG OIL PUMP VLV V (SHUNT)” is between 1 V and 2 V.
4. Perform active test.
5. Check that the indicated value of “ENG OIL PUMP VLV V (SHUNT)” under the following conditions.

Item	Condition	Value
ENG OIL PUMP VLV V (SHUNT)	Engine oil pump valve: Open	1 – 2 V
	Engine oil pump valve: Closed	0.10 – 0.18 V

Is the inspection result normal?

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

2.CHECK ENGINE OIL PUMP VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect engine oil pump valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between engine oil pump valve harness connector and ground.

+		–	Voltage
Engine oil pump valve			
Connector	Terminal		
F160	2	Ground	Battery voltage

Is the inspection result normal?

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

3.CHECK ENGINE OIL PUMP VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out #214 (10A) fuse.
3. Check that the fuse is not fusing.
4. Check the continuity between engine oil pump valve harness connector and fuse terminal.

+		–	Continuity
Engine oil pump valve			
Connector	Terminal		
F160	2	#214 fuse terminal	Existed

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

Is the inspection result normal?

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

4. CHECK ENGINE OIL PUMP VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine oil pump valve harness connector and ECM harness connector.

+		–		Continuity
Engine oil pump valve		ECM		
Connector	Terminal	Connector	Terminal	
F160	1	F149	28	Existed

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

Is the inspection result normal?

YES >> Replace engine oil pump valve. Refer to EM-76, "Exploded View".
NO >> Repair or replace error-detected parts.

P06DB OIL PUMP VALVE

Diagnosis Description

INFOID:0000000013609708

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P06DB	00	ENGINE OIL PRESSURE CONTROL (Engine oil pressure control circuit low)	NO SUBTYPE INFORMATION	The actuation of the valve of the oil pump in the combustion engine has a short circuit to ground.

POSSIBLE CAUSE

- Harness and connector
  (Engine oil pump valve circuit is open or shorted.)
- Engine oil pump valve

Diagnosis Procedure

INFOID:0000000013609709

1.CHECK COMPONENT FUNCTION

With CONSULT

1. Turn ignition switch ON. (Engine stopped.)
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK ENGINE OIL PUMP VALVE”.
3. Check that the indicated valve of “ENG OIL PUMP VLV V (SHUNT)” is between 1 V and 2 V.
4. Perform active test.
5. Check that the indicated value of “ENG OIL PUMP VLV V (SHUNT)” under the following conditions.

Item	Condition	Value
ENG OIL PUMP VLV V (SHUNT)	Engine oil pump valve: Open	1 – 2 V
	Engine oil pump valve: Closed	0.10 – 0.18 V

Is the inspection result normal?

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

2.CHECK ENGINE OIL PUMP VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect engine oil pump valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between engine oil pump valve harness connector and ground.

+		–	Voltage
Engine oil pump valve			
Connector	Terminal		
F160	2	Ground	Battery voltage

Is the inspection result normal?

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

3.CHECK ENGINE OIL PUMP VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out #214 (10A) fuse.
3. Check that the fuse is not fusing.
4. Check the continuity between engine oil pump valve harness connector and fuse terminal.

+		–	Continuity
Engine oil pump valve			
Connector	Terminal		
F160	2	#214 fuse terminal	Existed

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

Is the inspection result normal?

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

4. CHECK ENGINE OIL PUMP VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine oil pump valve harness connector and ECM harness connector.

+		–		Continuity
Engine oil pump valve		ECM		
Connector	Terminal	Connector	Terminal	
F160	1	F149	28	Existed

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

Is the inspection result normal?

YES >> Replace engine oil pump valve. Refer to EM-76, "Exploded View".
NO >> Repair or replace error-detected parts.

P06DC OIL PUMP VALVE

Diagnosis Description

INFOID:0000000013609710

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P06DC	00	ENGINE OIL PRESSURE CONTROL (Engine oil pressure control circuit high)	NO SUBTYPE INFORMATION	The actuation of the valve of the oil pump in the combustion engine has a short circuit to positive.

POSSIBLE CAUSE

- Harness and connector
  (Engine oil pump valve circuit is open or shorted.)
- Engine oil pump valve

Diagnosis Procedure

INFOID:0000000013609711

1.CHECK COMPONENT FUNCTION

With CONSULT

1. Turn ignition switch ON. (Engine stopped.)
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK ENGINE OIL PUMP VALVE”.
3. Check that the indicated valve of “ENG OIL PUMP VLV V (SHUNT)” is between 1 V and 2 V.
4. Perform active test.
5. Check that the indicated value of “ENG OIL PUMP VLV V (SHUNT)” under the following conditions.

Item	Condition	Value
ENG OIL PUMP VLV V (SHUNT)	Engine oil pump valve: Open	1 – 2 V
	Engine oil pump valve: Closed	0.10 – 0.18 V

Is the inspection result normal?

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

2.CHECK ENGINE OIL PUMP VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect engine oil pump valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between engine oil pump valve harness connector and ground.

+		–	Voltage
Engine oil pump valve			
Connector	Terminal		
F160	2	Ground	Battery voltage

Is the inspection result normal?

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

3.CHECK ENGINE OIL PUMP VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out #214 (10A) fuse.
3. Check that the fuse is not fusing.
4. Check the continuity between engine oil pump valve harness connector and fuse terminal.

+		–	Continuity
Engine oil pump valve			
Connector	Terminal		
F160	2	#214 fuse terminal	Existed

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

Is the inspection result normal?

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

4. CHECK ENGINE OIL PUMP VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine oil pump valve harness connector and ECM harness connector.

+		–		Continuity
Engine oil pump valve		ECM		
Connector	Terminal	Connector	Terminal	
F160	1	F149	28	Existed

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

Is the inspection result normal?

YES >> Replace engine oil pump valve. Refer to EM-76, "Exploded View".
NO >> Repair or replace error-detected parts.

P0702 TRANSMISSION CONTROL SYSTEM

DTC Description

INFOID:0000000013609712

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0702	00	TRANSMISSION CONTROL SYSTEM (Transmission control system electrical)	NO SUBTYPE INFORMATION	Control unit “Transmission” has a malfunction.
	29		SIGNAL INVALID	Control unit “Transmission” has a malfunction. There is an invalid signal.

POSSIBLE CAUSE

- Harness and connectors (CAN circuit)
- TCM
- ECM

Diagnosis Procedure

INFOID:0000000013609713

1.CHECK SELF-DIAGNOSTIC RESULT

With CONSULT

1. Perform “All DTC reading”.
2. Check DTC of “TRANSMISSION”.

Is the DTC related to “communication error with ECM” detected?

YES >> GO TO 2.
NO >> Replace ECM. Refer to EC-963, "Removal and Installation".

2.CHECK HARNESS AND CONNECTORS FOR CAN COMMUNICATION

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

+		–		Continuity
ECM		TCM		
Connector	Terminal	Connector	Terminal	
E48	138	E47	3	Existed
	151		1	

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

Is the inspection result normal?

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

3.REPLACE ECM

With CONSULT

1. Replace ECM. Refer to EC-963, "Removal and Installation".
2. Turn ignition switch ON and wait at least 5 seconds.
3. Check “Self-diagnostic result” of “ENGINE”.

Is DTC “P0702” detected again?

YES >> Replace TCM. Refer to TM-216, "Removal and Installation".
NO >> INSPECTION END

P0715

Diagnosis Description

INFOID:0000000013609718

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P0716

Diagnosis Description

INFOID:0000000013609719

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P0717

Diagnosis Description

INFOID:0000000013609720

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P0718

Diagnosis Description

INFOID:0000000013609721

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P0730 TRANSMISSION GEAR RATIO

DTC Description

INFOID:0000000013609722

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
P0730	00	INCORRECT GEAR RATIO (Incorrect gear ratio)	NO SUBTYPE INFORMATION	There is an impermissible transmission ratio.

POSSIBLE CAUSE

- ECM
- TCM
- CAN communication line

Diagnosis Procedure

INFOID:0000000013609723

1.CHECK SELF-DIAGNOSTIC RESULT

With CONSULT

1. Perform “All DTC reading”.
2. Check DTC of “TRANSMISSION”.

Is the DTC related to “communication error with ECM” detected?

YES >> GO TO 2.
NO >> Replace ECM. Refer to EC-963, "Removal and Installation".

2.CHECK HARNESS AND CONNECTORS FOR CAN COMMUNICATION

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

+		–		Continuity
ECM		TCM		
Connector	Terminal	Connector	Terminal	
E48	138	E47	3	Existed
	151		1	

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

Is the inspection result normal?

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

3.REPLACE ECM

With CONSULT

1. Replace ECM. Refer to EC-963, "Removal and Installation".
2. Turn ignition switch ON and wait at least 5 seconds.
3. Check “Self-diagnostic result” of “ENGINE”.

Is DTC “P0730” detected again?

YES >> Replace TCM. Refer to TM-216, "Removal and Installation".
NO >> INSPECTION END

P0740

Diagnosis Description

INFOID:0000000013609724

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P0743

Diagnosis Description

INFOID:0000000013609725

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P0748

Diagnosis Description

INFOID:0000000013609726

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P0753

Diagnosis Description

INFOID:0000000013609727

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P0758

Diagnosis Description

INFOID:0000000013609728

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P0763

Diagnosis Description

INFOID:0000000013609729

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P0778

Diagnosis Description

INFOID:0000000013609730

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P0798

Diagnosis Description

INFOID:0000000013609731

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P0A0F THE ENGINE DOES NOT START

DTC Description

INFOID:0000000013609736

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0A0F	05	ENGINE FAILED TO START (Motor Electronics Coolant Pump "A" Control Circuit High)	SYSTEM PROGRAMMING ERROR	The engine does not start. There is a programming malfunction.
	97		CMP/SYS OPR OBST OR BLKD	The engine does not start. The system function is restricted.

POSSIBLE CAUSE

The engine speed is too low.

Diagnosis Procedure

INFOID:0000000013609737

1.CHECK CHARGING SYSTEM

Check charging system. Refer to CHG-21, "Work Flow (With EXP-800 NI or GR8-1200 NI)" (With EXP-800 NI or GR8-1200 NI) or CHG-25, "Work Flow (Without EXP-800 NI or GR8-1200 NI)" (Without EXP-800 NI or GR8-1200 NI).

Is the inspection result normal?

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

2.CHECK BATTERY

Check battery. Refer to PG-102, "MAIN BATTERY : How to Handle Battery" (MAIN BATTERY), PG-103, "SUB BATTERY : How to Handle Battery" (SUB BATTERY).

Is the inspection result normal?

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

3.CHECK DTC

With CONSULT

Check DTC in "ENGINE".

Is any DTC related to starter relay control detected?

YES >> GO TO 4.
NO >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".

4.CHECK STARTING SYSTEM

Check engine starting system. Refer to STR-10, "Work Flow (With GR8-1200 NI)" (With GR8-1200 NI) or STR-13, "Work Flow (Without GR8-1200 NI)" (Without GR8-1200 NI).

Is the inspection result normal?

YES >> Check engine (mechanical malfunction).
NO >> Repair or replace error-detected parts.

P0A1E

Diagnosis Description

INFOID:0000000013609738

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P0A7C FPCM TEMPERATURE

DTC Description

INFOID:0000000013609739

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P0A7C	00	MOTOR ELECTRONICS OVER TEMP (Motor Electronics Over Temperature)	NO SUBTYPE INFORMATION	The control unit is overheated.

POSSIBLE CAUSE

Overload

DTC CONFIRMATION PROCEDURE

NOTE:

This DTC is displayed as protection function history. If no malfunction is detected after the diagnosis, the customer must be informed of the activation of the protection function.

1.INTERVIEW THE CUSTOMER

Interview the customer about the driving conditions when the DTC is detected.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Perform test drive on equal conditions with the information from customer.
2. Stop the vehicle and wait at least 5 seconds.
3. Check “Self Diagnostic Result” of “FPCM”.

Is DTC “P0A7C” detected?

YES >> Proceed to EC-724, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000013609740

2WD

1.INSPECTION START

Check the following items.

- Out of gas
- Low fuel pressure line open

Is the inspection result normal?

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

2.COMPONENT FUNCTION CHECK

1. Turn ignition switch OFF and wait at least 30 seconds.
2. Listen to fuel level sensor unit and fuel pump operation sound for a few seconds after ignition switch is turned ON.

Is the inspection result normal?

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

3.CHECK FPCM POWER SUPPLY

Check FPCM power supply and ground circuit. Refer to EC-208, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

Is the inspection result normal?

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

4. CHECK FUEL PUMP CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect FPCM harness connector and fuel level sensor unit and fuel pump harness connector.
3. Check the continuity between FPCM harness connector and fuel level sensor unit and fuel pump harness connector.

+		–		Continuity
FPCM		Fuel level sensor unit and fuel pump		
Connector	Terminal	Connector	Terminal	
M456	11	M370	3	Existed
	12		1	

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 FUEL LEVEL SENSOR UNIT AND FUEL PUMP

Check fuel level sensor unit and fuel pump. Refer to EC-726, "Component Inspection (Fuel Pump)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace fuel pump.

6. CHECK FUEL LEVEL SENSOR UNIT AND FUEL PUMP ACTIVATION SIGNAL CIRCUIT

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

+		–		Continuity
FPCM		ECM		
Connector	Terminal	Connector	Terminal	
M135	2	E48	127	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

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

AWD

1. CHECK DTC PRIORITY

If DTC PA07C is displayed with other DTC, perform the trouble diagnosis for other DTC first.

Is other DTC detected?

YES >> Perform diagnosis of detected DTC. Refer to EC-142, "DTC Index".
NO >> GO TO 2.

2. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

Component Inspection (Fuel Pump)

INFOID:0000000013609741

1.CHECK FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit and fuel level sensor unit and fuel pump harness connector.
3. Check resistance between fuel level sensor unit and fuel pump terminals.

Terminals	Condition	Resistance
1 and 3	Temperature: 25°C (77°F)	0.2 – 5.0 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel pump. Refer to FL-17, "Exploded View".

P1188 PRESSURE SENSOR DOWNSTREAM OF AIR FILTER

DTC Description

INFOID:0000000013609742

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms		DTC detecting condition
	DTC (Trouble diagnosis content)	Malfunction type	
P1188	INTAKE AIR PRESSURE SENSOR (Intake air pressure sensor)	SG BS LVL O-OF RNG/ZR AJST ERR	The pressure sensor downstream of air filter has a malfunction. The signal offset is outside the permissible range.

POSSIBLE CAUSE

- Harness and connectors
  (Pressure sensor downstream of air filter circuit is open or shorted.)
- Pressure sensor downstream of air filter

Diagnosis Procedure

INFOID:0000000013609743

1.CHECK POWER SUPPLY OF PRESSURE SENSOR DOWNSTREAM OF AIR FILTER

1. Turn ignition switch OFF.
2. Disconnect pressure sensor downstream of air filter harness connector.
3. Turn ignition switch ON.
4. Check the voltage between pressure sensor downstream of air filter harness connector and ground.

+		–	Voltage
Pressure sensor downstream of air filter			
Connector	Terminal		
F136	3	Ground	4.75 – 5.25 V

Is the inspection result normal?

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

2.CHECK PRESSURE SENSOR DOWNSTREAM OF AIR FILTER POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and pressure sensor downstream of air filter harness connector.

+		–		Continuity
ECM		Pressure sensor downstream of air filter		
Connector	Terminal	Connector	Terminal	
F149	16	F136	3	Existed

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

3.CHECK PRESSURE SENSOR DOWNSTREAM OF AIR FILTER CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

3. Check the continuity between ECM harness connector and pressure sensor downstream of air filter harness connector.

+		–		Continuity
ECM		Pressure sensor downstream of air filter		
Connector	Terminal	Connector	Terminal	
F149	11	F136	2	Existed
	90		1	

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

Is the inspection result normal?

YES >> Replace pressure sensor downstream of air filter. Refer to EM-23, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P1189 PRESSURE SENSOR DOWNSTREAM OF AIR FILTER

DTC Description

INFOID:0000000013609744

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P1189	11	INTAKE AIR PRESSURE SENSOR (Intake air pressure sensor)	CIRCUIT SHORT TO GROUND	The pressure sensor downstream of air filter has a short circuit to ground. There is a short circuit to ground.

POSSIBLE CAUSE

- Harness and connectors
  (Pressure sensor downstream of air filter circuit is open or shorted.)
- Pressure sensor downstream of air filter

Diagnosis Procedure

INFOID:0000000013609745

1.CHECK POWER SUPPLY OF PRESSURE SENSOR DOWNSTREAM OF AIR FILTER

1. Turn ignition switch OFF.
2. Disconnect pressure sensor downstream of air filter harness connector.
3. Turn ignition switch ON.
4. Check the voltage between pressure sensor downstream of air filter harness connector and ground.

+		–	Voltage
Pressure sensor downstream of air filter			
Connector	Terminal		
F136	3	Ground	4.75 – 5.25 V

Is the inspection result normal?

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

2.CHECK PRESSURE SENSOR DOWNSTREAM OF AIR FILTER POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and pressure sensor downstream of air filter harness connector.

+		–		Continuity
ECM		Pressure sensor downstream of air filter		
Connector	Terminal	Connector	Terminal	
F149	16	F136	3	Existed

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

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

3.CHECK PRESSURE SENSOR DOWNSTREAM OF AIR FILTER CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

3. Check the continuity between ECM harness connector and pressure sensor downstream of air filter harness connector.

+		–		Continuity
ECM		Pressure sensor downstream of air filter		
Connector	Terminal	Connector	Terminal	
F149	11	F136	2	Existed
	90		1	

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

Is the inspection result normal?

YES >> Replace pressure sensor downstream of air filter. Refer to EM-23, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P1190 PRESSURE SENSOR DOWNSTREAM OF AIR FILTER

DTC Description

INFOID:0000000013609746

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P1190	12	INTAKE AIR PRESSURE SENSOR (Intake air pressure sensor)	CIRCUIT SHORT TO BATTERY	The pressure sensor downstream of air filter has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

- Harness and connectors
  (Pressure sensor downstream of air filter circuit is open or shorted.)
- Pressure sensor downstream of air filter

Diagnosis Procedure

INFOID:0000000013609747

1.CHECK POWER SUPPLY OF PRESSURE SENSOR DOWNSTREAM OF AIR FILTER

1. Turn ignition switch OFF.
2. Disconnect pressure sensor downstream of air filter harness connector.
3. Turn ignition switch ON.
4. Check the voltage between pressure sensor downstream of air filter harness connector and ground.

+		–	Voltage
Pressure sensor downstream of air filter			
Connector	Terminal		
F136	3	Ground	4.75 – 5.25 V

Is the inspection result normal?

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

2.CHECK PRESSURE SENSOR DOWNSTREAM OF AIR FILTER POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and pressure sensor downstream of air filter harness connector.

+		–		Continuity
ECM		Pressure sensor downstream of air filter		
Connector	Terminal	Connector	Terminal	
F149	16	F136	3	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

3.CHECK PRESSURE SENSOR DOWNSTREAM OF AIR FILTER CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

3. Check the continuity between ECM harness connector and pressure sensor downstream of air filter harness connector.

+		–		Continuity
ECM		Pressure sensor downstream of air filter		
Connector	Terminal	Connector	Terminal	
F149	11	F136	2	Existed
	90		1	

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Replace pressure sensor downstream of air filter. Refer to EM-23, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P1240 FPCM

DTC Description

INFOID:0000000013609748

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P1240	00	CAN BUS (Controller area network bus)	NO SUBTYPE INFORMATION	The CAN bus has a malfunction.

POSSIBLE CAUSE

- FPCM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check “Self Diagnostic Result” of “FPCM”.

Is DTC “P1240” detected?

YES >> Proceed to EC-733, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000013609749

1.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

With CONSULT

1. Erase “Self Diagnostic Result” of “FPCM”.
2. Perform DTC confirmation procedure again. Refer to EC-733, "DTC Description".

Is DTC “P1240” detected again?

YES >> Replace FPCM. Refer to EC-964, "Removal and Installation".
NO >> INSPECTION END

P126F STOP/START: HOT START SIGNAL

DTC Description

INFOID:0000000013609750

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P126F	01	STOP/START: HOT START SIGNAL (Stop/start: hot start signal)	[ELECTRICAL MALFUNCTION]	Stop/Start function has detected excessively low engine speed during the starting procedure. The signal 'Hot start' from the automatic engine start/stop system has a malfunction. There is a general electrical malfunction.

POSSIBLE CAUSE

Stop/Start system

Diagnosis Procedure

INFOID:0000000013609751

1.CHECK HARNESS AND CONNECTOR

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect the BCM harness connector.
4. Check the continuity between ECM harness connector and BCM harness connector.

+		–		Continuity
ECM		BCM		
Connector	Terminal	Connector	Terminal	
E48	122	E15	141	Existed

5. Also check harness for short to battery and short to ground.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.REPLACE BCM

With CONSULT

1. Check “Self-diagnostic result” of “BCM”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to BCS-51, "DTC Index".
NO >> INSPECTION END

P13AC POWER ELECTRONIC CONTROL UNIT

Diagnosis Description

INFOID:0000000013609752

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P13AD POWER ELECTRONIC CONTROL UNIT

Diagnosis Description

INFOID:0000000013609753

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P13AE POWER ELECTRONIC CONTROL UNIT

Diagnosis Description

INFOID:0000000013609754

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P13AF ECM

DTC Description

INFOID:0000000013609755

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	Malfunction type	
P13AF	12	ON-BRD ELEC SYS SW/OVR OUTPT (On-brd elec sys sw/ovr outpt)	CIRCUIT SHORT TO BATTERY	The output for on-board electrical system switchover has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

- ECM
- BCM

Diagnosis Procedure

INFOID:0000000013609756

1.CHECK SELF-DIAGNOSTIC RESULT

With CONSULT

Perform “All DTC reading”.

Is any DTC related other than P13AF?

YES >> Perform trouble diagnosis for the detected DTC.
NO >> INSPECTION END

P13B0 ECM

DTC Description

INFOID:0000000013609757

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P13B0	11	ON-BRD ELEC SYS SW/OVR OUTPT	CIRCUIT SHORT TO GROUND	The output for on-board electrical system switchover has a short circuit to ground. There is a short circuit to ground.

POSSIBLE CAUSE

- CAN communication line
- BCM

Diagnosis Procedure

INFOID:0000000013609758

1.CHECK SELF-DIAGNOSTIC RESULT

With CONSULT

1. Check “Self-diagnostic result” of “BCM”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to BCS-51, "DTC Index".
NO >> INSPECTION END

P13B1 ECM

DTC Description

INFOID:0000000013609759

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P13B1	13	ON-BRD ELEC SYS SW/OVR OUTPT (on-brd elec sys sw/ovr outpt)	CIRCUIT OPEN	The output for on-board electrical system switchover has an electrical malfunction or an open circuit. There is an open circuit.

POSSIBLE CAUSE

- ECM
- BCM

Diagnosis Procedure

INFOID:0000000013609760

1.CHECK SELF-DIAGNOSTIC RESULT

With CONSULT

Perform “All DTC reading”.

Is any DTC related other than P13B1?

YES >> Perform trouble diagnosis for the detected DTC.
NO >> INSPECTION END

P13B2 IGNITION COIL POWER SUPPLY

DTC Description

INFOID:0000000013609761

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P13B2	00	IGNITION COIL FUSE 1 (Ignition coil fuse 1)	NO SUBTYPE INFORMATION	Electrical fuse for the ignition coils has a malfunction.

POSSIBLE CAUSE

Fuse for ignition coils

Diagnosis Procedure

INFOID:0000000013609762

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Pull out #214 (10A) fuse.
3. Check that the fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace the fuse after repairing the applicable circuit.

2.CHECK ECM POWER SUPPLY CIRCUIT

Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P13B3 IGNITION COIL POWER SUPPLY

DTC Description

INFOID:0000000013609763

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P13B3	00	IGNITION COIL FUSE 1 (Ignition coil fuse 1)	NO SUBTYPE INFORMATION	Electrical fuse for the ignition coils has a malfunction.

POSSIBLE CAUSE

Fuse for ignition coils

Diagnosis Procedure

INFOID:0000000013609764

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Pull out #214 (10A) fuse.
3. Check that the fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace the fuse after repairing the applicable circuit.

2.CHECK ECM POWER SUPPLY CIRCUIT

Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P13C5, P13C6 ENGINE KNOCKING

DTC Description

INFOID:0000000013609765

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P13C5	23	TORQUE LIMIT BY KNOCK CONT (Torque limit by knock cont)	SIGNAL STUCK LOW	A short-term torque limitation was detected by the knock control. No signal change: Voltage level is too low.
P13C6	24		SIGNAL STUCK HIGH	A long-term torque limitation was detected by the knock control. No signal change: Voltage level is too high.

POSSIBLE CAUSE

- Correction value of RON (research octane number)
- Fuel quality inferior
- Ignition system
- Knock sensors for tighten too much

Diagnosis Procedure

INFOID:0000000013609766

1.CHECK COMPONENT

Check the following:
- Value of RON (research octane number)
- Fuel quality
- Ignition system
- Knock sensors installation condition.

>> INSPECTION END

P13EA IGNITION TIMING

Diagnosis Description

INFOID:0000000013609767

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P13EA	00	COLD START IGN ANGLE SETTING (Cold start ignition angle setting)	NO SUBTYPE INFORMATION	The ignition angle setting has a malfunction during cold starting (partial load operation).

POSSIBLE CAUSE
Ignition timing

Diagnosis Procedure

INFOID:0000000013609768

1.CHECK DTC

With CONSULT
Check DTC.

Is any DTC other than P13EA detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to EC-142, "DTC Index".
NO >> Erase DTC.

P1522 EVAP PURGE CONTROL VALVE

DTC Description

INFOID:0000000013609769

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P1522	00	EVAP control system check valve (—)	NO SUBTYPE INFORMATION	The check valve of the evaporative emission control system (at partial load) is jammed closed.

POSSIBLE CAUSE
Purging (At full load)

Diagnosis Procedure

INFOID:0000000013609770

1.CHECK COMPONENT FUNCTION

With CONSULT
1. Turn ignition switch ON. (Engine stopped.)
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK PURGING SWITCHOVER VALVE”.
3. Perform the Active Test.
4. Check that the indicated value of “PWR CSMN (PURG SWOVR/V)” is between 390 – 495 mA.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that No. 213 (15 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK EVAP PURGE CONTROL VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect EVAP purge control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP purge control valve harness connector and ground.

+		–	Voltage
EVAP purge control valve			
Connector	Terminal		
E101	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK EVAP PURGE CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out No. 213 fuse.
3. Check the continuity between EVAP purge control valve harness connector and fuse terminal.

+		–	Continuity
EVAP purge control valve			
Connector	Terminal		
E101	1	No. 213 fuse terminal	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.

5.CHECK EVAP PURGE CONTROL VALVE

Check EVAP purge control valve. Refer to EC-558, "Component Inspection (EVAP Purge Control Valve)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP purge control valve. Refer to EC-27, "Component Parts Location".

6.CHECK EVAP PURGE CONTROL VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EVAP purge control valve harness connector.

