SECTION EC
ENGINE CONTROL SYSTEM

CONTENTS

HR16DE

PRECAUTION

PRECAUTIONS

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

INFOID:0000000009760534

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SR and SB section of this Service Manual.

WARNING:

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

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

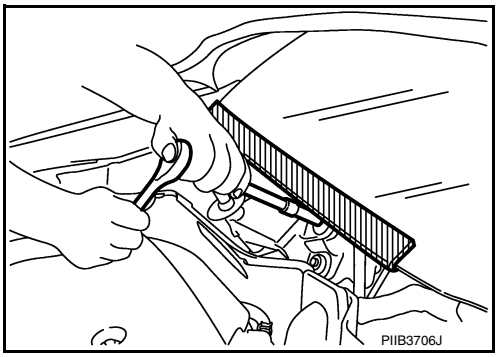
WARNING:

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

Precaution for Procedure without Cowl Top Cover

INFOID:0000000009020566

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



On Board Diagnostic (OBD) System of Engine and CVT

INFOID:0000000009020567

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

CAUTION:

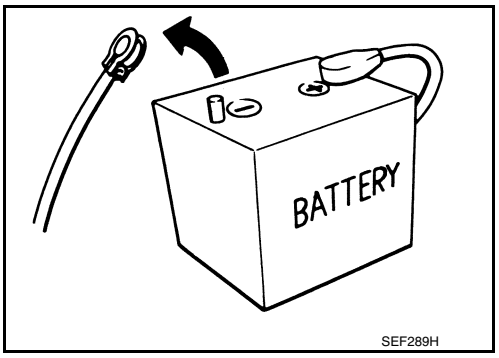
- **Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MI to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MI to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-53, "Description".**

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

General Precautions

INFOID:0000000009020568

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



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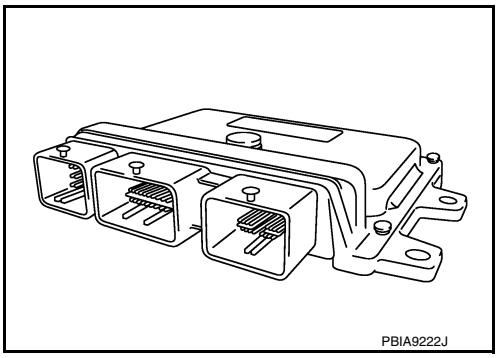
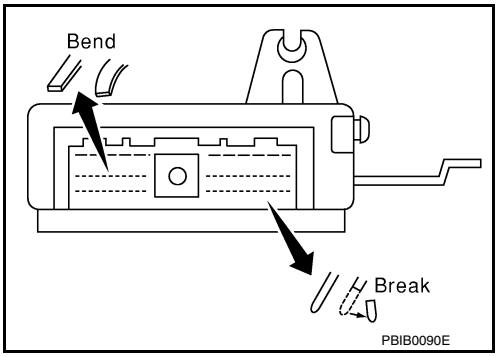
- **Do not disassemble ECM.**
- **If a battery cable is disconnected, the memory will return to the ECM value.**
  The ECM will now start to self-control at its initial value. So, engine operation can vary slightly in this case. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- **If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.**
  - **Diagnostic trouble codes**
  - **1st trip diagnostic trouble codes**
  - **Freeze frame data**
  - **1st trip freeze frame data**
  - **System readiness test (SRT) codes**
  - **Test values**
- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- **Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.**
- **Keep engine control system parts and harness dry.**


PBIA9222J



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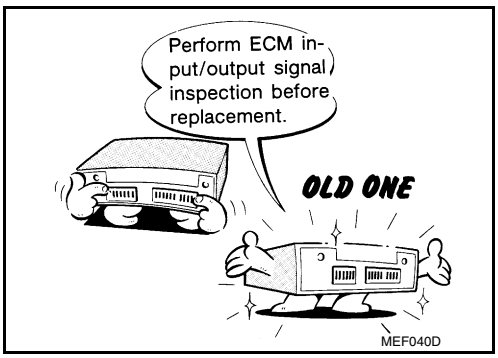
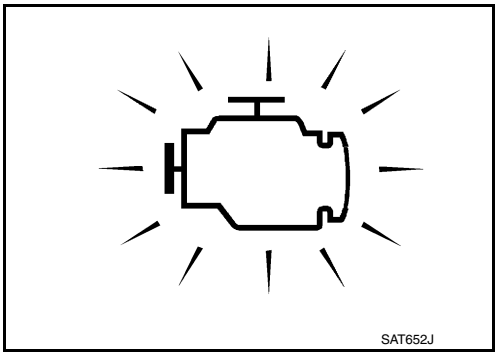
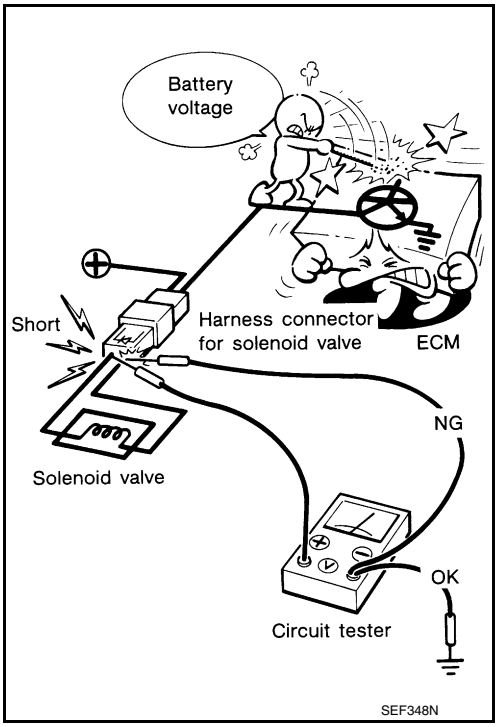
- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-70, "Reference Value".**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble electric throttle control actuator.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).**



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

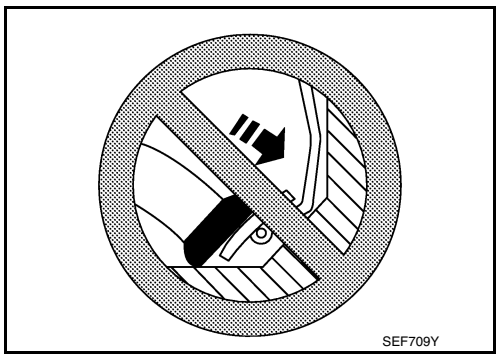


- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.

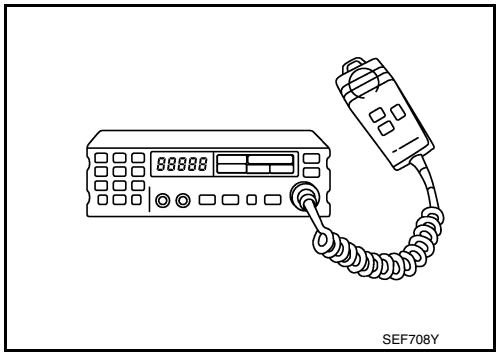


- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**

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


SEF709Y

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



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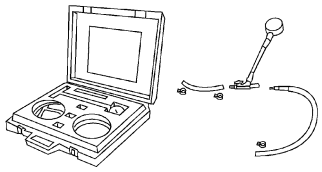
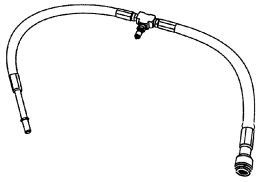
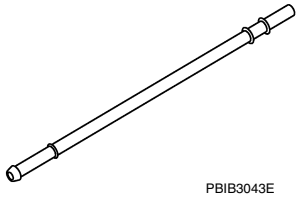
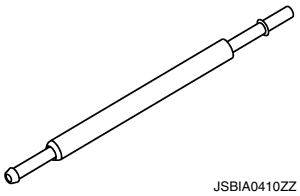
PREPARATION

PREPARATION

Special Service Tools

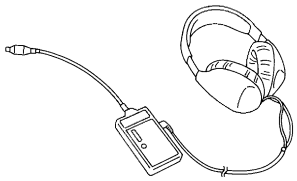
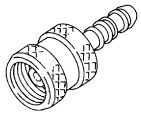
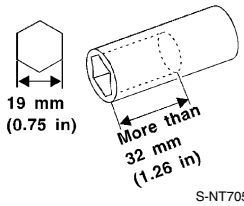
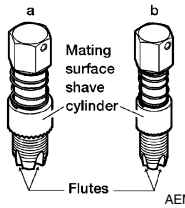
INFOID:0000000009020569

NOTE:
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
(J-44321) Fuel pressure gauge kit  LEC642	Checks fuel pressure
(J-44321-6) Fuel pressure adapter  LBIA0376E	Connects fuel pressure gauge to quick connector type fuel lines.
KV10118400 Fuel tube adapter  PBIB3043E	Measuring fuel pressure
KV10120000 Fuel tube adapter  JSBIA0410ZZ	

Commercial Service Tools

INFOID:0000000009020570

Tool name (Kent-Moore No.)		Description
Leak detector i.e.: (J-41416)	 S-NT703	Locates the EVAP leak
EVAP service port adapter i.e.: (J-41413-OBD)	 S-NT704	Applies positive pressure through EVAP service port
Fuel filler cap adapter i.e.: (MLR-8382)	 S-NT815	Checks fuel tank vacuum relief valve opening pressure
Socket wrench	 S-NT705	Removes and installs engine coolant temperature sensor
Oxygen sensor thread cleaner i.e.: (J-43897-18), (J-43897-12)	 AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor** **b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor**
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)	 S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