+		–		Continuity
ECM		EVAP purge control valve		
Connector	Terminal	Connector	Terminal	
E48	153	E101	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK EVAP PURGE CIRUIT LEAKAGE

Check leakage of the following components.
- Hose and tube
- EVAP canister
- EVAP purge control valve (mechanical malfunction)

>> INSPECTION END

Component Inspection (EVAP Purge Control Valve)

INFOID:0000000013609771

1.CHECK EVAP PURGE CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect EVAP purge control valve harness connector.
3. Check the resistance between EVAP purge control valve terminals.

EVAP purge control valve		Condition	Resistance (Approx.)
+	–		
Terminal			
1	2	Temperature: 25°C (77°F)	14.2 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP purge control valve. Refer to EC-27, "Component Parts Location".

P1523 EVAP PURGE CONTROL VALVE

DTC Description

INFOID:0000000013609772

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	Malfunction type	
P1523	00	EVAP control system check valve (—)	NO SUBTYPE INFORMATION	The check valve of the evaporative emission control system (at partial load) is jammed open.

POSSIBLE CAUSE

Purging (At full load)

Diagnosis Procedure

INFOID:0000000013609773

1.CHECK COMPONENT FUNCTION

With CONSULT

1. Turn ignition switch ON. (Engine stopped.)
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK PURGING SWITCHOVER VALVE”.
3. Perform the Active Test.
4. Check that the indicated value of “PWR CSMN (PURG SWOVR/V)” is between 390 – 495 mA.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that No. 213 (15 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK EVAP PURGE CONTROL VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect EVAP purge control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP purge control valve harness connector and ground.

+		−	Voltage
EVAP purge control valve			
Connector	Terminal		
E101	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK EVAP PURGE CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out No. 213 fuse.
3. Check the continuity between EVAP purge control valve harness connector and fuse terminal.

+		–	Continuity
EVAP purge control valve			
Connector	Terminal		
E101	1	No. 213 fuse terminal	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.

5.CHECK EVAP PURGE CONTROL VALVE

Check EVAP purge control valve. Refer to EC-558, "Component Inspection (EVAP Purge Control Valve)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP purge control valve. Refer to EC-27, "Component Parts Location".

6.CHECK EVAP PURGE CONTROL VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EVAP purge control valve harness connector.

+		–		Continuity
ECM		EVAP purge control valve		
Connector	Terminal	Connector	Terminal	
E48	153	E101	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK EVAP PURGE CIRUIT LEAKAGE

Check leakage of the following components.
- Hose and tube
- EVAP canister
- EVAP purge control valve (mechanical malfunction)

>> INSPECTION END

Component Inspection (EVAP Purge Control Valve)

INFOID:0000000013609774

1.CHECK EVAP PURGE CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect EVAP purge control valve harness connector.
3. Check the resistance between EVAP purge control valve terminals.

EVAP purge control valve		Condition	Resistance (Approx.)
+	–		
Terminal			
1	2	Temperature: 25°C (77°F)	14.2 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP purge control valve. Refer to EC-27, "Component Parts Location".

P1524 EVAP PURGE CONTROL VALVE

DTC Description

INFOID:0000000013609775

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P1524	00	EVAP CONT C/V (FULL LOAD) (—)	NO SUBTYPE INFORMATION	The check valve of the evaporative emission control system (at full load) is jammed closed.

POSSIBLE CAUSE

Purging (At full load)

Diagnosis Procedure

INFOID:0000000013609776

1.CHECK COMPONENT FUNCTION

With CONSULT

1. Turn ignition switch ON. (Engine stopped.)
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK PURGING SWITCHOVER VALVE”.
3. Perform the Active Test.
4. Check that the indicated value of “PWR CSMN (PURG SWOVR/V)” is between 390 – 495 mA.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that No. 213 (15 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK EVAP PURGE CONTROL VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect EVAP purge control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP purge control valve harness connector and ground.

+		–	Voltage
EVAP purge control valve			
Connector	Terminal		
E101	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK EVAP PURGE CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out No. 213 fuse.
3. Check the continuity between EVAP purge control valve harness connector and fuse terminal.

+		–	Continuity
EVAP purge control valve			
Connector	Terminal		
E101	1	No. 213 fuse terminal	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.

5.CHECK EVAP PURGE CONTROL VALVE

Check EVAP purge control valve. Refer to EC-558, "Component Inspection (EVAP Purge Control Valve)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP purge control valve. Refer to EC-27, "Component Parts Location".

6.CHECK EVAP PURGE CONTROL VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EVAP purge control valve harness connector.

+		–		Continuity
ECM		EVAP purge control valve		
Connector	Terminal	Connector	Terminal	
E48	153	E101	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK EVAP PURGE CIRUIT LEAKAGE

Check leakage of the following components.
- Hose and tube
- EVAP canister
- EVAP purge control valve (mechanical malfunction)

>> INSPECTION END

Component Inspection (EVAP Purge Control Valve)

INFOID:0000000013609777

1.CHECK EVAP PURGE CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect EVAP purge control valve harness connector.
3. Check the resistance between EVAP purge control valve terminals.

EVAP purge control valve		Condition	Resistance (Approx.)
+	–		
Terminal			
1	2	Temperature: 25°C (77°F)	14.2 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP purge control valve. Refer to EC-27, "Component Parts Location".

P1525 EVAP CONTROL SYSTEM CHECK VALVE

DTC Description

INFOID:0000000013609778

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P1525	00	EVAP control system check valve (—)	NO SUBTYPE INFORMATION	The check valve of the evaporative emission control system (at full load) is jammed open.

POSSIBLE CAUSE
Purging (At full load)

Diagnosis Procedure

INFOID:0000000013609779

1.CHECK COMPONENT FUNCTION

With CONSULT
1. Turn ignition switch ON. (Engine stopped.)
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK PURGING SWITCHOVER VALVE”.
3. Perform the Active Test.
4. Check that the indicated value of “PWR CSMN (PURG SWOVR/V)” is between 390 – 495 mA.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that No. 213 (15 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK EVAP PURGE CONTROL VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect EVAP purge control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP purge control valve harness connector and ground.

+		−	Voltage
EVAP purge control valve			
Connector	Terminal		
E101	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK EVAP PURGE CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out No. 213 fuse.
3. Check the continuity between EVAP purge control valve harness connector and fuse terminal.

+		–	Continuity
EVAP purge control valve			
Connector	Terminal		
E101	1	No. 213 fuse terminal	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.

5.CHECK EVAP PURGE CONTROL VALVE

Check EVAP purge control valve. Refer to EC-558, "Component Inspection (EVAP Purge Control Valve)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP purge control valve. Refer to EC-27, "Component Parts Location".

6.CHECK EVAP PURGE CONTROL VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EVAP purge control valve harness connector.

+		–		Continuity
ECM		EVAP purge control valve		
Connector	Terminal	Connector	Terminal	
E48	153	E101	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK EVAP PURGE CIRUIT LEAKAGE

Check leakage of the following components.
- Hose and tube
- EVAP canister
- EVAP purge control valve (mechanical malfunction)

>> INSPECTION END

Component Inspection (EVAP Purge Control Valve)

INFOID:0000000013609780

1.CHECK EVAP PURGE CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect EVAP purge control valve harness connector.
3. Check the resistance between EVAP purge control valve terminals.

EVAP purge control valve		Condition	Resistance (Approx.)
+	–		
Terminal			
1	2	Temperature: 25°C (77°F)	14.2 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP purge control valve. Refer to EC-27, "Component Parts Location".

P1611 FPCM POWER SUPPLY

DTC Description

INFOID:0000000013609781

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P1611	00	FUEL PUMP (Fuel pump)	NO SUBTYPE INFORMATION	The fuel pump has been switched off.

POSSIBLE CAUSE

- Harness and connectors (FPCM power supply circuit)
- Battery
- Charging system

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 70 seconds.
2. Check “Self Diagnostic Result” of “FPCM”.

Is DTC “P1611” detected?

YES >> Proceed to EC-757, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000013609782

1.CHECK FPCM POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect FPCM harness connector.
3. Turn ignition switch ON.
4. Check the voltage between FPCM harness connector terminals.

FPCM			voltage
Connector	+	–	
	Terminal		
M456	10	9	11 – 15 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK FPCM POWER SUPPLY CIRCUIT

Check FPCM power supply circuit. Refer to EC-208, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P162A FPCM

DTC Description

INFOID:0000000013609783

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P162A	00	CONTROL UNIT “FUEL PUMP” (Control unit “fuel pump”)	NO SUBTYPE INFORMATION	There is an internal fault in control unit ″Fuel pump″.

POSSIBLE CAUSE

FPCM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check “Self Diagnostic Result” of “FPCM”.

Is DTC “P162A” detected?

YES >> Proceed to EC-758, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000013609784

1.REPLACE FPCM

Replace FPCM. Refer to EC-964, "Removal and Installation".

>> INSPECTION END

P1614 ECM

DTC Description

INFOID:0000000013609785

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P1614	04	INTERNAL CONTROL UNIT RESET (—)	SYSTEM INTERNAL MAL-FUNCTN	An internal control unit reset was performed. There is an internal malfunction.
	05		SYSTEM PROGRAMMING ERROR	An internal control unit reset was performed. There is a programming malfunction.
	06		ALGORITHM BASED ERROR	An internal control unit reset was performed. There is an algorithm malfunction.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609786

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P1644 CONFIGURATION INCORRECT

DTC Description

INFOID:0000000013609787

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P1644	00	CONFIGURATION INCORRECT (—)	NO SUBTYPE INFORMATION	An incorrect variant coding or configuration was detected.
	04		SYSTEM INTERNAL MALFUNCTN	An incorrect variant coding or configuration was detected. There is an internal malfunction.
	08		BUS SIGNAL/MESSAGE ERROR	An incorrect variant coding or configuration was detected. There is a signal error or the message error.
	29		SIGNAL INVALID	An incorrect variant coding or configuration was detected. There is an invalid signal.
	55		NOT CONFIGURED	An incorrect variant coding or configuration was detected. The component is not configured.
	56		—	An incorrect variant coding or configuration was detected. An incorrect or incompatible configuration was detected.
	64		SIGNAL PLAUSIBILITY ERROR	An incorrect variant coding or configuration was detected. There is an implausible signal.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609788

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P1670 CALIBRATION ERROR

DTC Description

INFOID:0000000013609789

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P1670	85	TORQUE CURVE CALIBRATION (—)	SIG ABOVE ALLOWABLE RANGE	Calibration of the torque curve of the control unit has a malfunction. There is a signal above the permissible limit value.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609790

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P167B CRASH SIGNAL

DTC Description

INFOID:0000000013609791

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P167B	00	DRIVTRN SHUTOFF DUE TO CRASH (—)	NO SUBTYPE INFORMATION	The drivetrain has been switched off due to a crash signal.

POSSIBLE CAUSE

Car crash detection signal error

Diagnosis Procedure

INFOID:0000000013609792

1.CHECK SELF-DIAGNOSTIC RESULT

With CONSULT

Perform “All DTC reading”.

Is any DTC related other than P167B?

YES >> Perform trouble diagnosis for the detected DTC.
NO >> INSPECTION END

P1CCF HIGH PRESSURE FUEL SYSTEM

DTC Description

INFOID:0000000013609793

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P1CCF	00	HIGH PRESSURE SYSTEM (—)	NO SUBTYPE INFORMATION	High pressure could not be built up during engine start.

POSSIBLE CAUSE

- Harness or connectors
  (Fuel pressure and temperature sensor circuit is open or shorted.)
  (Quantity control valve circuit is open or shorted.)
- High pressure fuel system leak
- Fuel pressure and temperature sensor
- Quantity control valve

Diagnosis Procedure

INFOID:0000000013609794

1.START ENGINE

Start the engine and let it idle.

Is it difficult to keep at idle?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL

With CONSULT

1. Warm the engine up to engine coolant temperature reaches 75°C (167°F).
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL PRESS AND TEMP SENSOR”.
3. Keep the engine speed between 500 – 1,000 rpm.
4. Perform the Active Test.
   NOTE:
   When start the test, fuel pump is activated and quantity control valve is not activated.
5. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 300 kPa (3 bar, 3.06 kg-cm^2, 43.5 psi) and 1200 kPa (12 bar, 12.24 kg-cm^2, 174 psi).

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 6.

3.ERASE DTC

1. Erase the DTC.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Start the engine and let it idle for 60 seconds.
4. Turn ignition switch OFF.
5. Turn ignition switch ON.
6. Check DTC.

Is the DTC detected again?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> INSPECTION END

4.PRECONDITIONING FOR CHECKING FUEL PRESSURE AND TEMPERATURE SENSOR OUTPUT SIGNAL

CAUTION:
Refer to EC-23, "Precaution for Risk of Explosion and Injury" for work in safety.

With CONSULT

1. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “RAIL PRES (ACTUAL VALUE)”.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Slightly loosen the threaded connection of the fuel line to the fuel rail to reduce the fuel pressure.
   CAUTION:
   Collect escaping fuel with several rags.
4. Wait at least 60 seconds.
5. Retighten the threaded connection of fuel line.
6. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 0 kPa (0 bar, 0 kg-cm^2, 0 psi) and 300 kPa (3 bar, 3.06 kg-cm^2, 43.5 psi).

>> GO TO 5.

5. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL

With CONSULT
1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL PRESS AND TEMP SENSOR”.
   NOTE:
   When start the test, fuel pump is activated and quantity control valve is not activated.
3. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 300 kPa (3 bar, 3.06 kg-cm^2, 43.5 psi) and 1200 kPa (12 bar, 12.24 kg-cm^2, 174 psi).

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 6.

6. CHECK POWER SUPPLY OF FUEL PRESSURE AND TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect fuel pressure and temperature sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel pressure and temperature sensor harness connector and ground.

Fuel pressure and temperature sensor			Voltage
Connector	+	–	
	Terminal		
F139	4	1	4.75 – 5.25 V

Is the measured value OK?

YES >> GO TO 8.
NO >> GO TO 7.

7. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR POWER SUPPLY AND GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and fuel pressure and temperature sensor harness connector.

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	12	F139	1	Existed
	18		4	

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

NO >> Repair or replace error-detected parts.

8. CHECK FUEL PRESSURE AND TEMPERATURE SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and fuel pressure and temperature sensor harness connector.

+		–		Continuity
ECM		Fuel pressure and temperature sensor		
Connector	Terminal	Connector	Terminal	
F149	65	F139	3	Existed
	67		2	

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Replace fuel pressure and temperature sensor.
NO >> Repair or replace error-detected parts.

9. CHECK HIGH PRESSURE FUEL SYSTEM LEAK

With CONSULT

1. Start the engine and warm it up to engine coolant temperature reaches 75°C (167°F).
2. Turn ignition switch OFF.
3. Turn ignition switch ON.
4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK FUEL HI PRESS CIRC FOR LEAKTIGHTNESS”.
5. Connect charger to battery.
6. Set the vehicle to the following conditions.

Item	Condition
Engine coolant temperature	75 – 105°C (167 – 221°F)
Fuel temperature	40 – 80°C (104 – 176°F)
Engine speed	550 – 800 rpm
Electrical load	OFF

7. Check that the displayed value of “RAIL PRES (ACTUAL VALUE)” is between 19 MPa (190 bar, 193.8 kg-cm^2, 2755 psi) and 21 MPa (210 bar, 214.2 kg-cm^2, 3045 psi).
8. Perform the Active Test.

CAUTION:
Never turn ignition switch OFF.
NOTE:
When the result is normal, the fuel rail pressure value must not drop below 10 MPa (100 bar, 102 kg-cm^2, 1450 psi) within 3 minutes.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Check high pressure fuel line for fuel leak.

10. CHECK QUANTITY CONTROL VALVE FUNCTION

With CONSULT

1. Check that low fuel pressure system is normal.
2. Set the vehicle to the following conditions.

Item	Condition
Engine coolant temperature	75 – 105°C (167 – 221°F)
Fuel temperature	40 – 80°C (104 – 176°F)

Item	Condition
Engine speed	50 rpm or more
A/C	OFF

3. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK QUANTITY CONTROL VALVE”.
4. Perform the Active Test.

NOTE:
When the result is normal, the fuel rail pressure value is increased to approximately 20 MPa (200 bar, 204 kg-cm^2, 2900 psi).

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 11.

11.CHECK QUANTITY CONTROL VALVE

Check quantity control valve. Refer to EC-766, "Component Inspection (Quantity Control Valve)".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace high pressure fuel pump. Refer to EM-44, "Removal and Installation".

12.CHECK QUANTITY CONTROL VALVE CONTROL CIRCUIT

1. Disconnect ECM harness connector and quantity control valve harness connector.
2. Check the continuity between ECM harness connector and quantity control valve harness connector.

+		–		Continuity
ECM		Quantity control valve		
Connector	Terminal	Connector	Terminal	
F149	75	F169	1	Existed
	76		2	

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

13.ERASE DTC

1. Check the following.
- If the actuation angle of the quantity control valve matches the specified value exactly, synchronization between the camshaft and crankshaft must be checked. (Substitute value in emergency mode)
- If DTC related to camshaft is detected, perform trouble diagnosis for the detected DTC.
- If DTC related to crankshaft is detected, perform trouble diagnosis for the detected DTC.

2. Erase the DTC.
3. Turn ignition switch OFF and wait at least 30 seconds.
4. Start the engine and let it idle for 60 seconds.
5. Check DTC.

Is the DTC detected again?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> INSPECTION END

Component Inspection (Quantity Control Valve)

INFOID:0000000013609795

1.CHECK QUANTITY CONTROL VALVE-1

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the resistance between ECM harness connector terminals.

ECM		Resistance (Ω)
+	–	
Terminal		
76	75	0.3 – 1.1

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK QUANTITY CONTROL VALVE-2

1. Disconnect quantity control valve harness connector.
2. Check the resistance between quantity control valve terminals.

Quantity control valve		Resistance (Ω)
+	–	
Terminal		
2	1	0.3 – 1.1

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure fuel pump. Refer to EM-44, "Removal and Installation".

P1CD8 EXHAUST LEAKAGE

DTC Description

INFOID:0000000013609796

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P1CD8	78	EXHAUST LEAKAGE (—)	ALGNMNT OR ADJSTMNT INCRRCT	A leakage in the exhaust pipe upstream of the right NOx sensor was detected. The adaptation or adjustment is incorrect.
	7A		FLUID LEAK OR SEAL MALFUNCTN	A leakage in the exhaust pipe upstream of the right NOx sensor was detected. Leakage or a damaged seal was detected.

POSSIBLE CAUSE

- Engine combustion system
- Crankshaft position sensor
- Fuel system
- Excessive load of starting engine
- Friction or wareout of engine components
- Transmission

Diagnosis Procedure

INFOID:0000000013609797

1.CHECK EXHAUST SYSTEM LEAK

Check the exhaust system leak.

>> INSPECTION END

P1CDE STOP/START SYSTEM

DTC Description

INFOID:0000000013609798

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P1CDE	00	ECO START/STOP FUNCTION (ECO start/stop function)	NO SUBTYPE INFORMATION	Stop/Start function has detected excessively low engine speed during the starting procedure.

POSSIBLE CAUSE

Stop/Start system

Diagnosis Procedure

INFOID:0000000013609799

1.CHECK DTC

With CONSULT

Check “All DTC reading”.

Is any DTC other than P1CDE detected?

YES >> Perform trouble diagnosis for the detected DTC.
NO >> GO TO 2.

2.CHECK ENGINE START OPERATION

1. Start engine.
2. Check that the engine starts normally.

Does the engine turn over? Does the starter motor operate?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Engine or transmission has a mechanical malfunction.

P1CDF STOP/START SYSTEM

DTC Description

INFOID:0000000013609800

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P1CDF	00	ECO START/STOP FUNCTION (ECO start/stop function)	NO SUBTYPE INFORMATION	The ECO start/stop function has aborted an engine start due to a malfunction at sensor ″Neutral position of transmission″.

POSSIBLE CAUSE

Transmission system

Diagnosis Procedure

INFOID:0000000013609801

1.CHECK DTC

With CONSULT

Check DTC in “TRANSMISSION”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to LAN-58, "Trouble Diagnosis Flow Chart".

NO >> GO TO 2.

2.CHECK DTC IN ECM

With CONSULT

Check DTC in “ECM”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to LAN-58, "Trouble Diagnosis Flow Chart".

NO >> INSPECTION END

P1CE0 STOP/START SYSTEM

DTC Description

INFOID:0000000013609802

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
P1CE0	00	ECO START/STOP FUNCTION (ECO start/stop function)	NO SUBTYPE INFORMATION	Stop/Start function has detected an implausible engine speed.

POSSIBLE CAUSE

Stop/Start system

Diagnosis Procedure

INFOID:0000000013609803

1.CHECK DTC

With CONSULT

Check “All DTC reading”.

Is any DTC other than P1CE0 detected?

YES >> Perform trouble diagnosis for the detected DTC.
NO >> GO TO 2.

2.CHECK ENGINE START OPERATION

1. Start engine.
2. Check that the engine starts normally.

Does the engine turn over? Does the starter motor operate?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Check starter system.

P1CE1 STOP/START SYSTEM

DTC Description

INFOID:0000000013609804

DTC DETECTION LOGIC

DTC		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
P1CE1	00	ECO START/STOP FUNCTION (ECO start/stop function)	NO SUBTYPE INFORMATION	Stop/Start function has detected implausible drive authorization data.

POSSIBLE CAUSE

Stop/Start system

Diagnosis Procedure

INFOID:0000000013609805

1.CHECK DTC

With CONSULT

1. Turn ignition switch ON.
2. Check “All DTC Reading”.

Is any DTC other than P1CE1 detected?

YES >> Perform trouble diagnosis for the detected DTC.
NO >> INSPECTION END

P1CE2 STOP/START SYSTEM

DTC Description

INFOID:0000000013609806

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
P1CE2	00	ECO START/STOP FUNCTION (ECO start/stop function)	NO SUBTYPE INFORMATION	Stop/Start function has detected excessively low engine speed.

POSSIBLE CAUSE

Stop/Start system

Diagnosis Procedure

INFOID:0000000013609807

1.CHECK DTC

With CONSULT

1. Turn ignition switch ON.
2. Check “All DTC Reading”.

Is any DTC other than P1CE2 detected?

YES >> Perform trouble diagnosis for the detected DTC.
NO >> INSPECTION END

P1CE3 FUEL INJECTOR INJECTION

Diagnosis Description

INFOID:0000000013609808

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P1CE4 FUEL INJECTOR INJECTION

Diagnosis Description

INFOID:0000000013609809

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P1CE5 FUEL INJECTOR INJECTION

Diagnosis Description

INFOID:0000000013609810

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P1CE6 FUEL INJECTOR INJECTION

Diagnosis Description

INFOID:0000000013609811

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P1CE7 INTAKE AIR LEAK

DTC Description

INFOID:0000000013609812

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P1CE7	00	CRANKCASE VENTILATION SYSTEM (Crankcase ventilation system)	NO SUBTYPE INFORMATION	Crankcase ventilation in wide open throttle operation (cylinder bank 1) has a malfunction.

POSSIBLE CAUSE

- Partial load operation crankcase ventilation valve
- Engine coolant temperature sensor
- Coolant thermostat heater element
- Knock sensor 1
- Knock sensor 2
- Starter motor
- Pressure sensor upstream of throttle valve
- Throttle valve actuator

Diagnosis Procedure

INFOID:0000000013609813

1.CHECK FOR CRANKCASE VENTILATION COMPONENT PARTS

Check the following parts installation condition.

- Partial load operation crankcase ventilation valve
- Engine coolant temperature sensor
- Coolant thermostat heater element
- Knock sensor 1
- Knock sensor 2
- Starter motor
- Pressure sensor upstream of throttle valve
- Throttle valve actuator

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK PARTIAL LOAD OPERATION CRANKCASE VENTILATION VALVE

Check the partial load operation crankcase ventilation valve. Refer to EC-959, "Diagnosis Procedure".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P1CEF FUEL INJECTOR INJECTION

Diagnosis Description

INFOID:0000000013609814

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P1CF0 FUEL INJECTOR INJECTION

Diagnosis Description

INFOID:0000000013609815

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P1CF1 FUEL INJECTOR INJECTION

Diagnosis Description

INFOID:0000000013609816

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P1CF2 FUEL INJECTOR INJECTION

Diagnosis Description

INFOID:0000000013609817

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P1CF3 FUEL INJECTOR INJECTION

Diagnosis Description

INFOID:0000000013609818

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P1CF4 FUEL INJECTOR INJECTION

Diagnosis Description

INFOID:0000000013609819

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P1D01 CRANKCASE VENTILATION SYSTEM

DTC Description

INFOID:0000000013609820

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P1D01	11	CRANKCASE VENT VALVE (Crankcase vent valve)	CIRCUIT SHORT TO GROUND	The vent valve for the crankcase has a short circuit to ground. There is a short circuit to ground.

POSSIBLE CAUSE

- Partial load operation crankcase ventilation valve
- Engine coolant temperature sensor
- Coolant thermostat heater element
- Knock sensor 1
- Knock sensor 2
- Starter motor
- Pressure sensor upstream of throttle valve
- Throttle valve actuator

Diagnosis Procedure

INFOID:0000000013609821

1.CHECK FOR CRANKCASE VENTILATION COMPONENT PARTS

Check the following parts installation condition.

- Partial load operation crankcase ventilation valve
- Engine coolant temperature sensor
- Coolant thermostat heater element
- Knock sensor 1
- Knock sensor 2
- Starter motor
- Pressure sensor upstream of throttle valve
- Throttle valve actuator

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK PARTIAL LOAD OPERATION CRANKCASE VENTILATION VALVE

Check the partial load operation crankcase ventilation valve. Refer to EC-959, "Diagnosis Procedure".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P1D02 CRANKCASE VENTILATION SYSTEM

DTC Description

INFOID:0000000013609822

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P1D02	12	CRANKCASE VENT VALVE (Crankcase vent valve)	CIRCUIT SHORT TO BATTERY	The values for injector injection quantity adjustment for cylinder balancing are not available.

POSSIBLE CAUSE

- Partial load operation crankcase ventilation valve
- Engine coolant temperature sensor
- Coolant thermostat heater element
- Knock sensor 1
- Knock sensor 2
- Starter motor
- Pressure sensor upstream of throttle valve
- Throttle valve actuator

Diagnosis Procedure

INFOID:0000000013609823

1.CHECK FOR CRANKCASE VENTILATION COMPONENT PARTS

Check the following parts installation condition.

- Partial load operation crankcase ventilation valve
- Engine coolant temperature sensor
- Coolant thermostat heater element
- Knock sensor 1
- Knock sensor 2
- Starter motor
- Pressure sensor upstream of throttle valve
- Throttle valve actuator

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK PARTIAL LOAD OPERATION CRANKCASE VENTILATION VALVE

Check the partial load operation crankcase ventilation valve. Refer to EC-959, "Diagnosis Procedure".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P1D03 CRANKCASE VENTILATION SYSTEM

DTC Description

INFOID:0000000013609824

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P1D03	13	CRANKCASE VENT VALVE (Crankcase vent valve)	CIRCUIT OPEN	The vent valve for the crankcase has an electrical malfunction. There is an open circuit.

POSSIBLE CAUSE

- Partial load operation crankcase ventilation valve
- Engine coolant temperature sensor
- Coolant thermostat heater element
- Knock sensor 1
- Knock sensor 2
- Starter motor
- Pressure sensor upstream of throttle valve
- Throttle valve actuator

Diagnosis Procedure

INFOID:0000000013609825

1.CHECK FOR CRANKCASE VENTILATION COMPONENT PARTS

Check the following parts installation condition.

- Partial load operation crankcase ventilation valve
- Engine coolant temperature sensor
- Coolant thermostat heater element
- Knock sensor 1
- Knock sensor 2
- Starter motor
- Pressure sensor upstream of throttle valve
- Throttle valve actuator

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK PARTIAL LOAD OPERATION CRANKCASE VENTILATION VALVE

Check the partial load operation crankcase ventilation valve. Refer to EC-959, "Diagnosis Procedure".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P1D04 STOP/START SYSTEM

DTC Description

INFOID:0000000013609826

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	Malfunction type	
P1D04	00	ECO START/STOP FUNCTION (ECO start/stop function)	NO SUBTYPE INFORMATION	Stop/Start function has requested a manual engine start.

POSSIBLE CAUSE

- Stop/Start switch
- Stop/Start function

Diagnosis Procedure

INFOID:0000000013609827

1.CHECK SELF-DIAGNOSTIC RESULT

With CONSULT

Perform “All DTC reading”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC.
NO >> INSPECTION END

P1D05 STOP/START SYSTEM

DTC Description

INFOID:0000000013609828

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P1D05	00	ECO START/STOP FUNCTION (ECO start/stop function)	NO SUBTYPE INFORMATION	Stop/Start function has prevented an engine stop.

POSSIBLE CAUSE

- Door switch circuit
- Seat belt buckle switch circuit

Diagnosis Procedure

INFOID:0000000013609829

1.CHECK DOOR SWITCH

Check door switch (driver side). Refer to DLK-108, "LH : Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK SEAT BELT BUCKLE SWITCH

Check seat belt buckle switch. Refer to SRC-89, "Diagnosis Procedure".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P1D06 STOP/START SYSTEM

DTC Description

INFOID:0000000013609830

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	Malfunction type	
P1D06	00	ECO START/STOP FUNCTION (ECO start/stop function)	NO SUBTYPE INFORMATION	The ECO start/stop function has a malfunction.

POSSIBLE CAUSE

- Stop/Start switch
- Stop/Start function

Diagnosis Procedure

INFOID:0000000013609831

1.CHECK SELF-DIAGNOSTIC RESULT

With CONSULT

Perform “All DTC reading”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC.
NO >> INSPECTION END

P1D07 STOP/START SYSTEM

DTC Description

INFOID:0000000013609832

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P1D07	00	ECO START/STOP FUNCTION (ECO start/stop function)	NO SUBTYPE INFORMATION	Stop/Start function has prevented an engine start.
	48		SUPERVISION SOFTWARE ERROR	The ECO start/stop function has prevented an engine start. There is an error in the control memory.

POSSIBLE CAUSE

- Door switch circuit
- Seat belt buckle switch circuit

Diagnosis Procedure

INFOID:0000000013609833

1.CHECK DOOR SWITCH

Check door switch (driver side). Refer to DLK-108, "LH : Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK SEAT BELT BUCKLE SWITCH

Check seat belt buckle switch. Refer to SRC-89, "Diagnosis Procedure".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P1D68 CRANKCASE VENTILATION SYSTEM

DTC Description

INFOID:0000000013609834

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	Malfunction type	
P1D68	7A	CRANKCASE VENT LINE (Crankcase vent line)	NO SUBTYPE INFORMATION	The vent line for the crankcase is leaky. Leakage or a damaged seal was detected.

POSSIBLE CAUSE

- Partial load operation crankcase ventilation valve
- Engine coolant temperature sensor
- Coolant thermostat heater element
- Knock sensor 1
- Knock sensor 2
- Starter motor
- Pressure sensor upstream of throttle valve
- Throttle valve actuator

Diagnosis Procedure

INFOID:0000000013609835

1.CHECK FOR CRANKCASE VENTILATION COMPONENT PARTS

Check the following parts installation condition.

- Partial load operation crankcase ventilation valve
- Engine coolant temperature sensor
- Coolant thermostat heater element
- Knock sensor 1
- Knock sensor 2
- Starter motor
- Pressure sensor upstream of throttle valve
- Throttle valve actuator

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK PARTIAL LOAD OPERATION CRANKCASE VENTILATION VALVE

Check the partial load operation crankcase ventilation valve. Refer to EC-959, "Diagnosis Procedure".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P2065 FUEL LEVEL SENSOR

DTC Description

INFOID:0000000013609836

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P2065	8F	Fuel level sensor rh (Fuel level sensor “B” circuit)	ERRATIC	The right fuel level sensor has an electrical malfunction. The signal or message is erratic.

POSSIBLE CAUSE

Fuel level sensor

Diagnosis Procedure

INFOID:0000000013609837

1. CHECK “SELF-DIAGNOSTIC RESULT” OF “BCM”

With CONSULT

Check “Self-diagnostic result” of “BCM”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BCS-51, "DTC Index".

NO >> Replace BCM. Refer to BCS-248, "Removal and Installation".

P2066 FUEL LEVEL SENSOR

DTC Description

INFOID:0000000013609838

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P2066	00	Right fuel level sensor malf (Fuel level sensor “B” performance)	NO SUBTYPE INFORMATION	The right fuel level sensor has a malfunction.
	2A		SIGNAL STUCK IN RANGE	The right fuel level sensor has a malfunction. There is no signal change.
	85		SIG ABOVE ALLOWABLE RANGE	The right fuel level sensor has a malfunction. There is a signal above the permissible limit value.

POSSIBLE CAUSE

Fuel level sensor

Diagnosis Procedure

INFOID:0000000013609839

1. CHECK “SELF-DIAGNOSTIC RESULT” OF “BCM”

With CONSULT

Check “Self-diagnostic result” of “BCM”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BCS-51, "DTC Index".
NO >> Replace BCM. Refer to BCS-248, "Removal and Installation".

P2067 FUEL LEVEL SENSOR

DTC Description

INFOID:0000000013609840

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P2067	11	Fuel level sensor B (Fuel level sensor “B” circuit low)	CIRCUIT SHORT TO GROUND	The right fuel level sensor has a short circuit to ground. There is a short circuit to ground.

POSSIBLE CAUSE

Fuel level sensor

Diagnosis Procedure

INFOID:0000000013609841

1. CHECK “SELF-DIAGNOSTIC RESULT” OF “BCM”

With CONSULT

Check “Self-diagnostic result” of “BCM”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BCS-51, "DTC Index".

NO >> Replace BCM. Refer to BCS-248, "Removal and Installation".

P2068 FUEL LEVEL SENSOR

DTC Description

INFOID:0000000013609842

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P2068	12	Fuel level sensor B (Fuel Level Sensor ″B″ Circuit High)	CIRCUIT SHORT TO BATTERY	The right fuel level sensor has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

Fuel level sensor

Diagnosis Procedure

INFOID:0000000013609843

1.CHECK “SELF-DIAGNOSTIC RESULT” OF “BCM”

With CONSULT

Check “Self-diagnostic result” of “BCM”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to BCS-51, "DTC Index".

NO >> Replace BCM. Refer to BCS-248, "Removal and Installation".

P2072 MAP/MAF-THROTTLE POSITION CORRELATION

Diagnosis Description

INFOID:0000000013609844

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P2072	04	Throttle actuator control system (Throttle Actuator Control System - Ice Blockage Bank 1)	SYSTEM INTERNAL MALFUNCTN	The throttle valve is blocked due to ice. There is an internal malfunction.
	84		SIG BELOW ALLOWABLE RANGE	The throttle valve is blocked due to ice. There is a signal below the permissible limit value.
	85		SIG ABOVE ALLOWABLE RANGE	The throttle valve is blocked due to ice. There is a signal above the permissible limit value.
	86		SIGNAL INVALID	The throttle valve is blocked due to ice. There is an incorrect signal.

POSSIBLE CAUSE

Throttle valve stick (iced up)

Diagnosis Procedure

INFOID:0000000013609845

1.CHECK THROTTLE VALVE

Visually check the throttle valve for that the valve is iced up.

Is the inspection result normal?

>> GO TO 2.

2.ERASE DTC

Erase DTC after performing the following.

- Ice-out the throttle valve.
- Check air cleaner filter for water content and replace it (if necessary).
- Check engine oil for water content and perform oil change (if necessary).

>> INSPECTION END

P2088 INTAKE CAMSHAFT ACTUATOR

DTC Description

INFOID:0000000013609846

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P2088	00	Camshaft A position actuator b1 (″A″ Camshaft Position Actuator Control Circuit Low Bank 1)	NO SUBTYPE INFORMATION	Actuator 'Intake camshaft' (cylinder bank 1) has a short circuit to ground.

POSSIBLE CAUSE

- Harness or connectors
  (Intake camshaft actuator circuit)
- Intake camshaft actuator

Diagnosis Procedure

INFOID:0000000013609847

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “DATA MONITOR”.
3. Set the vehicle as the following conditions:

Item	Condition
ENGINE SPEED	3,000 – 3,500 rpm or more
COOLANT TEMPERATURE	80°C (176°F)

4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK INTAKE CAMSHAFT SOLENOID”.
5. Perform Active Test.
   NOTE:
   After performing Active Test, erase DTC if necessary.

Is the actuator actuated?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that No. 212 (15 A) fuse is not blowing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK INTAKE CAMSHAFT ACTUATOR POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect intake camshaft actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake camshaft actuator harness connector and ground.

+		−	Voltage
Intake camshaft actuator			
Connector	Terminal		
F162	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform trouble diagnosis for intake camshaft actuator power supply circuit.

4. CHECK INTAKE CAMSHAFT ACTUATOR CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and intake camshaft actuator harness connector.

+		–		
ECM		Intake camshaft actuator		Continuity
Connector	Terminal	Connector	Terminal	
F149	29	F162	1	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake camshaft actuator. Refer to EM-63, "Exploded View".
NO >> Repair or replace error-detected parts.

P2089 INTAKE CAMSHAFT ACTUATOR

DTC Description

INFOID:0000000013609848

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P2089	00	Camshaft A position actuator b1 (“A” Camshaft Position Actuator Control Circuit High Bank 1)	NO SUBTYPE INFORMATION	Actuator ′Intake camshaft′ (cylinder bank 1) has a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Intake camshaft actuator circuit)
- Intake camshaft actuator

Diagnosis Procedure

INFOID:0000000013609849

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “DATA MONITOR”.
3. Set the vehicle as the following conditions:

Item	Condition
ENGINE SPEED	3,000 – 3,500 rpm or more
COOLANT TEMPERATURE	80°C (176°F)

4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK INTAKE CAMSHAFT SOLENOID”.
5. Perform Active Test.
   NOTE:
   After performing Active Test, erase DTC if necessary.

Is the actuator actuated?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that No. 212 (15 A) fuse is not blowing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK INTAKE CAMSHAFT ACTUATOR POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect intake camshaft actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake camshaft actuator harness connector and ground.

+		−	Voltage
Intake camshaft actuator			
Connector	Terminal		
F162	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform trouble diagnosis for intake camshaft actuator power supply circuit.

4. CHECK INTAKE CAMSHAFT ACTUATOR CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and intake camshaft actuator harness connector.

+		–		
ECM		Intake camshaft actuator		Continuity
Connector	Terminal	Connector	Terminal	
F149	29	F162	1	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake camshaft actuator. Refer to EM-63, "Exploded View".
NO >> Repair or replace error-detected parts.

P2090 EXHAUST CAMSHAFT ACTUATOR

DTC Description

INFOID:0000000013609850

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P2090	00	Camshaft B position actuator b1 (″B″ Camshaft Position Actuator Control Circuit Low Bank 1)	NO SUBTYPE INFORMATION	Actuator ′Exhaust camshaft′ (cylinder bank 1) has a short circuit to ground.

POSSIBLE CAUSE

- Harness or connectors
  (Exhaust camshaft actuator circuit)
- Exhaust camshaft actuator

Diagnosis Procedure

INFOID:0000000013609851

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “DATA MONITOR”.
3. Set the vehicle as the following conditions:

Item	Condition
ENGINE SPEED	3,000 – 3,500 rpm
COOLANT TEMPERATURE	80°C (176°F)

4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK EXHAUST CAMSHAFT SOLENOID”.
5. Perform Active Test.
   NOTE:
   After performing Active Test, erase DTC if necessary.

Is the actuator actuated?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that #212 (15 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK EXHAUST CAMSHAFT ACTUATOR POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect exhaust camshaft actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust camshaft actuator harness connector and ground.

+		−	Voltage
Exhaust camshaft actuator			
Connector	Terminal		
F163	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform trouble diagnosis for exhaust camshaft actuator power supply circuit.

4. CHECK EXHAUST CAMSHAFT ACTUATOR CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and exhaust camshaft actuator harness connector.

+		–		
ECM		Exhaust camshaft actuator		Continuity
Connector	Terminal	Connector	Terminal	
F149	53	F163	1	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace exhaust camshaft actuator. Refer to EM-63, "Exploded View".
NO >> Repair or replace error-detected parts.

P2091 EXHAUST CAMSHAFT ACTUATOR

DTC Description

INFOID:0000000013609852

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P2091	00	Camshaft B position actuator b1 (″B″ Camshaft Position Actuator Control Circuit High Bank 1)	NO SUBTYPE INFORMATION	Actuator ′Exhaust camshaft′ (cylinder bank 1) has a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Exhaust camshaft actuator circuit)
- Exhaust camshaft actuator

Diagnosis Procedure

INFOID:0000000013609853

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “DATA MONITOR”.
3. Set the vehicle as the following conditions:

Item	Condition
ENGINE SPEED	3,000 – 3,500 rpm
COOLANT TEMPERATURE	80°C (176°F)

4. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK EXHAUST CAMSHAFT SOLENOID”.
5. Perform Active Test.
   NOTE:
   After performing Active Test, erase DTC if necessary.

Is the actuator actuated?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that #212 (15 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK EXHAUST CAMSHAFT ACTUATOR POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect exhaust camshaft actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust camshaft actuator harness connector and ground.

+		−	Voltage
Exhaust camshaft actuator			
Connector	Terminal		
F163	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform trouble diagnosis for exhaust camshaft actuator power supply circuit.

4. CHECK EXHAUST CAMSHAFT ACTUATOR CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and exhaust camshaft actuator harness connector.

+		–		
ECM		Exhaust camshaft actuator		Continuity
Connector	Terminal	Connector	Terminal	
F149	53	F163	1	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace exhaust camshaft actuator. Refer to EM-63, "Exploded View".
NO >> Repair or replace error-detected parts.

P2096 AIR-FUEL RATIO

DTC Description

INFOID:0000000013609854

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P2096	00	Post catalyst fuel trim system b1 (Post Catalyst Fuel Trim System Too Lean Bank 1)	NO SUBTYPE INFORMATION	The mixture is too lean downstream of the catalytic converter (cylinder bank 1).

POSSIBLE CAUSE

Mixture adaptation

Diagnosis Procedure

INFOID:0000000013609855

1.PERFORM ACTIVE TEST

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “MIXTURE ADAPTATION”.
3. Set the vehicle under the following conditions:

Monitor item	Condition
ENGINE SPEED	400 – 800 rpm
C/AIR TEMP/S U/STRM THRTL	40 – 80°C (104 –176°F)
ENGINE LOAD	30% or less
COOLANT TEMPERATURE	80°C (176°F) or more
L/CONT STAT U/STRM RH CAT	ACTIVE
GEAR RANGE ENGAGED	P/N

4. Perform the Active Test.
   NOTE:
   The test takes up to approximately 60 seconds.
5. Check that “CMPLT” is displayed.

>> GO TO 2.

2.CHECK CONDITION

With CONSULT

Check that all items fill each conditions as follows.

Item	Condition
SELF ADJ LWR P/LOAD RANGE	0.85 – 1.15
IN/MNFLD P CRR VL (STRTFD)	Less then 25 hPa (0.025 bar, 0.0255 kg-cm^2, 0.3625 psi)
MASS AIR FLOW CRRCTN VAL	0 – 15 kg/h

>> INSPECTION END

P2097 AIR-FUEL RATIO

DTC Description

INFOID:0000000013609856

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P2097	00	Post catalyst fuel trim system b1 (Post Catalyst Fuel Trim System Too Rich Bank 1)	NO SUBTYPE INFORMATION	The mixture is too rich downstream of the catalytic converter (cylinder bank 1).

POSSIBLE CAUSE

Mixture adaptation

Diagnosis Procedure

INFOID:0000000013609857

1.PERFORM ACTIVE TEST

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “MIXTURE ADAPTATION”.
3. Set the vehicle under the following conditions:

Monitor item	Condition
ENGINE SPEED	400 – 800 rpm
C/AIR TEMP/S U/STRM THRTL	40 – 80°C (104 –176°F)
ENGINE LOAD	30% or less
COOLANT TEMPERATURE	80°C (176°F) or more
L/CONT STAT U/STRM RH CAT	ACTIVE
GEAR RANGE ENGAGED	P/N

4. Perform the Active Test.
   NOTE:
   The test takes up to approximately 60 seconds.
5. Check that “CMPLT” is displayed.

>> GO TO 2.

2.CHECK CONDITION

With CONSULT

Check that all items fill each conditions as follows.

Item	Condition
SELF ADJ LWR P/LOAD RANGE	0.85 – 1.15
IN/MNFLD P CRR VL (STRTFD)	Less then 25 hPa (0.025 bar, 0.0255 kg-cm^2, 0.3625 psi)
MASS AIR FLOW CRRCTN VAL	0 – 15 kg/h

>> INSPECTION END

P2101 THROTTLE VALVE ACTUATOR

DTC Description

INFOID:0000000013609858

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2101	00	THROTTLE ACT A CONT MOTOR (Throttle Actuator A Control Motor Circuit Range/Performance)	NO SUBTYPE INFORMATION	The throttle valve actuator has a malfunction.
	28		SG BS LVL O-OF RNG/ZR AJST ERR	The throttle valve actuator has a malfunction. The signal offset is outside the permissible range.
	29		SIGNAL INVALID	The throttle valve actuator has a malfunction. There is an invalid signal.
	64		SIGNAL PLAUSIBILITY ERROR	The throttle valve actuator has a malfunction. There is an implausible signal.
	84		SIG BELOW ALLOWABLE RANGE	he throttle valve actuator has a malfunction. There is a signal below the permissible limit value.
	85		SIG ABOVE ALLOWABLE RANGE	he throttle valve actuator has a malfunction. There is a signal above the permissible limit value.

POSSIBLE CAUSE

- Harness and connectors (Throttle valve actuator circuit is open or shorted.)
- Throttle valve actuator

Diagnosis Procedure

INFOID:0000000013609859

1.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect throttle valve actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between throttle valve actuator harness connector terminals.

Throttle valve actuator			Voltage
Connector	+	–	
	Terminal		
F148	4	6	4.75 – 5.25 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY AND GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	4	F149	17	Existed
	6		14	

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

NO >> Repair or replace error-detected parts.

3. CHECK THROTTLE VALVE POSITION SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	5	F149	62	Existed
	3		38	

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK THROTTLE VALVE ACTUATOR MOTOR CONTROL CIRCUIT

1. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	1	F149	24	Existed
	2		48	

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace throttle valve actuator. Refer to EM-28, "Exploded View"
NO >> Repair or replace error-detected parts.

P2102 THROTTLE VALVE ACTUATOR

DTC Description

INFOID:0000000013609860

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2102	00	THROTTLE ACT A CONT MOTOR (Throttle Actuator "A" Control Motor Circuit Low)	NO SUBTYPE INFORMATION	The throttle valve actuator has a short circuit to ground.

POSSIBLE CAUSE

- Harness and connectors (Throttle valve actuator circuit is open or shorted.)
- Throttle valve actuator

Diagnosis Procedure

INFOID:0000000013609861

1.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect throttle valve actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between throttle valve actuator harness connector terminals.

Throttle valve actuator			Voltage
Connector	+	–	
	Terminal		
F148	4	6	4.75 – 5.25 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY AND GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	4	F149	17	Existed
	6		14	

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

3.CHECK THROTTLE VALVE POSITION SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	5	F149	62	Existed
	3		38	

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE VALVE ACTUATOR MOTOR CONTROL CIRCUIT

1. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	1	F149	24	Existed
	2		48	

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace throttle valve actuator. Refer to EM-28, "Exploded View"
NO >> Repair or replace error-detected parts.

P2103 THROTTLE VALVE ACTUATOR

DTC Description

INFOID:0000000013609862

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2103	00	THROTTLE ACT A CONT MOTOR (Throttle Actuator "A" Control Motor Circuit High)	NO SUBTYPE INFORMATION	The throttle valve actuator has a short circuit to positive.

POSSIBLE CAUSE

- Harness and connectors (Throttle valve actuator circuit is open or shorted.)
- Throttle valve actuator

Diagnosis Procedure

INFOID:0000000013609863

1.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect throttle valve actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between throttle valve actuator harness connector terminals.

Throttle valve actuator			Voltage
Connector	+	–	
	Terminal		
F148	4	6	4.75 – 5.25 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY AND GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	4	F149	17	Existed
	6		14	

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

3.CHECK THROTTLE VALVE POSITION SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	5	F149	62	Existed
	3		38	

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE VALVE ACTUATOR MOTOR CONTROL CIRCUIT

1. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	1	F149	24	Existed
	2		48	

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace throttle valve actuator. Refer to EM-28, "Exploded View"
NO >> Repair or replace error-detected parts.

P2111 THROTTLE VALVE ACTUATOR

DTC Description

INFOID:0000000013609864

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2111	00	Throttle actuator A control system (Throttle Actuator "A" Control System - Stuck Open)	NO SUBTYPE INFORMATION	The throttle valve is jammed open.

POSSIBLE CAUSE

- Harness and connectors
  (Throttle valve actuator circuit is open or shorted.)
- Throttle valve actuator

Diagnosis Procedure

INFOID:0000000013609865

1.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect throttle valve actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between throttle valve actuator harness connector terminals.

Throttle valve actuator			Voltage
Connector	+	–	
	Terminal		
F148	4	6	4.75 – 5.25 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY AND GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	4	F149	17	Existed
	6		14	

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

3.CHECK THROTTLE VALVE POSITION SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	5	F149	62	Existed
	3		38	

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE VALVE ACTUATOR MOTOR CONTROL CIRCUIT

1. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	1	F149	24	Existed
	2		48	

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace throttle valve actuator. Refer to EM-28, "Exploded View"
NO >> Repair or replace error-detected parts.

P2119 THROTTLE VALVE

DTC Description

INFOID:0000000013609866

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2119	00	THROTTLE ACT A CONT THRTL BDY (Throttle Actuator ″A″ Control Throttle Body Range/Performance)	NO SUBTYPE INFORMATION	The throttle valve has a mechanical malfunction.

POSSIBLE CAUSE

- Harness and connectors
  (Throttle valve actuator circuit is open or shorted.)
- Throttle valve actuator

Diagnosis Procedure

INFOID:0000000013609867

1.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect throttle valve actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between throttle valve actuator harness connector terminals.

Throttle valve actuator			Voltage
Connector	+	–	
	Terminal		
F148	4	6	4.75 – 5.25 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY AND GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	4	F149	17	Existed
	6		14	

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

3.CHECK THROTTLE VALVE POSITION SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	5	F149	62	Existed
	3		38	

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE VALVE ACTUATOR MOTOR CONTROL CIRCUIT

1. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	1	F149	24	Existed
	2		48	

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace throttle valve actuator. Refer to EM-28, "Exploded View"
NO >> Repair or replace error-detected parts.

P2122 ACCELERATOR PEDAL POSITION SENSOR 1

Diagnosis Description

INFOID:0000000013609868

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2122	00	THROTTLE/PDL POSITION SEN/SW D (Throttle/Pedal Position Sensor/ Switch ″D″ Circuit Low)	NO SUBTYPE INFORMATION	Position sensor 1 for the accelerator pedal has a short circuit to ground.

POSSIBLE CAUSE

- Harness and connectors
  (Accelerator pedal position sensor 1 circuit is open or shorted.)
- Accelerator pedal position sensor 1

Diagnosis Procedure

INFOID:0000000013609869

1.CHECK ACCELERATOR PEDAL POSITION SENSOR FUNCTION

With CONSULT

1. Turn ignition switch ON (engine stopped).
2. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “ACCELERATOR PEDAL SEN 1” and “ACCELERATOR PEDAL SEN 2”.
3. Check the value of monitor items as following conditions.

Item	Condition	Value
ACCELERATOR PEDAL SEN 1	Accelerator pedal: fully released	0.2 – 0.5 V
	Accelerator pedal: fully depressed	4.3 – 4.8 V
ACCELERATOR PEDAL SEN 2	Accelerator pedal: fully released	0.1 – 0.5 V
	Accelerator pedal: fully depressed	2.1 – 2.5 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between accelerator pedal position sensor harness connector and ground.

+		−	Voltage (Approx.)
Accelerator pedal position sensor			
Connector	Terminal		
E95	1	Ground	4.75 – 5.25 V
	5		

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. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

+		–		Continuity
Accelerator pedal position sensor		ECM		
Connector	Terminal	Connector	Terminal	
E95	1	E48	104	Existed
	5		105	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

NO >> Repair or replace error-detected parts.

4. CHECK ACCELERATOR PEDAL POSITION SENSOR 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.

+		–		Continuity
Accelerator pedal position sensor		ECM		
Connector	Terminal	Connector	Terminal	
E95	2	E48	132	Existed
	3		106	
	4		119	
	6		145	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Replace accelerator pedal position sensor. Refer to ACC-4, "Removal and Installation".

NO >> Repair or replace error-detected parts.

P2123 ACCELERATOR PEDAL POSITION SENSOR 1

Diagnosis Description

INFOID:0000000013609870

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2123	00	THROTTLE/PDL POSITION SEN/SW D (Throttle/Pedal Position Sensor/ Switch ″D″ Circuit High)	NO SUBTYPE INFORMATION	Position sensor 1 for the accelerator pedal has a short circuit to positive.

POSSIBLE CAUSE

- Harness and connectors
  (Accelerator pedal position sensor 1 circuit is open or shorted.)
- Accelerator pedal position sensor 1

Diagnosis Procedure

INFOID:0000000013609871

1.CHECK ACCELERATOR PEDAL POSITION SENSOR FUNCTION

With CONSULT

1. Turn ignition switch ON (engine stopped).
2. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “ACCELERATOR PEDAL SEN 1” and “ACCELERATOR PEDAL SEN 2”.
3. Check the value of monitor items as following conditions.

Item	Condition	Value
ACCELERATOR PEDAL SEN 1	Accelerator pedal: fully released	0.2 – 0.5 V
	Accelerator pedal: fully depressed	4.3 – 4.8 V
ACCELERATOR PEDAL SEN 2	Accelerator pedal: fully released	0.1 – 0.5 V
	Accelerator pedal: fully depressed	2.1 – 2.5 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between accelerator pedal position sensor harness connector and ground.