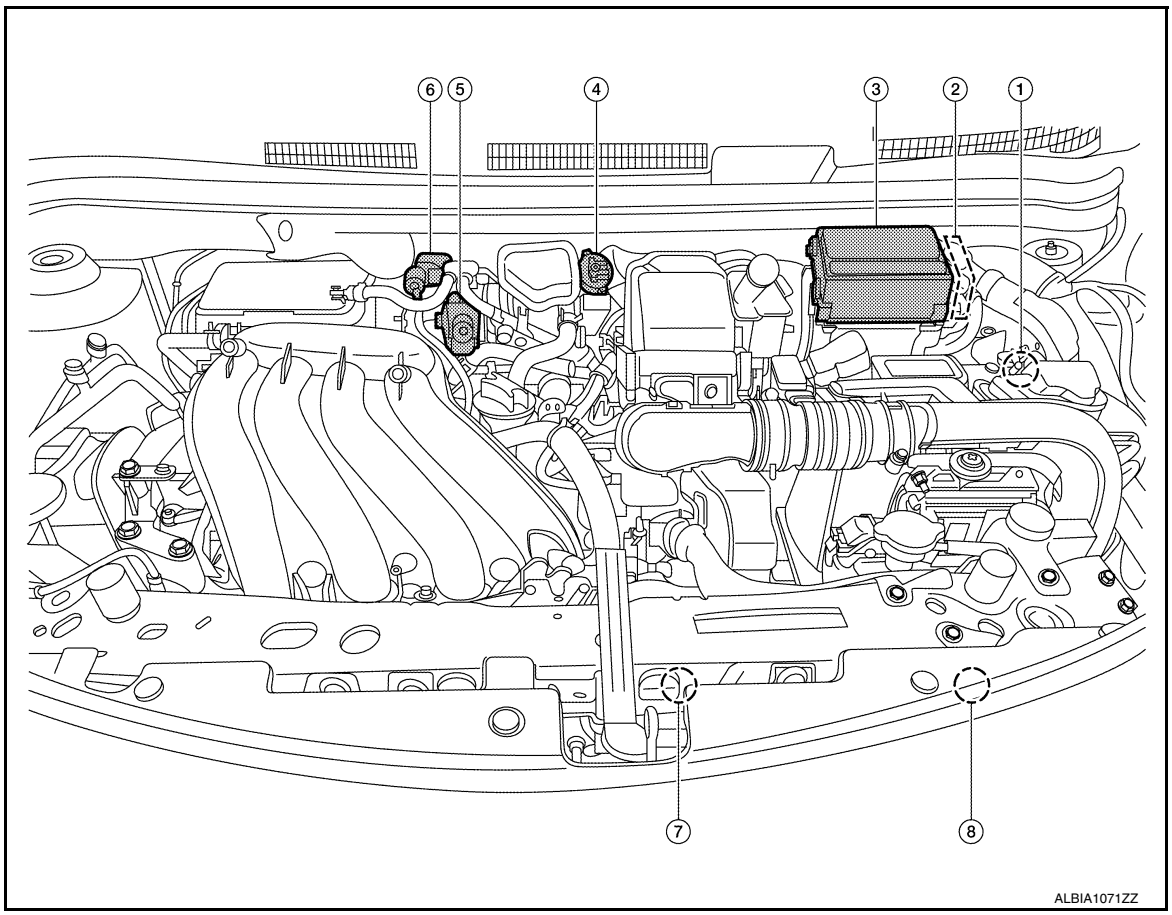
SYSTEM DESCRIPTION

COMPONENT PARTS

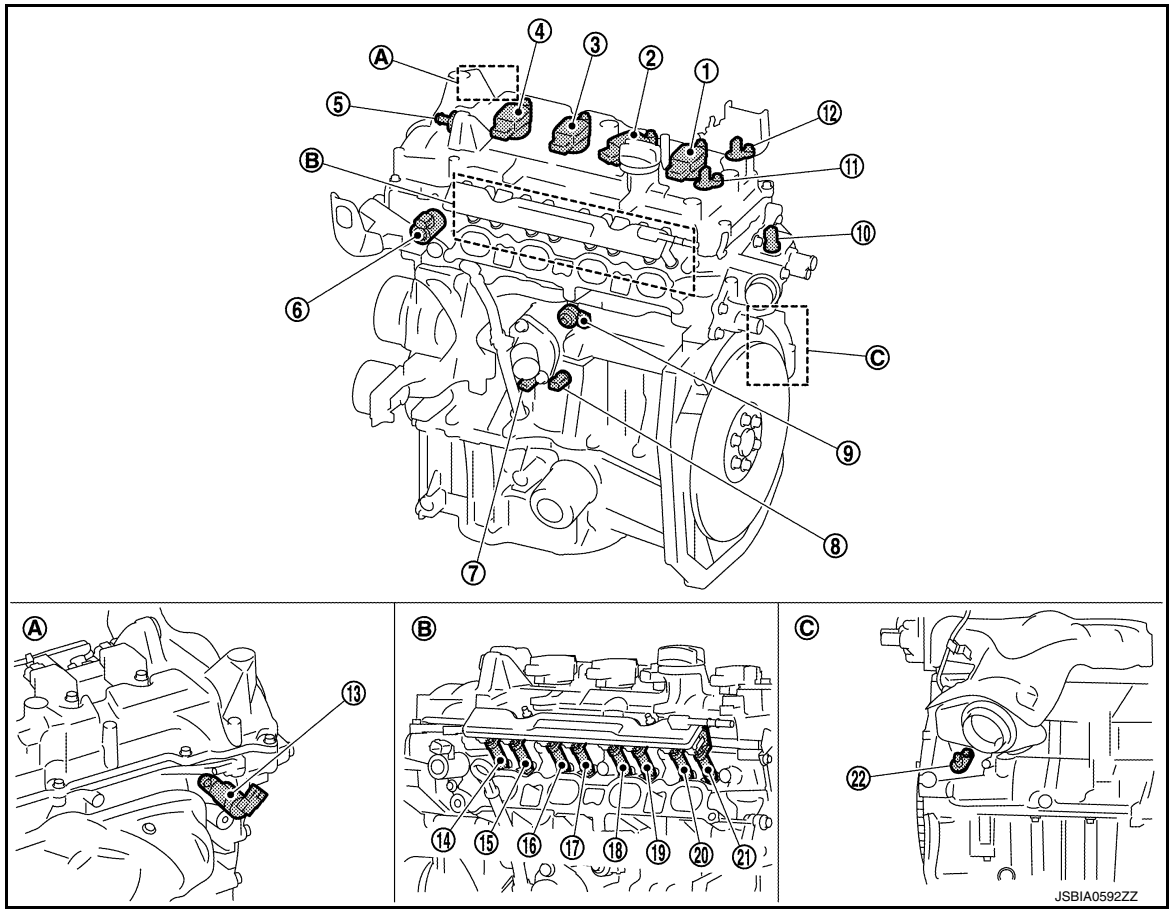
ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : Component Parts Location

INFOID:0000000009020571

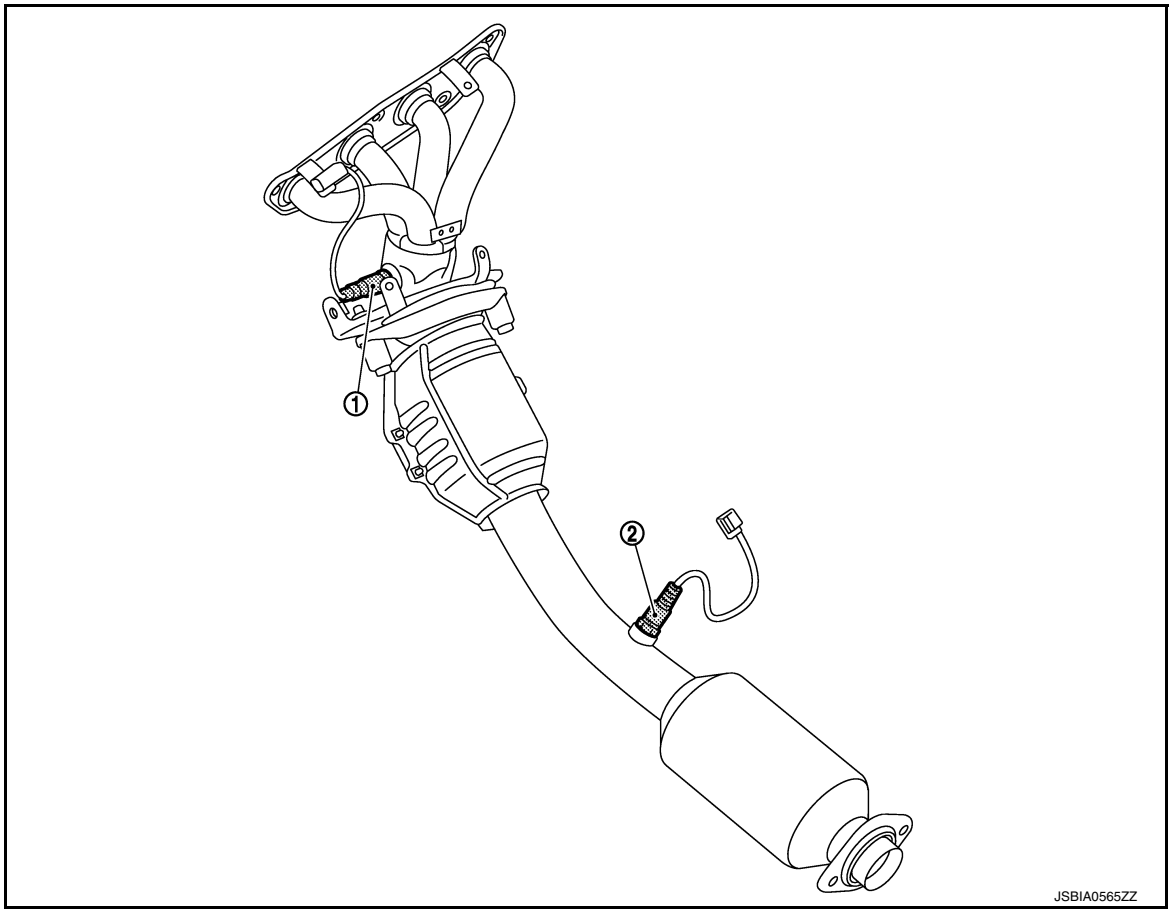


1. Battery current sensor
2. ECM
3. IPDM E/R
   Refer to PCS-5, "Component Parts Location" (with I-Key), PCS-34, "Component Parts Location" (without I-Key)
4. Mass air flow sensor (with intake air temperature sensor)
5. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
6. EVAP canister purge volume control solenoid valve
7. Cooling fan motor
8. Refrigerant pressure sensor
   Refer to HA-11, "Component Parts Location"