+		−	Voltage (Approx.)
Accelerator pedal position sensor			
Connector	Terminal		
E95	1	Ground	4.75 – 5.25 V
	5		

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. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

+		–		Continuity
Accelerator pedal position sensor		ECM		
Connector	Terminal	Connector	Terminal	
E95	1	E48	104	Existed
	5		105	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

NO >> Repair or replace error-detected parts.

4. CHECK ACCELERATOR PEDAL POSITION SENSOR 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.

+		–		Continuity
Accelerator pedal position sensor		ECM		
Connector	Terminal	Connector	Terminal	
E95	2	E48	132	Existed
	3		106	
	4		119	
	6		145	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Replace accelerator pedal position sensor. Refer to ACC-4, "Removal and Installation".

NO >> Repair or replace error-detected parts.

P2127 ACCELERATOR PEDAL POSITION SENSOR 2

Diagnosis Description

INFOID:0000000013609872

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2127	11	CIRCUIT SHORT TO GROUND (Throttle/Pedal Position Sensor/ Switch ″E″ Circuit Low)	CIRCUIT SHORT TO GROUND	Position sensor 2 for the accelerator pedal has a short circuit to ground. There is a short circuit to ground.

POSSIBLE CAUSE

- Harness and connectors
  (Accelerator pedal position sensor 2 circuit is open or shorted.)
- Accelerator pedal position sensor 2

Diagnosis Procedure

INFOID:0000000013609873

1.CHECK ACCELERATOR PEDAL POSITION SENSOR FUNCTION

With CONSULT

1. Turn ignition switch ON (engine stopped).
2. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “ACCELERATOR PEDAL SEN 1” and “ACCELERATOR PEDAL SEN 2”.
3. Check the value of monitor items as following conditions.

Item	Condition	Value
ACCELERATOR PEDAL SEN 1	Accelerator pedal: fully released	0.2 – 0.5 V
	Accelerator pedal: fully depressed	4.3 – 4.8 V
ACCELERATOR PEDAL SEN 2	Accelerator pedal: fully released	0.1 – 0.5 V
	Accelerator pedal: fully depressed	2.1 – 2.5 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between accelerator pedal position sensor harness connector and ground.

+		−	Voltage (Approx.)
Accelerator pedal position sensor			
Connector	Terminal		
E95	1	Ground	4.75 – 5.25 V
	5		

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. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

+		–		Continuity
Accelerator pedal position sensor		ECM		
Connector	Terminal	Connector	Terminal	
E95	1	E48	104	Existed
	5		105	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

NO >> Repair or replace error-detected parts.

4. CHECK ACCELERATOR PEDAL POSITION SENSOR 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.

+		–		Continuity
Accelerator pedal position sensor		ECM		
Connector	Terminal	Connector	Terminal	
E95	2	E48	132	Existed
	3		106	
	4		119	
	6		145	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Replace accelerator pedal position sensor. Refer to ACC-4, "Removal and Installation".

NO >> Repair or replace error-detected parts.

P2128 ACCELERATOR PEDAL POSITION SENSOR 2

Diagnosis Description

INFOID:0000000013609874

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2128	12	THROTTLE/PDL POSITION SEN/SW E (Throttle Pedal Position Sensor/ Switch ″E″ Circuit High)	CIRCUIT SHORT TO BATTERY	Position sensor 2 for the accelerator pedal has a short circuit to positive There is a short circuit to positive.

POSSIBLE CAUSE

- Harness and connectors
  (Accelerator pedal position sensor 2 circuit is open or shorted.)
- Accelerator pedal position sensor 2

Diagnosis Procedure

INFOID:0000000013609875

1.CHECK ACCELERATOR PEDAL POSITION SENSOR FUNCTION

With CONSULT

1. Turn ignition switch ON (engine stopped).
2. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “ACCELERATOR PEDAL SEN 1” and “ACCELERATOR PEDAL SEN 2”.
3. Check the value of monitor items as following conditions.

Item	Condition	Value
ACCELERATOR PEDAL SEN 1	Accelerator pedal: fully released	0.2 – 0.5 V
	Accelerator pedal: fully depressed	4.3 – 4.8 V
ACCELERATOR PEDAL SEN 2	Accelerator pedal: fully released	0.1 – 0.5 V
	Accelerator pedal: fully depressed	2.1 – 2.5 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between accelerator pedal position sensor harness connector and ground.

+		–	Voltage (Approx.)
Accelerator pedal position sensor			
Connector	Terminal		
E95	1	Ground	4.75 – 5.25 V
	5		

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. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

+		–		Continuity
Accelerator pedal position sensor		ECM		
Connector	Terminal	Connector	Terminal	
E95	1	E48	104	Existed
	5		105	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

NO >> Repair or replace error-detected parts.

4. CHECK ACCELERATOR PEDAL POSITION SENSOR 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.

+		–		Continuity
Accelerator pedal position sensor		ECM		
Connector	Terminal	Connector	Terminal	
E95	2	E48	132	Existed
	3		106	
	4		119	
	6		145	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Replace accelerator pedal position sensor. Refer to ACC-4, "Removal and Installation".

NO >> Repair or replace error-detected parts.

P2135 THROTTLE VALVE POSITION SENSOR

Diagnosis Description

INFOID:0000000013609876

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2135	00	THTL/PDL POS SEN/SW A/B CRRLTN (Throttle/Pedal Position Sensor/ Switch "A"/"B" Voltage Correlation)	NO SUBTYPE INFORMATION	The values from the position sensors of the throttle valve are implausible relative to each other.

POSSIBLE CAUSE

- Harness and connectors
  (Throttle valve actuator circuit is open or shorted.)
- Throttle valve actuator

Diagnosis Procedure

INFOID:0000000013609877

1.CHECK THROTTLE VALVE ACTUATOR

Check throttle valve actuator. Refer to EC-684, "Component Inspection (Throttle Valve Actuator)".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace throttle valve actuator. Refer to EM-28, "Exploded View".

2.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between throttle valve actuator harness connector and ground.

+		−	Voltage (Approx.)
Throttle valve actuator			
Connector	Terminal		
F148	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 4.

3.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		−		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	4	F149	17	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE VALVE POSITION SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	3	F149	38	Existed
	5		62	
	6		14	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Throttle Valve Actuator)

INFOID:0000000013609878

1.CHECK THROTTLE VALVE MOTOR

1. Turn ignition switch OFF.
2. Disconnect throttle valve actuator harness connector.
3. Check the resistance between throttle valve actuator terminals.

Terminal	Resistance
1 and 2	1 – 10 Ω

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace throttle valve actuator. Refer to EM-29, "Removal and Installation".

2.CHECK THROTTLE VALVE

1. Remove throttle valve actuator.
2. Operate throttle valve slowly by hand as far as the wide open position.
3. Check that the throttle valve does not stick and returning to closed position by spring force.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace throttle valve actuator. Refer to EM-29, "Removal and Installation".

P2136 THROTTLE VALVE POSITION SENSOR

Diagnosis Description

INFOID:0000000013609879

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2136	29	THTL/PDL POS SEN/SW A/C CRRLTN (Throttle/Pedal Position Sensor/Switch ″A″/″C″ Voltage Correlation)	SIGNAL INVALID	The values from the position sensors “A″/″C” of the throttle valve are implausible relative to each other. There is an invalid signal.

POSSIBLE CAUSE

- Harness and connectors
  (Throttle valve actuator circuit is open or shorted.)
- Throttle valve actuator

Diagnosis Procedure

INFOID:0000000013609880

1.CHECK THROTTLE VALVE ACTUATOR

Check throttle valve actuator. Refer to EC-684, "Component Inspection (Throttle Valve Actuator)".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace throttle valve actuator. Refer to EM-28, "Exploded View".

2.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between throttle valve actuator harness connector and ground.

+		−	Voltage (Approx.)
Throttle valve actuator			
Connector	Terminal		
F148	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 4.

3.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		−		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	4	F149	17	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE VALVE POSITION SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	3	F149	38	Existed
	5		62	
	6		14	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Throttle Valve Actuator)

INFOID:0000000013609881

1.CHECK THROTTLE VALVE MOTOR

1. Turn ignition switch OFF.
2. Disconnect throttle valve actuator harness connector.
3. Check the resistance between throttle valve actuator terminals.

Terminal	Resistance
1 and 2	1 – 10 Ω

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace throttle valve actuator. Refer to EM-29, "Removal and Installation".

2.CHECK THROTTLE VALVE

1. Remove throttle valve actuator.
2. Operate throttle valve slowly by hand as far as the wide open position.
3. Check that the throttle valve does not stick and returning to closed position by spring force.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace throttle valve actuator. Refer to EM-29, "Removal and Installation".

P2137 THROTTLE VALVE POSITION SENSOR

Diagnosis Description

INFOID:0000000013609882

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2137	00	Thrtl/Pdl pos sen/sw B/C correlatn (Throttle/Pedal Position Sensor/Switch "B"/"C" Voltage Correlation)	NO SUBTYPE INFORMATION	The values from the position sensors "B/C" of the throttle valve are implausible relative to each other.

POSSIBLE CAUSE

- Harness and connectors
  (Throttle valve actuator circuit is open or shorted.)
- Throttle valve actuator

Diagnosis Procedure

INFOID:0000000013609883

1.CHECK THROTTLE VALVE ACTUATOR

Check throttle valve actuator. Refer to EC-684, "Component Inspection (Throttle Valve Actuator)".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace throttle valve actuator. Refer to EM-28, "Exploded View".

2.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between throttle valve actuator harness connector and ground.

+		−	Voltage (Approx.)
Throttle valve actuator			
Connector	Terminal		
F148	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 4.

3.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		−		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	4	F149	17	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE VALVE POSITION SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	3	F149	38	Existed
	5		62	
	6		14	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Throttle Valve Actuator)

INFOID:0000000013609884

1.CHECK THROTTLE VALVE MOTOR

1. Turn ignition switch OFF.
2. Disconnect throttle valve actuator harness connector.
3. Check the resistance between throttle valve actuator terminals.

Terminal	Resistance
1 and 2	1 – 10 Ω

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace throttle valve actuator. Refer to EM-29, "Removal and Installation".

2.CHECK THROTTLE VALVE

1. Remove throttle valve actuator.
2. Operate throttle valve slowly by hand as far as the wide open position.
3. Check that the throttle valve does not stick and returning to closed position by spring force.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace throttle valve actuator. Refer to EM-29, "Removal and Installation".

P2138 ACCELERATOR PEDAL POSITION SENSOR

Diagnosis Description

INFOID:0000000013609885

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2138	00	THTL/PDL POS SEN/SW D/E CRRLTN (Throttle/Pedal Position Sensor/Switch "D"/"E" Voltage Correlation)	NO SUBTYPE INFORMATION	The values from the position sensors of the accelerator pedal are implausible relative to each other.

POSSIBLE CAUSE

- Harness and connectors
  (Accelerator pedal position sensor circuit is open or shorted.)
- Accelerator pedal position sensor

Diagnosis Procedure

INFOID:0000000013609886

1.CHECK ACCELERATOR PEDAL POSITION SENSOR FUNCTION

With CONSULT

1. Turn ignition switch ON (engine stopped).
2. On CONSULT screen, select "ENGINE" >> "DATA MONITOR" >> "ACCELERATOR PEDAL SEN 1" and "ACCELERATOR PEDAL SEN 2".
3. Check the value of monitor items as following conditions.

Item	Condition	Value
ACCELERATOR PEDAL SEN 1	Accelerator pedal: fully released	0.2 – 0.5 V
	Accelerator pedal: fully depressed	4.3 – 4.8 V
ACCELERATOR PEDAL SEN 2	Accelerator pedal: fully released	0.1 – 0.5 V
	Accelerator pedal: fully depressed	2.1 – 2.5 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between accelerator pedal position sensor harness connector and ground.

+		−	Voltage (Approx.)
Accelerator pedal position sensor			
Connector	Terminal		
E95	1	Ground	4.75 – 5.25 V
	5		

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. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

+		–		Continuity
Accelerator pedal position sensor		ECM		
Connector	Terminal	Connector	Terminal	
E95	1	E48	104	Existed
	5		105	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

NO >> Repair or replace error-detected parts.

4. CHECK ACCELERATOR PEDAL POSITION SENSOR 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.

+		–		Continuity
Accelerator pedal position sensor		ECM		
Connector	Terminal	Connector	Terminal	
E95	2	E48	132	Existed
	3		106	
	4		119	
	6		145	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Replace accelerator pedal position sensor. Refer to ACC-4, "Removal and Installation".

NO >> Repair or replace error-detected parts.

P2176 THROTTLE VALVE ACTUATOR

DTC Description

INFOID:0000000013609887

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2176	09	Throttle actuator A control system (Throttle Actuator "A" Control System - Idle Position Not Learned)	COMPONENT MALFUNCTION	Adaptation of the idle position of the throttle valve actuator was not performed. There is a component malfunction.
	16		CIRC VOLT BELOW THRESHOLD	Adaptation of the idle position of the throttle valve actuator was not performed. The limit value for electrical voltage has not been attained.
	17		CIRC VOLT ABOVE THRESHOLD	Adaptation of the idle position of the throttle valve actuator was not performed. The limit value for electrical voltage has been exceeded.

POSSIBLE CAUSE

- Harness and connectors
  (Throttle valve actuator circuit is open or shorted.)
- Throttle valve actuator

Diagnosis Procedure

INFOID:0000000013609888

1.CHECK THROTTLE VALVE ACTUATOR

Check throttle valve actuator. Refer to EC-684, "Component Inspection (Throttle Valve Actuator)".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace throttle valve actuator. Refer to EM-28, "Exploded View".

2.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between throttle valve actuator harness connector and ground.

+		−	Voltage (Approx.)
Throttle valve actuator			
Connector	Terminal		
F148	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 4.

3.CHECK THROTTLE VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		−		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	4	F149	17	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4. CHECK THROTTLE VALVE POSITION SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between throttle valve actuator harness connector and ECM harness connector.

+		–		Continuity
Throttle valve actuator		ECM		
Connector	Terminal	Connector	Terminal	
F148	3	F149	38	Existed
	5		62	
	6		14	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P2177 AIR-FUEL RATIO

DTC Description

INFOID:0000000013609889

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2177	00	System lean bank1 (System Too Lean Off Idle Bank 1)	NO SUBTYPE INFORMATION	The mixture (cylinder bank 1) is too lean in partial load operation.
	97		CMP/SYS OPR OBST OR BLKD	The mixture (cylinder bank 1) is too lean in partial load operation. The system function is restricted.

POSSIBLE CAUSE

Mixture adaptation

Diagnosis Procedure

INFOID:0000000013609890

1.PERFORM ACTIVE TEST

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “MIXTURE ADAPTATION”.
3. Set the vehicle under the following conditions:

Monitor item	Condition
ENGINE SPEED	400 – 800 rpm
C/AIR TEMP/S U/STRM THRTL	40 – 80°C (104 –176°F)
ENGINE LOAD	30% or less
COOLANT TEMPERATURE	80°C (176°F) or more
L/CONT STAT U/STRM RH CAT	ACTIVE
GEAR RANGE ENGAGED	P/N

4. Perform the Active Test.
   NOTE:
   The test takes up to approximately 60 seconds.
5. Check that “CMPLT” is displayed.

>> GO TO 2.

2.CHECK CONDITION

With CONSULT

Check that all items fill each conditions as follows.

Item	Condition
SELF ADJ LWR P/LOAD RANGE	0.85 – 1.15
IN/MNFLD P CRR VL (STRTFD)	Less then 25 hPa (0.025 bar, 0.0255 kg-cm^2, 0.3625 psi)
MASS AIR FLOW CRRCTN VAL	0 – 15 kg/h

>> INSPECTION END

P2178 AIR-FUEL RATIO

DTC Description

INFOID:0000000013609891

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2178	00	System rich bank1 (System Too Rich Off Idle Bank 1)	NO SUBTYPE INFORMATION	The mixture (cylinder bank 1) is too rich in partial load operation.
	97		CMP/SYS OPR OBST OR BLKD	The mixture (cylinder bank 1) is too rich in partial load operation. The system function is restricted.

POSSIBLE CAUSE

Mixture adaptation

Diagnosis Procedure

INFOID:0000000013609892

1.PERFORM ACTIVE TEST

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “MIXTURE ADAPTATION”.
3. Set the vehicle under the following conditions:

Monitor item	Condition
ENGINE SPEED	400 – 800 rpm
C/AIR TEMP/S U/STRM THRTL	40 – 80°C (104 –176°F)
ENGINE LOAD	30% or less
COOLANT TEMPERATURE	80°C (176°F) or more
L/CONT STAT U/STRM RH CAT	ACTIVE
GEAR RANGE ENGAGED	P/N

4. Perform the Active Test.
   NOTE:
   The test takes up to approximately 60 seconds.
5. Check that “CMPLT” is displayed.

>> GO TO 2.

2.CHECK CONDITION

With CONSULT

Check that all items fill each conditions as follows.

Item	Condition
SELF ADJ LWR P/LOAD RANGE	0.85 – 1.15
IN/MNFLD P CRR VL (STRTFD)	Less then 25 hPa (0.025 bar, 0.0255 kg-cm^2, 0.3625 psi)
MASS AIR FLOW CRRCTN VAL	0 – 15 kg/h

>> INSPECTION END

P2187 AIR-FUEL RATIO

DTC Description

INFOID:0000000013609893

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2187	62	System lean bank1 (System Too Lean at Idle Bank 1)	SIGNAL COMPARE ERROR	The mixture (cylinder bank 1) is too lean at idle speed. The signal comparison is malfunctioning.
	97		CMP/SYS OPR OBST OR BLKD	The mixture (cylinder bank 1) is too lean at idle speed. The system function is restricted.

POSSIBLE CAUSE

Mixture adaptation

Diagnosis Procedure

INFOID:0000000013609894

1.PERFORM ACTIVE TEST

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “MIXTURE ADAPTATION”.
3. Set the vehicle under the following conditions:

Monitor item	Condition
ENGINE SPEED	400 – 800 rpm
C/AIR TEMP/S U/STRM THRTL	40 – 80°C (104 –176°F)
ENGINE LOAD	30% or less
COOLANT TEMPERATURE	80°C (176°F) or more
L/CONT STAT U/STRM RH CAT	ACTIVE
GEAR RANGE ENGAGED	P/N

4. Perform the Active Test.
   NOTE:
   The test takes up to approximately 60 seconds.
5. Check that “CMPLT” is displayed.

>> GO TO 2.

2.CHECK CONDITION

With CONSULT

Check that all items fill each conditions as follows.

Item	Condition
SELF ADJ LWR P/LOAD RANGE	0.85 – 1.15
IN/MNFLD P CRR VL (STRTFD)	Less then 25 hPa (0.025 bar, 0.0255 kg-cm^2, 0.3625 psi)
MASS AIR FLOW CRRCTN VAL	0 – 15 kg/h

>> INSPECTION END

P2188 AIR-FUEL RATIO

DTC Description

INFOID:0000000013609895

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2188	62	System rich bank1 (System Too Rich at Idle Bank 1)	SIGNAL COMPARE ERROR	The mixture (cylinder bank 1) is too rich at idle speed. The signal comparison is malfunctioning.
	97		CMP/SYS OPR OBST OR BLKD	The mixture (cylinder bank 1) is too rich at idle speed. The system function is restricted.

POSSIBLE CAUSE

Mixture adaptation

Diagnosis Procedure

INFOID:0000000013609896

1.PERFORM ACTIVE TEST

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “MIXTURE ADAPTATION”.
3. Set the vehicle under the following conditions:

Monitor item	Condition
ENGINE SPEED	400 – 800 rpm
C/AIR TEMP/S U/STRM THRTL	40 – 80°C (104 –176°F)
ENGINE LOAD	30% or less
COOLANT TEMPERATURE	80°C (176°F) or more
L/CONT STAT U/STRM RH CAT	ACTIVE
GEAR RANGE ENGAGED	P/N

4. Perform the Active Test.
   NOTE:
   The test takes up to approximately 60 seconds.
5. Check that “CMPLT” is displayed.

>> GO TO 2.

2.CHECK CONDITION

With CONSULT

Check that all items fill each conditions as follows.

Item	Condition
SELF ADJ LWR P/LOAD RANGE	0.85 – 1.15
IN/MNFLD P CRR VL (STRTFD)	Less then 25 hPa (0.025 bar, 0.0255 kg-cm^2, 0.3625 psi)
MASS AIR FLOW CRRCTN VAL	0 – 15 kg/h

>> INSPECTION END

P2195 A/F SENSOR

DTC Description

INFOID:0000000013609897

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P2195	00	O2 SENSOR SIGNAL B1 SEN 1 (O2 Sensor Signal Biased/ Stuck Lean Bank 1 Sensor 1)	NO SUBTYPE INFORMATION	The signal from oxygen sensor 1 (cylinder bank 1) is shifted towards “Lean”.
	85		SIG ABOVE ALLOWABLE RANGE	The signal from oxygen sensor 1 (cylinder bank 1) is shifted towards “Lean”. There is a signal above the permissible limit value.

POSSIBLE CAUSE

- Harness and connectors
  (A/F sensor circuit is open or shorted.)
- A/F sensor

Diagnosis Procedure

INFOID:0000000013609898

1.CHECK A/F SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect A/F sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor harness connector and ground.

+		−	Voltage
A/F sensor			
Connector	Terminal		
F143	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK A/F SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between A/F sensor harness connector and fuse terminal.

+		−	Continuity
A/F sensor			
Connector	Terminal		
F143	4	#214 fuse terminal	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR HEATER CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor harness connector and ECM harness connector.

+		–		Continuity
A/F sensor		ECM		
Connector	Terminal	Connector	Terminal	
F143	1	F149	63	Existed
	2		64	
	3		77	
	5		88	
	6		87	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace A/F sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P2196 A/F SENSOR

DTC Description

INFOID:0000000013609899

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P2196	00	O2 SENSOR B1 SENSOR 1 (O2 sensor signal biased/stuck rich bank 1 sensor 1)	NO SUBTYPE INFORMATION	The signal from oxygen sensor 1 (cylinder bank 1) is shifted towards “Rich”.
	84		SIG BELOW ALLOWABLE RANGE	The signal from oxygen sensor 1 (cylinder bank 1) is shifted towards “Rich”. There is a signal below the permissible limit value.

POSSIBLE CAUSE

- Harness and connectors
  (A/F sensor circuit is open or shorted.)
- A/F sensor

Diagnosis Procedure

INFOID:0000000013609900

1.CHECK A/F SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect A/F sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor harness connector and ground.

+		−	Voltage
A/F sensor			
Connector	Terminal		
F143	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK A/F SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between A/F sensor harness connector and fuse terminal.

+		−	Continuity
A/F sensor			
Connector	Terminal		
F143	4	#214 fuse terminal	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR HEATER CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor harness connector and ECM harness connector.

+		–		Continuity
A/F sensor		ECM		
Connector	Terminal	Connector	Terminal	
F143	1	F149	63	Existed
	2		64	
	3		77	
	5		88	
	6		87	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace A/F sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P219C AIR-FUEL RATIO IMBALANCE (CYLINDER 1)

DTC Description

INFOID:0000000013609901

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P219C	77	Cylinder 1 Air-fuel ratio imbalance (Cylinder 1 Air-Fuel Ratio Imbalance)	COMMAND POSI NOT REACHABLE	Mixture formation (cylinder 1) is irregular. The commanded position cannot be reached.
	78		ALGNMNT OR ADJSTMNT INCRRCT	Mixture formation (cylinder 1) is irregular. The adaptation or adjustment is incorrect.

POSSIBLE CAUSE

Mixture adaptation

Diagnosis Procedure

INFOID:0000000013609902

1.PERFORM ACTIVE TEST

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “MIXTURE ADAPTATION”.
3. Set the vehicle under the following conditions:

Monitor item	Condition
ENGINE SPEED	400 – 800 rpm
C/AIR TEMP/S U/STRM THRTL	40 – 80°C (104 –176°F)
ENGINE LOAD	30% or less
COOLANT TEMPERATURE	80°C (176°F) or more
L/CONT STAT U/STRM RH CAT	ACTIVE
GEAR RANGE ENGAGED	P/N

4. Perform the Active Test.
   NOTE:
   The test takes up to approximately 60 seconds.
5. Check that “CMPLT” is displayed.

>> GO TO 2.

2.CHECK CONDITION

With CONSULT

Check that all items fill each conditions as follows.

Item	Condition
SELF ADJ LWR P/LOAD RANGE	0.85 – 1.15
IN/MNFLD P CRR VL (STRTFD)	Less then 25 hPa (0.025 bar, 0.0255 kg-cm^2, 0.3625 psi)
MASS AIR FLOW CRRCTN VAL	0 – 15 kg/h

>> INSPECTION END

P219D AIR-FUEL RATIO IMBALANCE (CYLINDER 2)

DTC Description

INFOID:0000000013609903

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P219D	77	Cylinder 2 Air-fuel ratio imbalance (Cylinder 2 Air-Fuel Ratio Imbalance)	COMMAND POSI NOT REACHABLE	Mixture formation (cylinder 2) is irregular. The commanded position cannot be reached.
	78		ALGNMNT OR ADJSTMNT INCRRCT	Mixture formation (cylinder 2) is irregular. The adaptation or adjustment is incorrect.

POSSIBLE CAUSE

Mixture adaptation

Diagnosis Procedure

INFOID:0000000013609904

1.PERFORM ACTIVE TEST

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “MIXTURE ADAPTATION”.
3. Set the vehicle under the following conditions:

Monitor item	Condition
ENGINE SPEED	400 – 800 rpm
C/AIR TEMP/S U/STRM THRTL	40 – 80°C (104 –176°F)
ENGINE LOAD	30% or less
COOLANT TEMPERATURE	80°C (176°F) or more
L/CONT STAT U/STRM RH CAT	ACTIVE
GEAR RANGE ENGAGED	P/N

4. Perform the Active Test.
   NOTE:
   The test takes up to approximately 60 seconds.
5. Check that “CMPLT” is displayed.

>> GO TO 2.

2.CHECK CONDITION

With CONSULT

Check that all items fill each conditions as follows.

Item	Condition
SELF ADJ LWR P/LOAD RANGE	0.85 – 1.15
IN/MNFLD P CRR VL (STRTFD)	Less then 25 hPa (0.025 bar, 0.0255 kg-cm^2, 0.3625 psi)
MASS AIR FLOW CRRCTN VAL	0 – 15 kg/h

>> INSPECTION END

P219E AIR-FUEL RATIO IMBALANCE (CYLINDER 3)

DTC Description

INFOID:0000000013609905

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P219E	77	Cylinder 3 Air-fuel ratio imbalance (Cylinder 3 Air-Fuel Ratio Imbalance)	COMMAND POSI NOT REACHABLE	Mixture formation (cylinder 3) is irregular. The commanded position cannot be reached.
	78		ALGNMNT OR ADJSTMNT INCRRCT	Mixture formation (cylinder 3) is irregular. The adaptation or adjustment is incorrect.

POSSIBLE CAUSE

Mixture adaptation

Diagnosis Procedure

INFOID:0000000013609906

1.PERFORM ACTIVE TEST

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “MIXTURE ADAPTATION”.
3. Set the vehicle under the following conditions:

Monitor item	Condition
ENGINE SPEED	400 – 800 rpm
C/AIR TEMP/S U/STRM THRTL	40 – 80°C (104 –176°F)
ENGINE LOAD	30% or less
COOLANT TEMPERATURE	80°C (176°F) or more
L/CONT STAT U/STRM RH CAT	ACTIVE
GEAR RANGE ENGAGED	P/N

4. Perform the Active Test.
   NOTE:
   The test takes up to approximately 60 seconds.
5. Check that “CMPLT” is displayed.

>> GO TO 2.

2.CHECK CONDITION

With CONSULT

Check that all items fill each conditions as follows.

Item	Condition
SELF ADJ LWR P/LOAD RANGE	0.85 – 1.15
IN/MNFLD P CRR VL (STRTFD)	Less then 25 hPa (0.025 bar, 0.0255 kg-cm^2, 0.3625 psi)
MASS AIR FLOW CRRCTN VAL	0 – 15 kg/h

>> INSPECTION END

P219F AIR-FUEL RATIO IMBALANCE (CYLINDER 4)

DTC Description

INFOID:0000000013609907

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P219F	77	Cylinder 4 Air-fuel ratio imbalance (Cylinder 4 Air-Fuel Ratio Imbalance)	COMMAND POSI NOT REACHABLE	Mixture formation (cylinder 4) is irregular. The commanded position cannot be reached.
	78		ALGNMNT OR ADJSTMNT INCRRCT	Mixture formation (cylinder 4) is irregular. The adaptation or adjustment is incorrect.

POSSIBLE CAUSE

Mixture adaptation

Diagnosis Procedure

INFOID:0000000013609908

1.PERFORM ACTIVE TEST

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “MIXTURE ADAPTATION”.
3. Set the vehicle under the following conditions:

Monitor item	Condition
ENGINE SPEED	400 – 800 rpm
C/AIR TEMP/S U/STRM THRTL	40 – 80°C (104 –176°F)
ENGINE LOAD	30% or less
COOLANT TEMPERATURE	80°C (176°F) or more
L/CONT STAT U/STRM RH CAT	ACTIVE
GEAR RANGE ENGAGED	P/N

4. Perform the Active Test.
   NOTE:
   The test takes up to approximately 60 seconds.
5. Check that “CMPLT” is displayed.

>> GO TO 2.

2.CHECK CONDITION

With CONSULT

Check that all items fill each conditions as follows.

Item	Condition
SELF ADJ LWR P/LOAD RANGE	0.85 – 1.15
IN/MNFLD P CRR VL (STRTFD)	Less then 25 hPa (0.025 bar, 0.0255 kg-cm^2, 0.3625 psi)
MASS AIR FLOW CRRCTN VAL	0 – 15 kg/h

>> INSPECTION END

P2227 BAROMETRIC PRESSURE SENSOR

DTC Description

INFOID:0000000013609909

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P2227	27	BAROMETRIC PRESSURE SENSOR A (Barometric Pressure Sensor "A" Circuit Range/Performance)	SIG RTE OF CHNG ABV THRESHLD	The ambient pressure sensor has a malfunction. The signal change rate is above the permissible limit value.
	28		SG BS LVL O-OF RNG/ZR AJST ERR	The ambient pressure sensor has a malfunction. The signal offset is outside the permissible range.
	85		SIG ABOVE ALLOWABLE RANGE	The ambient pressure sensor has a malfunction. There is a signal above the permissible limit value.
	86		SIGNAL INVALID	The ambient pressure sensor has a malfunction. There is an incorrect signal.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609910

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P2228 BAROMETRIC PRESSURE SENSOR

DTC Description

INFOID:0000000013609911

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P2228	11	BAROMETRIC PRESSURE SENSOR A (Barometric Pressure Sensor "A" Circuit Low)	CIRCUIT SHORT TO GROUND	The ambient pressure sensor has a short circuit to ground. There is a short circuit to ground.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609912

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P2229 BAROMETRIC PRESSURE SENSOR

DTC Description

INFOID:0000000013609913

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P2229	12	BAROMETRIC PRESSURE SEN A (Barometric Pressure Sensor "A" Circuit High)	CIRCUIT SHORT TO BATTERY	The barometric pressure sensor has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE
ECM

Diagnosis Procedure

INFOID:0000000013609914

1.ERASE DTC

With CONSULT
1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P2230 BAROMETRIC PRESSURE SENSOR

DTC Description

INFOID:0000000013609915

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2230	27	Barometric pressure sensor A (Barometric Pressure Sensor "A" Circuit Intermittent/Erratic)	SIG RTE OF CHNG ABV THRESHLD	The barometric pressure sensor has a sporadic malfunction. The signal change rate is above the permissible limit value.
	85		SIG ABOVE ALLOWABLE RANGE	has a sporadic malfunction. There is a signal above the permissible limit value.

POSSIBLE CAUSE

ECM

Diagnosis Procedure

INFOID:0000000013609916

1.ERASE DTC

With CONSULT

1. Erase the DTC.
2. Turn ignition switch OFF.
3. Start the engine.
4. Check DTC.

Is the DTC detected again?

YES >> Replace ECM. Refer to EC-963, "Removal and Installation".
NO >> INSPECTION END

P2231 A/F SENSOR

DTC Description

INFOID:0000000013609917

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2231	00	Oxygen sensor bank1 sensor 1 (O2 Sensor Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 1)	NO SUBTYPE INFORMATION	The signal line of oxygen sensor 1 (cylinder bank 1) and the electrical heater circuit have a short circuit to each other.

POSSIBLE CAUSE

- Harness and connectors
  (A/F sensor circuit is open or shorted.)
- A/F sensor

Diagnosis Procedure

INFOID:0000000013609918

1.CHECK A/F SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect A/F sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor harness connector and ground.

+		−	Voltage
A/F sensor			
Connector	Terminal		
F143	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK A/F SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between A/F sensor harness connector and fuse terminal.

+		−	Continuity
A/F sensor			
Connector	Terminal		
F143	4	#214 fuse terminal	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR HEATER CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor harness connector and ECM harness connector.

+		–		Continuity
A/F sensor		ECM		
Connector	Terminal	Connector	Terminal	
F143	1	F149	63	Existed
	2		64	
	3		77	
	5		88	
	6		87	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace A/F sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P2237 A/F SENSOR

DTC Description

INFOID:0000000013609919

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2237	84	O2 SENSOR B1 SEN 1 (O2 Sensor Positive Current Control Circuit/Open Bank 1 Sensor 1)	SIG BELOW ALLOWABLE RANGE	The pump current connection of A/F sensor (cylinder bank 1) has an electrical malfunction or open circuit. There is a signal below the permissible limit value.
	85		SIG ABOVE ALLOWABLE RANGE	The pump current connection of A/F sensor (cylinder bank 1) has an electrical malfunction or open circuit. There is a signal above the permissible limit value.
	86		SIGNAL INVALID	The pump current connection of A/F sensor (cylinder bank 1) has an electrical malfunction or open circuit. There is an incorrect signal.

POSSIBLE CAUSE

- Harness and connectors
  (A/F sensor circuit is open or shorted.)
- A/F sensor

Diagnosis Procedure

INFOID:0000000013609920

1.CHECK A/F SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect A/F sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor harness connector and ground.

+		−	Voltage
A/F sensor			
Connector	Terminal		
F143	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK A/F SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between A/F sensor harness connector and fuse terminal.

+		−	Continuity
A/F sensor			
Connector	Terminal		
F143	4	#214 fuse terminal	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3. CHECK A/F SENSOR HEATER CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor harness connector and ECM harness connector.

+		–		Continuity
A/F sensor		ECM		
Connector	Terminal	Connector	Terminal	
F143	1	F149	63	Existed
	2		64	
	3		77	
	5		88	
	6		87	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace A/F sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P2243 A/F SENSOR

DTC Description

INFOID:0000000013609921

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2243	00	O2 SENSOR REF VOLTAGE B1 SEN 1 (O2 Sensor Reference Voltage Circuit/Open Bank 1 Sensor 1)	NO SUBTYPE INFORMATION	The reference voltage connection of oxygen sensor 1 (cylinder bank 1) has an electrical malfunction or open circuit.

POSSIBLE CAUSE

- Harness and connectors
  (A/F sensor circuit is open or shorted.)
- A/F sensor

Diagnosis Procedure

INFOID:0000000013609922

1.CHECK A/F SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect A/F sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor harness connector and ground.

+		−	Voltage
A/F sensor			
Connector	Terminal		
F143	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK A/F SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between A/F sensor harness connector and fuse terminal.

+		−	Continuity
A/F sensor			
Connector	Terminal		
F143	4	#214 fuse terminal	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR HEATER CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor harness connector and ECM harness connector.

+		–		Continuity
A/F sensor		ECM		
Connector	Terminal	Connector	Terminal	
F143	1	F149	63	Existed
	2		64	
	3		77	
	5		88	
	6		87	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace A/F sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P2251 A/F SENSOR

DTC Description

INFOID:0000000013609923

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P2251	00	O2 SENSOR B1 SEN 1 (O2 Sensor Negative Current Control Circuit/Open Bank 1 Sensor 1)	NO SUBTYPE INFORMATION	The signal return line connection of A/F sensor (cylinder bank 1) has an electrical malfunction or open circuit.

POSSIBLE CAUSE

- Harness and connectors
  (A/F sensor circuit is open or shorted.)
- A/F sensor

Diagnosis Procedure

INFOID:0000000013609924

1.CHECK A/F SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect A/F sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor harness connector and ground.

+		−	Voltage
A/F sensor			
Connector	Terminal		
F143	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK A/F SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between A/F sensor harness connector and fuse terminal.

+		−	Continuity
A/F sensor			
Connector	Terminal		
F143	4	#214 fuse terminal	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR HEATER CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor harness connector and ECM harness connector.

+		–		Continuity
A/F sensor		ECM		
Connector	Terminal	Connector	Terminal	
F143	1	F149	63	Existed
	2		64	
	3		77	
	5		88	
	6		87	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace A/F sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P2263 TC BOOST CONTROL SYSTEM

DTC Description

INFOID:0000000013609925

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2263	00	TC/SC BOOST SYSTEM (Turbocharger/Supercharger boost system performance)	NO SUBTYPE INFORMATION	The boost pressure deviates from the specified value.
	21		SIGNAL AMPLTUDE < MIN	The boost pressure deviates from the specified value. The signal amplitude is less than the minimum amplitude.
	22		SIG AMPLTUDE > MAX	The boost pressure deviates from the specified value. The signal amplitude is greater than the maximum amplitude.

POSSIBLE CAUSE

- Boost pressure control vacuum transducer
- Foreign matter caught at the pressure sensor upstream of throttle valve.
- Turbocharger
- Exhaust gas pressure
- Charge air leakage

Diagnosis Procedure

INFOID:0000000013609926

1.CHECK COMPONENT FUNCTION-1

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “BOOST PRESSURE CONTROL”.
3. Start the engine and let it idle.
4. Check that the value of “BOOST PRES POSITNR DUTY” is between 87% and 100%.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Pull out #214 (10A) fuse.
3. Check that the fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER POWER SUPPLY

1. Reinsert the fuse which pulled out.
2. Disconnect boost pressure control vacuum transducer harness connector.
3. Turn ignition switch ON.
4. Check the voltage between boost pressure control vacuum transducer harness connector and ground.

+		−	Voltage
Boost pressure control vacuum transducer			
Connector	Terminal		
F168	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4. CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out #214 (10 A) fuse.
3. Check the continuity between boost pressure control vacuum transducer harness connector and fuse terminal.

+		–	Continuity
Boost pressure control vacuum transducer			
Connector	Terminal		
F168	1	#214 fuse terminal	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-56, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5. CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER

Check boost pressure control vacuum transducer. Refer to EC-862, "Component Inspection (Boost Pressure Control Vacuum Transducer)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace boost pressure control vacuum transducer.

6. CHECK BOOST PRESSURE CONTROL VACUUM TRANSDUCER CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and boost pressure control vacuum transducer harness connector.

+		–		Continuity
ECM		Boost pressure control vacuum transducer		
Connector	Terminal	Connector	Terminal	
F149	51	F168	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

7. CHECK COMPONENT FUNCTION-2

With CONSULT

1. Set the vehicle to the following conditions.

Item	Condition
Engine speed	Idle
Engine coolant temperature	Less than 75°C (167°F)
Electrical load	OFF

2. Perform Active Test.
3. Check that the turbocharger control rod moves smoothly by visually check.

CAUTION:

Never operate the control rod by hand.

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8.CHECK VACUUM PRESSURE

1. Turn ignition switch OFF.
2. Disconnect vacuum hose at boost pressure control vacuum transducer.
3. Connect vacuum tester.
4. Start the engine and let it idle.
5. Check that the vacuum pressure is more than −75 kPa (−750 mbar, −0.765 kg/cm^2, −10.9 psi).

Is the inspection result normal?

YES >> GO TO 9.
NO >> Check vacuum line leakage, or vacuum pump performance.

9.CHECK COMPONENT

Check the following.
- Pressure sensor upstream of throttle valve (foreign matter is caught.)
- Turbocharger (obstructed movement)
- Exhaust gas pressure
- Charge air leakage
- Divert air switchover valve diaphragm

>> INSPECTION END

Component Inspection (Boost Pressure Control Vacuum Transducer)

INFOID:0000000013609927

1.CHECK BOOST PRESSRUE CONTROL VACUUM TRANSDUCER

1. Turn ignition switch OFF.
2. Disconnect boost pressure control vacuum transducer harness connector.
3. Check the resistance between boost pressure control vacuum transducer terminals.

Boost pressure control vacuum transducer	Resistance
Terminal	
1 and 2	9.8 – 11.2 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace boost pressure control vacuum transducer. Refer to EC-27, "Component Parts Location".

P2270 O2 SENSOR

DTC Description

INFOID:0000000013609928

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2270	00	Oxygen sensor bank1 sensor 2 (O2 Sensor Signal Biased/ Stuck Lean Bank 1 Sensor 2)	NO SUBTYPE INFORMATION	The signal from oxygen sensor 2 (cylinder bank 1) is shifted towards Lean.
	26		SIG RTE OF CHNG BLW THRESHLD	The signal from oxygen sensor 2 (cylinder bank 1) is shifted towards Lean. The signal change rate is below the permissible limit value.

POSSIBLE CAUSE

- Harness and connectors
  (Heated oxygen sensor circuit is open or shorted.)
- Heated oxygen sensor

Diagnosis Procedure

INFOID:0000000013609929

1.CHECK HEATED OXYGEN SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between heated oxygen sensor harness connector and ground.

+		–	Voltage
Heated oxygen sensor			
Connector	Terminal		
F144	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK HEATED OXYGEN SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between heated oxygen sensor harness connector and fuse terminal.

+		–	Continuity
Heated oxygen sensor			
Connector	Terminal		
F144	1	#214 fuse terminal	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK HEATED OXYGEN SENSOR HEATER CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between heated oxygen sensor harness connector and ECM harness connector.

+		–		Continuity
Heated oxygen sensor		ECM		
Connector	Terminal	Connector	Terminal	
F144	2	F149	95	Existed
	3		13	
	4		37	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace heated oxygen sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P2271 O2 SENSOR

DTC Description

INFOID:0000000013609930

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2271	00	O2 SENSOR B1 SENSOR 2 (O2 sensor signal biased/stuck rich bank 1 sensor 2)	NO SUBTYPE INFORMATION	The signal from oxygen sensor 2 (cylinder bank 1) is shifted towards Rich.
	26		SIG RTE OF CHNG BLW THRESHLD	The signal from oxygen sensor 2 (cylinder bank 1) is shifted towards Rich. The signal change rate is below the permissible limit value.

POSSIBLE CAUSE

- Harness and connectors
  (Heated oxygen sensor circuit is open or shorted.)
- Heated oxygen sensor

Diagnosis Procedure

INFOID:0000000013609931

1.CHECK HEATED OXYGEN SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between heated oxygen sensor harness connector and ground.

+		–	Voltage
Heated oxygen sensor			
Connector	Terminal		
F144	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK HEATED OXYGEN SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between heated oxygen sensor harness connector and fuse terminal.

+		–	Continuity
Heated oxygen sensor			
Connector	Terminal		
F144	1	#214 fuse terminal	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK HEATED OXYGEN SENSOR HEATER CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between heated oxygen sensor harness connector and ECM harness connector.

+		–		Continuity
Heated oxygen sensor		ECM		
Connector	Terminal	Connector	Terminal	
F144	2	F149	95	Existed
	3		13	
	4		37	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace heated oxygen sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P2279 INTAKE AIR SYSTEM

DTC Description

INFOID:0000000013609932

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2279	00	INTAKE AIR SYSTEM LEAK (Intake Air System Leak)	NO SUBTYPE INFORMATION	A leak was detected in the intake air system.
	16		CIRC VOLT BELOW THRESHOLD	A leak was detected in the intake air system. The limit value for electrical voltage has not been attained.
	7A		FLUID LEAK OR SEAL MALFUNCTN	A leak was detected in the intake air system. Leakage or a damaged seal was detected.

POSSIBLE CAUSE

Intake air leakage (between air cleaner and turbocharger)

Diagnosis Procedure

INFOID:0000000013609933

1.CHECK INTAKE AIR LEAK

Check intake air leak as the following part.
- Between air cleaner and turbocharger
- Intake air system
- Charge air system (for leaks and tighten all clamps)
- Crankcase ventilation system

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P2280 INTAKE AIR SYSTEM

DTC Description

INFOID:0000000013609934

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	Malfunction type	
P2280	97	AIR FLOW RESTRICTION/AIR LEAK (Air Flow Restriction/Air Leak Between Air Filter and MAF Bank 1)	CMP/SYS OPR OBST OR BLKD	The air mass flow in the intake air system (cylinder bank 1) has a malfunction. The system function is restricted.

POSSIBLE CAUSE

Intake air leakage (between turbocharger and charge air cooler)

Diagnosis Procedure

INFOID:0000000013609935

1.CHECK INTAKE AIR LEAK

Check seal boot on charge air pipe between turbocharger and charge air cooler for leaks.

>> INSPECTION END

P2300 IGNITION COIL CONTROL (CYLINDER 1)

DTC Description

INFOID:0000000013609936

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2300	00	Ignition coil A primary control (Ignition Coil "A" Primary Control Circuit Low)	NO SUBTYPE INFORMATION	The actuation of ignition coil 1 has a short circuit to ground.

POSSIBLE CAUSE

- Harness or connectors
  (Ignition coil circuit is open or shorted.)
- Ignition coil

Diagnosis Procedure

INFOID:0000000013609937

1.INSPECTION START

CAUTION:
Refer to EC-23, "Precaution for Risk of Explosion and Injury" for work in safety.
NOTE:
When the power supply of ignition coil is abnormal, ECM detects DTC P0351 [CIRCUIT OPEN].

>> GO TO 2.

2.CHECK IGNITION COIL POWER SUPPLY

1. Turn ignition switch OFF.
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 (No. 1)			
Connector	Terminal		
F153	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between ignition coil harness connector and fuse terminal.

+		–	Continuity
Ignition coil (No. 1)			
Connector	Terminal		
F153	1	#214 fuse terminal	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.

4.CHECK IGNITION COIL GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

+		–	Continuity
Ignition coil (No. 1)			
Connector	Terminal		
F153	2	Ground	Existed
	4		

Is the inspection result normal?

YES >> GO TO 5.
NO >> Perform trouble diagnosis for ground circuit.

5.CHECK IGNITION COIL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ignition coil harness connector.

+		–		Continuity
ECM		Ignition coil (No. 1)		
Connector	Terminal	Connector	Terminal	
F149	79	F153	3	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK IGNITION COIL

Check ignition coil (No. 1). Refer to EC-536, "Component Inspection (Ignition Coil)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

Component Inspection (Ignition Coil)

INFOID:0000000013609938

1.CHECK IGNITION COIL

1. Turn ignition switch OFF.
2. Check the resistance between ignition coil terminals.

Terminal	Resistance
3 and ground	200 kΩ or more

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning ignition coil. Refer to EM-58, "Removal and Installation".

P2301 IGNITION COIL CONTROL (CYLINDER 1)

DTC Description

INFOID:0000000013609939

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2301	00	Ignition coil A primary control (Ignition Coil "A" Primary Control Circuit High)	NO SUBTYPE INFORMATION	The actuation of ignition coil 1 has a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Ignition coil circuit is open or shorted.)
- Ignition coil

Diagnosis Procedure

INFOID:0000000013609940

1.INSPECTION START

CAUTION:
Refer to EC-23, "Precaution for Risk of Explosion and Injury" for work in safety.
NOTE:
When the power supply of ignition coil is abnormal, ECM detects DTC P0351 [CIRCUIT OPEN].

>> GO TO 2.

2.CHECK IGNITION COIL POWER SUPPLY

1. Turn ignition switch OFF.
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 (No. 1)			
Connector	Terminal		
F153	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between ignition coil harness connector and fuse terminal.

+		–	Continuity
Ignition coil (No. 1)			
Connector	Terminal		
F153	1	#214 fuse terminal	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.

4.CHECK IGNITION COIL GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

+		−	Continuity
Ignition coil (No. 1)			
Connector	Terminal		
F153	2	Ground	Existed
	4		

Is the inspection result normal?

YES >> GO TO 5.
NO >> Perform trouble diagnosis for ground circuit.

5.CHECK IGNITION COIL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ignition coil harness connector.

+		−		Continuity
ECM		Ignition coil (No. 1)		
Connector	Terminal	Connector	Terminal	
F149	79	F153	3	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace ignition coil. Refer to EM-58, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P2303 IGNITION COIL CONTROL (CYLINDER 2)

DTC Description

INFOID:0000000013609941

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2303	00	Ignition coil B primary control (Ignition Coil "B" Primary Control Circuit Low)	NO SUBTYPE INFORMATION	The actuation of ignition coil 2 has a short circuit to ground.

POSSIBLE CAUSE

- Harness or connectors
  (Ignition coil circuit is open or shorted.)
- Ignition coil

Diagnosis Procedure

INFOID:0000000013609942

1.INSPECTION START

CAUTION:
Refer to EC-23, "Precaution for Risk of Explosion and Injury" for work in safety.
NOTE:
When the power supply of ignition coil is abnormal, ECM detects DTC P0352 [CIRCUIT OPEN].

>> GO TO 2.

2.CHECK IGNITION COIL POWER SUPPLY

1. Turn ignition switch OFF.
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 (No. 2)			
Connector	Terminal		
F154	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between ignition coil harness connector and fuse terminal.

+		–	Continuity
Ignition coil (No. 2)			
Connector	Terminal		
F154	1	#214 fuse terminal	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.

4.CHECK IGNITION COIL GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

+		−	Continuity
Ignition coil (No. 2)			
Connector	Terminal		
F154	2	Ground	Existed
	4		

Is the inspection result normal?

YES >> GO TO 5.
NO >> Perform trouble diagnosis for ground circuit.

5.CHECK IGNITION COIL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ignition coil harness connector.

+		−		Continuity
ECM		Ignition coil (No. 2)		
Connector	Terminal	Connector	Terminal	
F149	7	F154	3	Existed

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK IGNITION COIL

Check ignition coil (No. 2). Refer to EC-870, "Component Inspection (Ignition Coil)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P2304 IGNITION COIL CONTROL (CYLINDER 2)

DTC Description

INFOID:0000000013609943

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2304	00	Ignition coil B primary control (Ignition Coil "B" Primary Control Circuit High)	NO SUBTYPE INFORMATION	The actuation of ignition coil 2 has a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Ignition coil circuit is open or shorted.)
- Ignition coil

Diagnosis Procedure

INFOID:0000000013609944

1.INSPECTION START

CAUTION:
Refer to EC-23, "Precaution for Risk of Explosion and Injury" for work in safety.
NOTE:
When the power supply of ignition coil is abnormal, ECM detects DTC P0352 [CIRCUIT OPEN].

>> GO TO 2.

2.CHECK IGNITION COIL POWER SUPPLY

1. Turn ignition switch OFF.
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 (No. 2)			
Connector	Terminal		
F154	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between ignition coil harness connector and fuse terminal.

+		–	Continuity
Ignition coil (No. 2)			
Connector	Terminal		
F154	1	#214 fuse terminal	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.

4.CHECK IGNITION COIL GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

+		−	Continuity
Ignition coil (No. 2)			
Connector	Terminal		
F154	2	Ground	Existed
	4		

Is the inspection result normal?

YES >> GO TO 5.
NO >> Perform trouble diagnosis for ground circuit.

5.CHECK IGNITION COIL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ignition coil harness connector.

+		−		Continuity
ECM		Ignition coil (No. 2)		
Connector	Terminal	Connector	Terminal	
F149	7	F154	3	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace ignition coil. Refer to EM-58, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P2306 IGNITION COIL CONTROL (CYLINDER 3)

DTC Description

INFOID:0000000013609945

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2306	00	Ignition coil C primary control (Ignition Coil "C" Primary Control Circuit Low)	NO SUBTYPE INFORMATION	The actuation of ignition coil 3 has a short circuit to ground.

POSSIBLE CAUSE

- Harness or connectors
  (Ignition coil circuit is open or shorted.)
- Ignition coil

Diagnosis Procedure

INFOID:0000000013609946

1.INSPECTION START

CAUTION:
Refer to EC-23, "Precaution for Risk of Explosion and Injury" for work in safety.
NOTE:
When the power supply of ignition coil is abnormal, ECM detects DTC P0353 [CIRCUIT OPEN].

>> GO TO 2.

2.CHECK IGNITION COIL POWER SUPPLY

1. Turn ignition switch OFF.
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 (No. 3)			
Connector	Terminal		
F155	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between ignition coil harness connector and fuse terminal.

+		–	Continuity
Ignition coil (No. 3)			
Connector	Terminal		
F155	1	#214 fuse terminal	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.

4.CHECK IGNITION COIL GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

+		–	Continuity
Ignition coil (No. 3)			
Connector	Terminal		
F155	2	Ground	Existed
	4		

Is the inspection result normal?

YES >> GO TO 5.
NO >> Perform trouble diagnosis for ground circuit.

5.CHECK IGNITION COIL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ignition coil harness connector.

+		–		Continuity
ECM		Ignition coil (No. 3)		
Connector	Terminal	Connector	Terminal	
F149	55	F155	3	Existed

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK IGNITION COIL

Check ignition coil (No. 3). Refer to EC-870, "Component Inspection (Ignition Coil)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P2307 IGNITION COIL CONTROL (CYLINDER 3)

DTC Description

INFOID:0000000013609947

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2307	00	Ignition coil C primary control (Ignition Coil "C" Primary Control Circuit High)	NO SUBTYPE INFORMATION	The actuation of ignition coil 3 has a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Ignition coil circuit is open or shorted.)
- Ignition coil

Diagnosis Procedure

INFOID:0000000013609948

1.INSPECTION START

CAUTION:
Refer to EC-23, "Precaution for Risk of Explosion and Injury" for work in safety.
NOTE:
When the power supply of ignition coil is abnormal, ECM detects DTC P0353 [CIRCUIT OPEN].

>> GO TO 2.