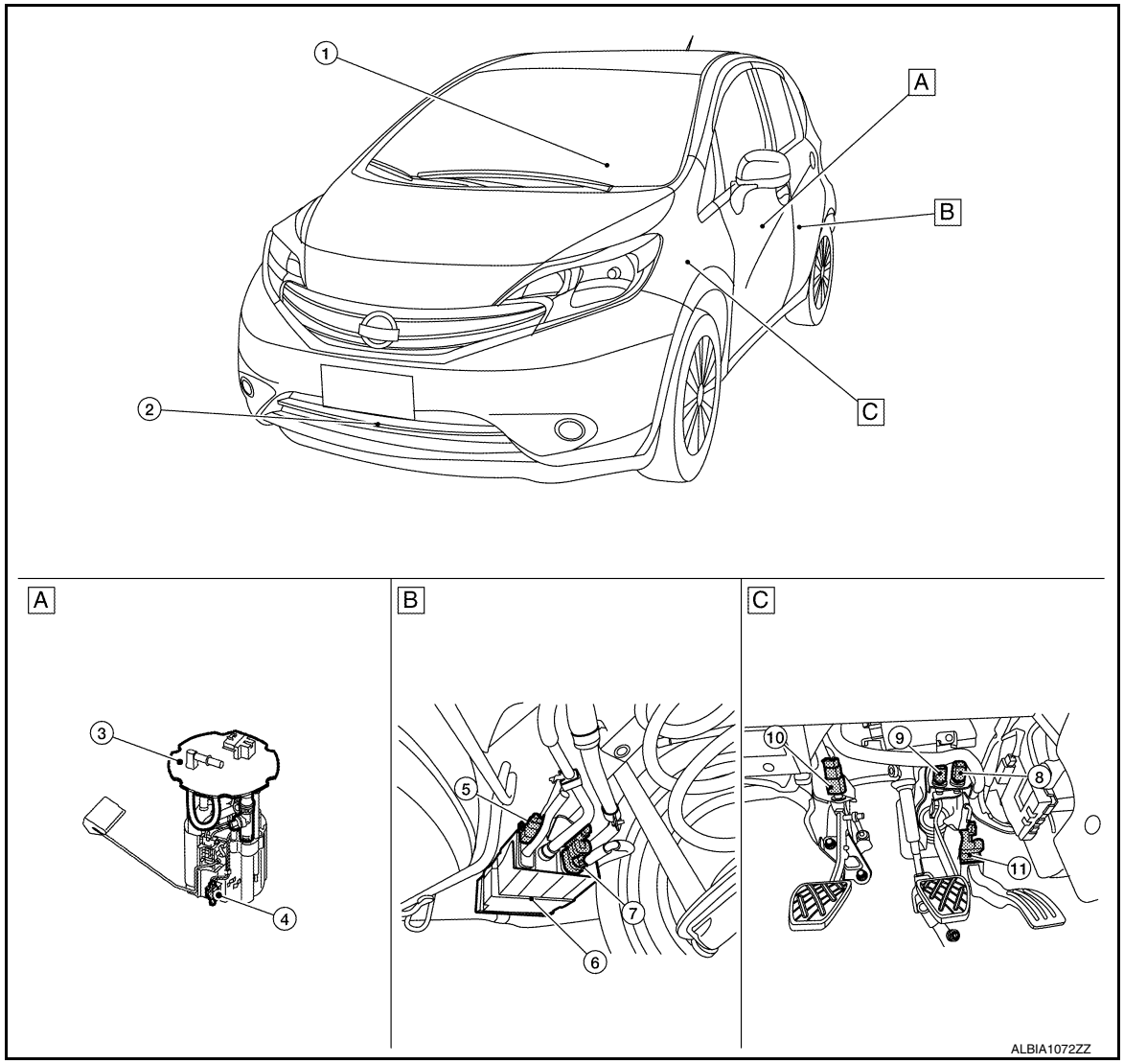


1. Ignition coil No.4 (with power transistor)
2. Ignition coil No.3 (with power transistor)
3. Ignition coil No.2 (with power transistor)
4. Ignition coil No.1 (with power transistor)
5. PCV valve
6. Intake valve timing control solenoid valve
7. Engine oil pressure sensor
8. Engine oil temperature sensor
9. Knock sensor
10. Engine coolant temperature sensor
11. Camshaft position sensor
12. Exhaust valve timing control position sensor
13. Exhaust valve timing control solenoid valve
14. Fuel injector No.1 (Front)
15. Fuel injector No.1 (Rear)
16. Fuel injector No.2 (Front)
17. Fuel injector No.2 (Rear)
18. Fuel injector No.3 (Front)
19. Fuel injector No.3 (Rear)
20. Fuel injector No.4 (Front)
21. Fuel injector No.4 (Rear)
22. Crankshaft position sensor

A. Engine front right side
B. Left view of the engine
C. Engine rear right side



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



1. ASCD steering switch
2. Active grille shutter
3. Fuel level sensor unit and fuel pump
4. Fuel tank temperature sensor
5. EVAP control system pressure sensor
6. EVAP canister
7. EVAP canister vent control valve
8. ASCD brake switch
9. Stop lamp switch
10. Clutch pedal position switch
11. Accelerator pedal position sensor

A. Fuel tank
B. Rear under body
C. Periphery of pedals

ENGINE CONTROL SYSTEM : Component Description

INFOID:0000000009020572

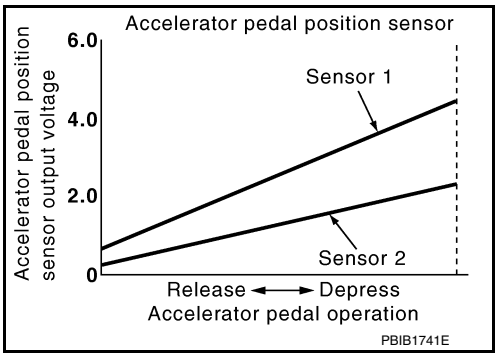
Component	Reference
ECM	EC-20, "ECM"
A/F sensor 1	EC-19, "Air Fuel Ratio Sensor 1"
A/F sensor 1 heater	EC-19, "Air Fuel Ratio Sensor 1 Heater"
Accelerator pedal position sensor	EC-18, "Accelerator Pedal Position Sensor"
Cooling fan motor	EC-20, "Cooling Fan"
Crankshaft position sensor	EC-20, "Crankshaft Position Sensor"
Electric throttle control actuator	EC-21, "Electric Throttle Control Actuator"
Engine coolant temperature sensor	EC-21, "Engine Coolant Temperature Sensor"

Component	Reference
Engine oil pressure sensor	EC-21, "Engine Oil Pressure Sensor"
Engine oil temperature sensor	EC-21, "Engine Oil Temperature Sensor"
EVAP canister purge volume control solenoid valve	EC-22, "EVAP Canister Purge Volume Control Solenoid Valve"
EVAP canister vent control valve	EC-22, "EVAP Canister Vent Control Valve"
EVAP control system pressure sensor	EC-22, "EVAP Control System Pressure Sensor"
Exhaust valve timing control position sensor	EC-19, "Camshaft Position Sensor"
Exhaust valve timing control solenoid valve	EC-23, "Exhaust Valve Timing Control Solenoid Valve"
Fuel injector	EC-23, "Fuel Injector"
Fuel pump	EC-23, "Fuel Pump"
Heated oxygen sensor 2	EC-24, "Heated Oxygen Sensor 2"
Heated oxygen sensor 2 heater	EC-24, "Heated Oxygen Sensor 2 Heater"
Ignition coil (with power transistor)	EC-24, "Ignition Coil With Power Transistor"
Intake air temperature sensor	EC-24, "Intake Air Temperature Sensor"
Camshaft position sensor	EC-19, "Camshaft Position Sensor"
Intake valve timing control solenoid valve	EC-25, "Intake Valve Timing Control Solenoid Valve"
Knock sensor	EC-25, "Knock Sensor"
Mass air flow sensor	EC-26, "Mass Air Flow Sensor"
PCV valve	EC-28, "Positive Crankcase Ventilation"
Refrigerant pressure sensor	EC-27, "Refrigerant Pressure Sensor"
Stop lamp switch	EC-27, "Stop Lamp Switch & ASCD Brake Switch"
Throttle control motor	EC-27, "Throttle Control Motor"
Throttle control motor relay	EC-27, "Throttle Control Motor Relay"
Throttle position sensor	EC-27, "Throttle Position Sensor"
ASCD steering switch	EC-27, "ASCD Steering Switch"
ASCD brake switch	EC-27, "Stop Lamp Switch & ASCD Brake Switch"
Clutch pedal position switch	EC-20, "Clutch Pedal Position Switch"
Active grille shutter	EXT-10, "ACTIVE GRILLE SHUTTER SYSTEM : Active grille shutter"

Accelerator Pedal Position Sensor

INFOID:0000000009020573

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



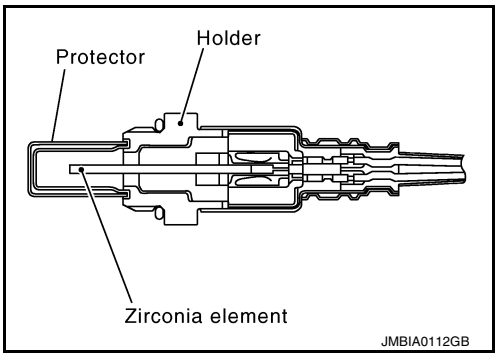
Air Fuel Ratio Sensor 1

INFOID:0000000009020574

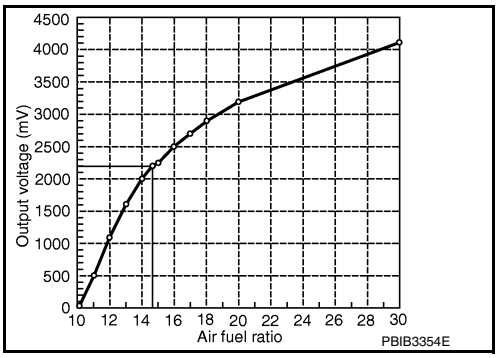
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



Air Fuel Ratio Sensor 1 Heater

INFOID:0000000009020575

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Air fuel ratio (A/F) sensor 1 heater control	Air fuel ratio (A/F) sensor 1 heater
Mass air flow sensor	Amount of intake air		

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

Camshaft Position Sensor

INFOID:0000000009020576

The camshaft position sensor senses the protrusion of camshaft to identify a particular cylinder. The camshaft position sensor senses the piston position.