2.CHECK IGNITION COIL POWER SUPPLY

1. Turn ignition switch OFF.
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 (No. 3)			
Connector	Terminal		
F155	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between ignition coil harness connector and fuse terminal.

+		–	Continuity
Ignition coil (No. 3)			
Connector	Terminal		
F155	1	#214 fuse terminal	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.

4.CHECK IGNITION COIL GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

+		−	Continuity
Ignition coil (No. 3)			
Connector	Terminal		
F155	2	Ground	Existed
	4		

Is the inspection result normal?

YES >> GO TO 5.
NO >> Perform trouble diagnosis for ground circuit.

5.CHECK IGNITION COIL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ignition coil harness connector.

+		−		Continuity
ECM		Ignition coil (No. 3)		
Connector	Terminal	Connector	Terminal	
F149	55	F155	3	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace ignition coil. Refer to EM-58, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P2309 IGNITION COIL CONTROL (CYLINDER 4)

DTC Description

INFOID:0000000013609949

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2309	00	Ignition coil D primary control (Ignition Coil "D" Primary Control Circuit Low)	NO SUBTYPE INFORMATION	The actuation of ignition coil 4 has a short circuit to ground.

POSSIBLE CAUSE

- Harness or connectors
  (Ignition coil circuit is open or shorted.)
- Ignition coil

Diagnosis Procedure

INFOID:0000000013609950

1.INSPECTION START

CAUTION:
Refer to EC-23, "Precaution for Risk of Explosion and Injury" for work in safety.
NOTE:
When the power supply of ignition coil is abnormal, ECM detects DTC P0354 [CIRCUIT OPEN].

>> GO TO 2.

2.CHECK IGNITION COIL POWER SUPPLY

1. Turn ignition switch OFF.
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 (No. 4)			
Connector	Terminal		
F156	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between ignition coil harness connector and fuse terminal.

+		–	Continuity
Ignition coil (No. 4)			
Connector	Terminal		
F156	1	#214 fuse terminal	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.

4.CHECK IGNITION COIL GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

+		–	Continuity
Ignition coil (No. 4)			
Connector	Terminal		
F156	2	Ground	Existed
	4		

Is the inspection result normal?

YES >> GO TO 5.
NO >> Perform trouble diagnosis for ground circuit.

5.CHECK IGNITION COIL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ignition coil harness connector.

+		–		Continuity
ECM		Ignition coil (No. 4)		
Connector	Terminal	Connector	Terminal	
F149	31	F156	3	Existed

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK IGNITION COIL

Check ignition coil (No. 4). Refer to EC-870, "Component Inspection (Ignition Coil)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P2310 IGNITION COIL CONTROL (CYLINDER 4)

DTC Description

INFOID:0000000013609951

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2310	00	Ignition coil D primary control (Ignition Coil "D" Primary Control Circuit High)	NO SUBTYPE INFORMATION	The actuation of ignition coil 4 has a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Ignition coil circuit is open or shorted.)
- Ignition coil

Diagnosis Procedure

INFOID:0000000013609952

1.INSPECTION START

CAUTION:
Refer to EC-23, "Precaution for Risk of Explosion and Injury" for work in safety.
NOTE:
When the power supply of ignition coil is abnormal, ECM detects DTC P0354 [CIRCUIT OPEN].

>> GO TO 2.

2.CHECK IGNITION COIL POWER SUPPLY

1. Turn ignition switch OFF.
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 (No. 4)			
Connector	Terminal		
F156	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between ignition coil harness connector and fuse terminal.

+		–	Continuity
Ignition coil (No. 4)			
Connector	Terminal		
F156	1	#214 fuse terminal	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.

4.CHECK IGNITION COIL GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

+		−	Continuity
Ignition coil (No. 4)			
Connector	Terminal		
F156	2	Ground	Existed
	4		

Is the inspection result normal?

YES >> GO TO 5.
NO >> Perform trouble diagnosis for ground circuit.

5.CHECK IGNITION COIL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ignition coil harness connector.

+		−		Continuity
ECM		Ignition coil (No. 4)		
Connector	Terminal	Connector	Terminal	
F149	31	F156	3	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace ignition coil. Refer to EM-58, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P230A AIR-FUEL RATIO IMBALANCE (CYLINDER 1)

DTC Description

INFOID:0000000013609953

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P230A	00	Cylinder 1 Air-Fuel Ratio Imbalance (Cylinder 1 Air-Fuel Ratio Imbalance - Adjustment At Limit During Balance)	[NO SUBTYPE INFORMATION]	The mixture formation (cylinder 1) is erratic and injector injection quantity adjustment is disabled.

POSSIBLE CAUSE

Injector injection quantity adjustment

Diagnosis Procedure

INFOID:0000000013609954

1.PERFORM ACTIVE TEST

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “MIXTURE ADAPTATION”.
3. Set the vehicle under the following conditions:

Monitor item	Condition
ENGINE SPEED	400 – 800 rpm
C/AIR TEMP/S U/STRM THRTL	40 – 80°C (104 –176°F)
ENGINE LOAD	30% or less
COOLANT TEMPERATURE	80°C (176°F) or more
L/CONT STAT U/STRM RH CAT	ACTIVE
GEAR RANGE ENGAGED	P/N

4. Perform the Active Test.
   NOTE:
   The test takes up to approximately 60 seconds.
5. Check that “CMPLT” is displayed.

>> GO TO 2.

2.CHECK CONDITION

With CONSULT

Check that all items fill each conditions as follows.

Item	Condition
SELF ADJ LWR P/LOAD RANGE	0.85 – 1.15
IN/MNFLD P CRR VL (STRTFD)	Less then 25 hPa (0.025 bar, 0.0255 kg-cm^2, 0.3625 psi)
MASS AIR FLOW CRRCTN VAL	0 – 15 kg/h

>> INSPECTION END

P230B AIR-FUEL RATIO IMBALANCE (CYLINDER 2)

DTC Description

INFOID:0000000013609955

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P230B	00	Cylinder 2 air-fuel ratio imbalance (Cylinder 2 Air-Fuel Ratio Imbalance - Adjustment At Limit During Balance)	[NO SUBTYPE INFORMATION]	The mixture formation (cylinder 2) is erratic and injector injection quantity adjustment is disabled.

POSSIBLE CAUSE

Injector injection quantity adjustment

Diagnosis Procedure

INFOID:0000000013609956

1.PERFORM ACTIVE TEST

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “MIXTURE ADAPTATION”.
3. Set the vehicle under the following conditions:

Monitor item	Condition
ENGINE SPEED	400 – 800 rpm
C/AIR TEMP/S U/STRM THRTL	40 – 80°C (104 –176°F)
ENGINE LOAD	30% or less
COOLANT TEMPERATURE	80°C (176°F) or more
L/CONT STAT U/STRM RH CAT	ACTIVE
GEAR RANGE ENGAGED	P/N

4. Perform the Active Test.
   NOTE:
   The test takes up to approximately 60 seconds.
5. Check that “CMPLT” is displayed.

>> GO TO 2.

2.CHECK CONDITION

With CONSULT

Check that all items fill each conditions as follows.

Item	Condition
SELF ADJ LWR P/LOAD RANGE	0.85 – 1.15
IN/MNFLD P CRR VL (STRTFD)	Less then 25 hPa (0.025 bar, 0.0255 kg-cm^2, 0.3625 psi)
MASS AIR FLOW CRRCTN VAL	0 – 15 kg/h

>> INSPECTION END

P230C AIR-FUEL RATIO IMBALANCE (CYLINDER 3)

DTC Description

INFOID:0000000013609957

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P230C	00	Cylinder 3 Air-Fuel Ratio Imbalance (Cylinder 3 Air-Fuel Ratio Imbalance - Adjustment At Limit During Balance)	[NO SUBTYPE INFORMATION]	The mixture formation (cylinder 3) is erratic and injector injection quantity adjustment is disabled.

POSSIBLE CAUSE

Injector injection quantity adjustment

Diagnosis Procedure

INFOID:0000000013609958

1.PERFORM ACTIVE TEST

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “MIXTURE ADAPTATION”.
3. Set the vehicle under the following conditions:

Monitor item	Condition
ENGINE SPEED	400 – 800 rpm
C/AIR TEMP/S U/STRM THRTL	40 – 80°C (104 –176°F)
ENGINE LOAD	30% or less
COOLANT TEMPERATURE	80°C (176°F) or more
L/CONT STAT U/STRM RH CAT	ACTIVE
GEAR RANGE ENGAGED	P/N

4. Perform the Active Test.
   NOTE:
   The test takes up to approximately 60 seconds.
5. Check that “CMPLT” is displayed.

>> GO TO 2.

2.CHECK CONDITION

With CONSULT

Check that all items fill each conditions as follows.

Item	Condition
SELF ADJ LWR P/LOAD RANGE	0.85 – 1.15
IN/MNFLD P CRR VL (STRTFD)	Less then 25 hPa (0.025 bar, 0.0255 kg-cm^2, 0.3625 psi)
MASS AIR FLOW CRRCTN VAL	0 – 15 kg/h

>> INSPECTION END

P230D AIR-FUEL RATIO IMBALANCE (CYLINDER 4)

DTC Description

INFOID:0000000013609959

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P230D	00	Cylinder 4 Air-Fuel Ratio Imbalance (Cylinder 4 Air-Fuel Ratio Imbalance - Adjustment At Limit During Balance)	[NO SUBTYPE INFORMATION]	The mixture formation (cylinder 4) is erratic and injector injection quantity adjustment is disabled.

POSSIBLE CAUSE

Injector injection quantity adjustment

Diagnosis Procedure

INFOID:0000000013609960

1.PERFORM ACTIVE TEST

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “MIXTURE ADAPTATION”.
3. Set the vehicle under the following conditions:

Monitor item	Condition
ENGINE SPEED	400 – 800 rpm
C/AIR TEMP/S U/STRM THRTL	40 – 80°C (104 –176°F)
ENGINE LOAD	30% or less
COOLANT TEMPERATURE	80°C (176°F) or more
L/CONT STAT U/STRM RH CAT	ACTIVE
GEAR RANGE ENGAGED	P/N

4. Perform the Active Test.
   NOTE:
   The test takes up to approximately 60 seconds.
5. Check that “CMPLT” is displayed.

>> GO TO 2.

2.CHECK CONDITION

With CONSULT

Check that all items fill each conditions as follows.

Item	Condition
SELF ADJ LWR P/LOAD RANGE	0.85 – 1.15
IN/MNFLD P CRR VL (STRTFD)	Less then 25 hPa (0.025 bar, 0.0255 kg-cm^2, 0.3625 psi)
MASS AIR FLOW CRRCTN VAL	0 – 15 kg/h

>> INSPECTION END

P2336, P2337, P2338, P2339 ENGINE KNOCKING

DTC Description

INFOID:0000000013609961

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	Malfunction type	
P2336	27	CLY1 KNOCK/CMBSTN VIBRTN SEN (Cylinder 1 above knock/combustion vibration sensor threshold)	SIG RTE OF CHNG ABV THRESHLD	The knock limit of cylinder 1 was exceeded. The signal change rate is above the permissible limit value.
P2337	27	CLY2 KNOCK/CMBSTN VIBRTN SEN (Cylinder 2 above knock/combustion vibration sensor threshold)		The knock limit of cylinder 2 was exceeded. The signal change rate is above the permissible limit value.
P2338	27	CLY3 KNOCK/CMBSTN VIBRTN SEN (Cylinder 3 above knock/combustion vibration sensor threshold)		The knock limit of cylinder 3 was exceeded. The signal change rate is above the permissible limit value.
P2339	27	CLY4 KNOCK/CMBSTN VIBRTN SEN (Cylinder 4 above knock/combustion vibration sensor threshold)		The knock limit of cylinder 4 was exceeded. The signal change rate is above the permissible limit value.

POSSIBLE CAUSE

- Correction value of RON (research octane number)
- Fuel quality inferior
- Ignition system
- Knock sensors for tighten too much

Diagnosis Procedure

INFOID:0000000013609962

1.CHECK COMPONENT

Check the following:
- Value of RON (research octane number)
- Fuel quality
- Ignition system
- Knock sensors installation condition.

>> INSPECTION END

P2414 A/F SENSOR

DTC Description

INFOID:0000000013609963

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2414	00	Oxygen sensor bank1 sensor 1 (O2 sensor exhaust sample error bank 1 sensor 1)	NO SUBTYPE INFORMATION	The signal of A/F sensor (cylinder bank 1) is implausible.

POSSIBLE CAUSE

- Harness and connectors
  (A/F sensor circuit is open or shorted.)
- A/F sensor

Diagnosis Procedure

INFOID:0000000013609964

1.CHECK A/F SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect A/F sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor harness connector and ground.

+		−	Voltage
A/F sensor			
Connector	Terminal		
F143	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK A/F SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 (10A) fuse is not fusing.
3. Check the continuity between A/F sensor harness connector and fuse terminal.

+		−	Continuity
A/F sensor			
Connector	Terminal		
F143	4	#214 (10A) fuse terminal	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR HEATER CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor harness connector and ECM harness connector.

+		–		Continuity
A/F sensor		ECM		
Connector	Terminal	Connector	Terminal	
F143	1	F149	63	Existed
	2		64	
	3		77	
	5		88	
	6		87	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace A/F sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P2421 EVAP CANISTER VENT CONTROL VALVE

DTC Description

INFOID:0000000013748612

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2421	00	Evaporation system vent valve (EVAP system vent valve stuck open)	NO SUBTYPE INFORMATION	The shutoff valve of the activated EVAP canister is jammed open.

POSSIBLE CAUSE

- Harness or connectors (EVAP canister vent control valve circuit)
- EVAP canister vent control valve
- EVAP canister
- EVAP line

Diagnosis Procedure

INFOID:0000000013748938

1.CHECK COMPONENT FUNCTION

With CONSULT

1. Turn ignition switch ON. (Engine stopped.)
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK PURGING SWITCHOVER VALVE”.
3. Perform the Active Test.
4. Check that the indicated value of “PWR CSMN (PURG SWOVR/V)” is between 300 – 600 mA.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that No. 214 (10 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect EVAP canister vent control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister vent control valve harness connector and ground.

+		–	Voltage
EVAP canister vent control valve			
Connector	Terminal		
M710	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out No. 214 fuse.

3. Check the continuity between EVAP canister vent control valve harness connector and fuse terminal.

+		–	Continuity
EVAP canister vent control valve			
Connector	Terminal		
M710	1	No. 214 fuse terminal	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.

5.CHECK EVAP CANISTER VENT CONTROL VALVE

1. Clean the air passage of EVAP canister vent control valve using an air blower.
2. Check air passage continuity and operation delay time under the following conditions.
Make sure that new O-ring is installed properly.

Condition	Air passage continuity
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP canister (with EVAP canister vent control valve). Refer to FL-13, "Exploded View".

6.CHECK EVAP CANISTER VENT CONTROL VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EVAP canister vent control valve harness connector.

+		–		Continuity
ECM		EVAP canister vent control valve		
Connector	Terminal	Connector	Terminal	
E48	152	M710	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK EVAP PURGE CIRUIT LEAKAGE

Check leakage of the following components.
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection
- EVAP canister for damage
- EVAP canister vent control valve (mechanical malfunction)

>> INSPECTION END

P2422 EVAP CANISTER VENT CONTROL VALVE

DTC Description

INFOID:0000000013748172

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2422	00	Evaporation system vent valve (EVAP system vent valve stuck closed)	NO SUBTYPE INFORMATION	The shutoff valve of the activated EVAP canister sticks in the closed position.

POSSIBLE CAUSE

- Harness or connectors
  (EVAP canister vent control valve circuit)
- EVAP canister vent control valve
- EVAP canister
- EVAP line

Diagnosis Procedure

INFOID:0000000013748939

1.CHECK COMPONENT FUNCTION

With CONSULT

1. Turn ignition switch ON. (Engine stopped.)
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK PURGING SWITCHOVER VALVE”.
3. Perform the Active Test.
4. Check that the indicated value of “PWR CSMN (PURG SWOVR/V)” is between 300 – 600 mA.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that No. 214 (10 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect EVAP canister vent control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister vent control valve harness connector and ground.

+		–	Voltage
EVAP canister vent control valve			
Connector	Terminal		
M710	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out No. 214 fuse.

3. Check the continuity between EVAP canister vent control valve harness connector and fuse terminal.

+		–	Continuity
EVAP canister vent control valve			
Connector	Terminal		
M710	1	No. 214 fuse terminal	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.

5.CHECK EVAP CANISTER VENT CONTROL VALVE

1. Clean the air passage of EVAP canister vent control valve using an air blower.
2. Check air passage continuity and operation delay time under the following conditions.
Make sure that new O-ring is installed properly.

Condition	Air passage continuity
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP canister (with EVAP canister vent control valve). Refer to FL-13, "Exploded View".

6.CHECK EVAP CANISTER VENT CONTROL VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EVAP canister vent control valve harness connector.

+		–		Continuity
ECM		EVAP canister vent control valve		
Connector	Terminal	Connector	Terminal	
E48	152	M710	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK EVAP PURGE CIRUIT LEAKAGE

Check leakage of the following components.
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection
- EVAP canister for damage
- EVAP canister vent control valve (mechanical malfunction)

>> INSPECTION END

P24D5 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Description

INFOID:0000000013748969

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P24D5	84	EVAP system pressure sen/sw B (EVAP system pressure sensor/ switch B circuit)	SIG BELOWALLOWABLE RANGE	Pressure sensor/pressure switch 2 of the evaporative emission control system has an electrical fault. There is a signal below the permissible limit value.
	85		SIG ABOVE ALLOWABLE RANGE	Pressure sensor/pressure switch 2 of the evaporative emission control system has an electrical fault. There is a signal above the permissible limit value.

POSSIBLE CAUSE

- Harness and connectors (EVAP control system pressure sensor)
- EVAP control system pressure sensor

Diagnosis Procedure

INFOID:0000000013748970

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIV TEST” >> “Check purging pressure control”.
3. Select “OPEN”.
4. Check that the indicated value of purge pressure sensor is between (−)1 – (+)1 kPa [(−)0.01 – (+)0.01 bar, (−)0.01 – (+)0.01 kg-cm2, (−)0.145 – (+)0.145 psi]

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect EVAP control system pressure sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP control system pressure sensor harness connector and ground.

+		−	Voltage
EVAP control system pressure sensor			
Connector	Terminal		
F173	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EVAP control system pressure sensor harness connector.

+		–		Continuity
ECM		EVAP control system pressure sensor		
Connector	Terminal	Connector	Terminal	
F149	16	F173	3	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EVAP control system pressure sensor harness connector.

+		–		Continuity
ECM		EVAP control system pressure sensor		
Connector	Terminal	Connector	Terminal	
F149	36	F173	1	Existed
	11		2	

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Replace EVAP control system pressure sensor. Refer to EM-34, "Exploded View".
NO >> Repair or replace error-detected parts.

P24D6 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Description

INFOID:0000000013748941

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P24D6	02	EVAP system pressure sensor/ sw B (EVAP system pressure sensor/ switch B circuit range/performance)	GENERAL ELEC MAL-FUNCTN	Pressure sensor/pressure switch 2 of the evaporative emission control system has a malfunction. There is a general signal fault.
	16		CIRC VOLT BELOW THRESHOLD	Pressure sensor/pressure switch 2 of the evaporative emission control system has a malfunction. The limit value for electrical voltage has not been attained.
	17		CIRC VOLT ABOVE THRESHOLD	Pressure sensor/pressure switch 2 of the evaporative emission control system has a malfunction. The limit value for electrical voltage has been exceeded.
	26		SIG RTE OF CHNG BLW THRESHLD	Pressure sensor/pressure switch 2 of the evaporative emission control system has a malfunction. The signal change rate is below the permissible limit value.
	28		SG BS LVL O-OF RNG/ZR AJST FLR	Pressure sensor/pressure switch 2 of the evaporative emission control system has a malfunction. The signal offset is outside the permissible range.
	2A		SIGNAL STUCK IN RANGE	Pressure sensor/pressure switch 2 of the evaporative emission control system has a malfunction. There is no signal change.

POSSIBLE CAUSE

- Harness and connectors (EVAP control system pressure sensor)
- EVAP control system pressure sensor

Diagnosis Procedure

INFOID:0000000013748942

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIV TEST” >> “Check purging pressure control”.
3. Select “OPEN”.
4. Check that the indicated value of purge pressure sensor is between (−)1 – (+)1 kPa [(−)0.01 – (+)0.01 bar, (−)0.01 – (+)0.01 kg-cm2, (−)0.145 – (+)0.145 psi]

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect EVAP control system pressure sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP control system pressure sensor harness connector and ground.

+		–	Voltage
EVAP control system pressure sensor			
Connector	Terminal		
F173	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EVAP control system pressure sensor harness connector.

+		–		Continuity
ECM		EVAP control system pressure sensor		
Connector	Terminal	Connector	Terminal	
F149	16	F173	3	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EVAP control system pressure sensor harness connector.

+		–		Continuity
ECM		EVAP control system pressure sensor		
Connector	Terminal	Connector	Terminal	
F149	36	F173	1	Existed
	11		2	

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Replace EVAP control system pressure sensor. Refer to EM-34, "Exploded View".
NO >> Repair or replace error-detected parts.

P24D7 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Description

INFOID:0000000013748943

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P24D7	11	EVAP system pressure sen/sw B (EVAP system pressure sensor/ switch B circuit low)	CIRCUIT SHORT TO GROUND	Pressure sensor/pressure switch 2 of the evaporative emission control system has a short circuit to ground. There is a short circuit to ground.

POSSIBLE CAUSE

- Harness and connectors (EVAP control system pressure sensor)
- EVAP control system pressure sensor

Diagnosis Procedure

INFOID:0000000013748944

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIV TEST” >> “Check purging pressure control”.
3. Select “OPEN”.
4. Check that the indicated value of purge pressure sensor is between (–)1 – (+)1 kPa [(–)0.01 – (+)0.01 bar, (–)0.01 – (+)0.01 kg-cm2, (–)0.145 – (+)0.145 psi]

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect EVAP control system pressure sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP control system pressure sensor harness connector and ground.

+		–	Voltage
EVAP control system pressure sensor			
Connector	Terminal		
F173	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EVAP control system pressure sensor harness connector.

+		–		Continuity
ECM		EVAP control system pressure sensor		
Connector	Terminal	Connector	Terminal	
F149	16	F173	3	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EVAP control system pressure sensor harness connector.

+		–		Continuity
ECM		EVAP control system pressure sensor		
Connector	Terminal	Connector	Terminal	
F149	36	F173	1	Existed
	11		2	

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Replace EVAP control system pressure sensor. Refer to EM-34, "Exploded View".
NO >> Repair or replace error-detected parts.

P24D8 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Description

INFOID:0000000013748945

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P24D8	12	EVAP pressure sensor/switch B (EVAP system pressure sensor/ switch B circuit high)	CIRCUIT SHORT TO BATTERY	Pressure sensor/pressure switch 2 of the evaporative emission control system has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

- Harness and connectors (EVAP control system pressure sensor)
- EVAP control system pressure sensor

Diagnosis Procedure

INFOID:0000000013748946

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select “ENGINE” >> “ACTIV TEST” >> “Check purging pressure control”.
3. Select “OPEN”.
4. Check that the indicated value of purge pressure sensor is between (–)1 – (+)1 kPa [(–)0.01 – (+)0.01 bar, (–)0.01 – (+)0.01 kg-cm2, (–)0.145 – (+)0.145 psi]

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect EVAP control system pressure sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP control system pressure sensor harness connector and ground.

+		–	Voltage
EVAP control system pressure sensor			
Connector	Terminal		
F173	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EVAP control system pressure sensor harness connector.

+		–		Continuity
ECM		EVAP control system pressure sensor		
Connector	Terminal	Connector	Terminal	
F149	16	F173	3	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EVAP control system pressure sensor harness connector.

+		–		Continuity
ECM		EVAP control system pressure sensor		
Connector	Terminal	Connector	Terminal	
F149	36	F173	1	Existed
	11		2	

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Replace EVAP control system pressure sensor. Refer to EM-34, "Exploded View".
NO >> Repair or replace error-detected parts.

P2505 ECM POWER SUPPLY

DTC Description

INFOID:0000000013609965

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2505	00	ECM/PCM power input signal (ECM/PCM power input signal)	NO SUBTYPE INFORMATION	The power supply at the input of the control unit 'combustion engine' has an electrical malfunction.
	13		CIRCUIT OPEN	The power supply at the input of the control unit 'combustion engine' has an electrical malfunction. There is an open circuit.
	16		CIRC VOLT BELOW THRESHOLD	The power supply at the input of the control unit 'combustion engine' has an electrical malfunction. The limit value for electrical voltage has not been attained.
	17		CIRC VOLT ABOVE THRESHOLD	The power supply at the input of the control unit 'combustion engine' has an electrical malfunction. The limit value for electrical voltage has been exceeded.
	1C		CIRC VOLTAGE OUT OF RANGE	The power supply at the input of the control unit 'combustion engine' has an electrical malfunction. The voltage value is outside the permissible range.

POSSIBLE CAUSE

- Harness or connectors
  (ECM power supply circuit)
- Charging system (ECM power supply voltage is 19 V or more.)

Diagnosis Procedure

INFOID:0000000013609966

1.CHECK CHARGING SYSTEM

Check charging system. Refer to CHG-21, "Work Flow (With EXP-800 NI or GR8-1200 NI)" (With EXP-800 NI or GR8-1200 NI) or CHG-25, "Work Flow (Without EXP-800 NI or GR8-1200 NI)" (Without EXP-800 NI or GR8-1200 NI).

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P250B OIL LEVEL SENSOR

Diagnosis Description

INFOID:0000000013609967

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P250B	46	ENGINE OIL LEVEL SENSOR (Engine oil level sensor circuit range/performance)	CALIB/PRMTER MEMORY ERROR	The oil level sensor has a malfunction. There is an error in the calibration or parameterization memory.
	92		PFM/INCORRECT OPERATN	The oil level sensor has a malfunction. The function or the instruction is malfunction.
	96		CMPNENT INTERNAL MLFNCTN	The oil level sensor has a malfunction. There is an internal component malfunction.

POSSIBLE CAUSE

- Harness and connector
  (Engine oil level switch circuit is open or shorted.)
- Engine oil level switch

Diagnosis Procedure

INFOID:0000000013609968

1.CHECK ENGINE OIL LEVEL SWITCH SIGNAL

1. Turn ignition switch OFF.
2. Disconnect engine oil level switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between engine oil level switch harness connector and ground.

+		–	Voltage
Engine oil level switch			
Connector	Terminal		
F152	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK ENGINE OIL LEVEL SWITCH SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine oil level switch harness connector and ECM harness connector.

+		–		Continuity
Engine oil level switch		ECM		
Connector	Terminal	Connector	Terminal	
F152	2	F149	82	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

3.CHECK ENGINE OIL LEVEL SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between engine oil level switch harness connector and ground.

+		–	Continuity
Engine oil level switch			
Connector	Terminal		
F152	1	Ground	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK ENGINE OIL LEVEL SWITCH

Check engine oil level switch. Refer to EC-906, "Component Inspection (Engine Oil Level Switch)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine oil level switch. Refer to EM-76, "Removal and Installation".

Component Inspection (Engine Oil Level Switch)

INFOID:0000000013609969

1.CHECK ENGINE OIL LEVEL SWITCH

1. Turn ignition switch OFF.
2. Disconnect engine oil level switch harness connector.
3. Check the resistance between engine oil level switch terminals.

Engine oil level switch	Condition	Resistance
Terminal		
1 and 2	Engine oil level: Filled enough	0 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine oil level switch. Refer to EM-76, "Removal and Installation".

P250E ENGINE OIL LEVEL SENSOR

Diagnosis Description

INFOID:0000000013609970

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P250E	2A	Engine oil level sensor (Engine oil level sensor circuit intermittent/erratic)	SIGNAL STUCK IN RANGE	The oil level sensor has a sporadic malfunction. There is no signal change.
	46		CALIB/PRMTER MEMORY ERROR	The oil level sensor has a sporadic malfunction. There is an error in the calibration or parameterization memory.

POSSIBLE CAUSE

- Harness and connector
  (Engine oil level switch circuit is open or shorted.)
- Engine oil level switch

Diagnosis Procedure

INFOID:0000000013609971

1.CHECK ENGINE OIL LEVEL SWITCH SIGNAL

1. Turn ignition switch OFF.
2. Disconnect engine oil level switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between engine oil level switch harness connector and ground.

+		–	Voltage
Engine oil level switch			
Connector	Terminal		
F152	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK ENGINE OIL LEVEL SWITCH SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine oil level switch harness connector and ECM harness connector.

+		–		Continuity
Engine oil level switch		ECM		
Connector	Terminal	Connector	Terminal	
F152	2	F149	82	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to EC-207, "ECM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

3.CHECK ENGINE OIL LEVEL SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between engine oil level switch harness connector and ground.

+		–	Continuity
Engine oil level switch			
Connector	Terminal		
F152	1	Ground	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK ENGINE OIL LEVEL SWITCH

Check engine oil level switch. Refer to EC-908, "Component Inspection (Engine Oil Level Switch)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine oil level switch. Refer to EM-76, "Removal and Installation".

Component Inspection (Engine Oil Level Switch)

INFOID:0000000013609972

1.CHECK ENGINE OIL LEVEL SWITCH

1. Turn ignition switch OFF.
2. Disconnect engine oil level switch harness connector.
3. Check the resistance between engine oil level switch terminals.

Engine oil level switch	Condition	Resistance
Terminal		
1 and 2	Engine oil level: Filled enough	0 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine oil level switch. Refer to EM-76, "Removal and Installation".

P252B

Diagnosis Description

INFOID:0000000013609973

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P2539 FUEL PRESSURE SENSOR

ECM

ECM : DTC Description

INFOID:0000000013609974

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P2539	00	LOW PRESS FUEL SYSTEM SENSOR (Low pressure fuel system sensor circuit)	NO SUBTYPE INFORMATION	The pressure sensor of the low-pressure fuel circuit has a malfunction.

POSSIBLE CAUSE

Low pressure fuel control system

ECM : Diagnosis Procedure

INFOID:0000000013609975

1.CHECK DTC IN FPCM

With CONSULT

Check DTC in “FPCM”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to EC-157, "2WD : DTC Index" (2WD models) or EC-161, "AWD : DTC Index" (AWD models).

NO >> INSPECTION END

FUEL PUMP CONTROL MODULE (FPCM)

FUEL PUMP CONTROL MODULE (FPCM) : DTC Description

INFOID:0000000013609976

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P2539	00	LOW PRESS FUEL SYSTEM SENSOR (Low Pressure Fuel System Sensor Circuit)	NO SUBTYPE INFORMATION	The pressure sensor of the low-pressure fuel circuit has a malfunction.

POSSIBLE CAUSE

- Harness and connectors
  (Fuel pressure sensor circuit is open or shorted.)
- Fuel pressure sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start the engine and let it idle at least 10 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check self-diagnostic result of “FPCM”.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-911, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure

INFOID:0000000013609977

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch OFF.
2. Start the engine and let it idle.
3. On CONSULT screen, select “FPCM” >> “DATA MONITOR” >> “FUEL PRESSURE”.
4. Check that the indicated value is between 400 kPa (4 bar, 4.08 kg/cm^2, 58 psi) and 670 kPa (6.7 bar, 6.834 kg/cm^2, 97.15 psi).

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK FUEL PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect fuel pressure sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel pressure sensor harness connector terminals.

Fuel pressure sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
M390	1	3	5 V

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 3.

3.CHECK FUEL PRESSURE SENSOR POWER SUPPLY AND GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect FPCM harness connector and fuel pressure sensor harness connector.
3. Check the continuity between FPCM harness connector and fuel pressure sensor harness connector.

2WD models

+		–		Continuity
FPCM		Fuel pressure sensor		
Connector	Terminal	Connector	Terminal	
M135	8	M390	1	Existed
	6		3	

AWD models

+		–		Continuity
FPCM		Fuel pressure sensor		
Connector	Terminal	Connector	Terminal	
M136	3	M390	1	Existed
	5		3	

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 FPCM POWER SUPPLY AND GROUND CIRCUIT

Check FPCM power supply and ground circuit. Refer to EC-208, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace FPCM. Refer to EC-964, "Removal and Installation".
NO >> Repair or replace error-detected parts.

5. CHECK FUEL PRESSURE SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect FPCM harness connector and fuel pressure sensor harness connector.
3. Check the continuity between FPCM harness connector and fuel pressure sensor harness connector.

2WD models

+		–		Continuity
FPCM		Fuel pressure sensor		
Connector	Terminal	Connector	Terminal	
M135	7	M390	2	Existed

AWD models

+		–		Continuity
FPCM		Fuel pressure sensor		
Connector	Terminal	Connector	Terminal	
M136	4	M390	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace fuel pressure sensor.
NO >> Repair or replace error-detected parts.

P2540 FUEL PRESSURE SENSOR

ECM

ECM : DTC Description

INFOID:0000000013609978

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P2540	00	LOW PRESS FUEL SYSTEM SENSOR (Low pressure fuel system sensor circuit range/performance)	NO SUBTYPE INFORMATION	The signal for the pressure sensor of the low-pressure fuel circuit is implausible.

POSSIBLE CAUSE

Low pressure fuel control system

ECM : Diagnosis Procedure

INFOID:0000000013609979

1.CHECK DTC IN FPCM

With CONSULT

Check DTC in “FPCM”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to EC-157, "2WD : DTC Index" (2WD models) or EC-161, "AWD : DTC Index" (AWD models).

NO >> INSPECTION END

FUEL PUMP CONTROL MODULE (FPCM)

FUEL PUMP CONTROL MODULE (FPCM) : DTC Description

INFOID:0000000013609980

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms DTC (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P2540	00	LOW PRESS FUEL SYSTEM SENSOR (Low Pressure Fuel System Sensor Circuit Range/Performance)	NO SUBTYPE INFORMATION	The signal for the pressure sensor of the low-pressure fuel circuit is implausible.

POSSIBLE CAUSE

- Harness and connectors
  (Fuel pressure sensor circuit is open or shorted.)
- Fuel pressure sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start the engine and let it idle at least 30 seconds.
3. Check self-diagnostic result of “FPCM”.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-914, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure

INFOID:0000000013609981

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch OFF.
2. Start the engine and let it idle.
3. On CONSULT screen, select “FPCM” >> “DATA MONITOR” >> “FUEL PRESSURE”.
4. Check that the indicated value is between 400 kPa (4 bar, 4.08 kg/cm^2, 58 psi) and 670 kPa (6.7 bar, 6.834 kg/cm^2, 97.15 psi).

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK FUEL PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect fuel pressure sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel pressure sensor harness connector terminals.

Fuel pressure sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
M390	1	3	5 V

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 3.

3.CHECK FUEL PRESSURE SENSOR POWER SUPPLY AND GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect FPCM harness connector and fuel pressure sensor harness connector.
3. Check the continuity between FPCM harness connector and fuel pressure sensor harness connector.

2WD models

+		–		Continuity
FPCM		Fuel pressure sensor		
Connector	Terminal	Connector	Terminal	
M135	8	M390	1	Existed
	6		3	

AWD models

+		–		Continuity
FPCM		Fuel pressure sensor		
Connector	Terminal	Connector	Terminal	
M136	3	M390	1	Existed
	5		3	

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 FPCM POWER SUPPLY AND GROUND CIRCUIT

Check FPCM power supply and ground circuit. Refer to EC-208, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace FPCM. Refer to EC-964, "Removal and Installation".
NO >> Repair or replace error-detected parts.

5. CHECK FUEL PRESSURE SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect FPCM harness connector and fuel pressure sensor harness connector.
3. Check the continuity between FPCM harness connector and fuel pressure sensor harness connector.

2WD models

+		–		Continuity
FPCM		Fuel pressure sensor		
Connector	Terminal	Connector	Terminal	
M135	7	M390	2	Existed

AWD models

+		–		Continuity
FPCM		Fuel pressure sensor		
Connector	Terminal	Connector	Terminal	
M136	4	M390	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace fuel pressure sensor.
NO >> Repair or replace error-detected parts.

P2541 FUEL PRESSURE SENSOR

ECM

ECM : DTC Description

INFOID:0000000013609982

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P2541	00	LOW PRESS FUEL SYSTEM SENSOR (Low pressure fuel system sensor circuit low)	NO SUBTYPE INFORMATION	The pressure sensor of the low-pressure fuel circuit has a short circuit to ground.

POSSIBLE CAUSE

Low pressure fuel control system

ECM : Diagnosis Procedure

INFOID:0000000013609983

1.CHECK DTC IN FPCM

With CONSULT

Check DTC in “FPCM”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to EC-157, "2WD : DTC Index".
NO >> INSPECTION END

FUEL PUMP CONTROL MODULE (FPCM)

FUEL PUMP CONTROL MODULE (FPCM) : DTC Description

INFOID:0000000013609984

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms DTC (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P2541	00	LOW PRESS FUEL SYSTEM SENSOR (Low Pressure Fuel System Sensor Circuit Low)	NO SUBTYPE INFORMATION	The pressure sensor of the low-pressure fuel circuit has a short circuit to ground.

POSSIBLE CAUSE

- Harness and connectors
  (Fuel pressure sensor circuit is open or shorted.)
- Fuel pressure sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start the engine and let it idle at least 10 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check self-diagnostic result of “FPCM”.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-917, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure

INFOID:0000000013609985

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch OFF.
2. Start the engine and let it idle.
3. On CONSULT screen, select “FPCM” >> “DATA MONITOR” >> “FUEL PRESSURE”.
4. Check that the indicated value is between 400 kPa (4 bar, 4.08 kg/cm^2, 58 psi) and 670 kPa (6.7 bar, 6.834 kg/cm^2, 97.15 psi).

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK FUEL PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect fuel pressure sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel pressure sensor harness connector terminals.

Fuel pressure sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
M390	1	3	5 V

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 3.

3.CHECK FUEL PRESSURE SENSOR POWER SUPPLY AND GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect FPCM harness connector and fuel pressure sensor harness connector.
3. Check the continuity between FPCM harness connector and fuel pressure sensor harness connector.

2WD models

+		–		Continuity
FPCM		Fuel pressure sensor		
Connector	Terminal	Connector	Terminal	
M135	8	M390	1	Existed
	6		3	

AWD models

+		–		Continuity
FPCM		Fuel pressure sensor		
Connector	Terminal	Connector	Terminal	
M136	3	M390	1	Existed
	5		3	

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 FPCM POWER SUPPLY AND GROUND CIRCUIT

Check FPCM power supply and ground circuit. Refer to EC-208, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace FPCM. Refer to EC-964, "Removal and Installation".
NO >> Repair or replace error-detected parts.

5. CHECK FUEL PRESSURE SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect FPCM harness connector and fuel pressure sensor harness connector.
3. Check the continuity between FPCM harness connector and fuel pressure sensor harness connector.

2WD models

+		–		Continuity
FPCM		Fuel pressure sensor		
Connector	Terminal	Connector	Terminal	
M135	7	M390	2	Existed

AWD models

+		–		Continuity
FPCM		Fuel pressure sensor		
Connector	Terminal	Connector	Terminal	
M136	4	M390	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace fuel pressure sensor.
NO >> Repair or replace error-detected parts.

P2542 FUEL PRESSURE SENSOR

ECM

ECM : DTC Description

INFOID:0000000013609986

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P2542	00	LOW PRESS FUEL SYSTEM SENSOR (Low pressure fuel system sensor circuit high)	NO SUBTYPE INFORMATION	The pressure sensor of the low-pressure fuel circuit has a short circuit to positive.

POSSIBLE CAUSE

Low pressure fuel control system

ECM : Diagnosis Procedure

INFOID:0000000013609987

1.CHECK DTC IN FPCM

With CONSULT

Check DTC in “FPCM”.

Is any DTC detected?

YES >> Perform trouble diagnosis for the detected DTC. Refer to EC-157, "2WD : DTC Index".

NO >> INSPECTION END

FUEL PUMP CONTROL MODULE (FPCM)

FUEL PUMP CONTROL MODULE (FPCM) : DTC Description

INFOID:0000000013609988

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms DTC (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P2542	00	LOW PRESS FUEL SYSTEM SENSOR (Low Pressure Fuel System Sensor Circuit High)	NO SUBTYPE INFORMATION	The pressure sensor of the low-pressure fuel circuit has a short circuit to positive.

POSSIBLE CAUSE

- Harness and connectors
  (Fuel pressure sensor circuit is open or shorted.)
- Fuel pressure sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start the engine and let it idle at least 10 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check self-diagnostic result of “FPCM”.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-920, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure

INFOID:0000000013609989

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch OFF.
2. Start the engine and let it idle.
3. On CONSULT screen, select “FPCM” >> “DATA MONITOR” >> “FUEL PRESSURE”.
4. Check that the indicated value is between 400 kPa (4 bar, 4.08 kg/cm^2, 58 psi) and 670 kPa (6.7 bar, 6.834 kg/cm^2, 97.15 psi).

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK FUEL PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect fuel pressure sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel pressure sensor harness connector terminals.

Fuel pressure sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
M390	1	3	5 V

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 3.

3.CHECK FUEL PRESSURE SENSOR POWER SUPPLY AND GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect FPCM harness connector and fuel pressure sensor harness connector.
3. Check the continuity between FPCM harness connector and fuel pressure sensor harness connector.

2WD models

+		–		Continuity
FPCM		Fuel pressure sensor		
Connector	Terminal	Connector	Terminal	
M135	8	M390	1	Existed
	6		3	

AWD models

+		–		Continuity
FPCM		Fuel pressure sensor		
Connector	Terminal	Connector	Terminal	
M136	3	M390	1	Existed
	5		3	

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 FPCM POWER SUPPLY AND GROUND CIRCUIT

Check FPCM power supply and ground circuit. Refer to EC-208, "FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace FPCM. Refer to EC-964, "Removal and Installation".
NO >> Repair or replace error-detected parts.

5. CHECK FUEL PRESSURE SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect FPCM harness connector and fuel pressure sensor harness connector.
3. Check the continuity between FPCM harness connector and fuel pressure sensor harness connector.

2WD models

+		–		Continuity
FPCM		Fuel pressure sensor		
Connector	Terminal	Connector	Terminal	
M135	7	M390	2	Existed

AWD models

+		–		Continuity
FPCM		Fuel pressure sensor		
Connector	Terminal	Connector	Terminal	
M136	4	M390	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace fuel pressure sensor.
NO >> Repair or replace error-detected parts.

P257D ENGINE HOOD SWITCH

DTC Description

INFOID:0000000013609990

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P257D	00	ENGINE HOOD SWITCH (Engine hood switch circuit range/performance)	NO SUBTYPE INFORMATION	The contact switch Engine hood has a malfunction.

POSSIBLE CAUSE

- Harness or connectors
  (Hood switch circuit is open or shorted.)
- Hood switch

Diagnosis Procedure

INFOID:0000000013609991

1.CHECK HOOD SWITCH SGNAL

1. Turn ignition switch OFF.
2. Disconnect hood switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between hood switch harness connector and ground.

+		–	Voltage (Approx.)
Hood switch			
Connector	Terminal		
E86	2	Ground	12 V
	4		

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK HOOD SWITCH SGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect BCM harness connector.
3. Check the continuity between hood switch harness connector and BCM harness connector.

+		–		Continuity
Hood switch		BCM		
Connector	Terminal	Connector	Terminal	
E86	2	E15	124	Existed
	4		140	

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Check BCM power supply and ground circuit. Refer to BCS-63, "Wiring Diagram".
NO >> Repair or replace error-detected parts.

3.CHECK HOOD SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between hood switch harness connector and ground.

+		–	Continuity
Hood switch			
Connector	Terminal		
E86	1	Ground	Existed
	3		

Is the inspection result normal?

YES >> Replace hood switch assembly. Refer to DLK-261, "Exploded View".
NO >> Repair or replace error-detected parts.

P2600 COOLANT PUMP

DTC Description

INFOID:0000000013609992

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2600	00	COOLANT PUMP A (Coolant pump “A” circuit/open)	NO SUBTYPE INFORMATION	The output for the circulation pump 'Coolant' has an electrical malfunction or an open circuit.
	13		CIRCUIT OPEN	The output for the coolant pump has an electrical malfunction or an open circuit. There is an open circuit.

POSSIBLE CAUSE

- Harness or connectors
  (Coolant pump switchover valve circuit)
- Coolant pump switchover valve

Diagnosis Procedure

INFOID:0000000013609993

1.PRECONDITIONING

Set the vehicle to the following conditions.
- Check that the engine coolant is filled enough.
- Air conditioning system is turned OFF.
- Coolant temperature is between 65°C (149°F) and 85°C (185°F).

>> GO TO 2.

2.CHECK COMPONENT FUNCTION

With CONSULT
NOTE:
Perform this procedure at room temperature.
1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK COOLANT PUMP SWICHOVER VALVE”.
3. Perform the Active Test.
4. Listen to the coolant pump switchover valve operation sound using suitable tool.
5. Check that the coolant pump vacuum actuator linkage moves.

Is the inspection result normal?

YES >> INSPECTION END
NO-1 (coolant pump switchover valve is not activated.)>>GO TO 3.
NO-2 (coolant vacuum actuator linkage is not moved.)>>GO TO 7.

3.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that #214 (10 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace the fuse after repairing the applicable circuit.

4.CHECK COOLANT PUMP SWITCHOVER VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect coolant pump switchover valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between coolant pump switchover valve harness connector and ground.

+		–	Voltage
Coolant pump switchover valve			
Connector	Terminal		
F161	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. CHECK COOLANT PUMP SWITCHOVER VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out #214 (10A) fuse.
3. Check the continuity between coolant pump switchover valve harness connector and fuse terminal.

+		–	Continuity
Coolant pump switchover valve			
Connector	Terminal		
F161	1	#214 fuse terminal	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.

6. CHECK COOLANT PUMP SWITCHOVER VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and coolant pump switchover valve harness connector.

+		–		Continuity
ECM		Coolant pump switchover valve		
Connector	Terminal	Connector	Terminal	
F149	54	F161	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace coolant pump switchover valve. Refer to EC-27, "Component Parts Location".
NO >> Repair or replace error-detected parts.

7. CHECK VACUUM PRESSURE

1. Turn ignition switch OFF.
2. Disconnect vacuum hose at boost pressure control vacuum transducer.
3. Connect vacuum tester.
4. Start the engine and let it idle.
5. Check that the vacuum pressure is more than –75 kPa (–750 mbar, –0.765 kg/cm^2, –10.9 psi).

Is the inspection result normal?

YES >> INSPECTION END
NO >> Check vacuum line leakage, or vacuum pump performance.

P2602 COOLANT PUMP

DTC Description

INFOID:0000000013609994

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2602	00	COOLANT PUMP A (Coolant pump “A” circuit low)	NO SUBTYPE INFORMATION	The output for the coolant pump has a short circuit to ground.
	11		CIRCUIT SHORT TO GROUND	The output for the coolant pump has a short circuit to ground. There is a short circuit to ground.

POSSIBLE CAUSE

- Harness or connectors
  (Coolant pump switchover valve circuit)
- Coolant pump switchover valve

Diagnosis Procedure

INFOID:0000000013609995

1.PRECONDITIONING

Set the vehicle to the following conditions.
- Check that the engine coolant is filled enough.
- Air conditioning system is turned OFF.
- Coolant temperature is between 65°C (149°F) and 85°C (185°F).

>> GO TO 2.

2.CHECK COMPONENT FUNCTION

With CONSULT
NOTE:
Perform this procedure at room temperature.
1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK COOLANT PUMP SWICHOVER VALVE”.
3. Perform the Active Test.
4. Listen to the coolant pump switchover valve operation sound using suitable tool.
5. Check that the coolant pump vacuum actuator linkage moves.

Is the inspection result normal?

YES >> INSPECTION END
NO-1 (coolant pump switchover valve is not activated.)>>GO TO 3.
NO-2 (coolant vacuum actuator linkage is not moved.)>>GO TO 7.

3.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that #214 (10 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace the fuse after repairing the applicable circuit.

4.CHECK COOLANT PUMP SWITCHOVER VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect coolant pump switchover valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between coolant pump switchover valve harness connector and ground.

+		–	Voltage
Coolant pump switchover valve			
Connector	Terminal		
F161	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. CHECK COOLANT PUMP SWITCHOVER VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out #214 (10 A) fuse.
3. Check the continuity between coolant pump switchover valve harness connector and fuse terminal.

+		–	Continuity
Coolant pump switchover valve			
Connector	Terminal		
F161	1	#214 fuse terminal	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.

6. CHECK COOLANT PUMP SWITCHOVER VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and coolant pump switchover valve harness connector.

+		–		Continuity
ECM		Coolant pump switchover valve		
Connector	Terminal	Connector	Terminal	
F149	54	F161	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace coolant pump switchover valve. Refer to EC-27, "Component Parts Location".
NO >> Repair or replace error-detected parts.

7. CHECK VACUUM PRESSURE

1. Turn ignition switch OFF.
2. Disconnect vacuum hose at boost pressure control vacuum transducer.
3. Connect vacuum tester.
4. Start the engine and let it idle.
5. Check that the vacuum pressure is more than –75 kPa (–750 mbar, –0.765 kg/cm^2, –10.9 psi).

Is the inspection result normal?

YES >> INSPECTION END
NO >> Check vacuum line leakage, or vacuum pump performance.

P2603 COOLANT PUMP

DTC Description

INFOID:0000000013609996

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2603	00	COOLANT PUMP A (Coolant pump “A” circuit high)	NO SUBTYPE INFORMATION	The output for the coolant pump has a short circuit to positive.
	12		CIRCUIT SHORT TO BATTERY	The output for the coolant pump has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Coolant pump switchover valve circuit)
- Coolant pump switchover valve

Diagnosis Procedure

INFOID:0000000013609997

1.PRECONDITIONING

Set the vehicle to the following conditions.
- Check that the engine coolant is filled enough.
- Air conditioning system is turned OFF.
- Coolant temperature is between 65°C (149°F) and 85°C (185°F).

>> GO TO 2.

2.CHECK COMPONENT FUNCTION

With CONSULT
NOTE:
Perform this procedure at room temperature.
1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK COOLANT PUMP SWICHOVER VALVE”.
3. Perform the Active Test.
4. Listen to the coolant pump switchover valve operation sound using suitable tool.
5. Check that the coolant pump vacuum actuator linkage moves.

Is the inspection result normal?

YES >> INSPECTION END
NO-1 (coolant pump switchover valve is not activated.)>>GO TO 3.
NO-2 (coolant vacuum actuator linkage is not moved.)>>GO TO 7.

3.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that No. 98 (15 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace the fuse after repairing the applicable circuit.

4.CHECK COOLANT PUMP SWITCHOVER VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect coolant pump switchover valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between coolant pump switchover valve harness connector and ground.

+		–	Voltage
Coolant pump switchover valve			
Connector	Terminal		
F161	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. CHECK COOLANT PUMP SWITCHOVER VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out No. 98 fuse.
3. Check the continuity between coolant pump switchover valve harness connector and fuse terminal.

+		–	Continuity
Coolant pump switchover valve			
Connector	Terminal		
F161	1	No. 98 fuse terminal	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.

6. CHECK COOLANT PUMP SWITCHOVER VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and coolant pump switchover valve harness connector.

+		–		Continuity
ECM		Coolant pump switchover valve		
Connector	Terminal	Connector	Terminal	
F149	54	F161	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace coolant pump switchover valve. Refer to EC-27, "Component Parts Location".
NO >> Repair or replace error-detected parts.

7. CHECK VACUUM PRESSURE

1. Turn ignition switch OFF.
2. Disconnect vacuum hose at boost pressure control vacuum transducer.
3. Connect vacuum tester.
4. Start the engine and let it idle.
5. Check that the vacuum pressure is more than –75 kPa (–750 mbar, –0.765 kg/cm^2, –10.9 psi).

Is the inspection result normal?

YES >> INSPECTION END
NO >> Check vacuum line leakage, or vacuum pump performance.

P2610 ENGINE OFF TIME

DTC Description

INFOID:0000000013609998

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		DTC (Trouble diagnosis content)	Malfunction type	
P2610	08	ECM/PCM ENGINE OFF TIMER (ECM/PCM engine off timer performance)	BUS SIGNAL/MESSAGE ERROR	The engine off time has an implausible value. There is a signal error or the message is abnormal.
	29		SIGNAL INVALID	The engine off time has an implausible value. There is an invalid signal.
	82		SEQUENCE COUNTER INCORRECT	The engine off time has an implausible value. The instruction counter is not updated.
	84		SIG BELOW ALLOWABLE RANGE	The engine off time has an implausible value. There is a signal below the permissible limit value.
	85		SIG ABOVE ALLOWABLE RANGE	The engine off time has an implausible value. There is a signal above the permissible limit value.

POSSIBLE CAUSE
Combination meter

Diagnosis Procedure

INFOID:0000000013609999

1.CHECK “SELF-DIAGNOSTIC RESULT” OF “METER/M&A””

With CONSULT
Check “Self-diagnostic Result” of “METER/M&A”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to MWI-85, "DTC Index".
NO >> INSPECTION END

P2614 INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR

DTC Description

INFOID:0000000013610000

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2614	03	Camshaft position signal (Camshaft Position Signal Output Circuit/Open)	FM/PWM ERROR	The output signal for the position of the camshaft has an electrical malfunction or an open circuit. There is a frequency or pulse width modulation malfunction.
	29		SIGNAL INVALID	The output signal for the position of the camshaft has an electrical malfunction or an open circuit. There is an invalid signal.

POSSIBLE CAUSE

- Harness or connectors
  (Intake camshaft valve lift switchover actuator circuit)
- Intake camshaft valve lift switchover actuator

Diagnosis Procedure

INFOID:0000000013610001

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHING ACTUATOR”.
3. Perform Active Test.

Is the actuator actuated?