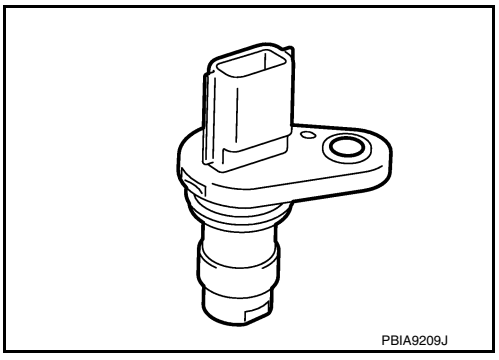
When the crankshaft position sensor system becomes inoperative, the camshaft position sensor provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

The sensor consists of a permanent magnet and Hall IC.

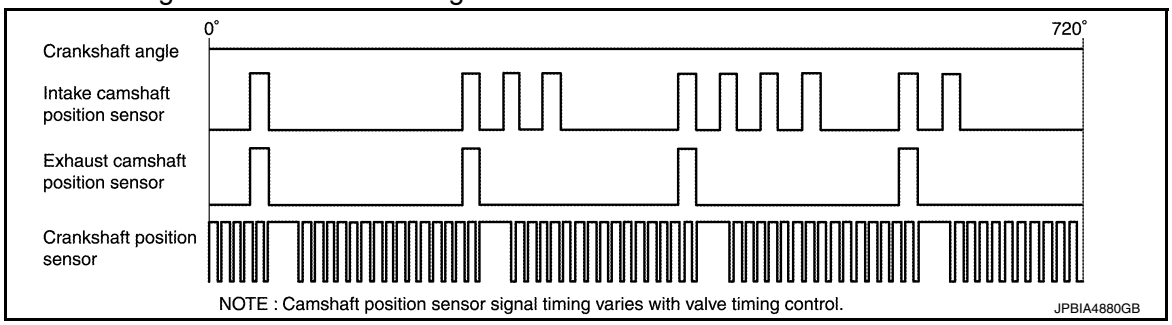
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.



ECM receives the signals as shown in the figure.



Clutch Pedal Position Switch

INFOID:0000000009762888

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

Cooling Fan

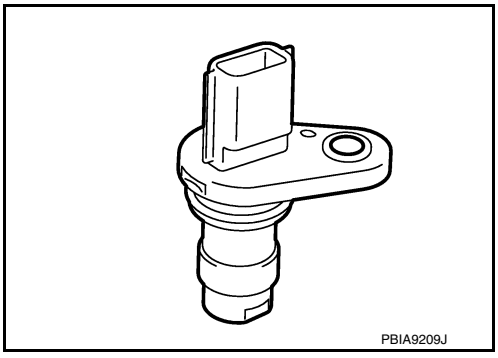
INFOID:0000000009020577

Cooling fan operates at low and high speed when the current flows in the cooling fan motor.
Refer to EC-38, "COOLING FAN CONTROL : System Description" for cooling fan operation.

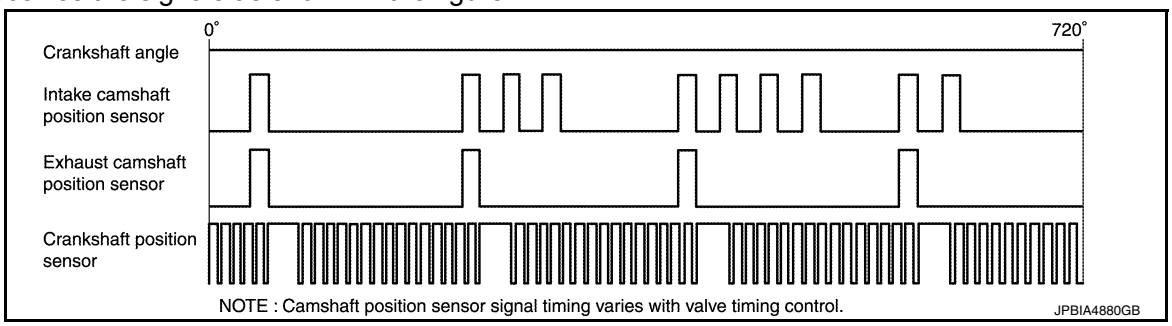
Crankshaft Position Sensor

INFOID:0000000009020578

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



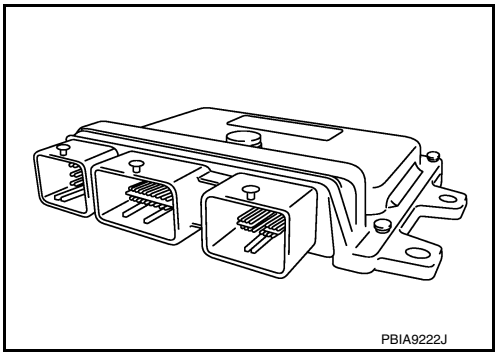
ECM receives the signals as shown in the figure.



ECM

INFOID:0000000009020579

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



Electric Throttle Control Actuator

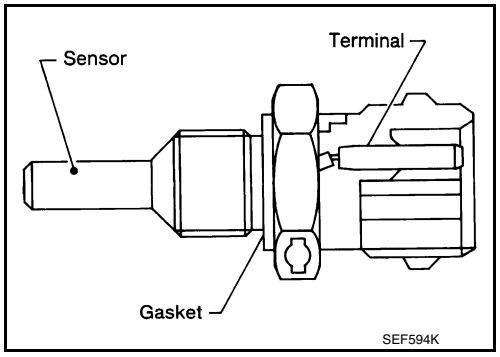
INFOID:0000000009020580

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle valve in response to driving conditions via the throttle control motor.

Engine Coolant Temperature Sensor

INFOID:0000000009020581

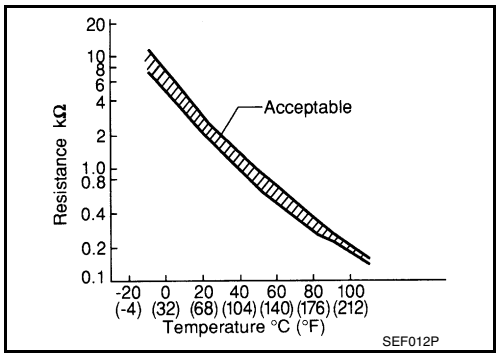
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.10 - 2.90
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

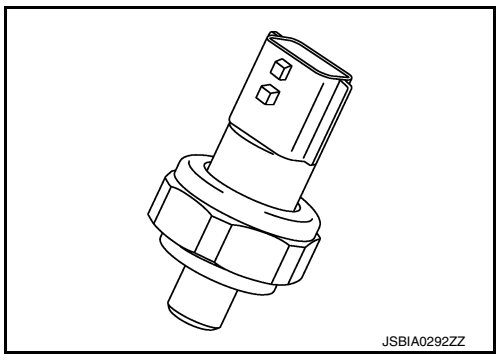
*: These data are reference values and are measured between ECM terminals.



Engine Oil Pressure Sensor

INFOID:0000000009020582

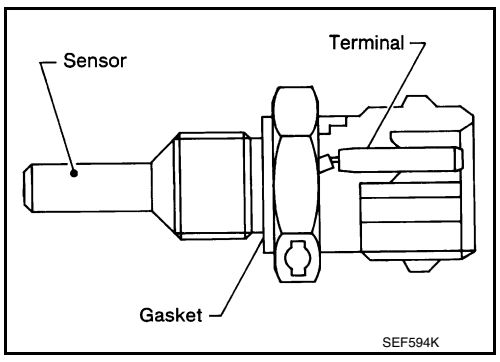
The engine oil pressure (EOP) sensor is detects engine oil pressure and transmits a voltage signal to the ECM.



Engine Oil Temperature Sensor

INFOID:0000000009020583

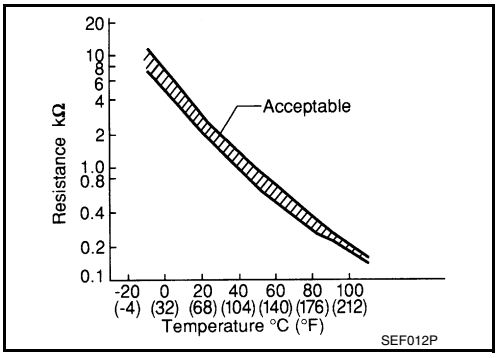
The engine oil temperature sensor is used to detect the engine oil temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine oil temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance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



<Reference data>

Engine oil temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.10 - 2.90
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260
110 (230)	0.6	0.143 - 0.153

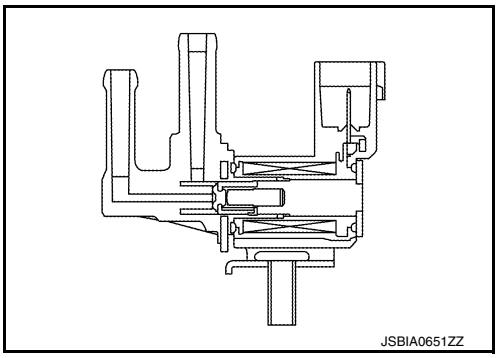
*: These data are reference values and are measured between ECM terminals.



EVAP Canister Purge Volume Control Solenoid Valve

INFOID:0000000009020584

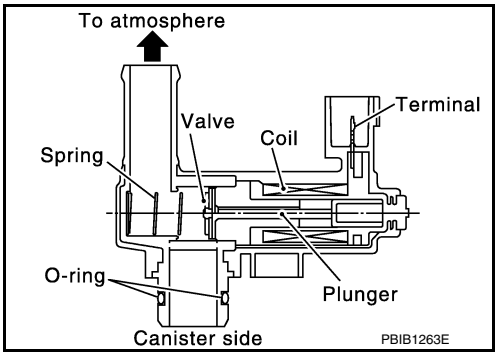
The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will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



EVAP Canister Vent Control Valve

INFOID:0000000009020585

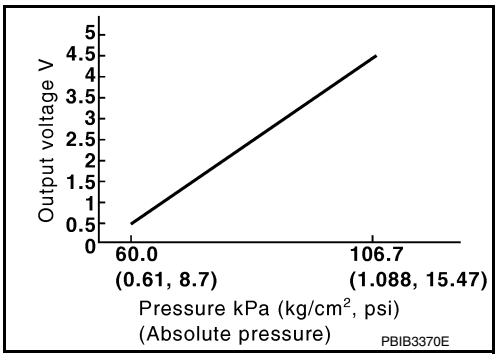
The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability 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.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows “EVAP Control System” diagnosis.



EVAP Control System Pressure Sensor

INFOID:0000000009020586

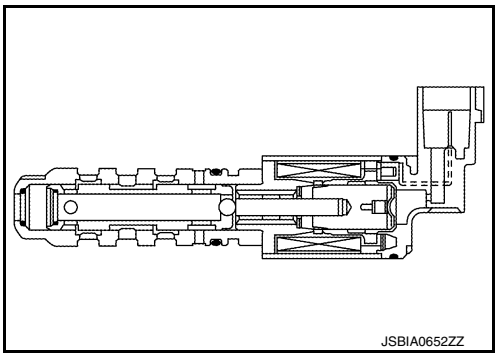
The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



Exhaust Valve Timing Control Solenoid Valve

INFOID:0000000009020587

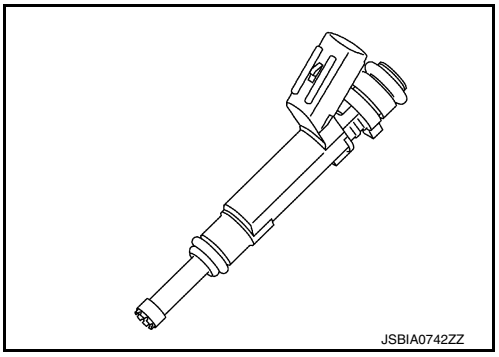
Exhaust valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The exhaust valve timing control solenoid valve changes the oil amount and direction of flow through exhaust valve timing control unit or stops oil flow.
The longer pulse width retards valve angle.
The shorter pulse width advances valve angle.
When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the exhaust valve angle at the control position.


JSBIA0652ZZ

Fuel Injector

INFOID:0000000009020588

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.


JSBIA0742ZZ

Fuel Pump

INFOID:0000000009020589

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay ↓ Fuel pump
Battery	Battery voltage*		

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

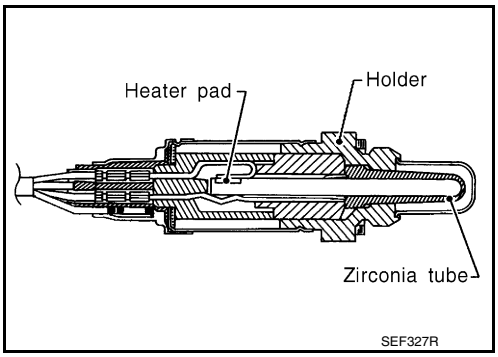
The ECM activates the fuel pump for a few seconds after the ignition switch is turned ON to improve engine start ability. If the ECM receives a engine speed signal from the crankshaft position sensor (POS) and camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.

Heated Oxygen Sensor 2

INFOID:0000000009020590

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



Heated Oxygen Sensor 2 Heater

INFOID:0000000009020591

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Engine coolant temperature sensor	Engine coolant temperature		
Mass air flow sensor	Amount of intake air		

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

OPERATION

Engine speed	Heated oxygen sensor 2 heater
Above 3,600 rpm	OFF
Below 3,600 rpm after the following conditions are met. • Engine: After warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

Ignition Coil With Power Transistor

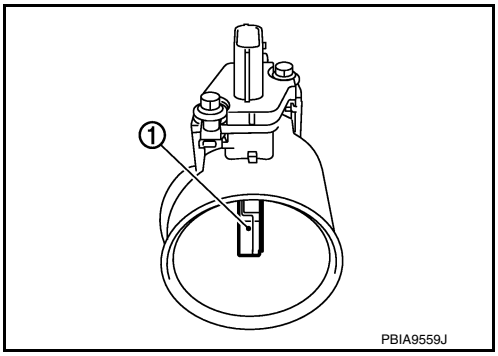
INFOID:0000000009020592

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

Intake Air Temperature Sensor

INFOID:0000000009020593

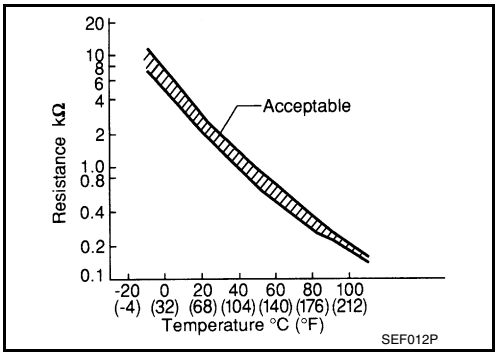
The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

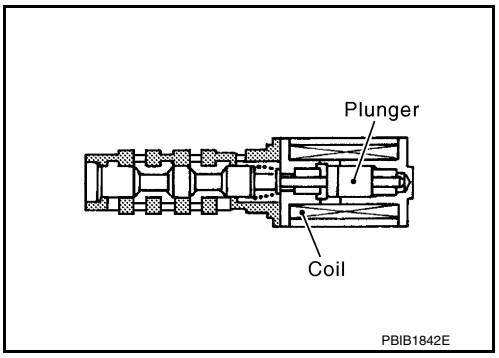
*: These data are reference values and are measured between ECM terminals.



Intake Valve Timing Control Solenoid Valve

INFOID:0000000009020594

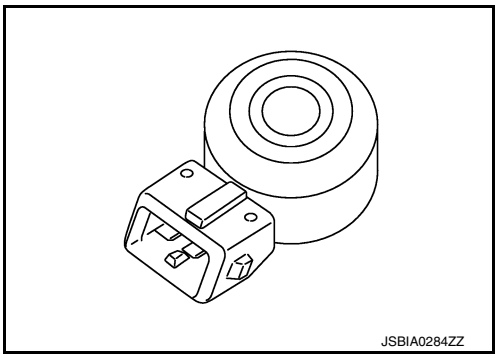
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.
The longer pulse width advances valve angle.
The shorter pulse width retards valve angle.
When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.



Knock Sensor

INFOID:0000000009020595

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

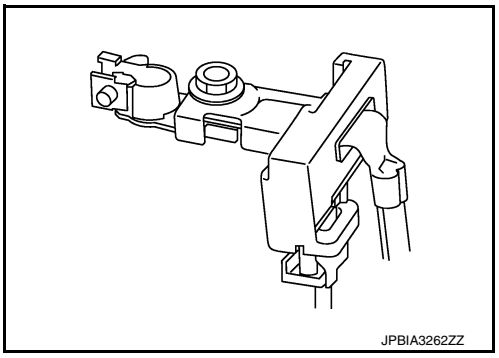


Battery Current Sensor (With Battery Temperature Sensor)

INFOID:0000000009696918

OUTLINE

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator.
Based on sensor signals, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer toCHG-8, "System Description".



CAUTION:
Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then the battery discharge may occur.

BATTERY CURRENT SENSOR

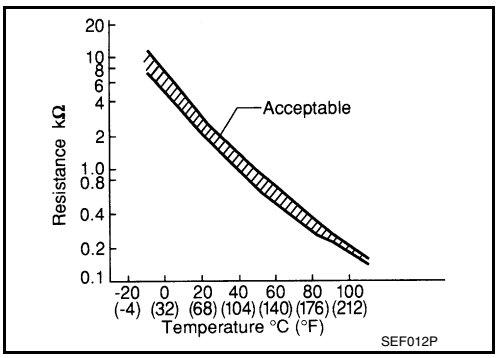
The battery current sensor is installed to the battery negative cable. The sensor measures the charging/discharging current of the battery.

BATTERY TEMPERATURE SENSOR

Battery temperature sensor is integrated in battery current sensor.
The sensor measures temperature around the battery.
The electrical resistance of the thermistor decreases as temperature increases.
<Reference data>

Temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
25 (77)	3.333	1.9 - 2.1
90 (194)	0.969	0.222 - 0.258

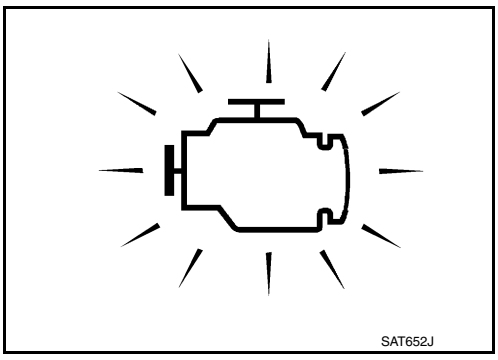
*: These data are reference values and are measured between battery temperature sensor signal terminal and sensor ground.