YES >> GO TO 9.
NO >> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR FUNCTION CHECK

Check signal between ECM harness connector terminal No. 33 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

1. Check intake camshaft valve lift switchover actuator. Refer to EC-314, "Component Inspection (Intake Camshaft Valve Lift Switchover)".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 1 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 96 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 2 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 72 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake camshaft valve lift switchover harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake camshaft valve lift switchover harness connector and ground.

+		–	Voltage (Approx.)
Intake camshaft valve lift switchover			
Connector	Terminal		
F172	4	Ground	5 V
	6		Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for intake camshaft valve lift switchover power supply circuit.

8. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ECM harness connector and intake camshaft valve lift switchover harness connector.

ECM		Intake camshaft valve lift switchover		Continuity
Connector	Terminal	Connector	Terminal	
F149	11	F172	3	Existed

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake camshaft valve lift switchover. Refer to EC-27, "Component Parts Location".
NO >> Repair or replace error-detected parts.

P2615 INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR

DTC Description

INFOID:0000000013610002

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2615	11	Camshaft position signal (Camshaft Position Signal Output Circuit Low)	CIRCUIT SHORT TO GROUND	The output signal for the position of the camshaft has a short circuit to ground. There is a short circuit to ground.

POSSIBLE CAUSE

- Harness or connectors
  (Intake camshaft valve lift switchover actuator circuit)
- Intake camshaft valve lift switchover actuator

Diagnosis Procedure

INFOID:0000000013610003

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHING ACTUATOR”.
3. Perform Active Test.

Is the actuator actuated?

YES >> GO TO 9.
NO >> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR FUNCTION CHECK

Check signal between ECM harness connector terminal No. 33 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

1. Check intake camshaft valve lift switchover actuator. Refer to EC-314, "Component Inspection (Intake Camshaft Valve Lift Switchover)".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 1 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 96 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 2 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 72 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake camshaft valve lift switchover harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake camshaft valve lift switchover harness connector and ground.

+		–	Voltage (Approx.)
Intake camshaft valve lift switchover			
Connector	Terminal		
F172	4	Ground	5 V
	6		Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for intake camshaft valve lift switchover power supply circuit.

8. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ECM harness connector and intake camshaft valve lift switchover harness connector.

ECM		Intake camshaft valve lift switchover		Continuity
Connector	Terminal	Connector	Terminal	
F149	11	F172	3	Existed

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake camshaft valve lift switchover. Refer to EC-27, "Component Parts Location".
NO >> Repair or replace error-detected parts.

P2616 INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR

DTC Description

INFOID:0000000013610004

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P2616	12	Camshaft position signal (Camshaft Position Signal Output Circuit High)	CIRCUIT SHORT TO BATTERY	The output signal for the position of the camshaft has a short circuit to positive. There is a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Intake camshaft valve lift switchover actuator circuit)
- Intake camshaft valve lift switchover actuator

Diagnosis Procedure

INFOID:0000000013610005

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHING ACTUATOR”.
3. Perform Active Test.

Is the actuator actuated?

YES >> GO TO 9.
NO >> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-207, "ECM : Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR FUNCTION CHECK

Check signal between ECM harness connector terminal No. 33 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK INTAKE CAMSHAFT VALVE LIFT SWITCHOVER ACTUATOR

1. Check intake camshaft valve lift switchover actuator. Refer to EC-314, "Component Inspection (Intake Camshaft Valve Lift Switchover)".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 1 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 96 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POSITION SENSOR 2 FUNCTION CHECK

Check signal between ECM harness connector terminal No. 72 and No.98. Refer to EC-119, "Reference Value".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake camshaft valve lift switchover harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake camshaft valve lift switchover harness connector and ground.

+		−	Voltage (Approx.)
Intake camshaft valve lift switchover			
Connector	Terminal		
F172	4	Ground	5 V
	6		Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for intake camshaft valve lift switchover power supply circuit.

8. INTAKE CAMSHAFT VALVE LIFT SWITCHOVER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ECM harness connector and intake camshaft valve lift switchover harness connector.

ECM		Intake camshaft valve lift switchover		Continuity
Connector	Terminal	Connector	Terminal	
F149	11	F172	3	Existed

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake camshaft valve lift switchover. Refer to EC-27, "Component Parts Location".
NO >> Repair or replace error-detected parts.

P2617 CRANKSHAFT POSITION SENSOR

DTC Description

INFOID:0000000013610006

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	DTC detecting condition
P2617	13	CAMSHAFT POSITION SIGNAL (Crankshaft position signal output circuit/open)	CIRCUIT OPEN	The signal of the position sensor of the crankshaft has an electrical malfunction or an open circuit. There is an open circuit.

POSSIBLE CAUSE

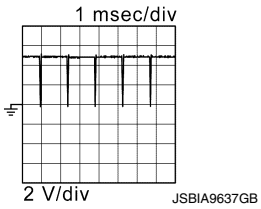
- Harness or connectors
  (Crankshaft position sensor circuit)
- Crankshaft position sensor

Diagnosis Procedure

INFOID:0000000013610007

1.COMPONENT FUNCTION CHECK

1. Start the engine and let it idle.
2. Check signal between ECM harness connector terminals.

ECM			Reference value
Connector	+	–	
	Terminal		
F149	81	12	

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK CRANKSHAFT POSITION SENSOR POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect crankshaft position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between crankshaft position sensor harness connector terminals.

Crankshaft position sensor			Voltage
Connector	+	–	
	Terminal		
F146	3	1	4.8 – 5.3 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK CRANKSHAFT POSITION SENSOR POWER SUPPLY-2

Check the voltage between crankshaft position sensor harness connector and ground.

+		–	Voltage
Crankshaft position sensor			
Connector	Terminal		
F146	3	Ground	4.8 – 5.3 V

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4. CHECK CRANKSHAFT POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and crankshaft position sensor harness connector.

+		–		Continuity
ECM		Crankshaft position sensor		
Connector	Terminal	Connector	Terminal	
F149	18	F146	3	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

5. CHECK CRANKSHAFT POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and crankshaft position sensor harness connector.

+		–		Continuity
ECM		Crankshaft position sensor		
Connector	Terminal	Connector	Terminal	
F149	12	F146	1	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

6. CHECK CRANKSHAFT POSITION SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and crankshaft position sensor harness connector.

+		–		Continuity
ECM		Crankshaft position sensor		
Connector	Terminal	Connector	Terminal	
F149	81	F146	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Replace crankshaft position sensor. Refer to EM-100, "Removal and Installation".
NO >> Repair or replace error-detected parts.

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-56, "Intermittent Incident".

>> INSPECTION END

P261A COOLANT PUMP SWITCHOVER VALVE

DTC Description

INFOID:0000000013610008

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P261A	00	Coolant pump B (Coolant Pump ″B″ Control Circuit/Open)	NO SUBTYPE INFORMATION	Actuation of coolant pump has an open circuit.

POSSIBLE CAUSE

- Harness or connectors (Coolant pump switchover valve circuit)
- Coolant pump switchover valve

Diagnosis Procedure

INFOID:0000000013610009

1.PRECONDITIONING

Set the vehicle to the following conditions.
- Check that the engine coolant is filled enough.
- Air conditioning system is turned OFF.
- Coolant temperature is between 65°C (149°F) and 85°C (185°F).

>> GO TO 2.

2.CHECK COMPONENT FUNCTION

With CONSULT
NOTE:
Perform this procedure at room temperature.
1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK COOLANT PUMP SWICHOVER VALVE”.
3. Perform the Active Test.
4. Listen to the coolant pump switchover valve operation sound using suitable tool.
5. Check that the coolant pump vacuum actuator linkage moves.

Is the inspection result normal?

YES >> INSPECTION END
NO-1 (coolant pump switchover valve is not activated.)>>GO TO 3.
NO-2 (coolant vacuum actuator linkage is not moved.)>>GO TO 7.

3.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that #214 (10 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace the fuse after repairing the applicable circuit.

4.CHECK COOLANT PUMP SWITCHOVER VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect coolant pump switchover valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between coolant pump switchover valve harness connector and ground.

+		–	Voltage
Coolant pump switchover valve			
Connector	Terminal		
F161	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. CHECK COOLANT PUMP SWITCHOVER VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out #214 (10A) fuse.
3. Check the continuity between coolant pump switchover valve harness connector and fuse terminal.

+		–	Continuity
Coolant pump switchover valve			
Connector	Terminal		
F161	1	#214 fuse terminal	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.

6. CHECK COOLANT PUMP SWITCHOVER VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and coolant pump switchover valve harness connector.

+		–		Continuity
ECM		Coolant pump switchover valve		
Connector	Terminal	Connector	Terminal	
F149	54	F161	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace coolant pump switchover valve. Refer to EC-27, "Component Parts Location".
NO >> Repair or replace error-detected parts.

7. CHECK VACUUM PRESSURE

1. Turn ignition switch OFF.
2. Disconnect vacuum hose at boost pressure control vacuum transducer.
3. Connect vacuum tester.
4. Start the engine and let it idle.
5. Check that the vacuum pressure is more than –75 kPa (–750 mbar, –0.765 kg/cm^2, –10.9 psi).

Is the inspection result normal?

YES >> INSPECTION END
NO >> Check vacuum line leakage, or vacuum pump performance.

P261B ENGINE COOLANT PUMP SWITCHOVER VALVE

DTC Description

INFOID:0000000013610010

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms Malfunction type	DTC detecting condition
P261B	00	Coolant pump B (Coolant Pump ″B″ Control Circuit Performance/Stuck Off)	NO SUBTYPE INFORMATION	The output of coolant pump has a malfunction or does not switch off.

POSSIBLE CAUSE

- Harness or connectors (Coolant pump switchover valve circuit)
- Coolant pump switchover valve

Diagnosis Procedure

INFOID:0000000013610011

1.PRECONDITIONING

Set the vehicle to the following conditions.
- Check that the engine coolant is filled enough.
- Air conditioning system is turned OFF.
- Coolant temperature is between 65°C (149°F) and 85°C (185°F).

>> GO TO 2.

2.CHECK COMPONENT FUNCTION

With CONSULT
NOTE:
Perform this procedure at room temperature.
1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK COOLANT PUMP SWICHOVER VALVE”.
3. Perform the Active Test.
4. Listen to the coolant pump switchover valve operation sound using suitable tool.
5. Check that the coolant pump vacuum actuator linkage moves.

Is the inspection result normal?

YES >> INSPECTION END
NO-1 (coolant pump switchover valve is not activated.)>>GO TO 3.
NO-2 (coolant vacuum actuator linkage is not moved.)>>GO TO 7.

3.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that #214 (10 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace the fuse after repairing the applicable circuit.

4.CHECK COOLANT PUMP SWITCHOVER VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect coolant pump switchover valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between coolant pump switchover valve harness connector and ground.

+		–	Voltage
Coolant pump switchover valve			
Connector	Terminal		
F161	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. CHECK COOLANT PUMP SWITCHOVER VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out #214 (10A) fuse.
3. Check the continuity between coolant pump switchover valve harness connector and fuse terminal.

+		–	Continuity
Coolant pump switchover valve			
Connector	Terminal		
F161	1	#214 fuse terminal	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.

6. CHECK COOLANT PUMP SWITCHOVER VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and coolant pump switchover valve harness connector.

+		–		Continuity
ECM		Coolant pump switchover valve		
Connector	Terminal	Connector	Terminal	
F149	54	F161	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace coolant pump switchover valve. Refer to EC-27, "Component Parts Location".
NO >> Repair or replace error-detected parts.

7. CHECK VACUUM PRESSURE

1. Turn ignition switch OFF.
2. Disconnect vacuum hose at boost pressure control vacuum transducer.
3. Connect vacuum tester.
4. Start the engine and let it idle.
5. Check that the vacuum pressure is more than –75 kPa (–750 mbar, –0.765 kg/cm^2, –10.9 psi).

Is the inspection result normal?

YES >> INSPECTION END
NO >> Check vacuum line leakage, or vacuum pump performance.

P261C ENGINE COOLANT PUMP SWITCHOVER VALVE

DTC Description

INFOID:0000000013610012

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P261C	00	Coolant pump B (Coolant Pump B Control Circuit Low)	NO SUBTYPE INFORMATION	Actuation of coolant pump has a short circuit to ground.

POSSIBLE CAUSE

- Harness or connectors (Coolant pump switchover valve circuit)
- Coolant pump switchover valve

Diagnosis Procedure

INFOID:0000000013610013

1.PRECONDITIONING

Set the vehicle to the following conditions.
- Check that the engine coolant is filled enough.
- Air conditioning system is turned OFF.
- Coolant temperature is between 65°C (149°F) and 85°C (185°F).

>> GO TO 2.

2.CHECK COMPONENT FUNCTION

With CONSULT
NOTE:
Perform this procedure at room temperature.
1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK COOLANT PUMP SWICHOVER VALVE”.
3. Perform the Active Test.
4. Listen to the coolant pump switchover valve operation sound using suitable tool.
5. Check that the coolant pump vacuum actuator linkage moves.

Is the inspection result normal?

YES >> INSPECTION END
NO-1 (coolant pump switchover valve is not activated.)>>GO TO 3.
NO-2 (coolant vacuum actuator linkage is not moved.)>>GO TO 7.

3.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that #214 (10 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace the fuse after repairing the applicable circuit.

4.CHECK COOLANT PUMP SWITCHOVER VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect coolant pump switchover valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between coolant pump switchover valve harness connector and ground.

+		–	Voltage
Coolant pump switchover valve			
Connector	Terminal		
F161	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. CHECK COOLANT PUMP SWITCHOVER VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out #214 (10A) fuse.
3. Check the continuity between coolant pump switchover valve harness connector and fuse terminal.

+		–	Continuity
Coolant pump switchover valve			
Connector	Terminal		
F161	1	#214 fuse terminal	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.

6. CHECK COOLANT PUMP SWITCHOVER VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and coolant pump switchover valve harness connector.

+		–		Continuity
ECM		Coolant pump switchover valve		
Connector	Terminal	Connector	Terminal	
F149	54	F161	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace coolant pump switchover valve. Refer to EC-27, "Component Parts Location".
NO >> Repair or replace error-detected parts.

7. CHECK VACUUM PRESSURE

1. Turn ignition switch OFF.
2. Disconnect vacuum hose at boost pressure control vacuum transducer.
3. Connect vacuum tester.
4. Start the engine and let it idle.
5. Check that the vacuum pressure is more than –75 kPa (–750 mbar, –0.765 kg/cm^2, –10.9 psi).

Is the inspection result normal?

YES >> INSPECTION END
NO >> Check vacuum line leakage, or vacuum pump performance.

P261D ENGINE COOLANT PUMP SWITCHOVER VALVE

DTC Description

INFOID:0000000013610014

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms (Malfunction type)	DTC detecting condition
P261D	00	Coolant pump B (Coolant Pump ″B″ Control Circuit High)	[NO SUBTYPE INFORMATION]	Actuation of coolant pump has a short circuit to positive.

POSSIBLE CAUSE

- Harness or connectors
  (Coolant pump switchover valve circuit)
- Coolant pump switchover valve

Diagnosis Procedure

INFOID:0000000013610015

1.PRECONDITIONING

Set the vehicle to the following conditions.
- Check that the engine coolant is filled enough.
- Air conditioning system is turned OFF.
- Coolant temperature is between 65°C (149°F) and 85°C (185°F).

>> GO TO 2.

2.CHECK COMPONENT FUNCTION

With CONSULT
NOTE:
Perform this procedure at room temperature.
1. Start the engine and let it idle.
2. On CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “CHECK COOLANT PUMP SWICHOVER VALVE”.
3. Perform the Active Test.
4. Listen to the coolant pump switchover valve operation sound using suitable tool.
5. Check that the coolant pump vacuum actuator linkage moves.

Is the inspection result normal?

YES >> INSPECTION END
NO-1 (coolant pump switchover valve is not activated.)>>GO TO 3.
NO-2 (coolant vacuum actuator linkage is not moved.)>>GO TO 7.

3.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that #214 (10 A) fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace the fuse after repairing the applicable circuit.

4.CHECK COOLANT PUMP SWITCHOVER VALVE POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect coolant pump switchover valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between coolant pump switchover valve harness connector and ground.

+		–	Voltage
Coolant pump switchover valve			
Connector	Terminal		
F161	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. CHECK COOLANT PUMP SWITCHOVER VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out #214 (10A) fuse.
3. Check the continuity between coolant pump switchover valve harness connector and fuse terminal.

+		–	Continuity
Coolant pump switchover valve			
Connector	Terminal		
F161	1	#214 fuse terminal	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.

6. CHECK COOLANT PUMP SWITCHOVER VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and coolant pump switchover valve harness connector.

+		–		Continuity
ECM		Coolant pump switchover valve		
Connector	Terminal	Connector	Terminal	
F149	54	F161	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace coolant pump switchover valve. Refer to EC-27, "Component Parts Location".
NO >> Repair or replace error-detected parts.

7. CHECK VACUUM PRESSURE

1. Turn ignition switch OFF.
2. Disconnect vacuum hose at boost pressure control vacuum transducer.
3. Connect vacuum tester.
4. Start the engine and let it idle.
5. Check that the vacuum pressure is more than –75 kPa (–750 mbar, –0.765 kg/cm^2, –10.9 psi).

Is the inspection result normal?

YES >> INSPECTION END
NO >> Check vacuum line leakage, or vacuum pump performance.

P2626 A/F SENSOR

DTC Description

INFOID:0000000013610016

DTC DETECTION LOGIC

DTC No.		CONSULT screen terms		DTC detecting condition
		(Trouble diagnosis content)	[Malfunction type]	
P2626	00	O2 SENSOR B1 SENSOR 1 (O2 sensor pumping current trim circuit/open bank 1 sensor 1)	NO SUBTYPE INFORMATION	The trimming resistor connection of A/F sensor (cylinder bank 1) has an electrical malfunction or open circuit.

POSSIBLE CAUSE

- Harness and connectors
  (A/F sensor circuit is open or shorted.)
- A/F sensor

Diagnosis Procedure

INFOID:0000000013610017

1.CHECK A/F SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect A/F sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor harness connector and ground.

+		−	Voltage
A/F sensor			
Connector	Terminal		
F143	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK A/F SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check that #214 fuse is not fusing.
3. Check the continuity between A/F sensor harness connector and fuse terminal.

+		−	Continuity
A/F sensor			
Connector	Terminal		
F143	4	#214 fuse terminal	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR HEATER CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor harness connector and ECM harness connector.

+		–		Continuity
A/F sensor		ECM		
Connector	Terminal	Connector	Terminal	
F143	1	F149	63	Existed
	2		64	
	3		77	
	5		88	
	6		87	

4. Also check harness for short to ground, short to power, and short to each circuit.

Is the inspection result normal?

YES >> Replace A/F sensor. Refer to EX-5, "Exploded View".
NO >> Repair or replace error-detected parts.

P2716

Diagnosis Description

INFOID:0000000013610018

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P2725

Diagnosis Description

INFOID:0000000013610019

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P2734

Diagnosis Description

INFOID:0000000013610020

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P2757

Diagnosis Description

INFOID:0000000013610021

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P2759

Diagnosis Description

INFOID:0000000013610022

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P2766

Diagnosis Description

INFOID:0000000013610023

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P2767

Diagnosis Description

INFOID:0000000013610024

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P2768

Diagnosis Description

INFOID:0000000013610025

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

P2810

Diagnosis Description

INFOID:0000000013610028

This DTC is displayed but not used. When the DTC is detected, erase the DTC.
When this DTC is detected with other DTCs, perform trouble diagnosis for other DTCs.

CRANKCASE VENTILATION SYSTEM

Diagnosis Procedure

INFOID:0000000013610029

1.CHECK PARTIAL LOAD OPERATION CRANKCASE VENTILATION VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect partial load operation crankcase ventilation valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between partial load operation crankcase ventilation valve harness connector and ground.

+		–	Voltage
Partial load operation crankcase ventilation valve			
Connector	Terminal		
F145	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK PARTIAL LOAD OPERATION CRANKCASE VENTILATION VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Pull out #214 (10A) fuse.
3. Check that the fuse is not fusing.
4. Check the continuity between partial load operation crankcase ventilation valve harness connector and fuse terminal.

+		–	Continuity
Partial load operation crankcase ventilation valve			
Connector	Terminal		
F145	2	#214 fuse terminal	Existed

5. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK PARTIAL LOAD OPERATION CRANKCASE VENTILATION VALVE CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between partial load operation crankcase ventilation valve harness connector and ECM harness connector.

+		–		Continuity
Partial load operation crankcase ventilation valve		ECM		
Connector	Terminal	Connector	Terminal	
F145	1	F149	3	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Replace partial load operation crankcase ventilation valve. Refer to EM-34, "Exploded View".
NO >> Repair or replace error-detected parts.

SYMPTOM DIAGNOSIS

ENGINE UNABLE TO BE STARTED AFTER COLLISION

Description

INFOID:0000000013954634

ENGINE STARTINHIBITION AFTER CRASH

After air bag has deployed, ECM inhibits the engine from starting. To cancel the engine start inhibition, perform “Enabling of engine start after crash event” in Work Support of CONSULT. Refer to EC-199, "Description".

PERIODIC MAINTENANCE

EVAPORATIVE EMISSION SYSTEM

Inspection

INFOID:0000000013803497

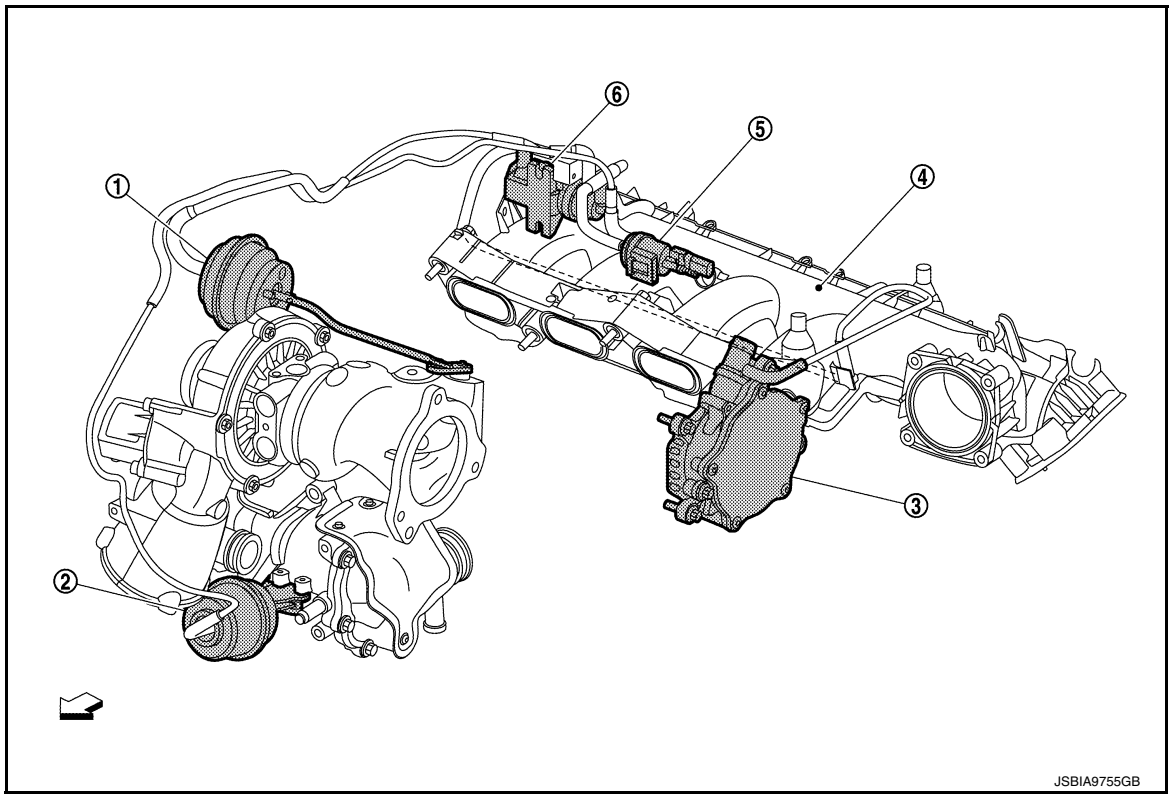
Check the Purge System with Leak Test. Refer to EC-961, "Inspection".

REMOVAL AND INSTALLATION

VACUUM LINES

Vacuum Line Layout

INFOID:0000000013608619



① Boost pressure control flap vacuum actuator	② Coolant pump vacuum actuator	③ Vacuum pump
④ Charge air manifold	⑤ Coolant pump switchover valve	⑥ Boost pressure control vacuum transducer

⇦ : Vehicle front

ECM

Removal and Installation

INFOID:0000000013608620

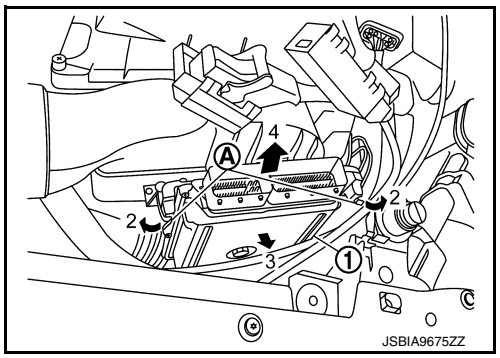
CAUTION:
Must be perform additional service when replacing ECM. Refer to EC-183, "Description".

REMOVAL

1. Disconnect battery negative terminal.
2. Disconnect ECM harness connectors. Refer to HARNESS CONNECTOR (LEVER LOCKING TYPE) in PG-9, "Harness Connector".
3. Remove ECM from the bracket.
   1. Push pawl Ⓐ in the direction shown by arrow (➡ 2) and move ECM ① forward (➡ 3) to unlock.

      ⇨ : Vehicle front

   2. Pull out ECM in the direction shown by arrow (➡ 4).
4. Remove bracket from the engine.
   - Pull out ECM upward.



INSTALLATION

Install in the reverse order of removal.

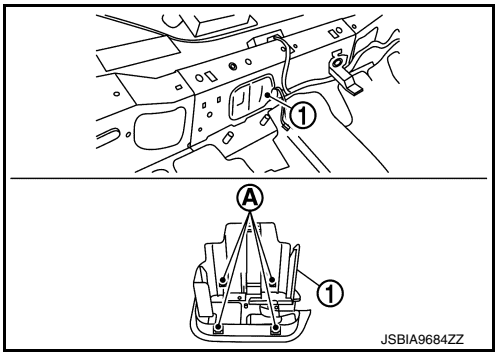
FUEL PUMP CONTROL MODULE (FPCM)

Removal and Installation

INFOID:0000000013608621

REMOVAL

1. Disconnect battery negative terminal.
2. Remove rear seat cushion. Refer to SE-78, "Exploded View".
3. Remove center hinge bracket. Refer to SE-78, "Exploded View".
4. Disengage the pawls Ⓐ of the cover ①, and pull forwards to remove.
5. Remove FPCM from cover.
6. Disconnect FPCM harness connectors.



INSTALLATION

CAUTION:

Must be perform CONFIGURATION and ACTIVATION OF FUEL PUMP after replacing FPCM. Refer to EC-182, "Special Repair Requirement List".

Note the following, and install in the reverse order of removal.

- Put FPCM ① in the cover ② to install it to the vehicle.