Malfunction Indicator Lamp (MIL)

INFOID:0000000009020596

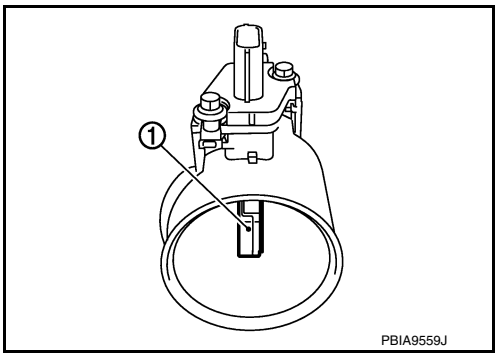
The MIL is located on the combination meter.
The MIL will illuminate when the ignition switch is turned ON without the engine running. This is a bulb check.
When the engine is started, the MIL should turn OFF. If MIL remains ON or continues blinking, the on board diagnostic system detects a DTC(s) that affects exhaust gas.
For details, refer to EC-57, "DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)".



Mass Air Flow Sensor

INFOID:0000000009020597

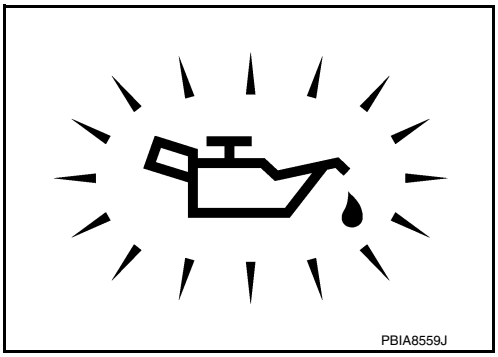
The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



Oil Pressure Warning Lamp

INFOID:0000000009020598

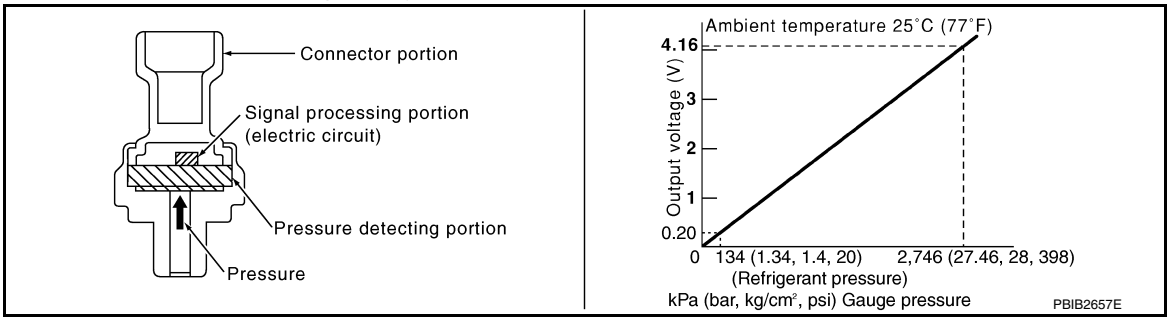
Oil pressure warning lamp is located on the combination meter.
It indicates the low pressure of the engine oil and the malfunction of the engine oil pressure system.
Combination meter turns the oil pressure warning lamp ON/OFF according to the oil pressure warning lamp signal received from ECM via CAN communication.
For details, refer to EC-43, "ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description".



Refrigerant Pressure Sensor

INFOID:0000000009020599

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



Stop Lamp Switch & ASCD Brake Switch

INFOID:0000000009020600

Stop lamp switch and ASCD brake switch are installed to brake pedal bracket.
ECM detects the state of the brake pedal by those two types of input (ON/OFF signal).

Brake pedal	ASCD brake switch	Stop lamp switch
Released	ON	OFF
Depressed	OFF	ON

Throttle Control Motor

INFOID:0000000009020601

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle valve in response to driving conditions via the throttle control motor.

Throttle Control Motor Relay

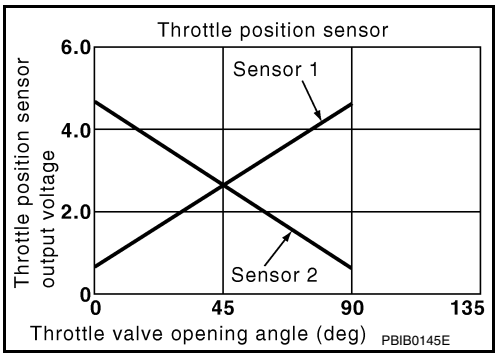
INFOID:0000000009020602

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

Throttle Position Sensor

INFOID:0000000009020603

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



ASCD Steering Switch

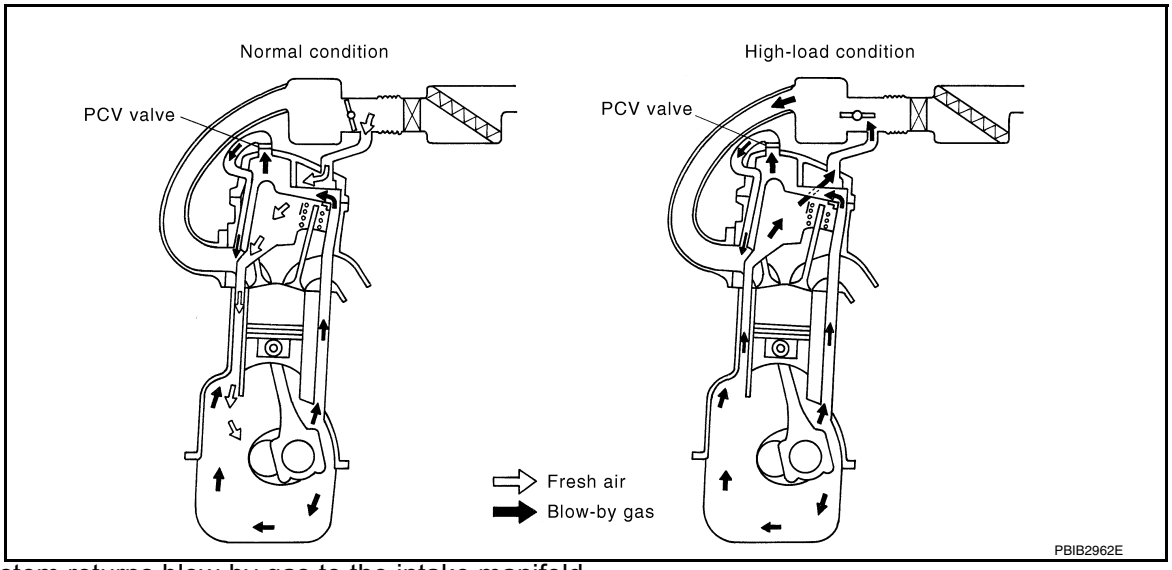
INFOID:0000000009020604

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

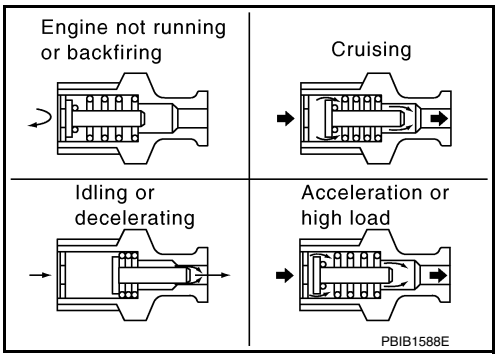
STRUCTURE AND OPERATION

Positive Crankcase Ventilation

INFOID:0000000009020605

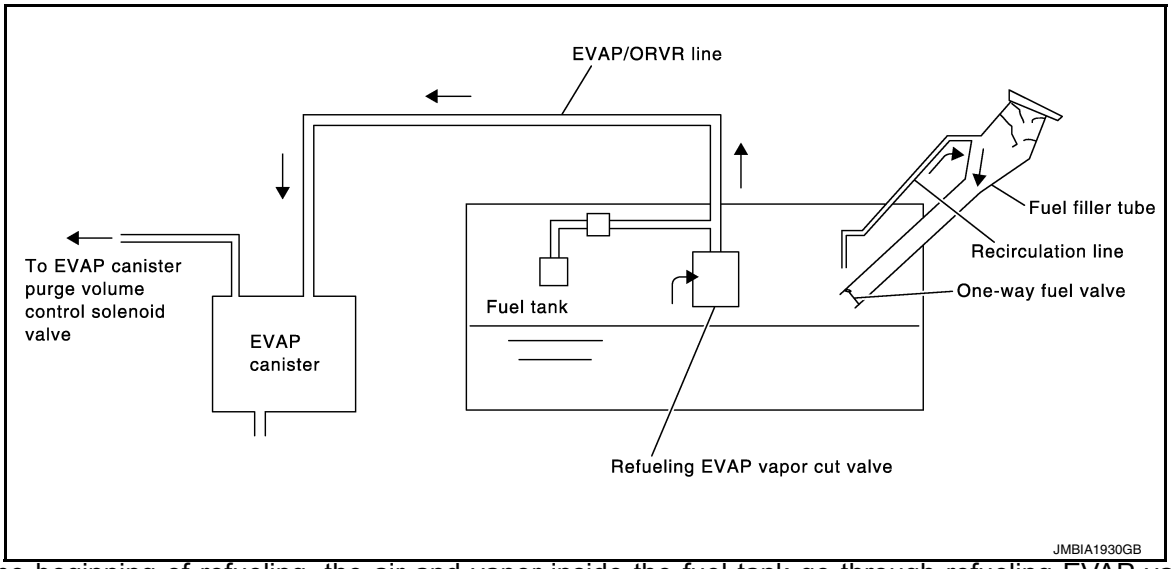


This system returns blow-by gas to the intake manifold.
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.
The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



On Board Refueling Vapor Recovery (ORVR)

INFOID:0000000009020606



From the beginning of refueling, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve and EVAP/ORVR line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

WARNING:

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

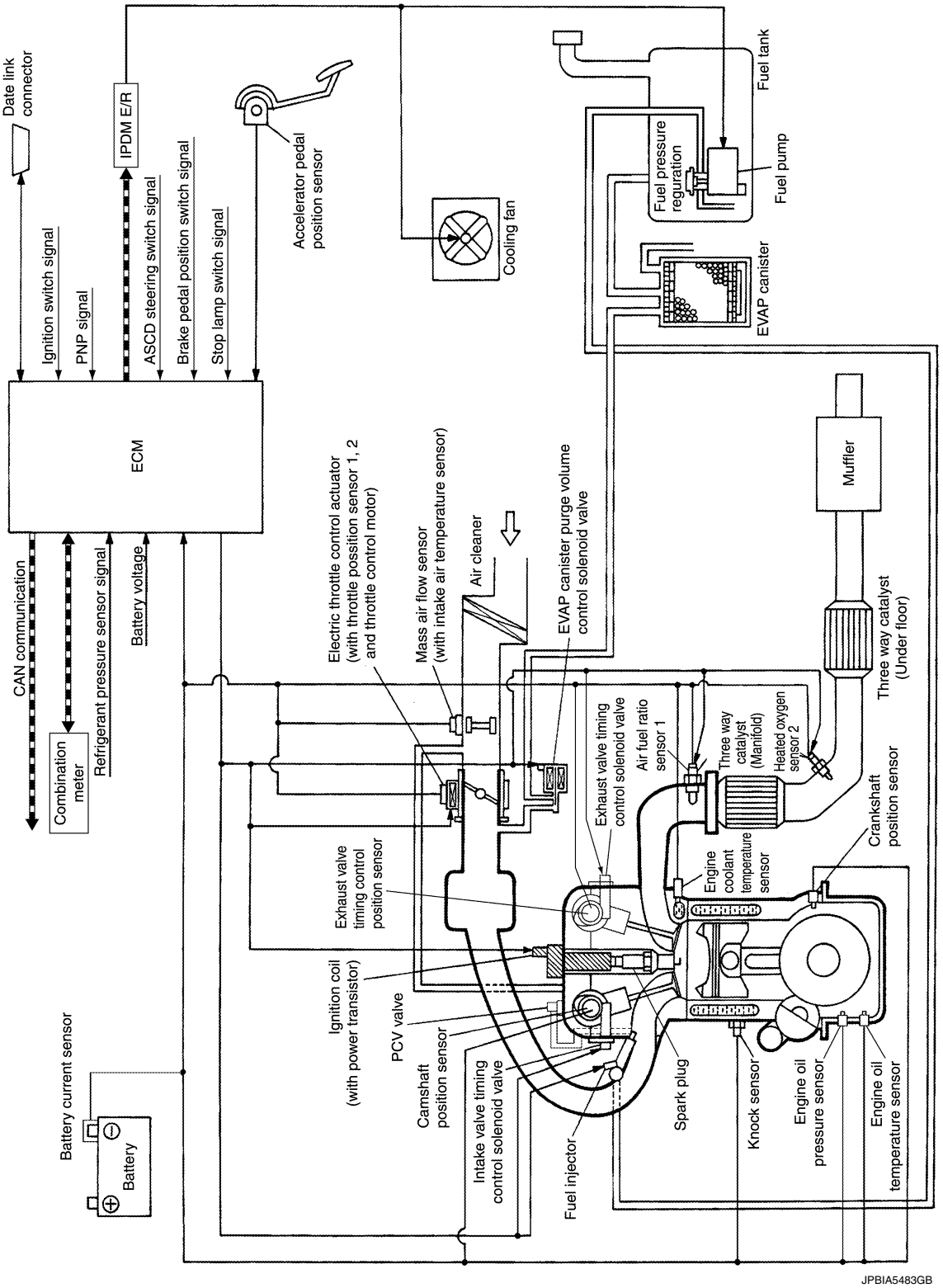
- **Put a "CAUTION: FLAMMABLE" sign in workshop.**
- **Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.**
- **Be sure to furnish the workshop with a CO_2 fire extinguisher.**

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 EC-135, "Work Procedure".**
  - **Disconnect battery ground cable.**
- **Always replace O-ring when the fuel gauge retainer is removed.**
- **Do not kink or twist hose and tube when they are installed.**
- **Do not tighten hose and clamps excessively to avoid damaging hoses.**
- **After installation, run engine and check for fuel leaks at connection.**
- **Do not 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 Diagram

INFOID:0000000009020607



ENGINE CONTROL SYSTEM : System Description

INFOID:0000000009020608

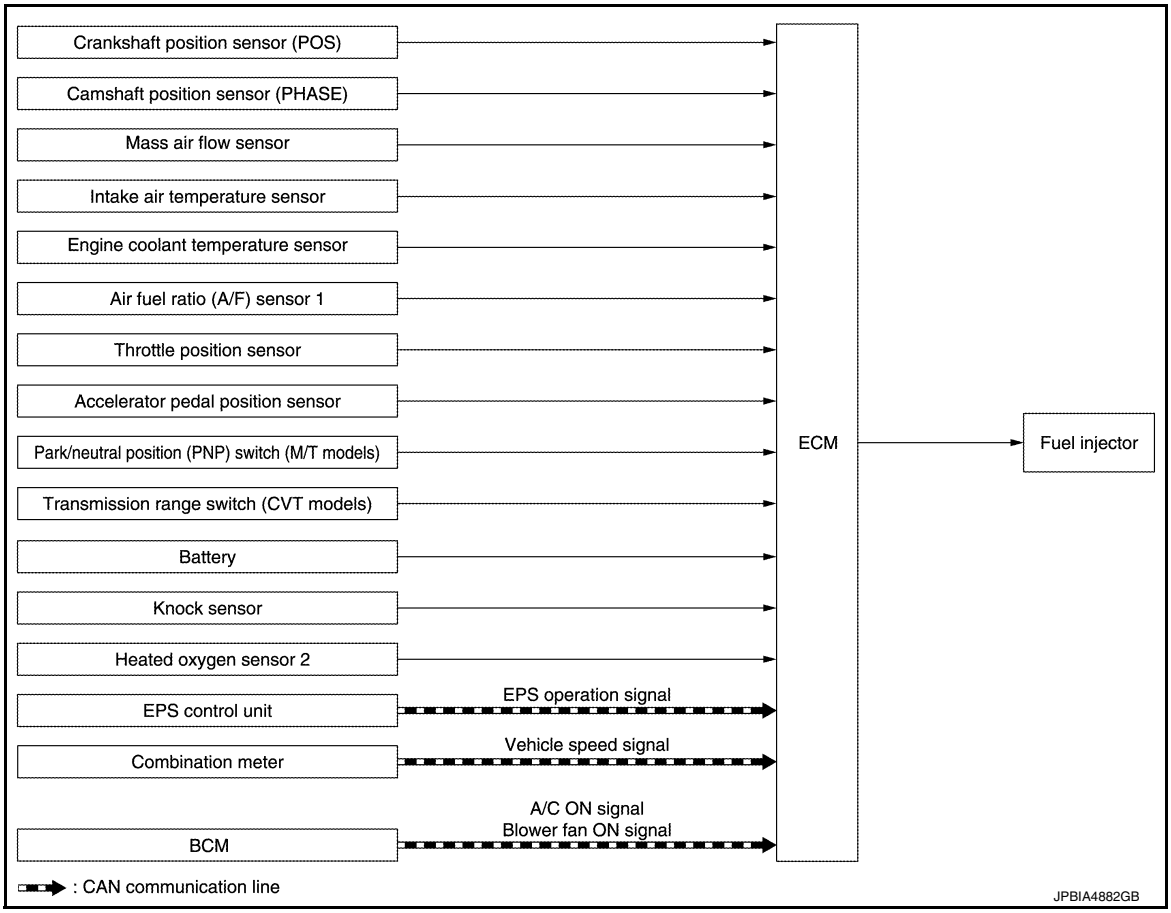
ECM performs various controls such as fuel injection control and ignition timing control.

Function	Reference
Multiport fuel injection system	EC-32, "MULTIPORT FUEL INJECTION SYSTEM : System Description"
Electric ignition system	EC-35, "ELECTRIC IGNITION SYSTEM : System Description"
Air conditioning cut control	EC-37, "AIR CONDITIONING CUT CONTROL : System Description"
CAN communication	EC-38, "CAN COMMUNICATION : System Description"
Cooling fan control	EC-38, "COOLING FAN CONTROL : System Description"
Evaporative emission system	EC-40, "EVAPORATIVE EMISSION SYSTEM : System Description"
Intake valve timing control	EC-41, "INTAKE VALVE TIMING CONTROL : System Description"
Exhaust valve timing control	EC-42, "EXHAUST VALVE TIMING CONTROL : System Description"
Engine protection control at low engine oil pressure	EC-43, "ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description"
Fuel filler cap warning system	EC-44, "FUEL FILLER CAP WARNING SYSTEM : System Description"
Automatic speed control device (ASCD)	EC-45, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description"
Active grille shutter system	EXT-11, "ACTIVE GRILLE SHUTTER SYSTEM : System Description"

MULTIPORT FUEL INJECTION SYSTEM

MULTIPORT FUEL INJECTION SYSTEM : System Diagram

INFOID:0000000009020609



MULTIPORT FUEL INJECTION SYSTEM : System Description

INFOID:0000000009020610

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*4 Piston position	Fuel injection & mixture ratio control	Fuel injector
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Intake air temperature sensor	Intake air temperature		
Engine coolant temperature sensor	Engine coolant temperature		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) switch*1	PNP signal		
Transmission range switch*2			
Battery	Battery voltage*4		
Knock sensor	Engine knocking condition		
Heated oxygen sensor 2*3	Density of oxygen in exhaust gas		
EPS control unit	EPS operation signal*5		
Combination meter	Vehicle speed*5		
BCM	A/C ON signal*5 Blower fan signal*5		

*1: M/T models
*2: CVT models
*3: This sensor is not used to control the engine system under normal conditions.
*4: ECM determines the start signal status by the signals of engine speed and battery voltage.
*5: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from the crankshaft position sensor, camshaft position sensor and the mass air flow sensor.

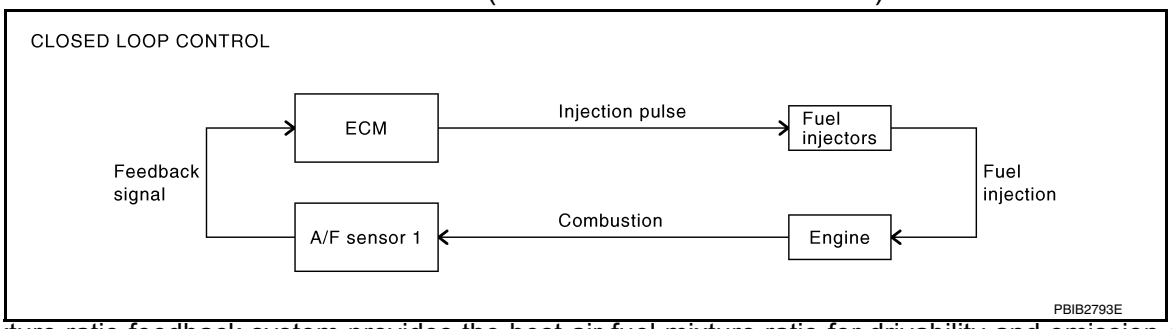
VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

<Fuel increase>
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever position is changed from N to D (CVT models)
- High-load, high-speed operation

<Fuel decrease>
- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for drivability and emission control. The three way catalyst (manifold) can better reduce CO, HC and NOx emissions. This system uses A/F sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about A/F sensor 1, refer to EC-19, "Air Fuel Ratio Sensor 1". This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of A/F sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

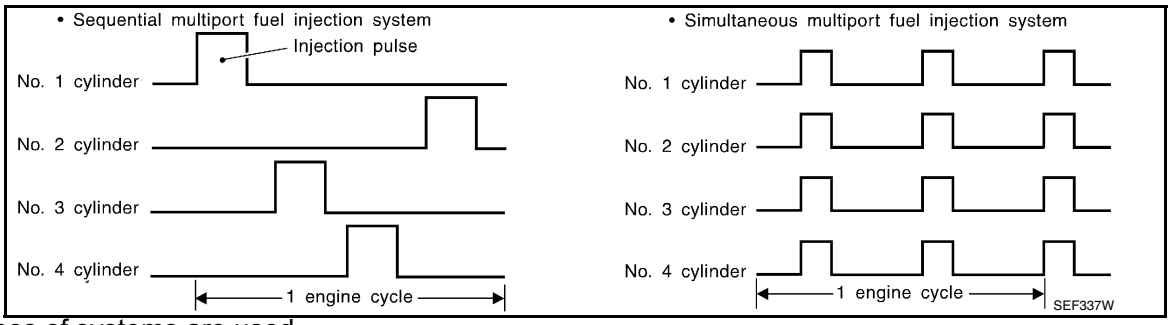
- Open Loop Control
  The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of A/F sensor 1 or its circuit
- Insufficient activation of heated sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (CVT models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from A/F sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., fuel injector clogging) directly affect mixture ratio.
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of “injection pulse duration” to automatically compensate for the difference between the two ratios.
“Fuel trim” refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes “short-term fuel trim” and “long-term fuel trim”.
“Short-term fuel trim” is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from A/F sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.
“Long-term fuel trim” is overall fuel compensation carried out long-term to compensate for continual deviation of the “short-term fuel trim” from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING



Two types of systems are used.

- Sequential Multiport Fuel Injection System
  Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.
- Simultaneous Multiport Fuel Injection System
  Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
  The four injectors will then receive the signals two times for each engine cycle.
  This system is used when the engine is being started and/or if the fail safe system (CPU) is operating.

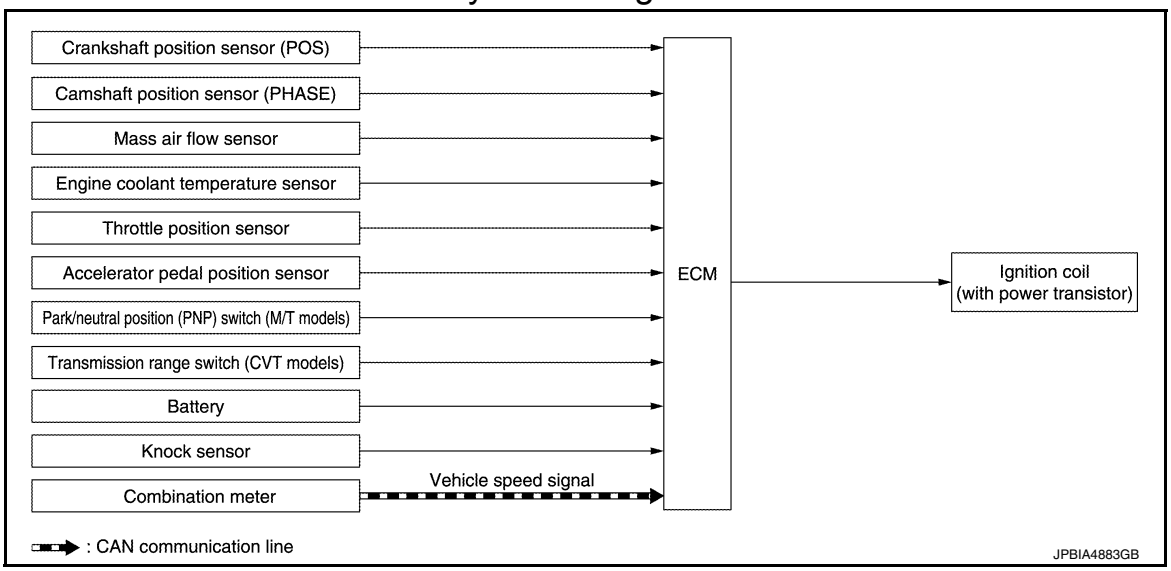
FUEL SHUT-OFF

Fuel to each cylinder is cut off during deceleration, operation of the engine at excessively high speeds or operation of the vehicle at excessively high speeds.

ELECTRIC IGNITION SYSTEM

ELECTRIC IGNITION SYSTEM : System Diagram

INFOID:0000000009020611



ELECTRIC IGNITION SYSTEM : System Description

INFOID:0000000009020612

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*3 Piston position	Ignition timing control	Ignition coil (with power transistor)
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) switch*1	PNP signal		
Transmission range switch*2			
Battery	Battery voltage*3		
Knock sensor	Engine knocking		
Combination meter	Vehicle speed*4		

*1: M/T models
*2: CVT models
*3: ECM determines the start signal status by the signals of engine speed and battery voltage.
*4: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

Firing order: 1 - 3 - 4 - 2
The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.
The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

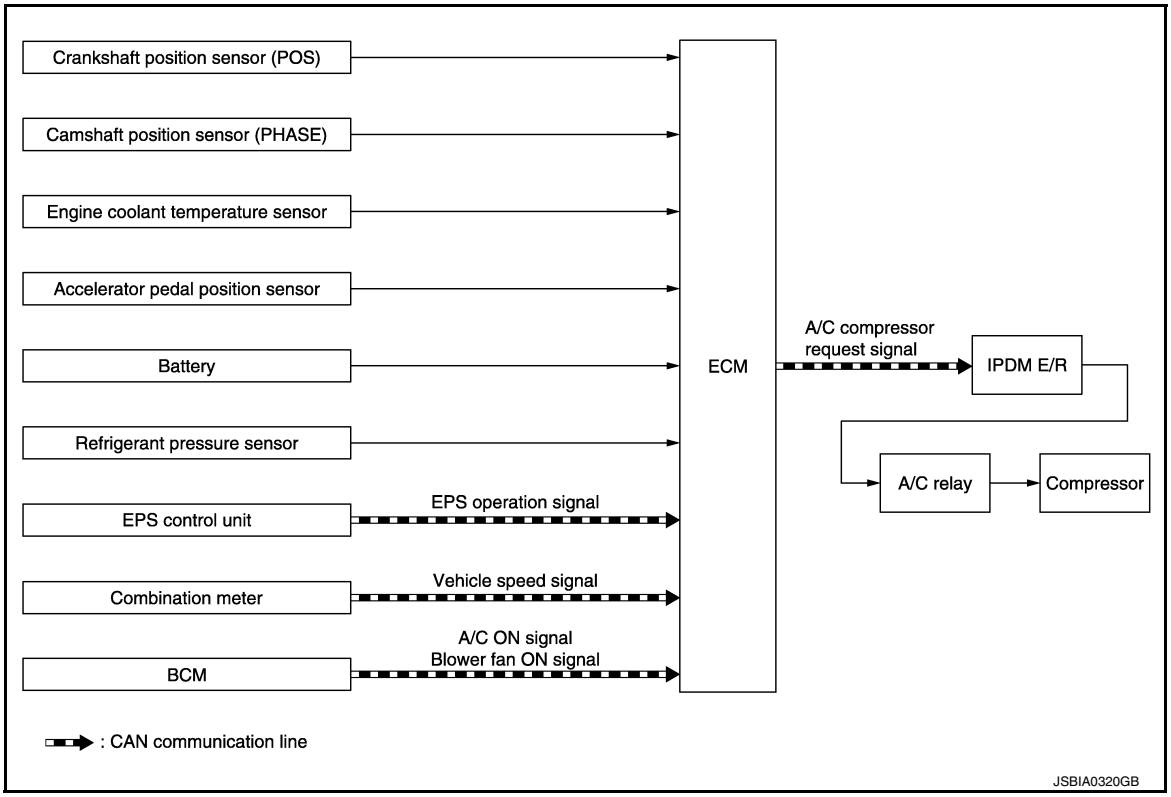
- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

AIR CONDITIONING CUT CONTROL

AIR CONDITIONING CUT CONTROL : System Diagram

INFOID:0000000009020613



AIR CONDITIONING CUT CONTROL : System Description

INFOID:0000000009020614

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1 Piston position	A/C compressor request signal	IPDM E/R ↓ Air conditioner relay ↓ Compressor
Engine coolant temperature sensor	Engine coolant temperature		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*1		
Refrigerant pressure sensor	Refrigerant pressure		
EPS control unit	EPS operation signal*2		
Combination meter	Vehicle speed signal*2		
BCM	A/C ON signal*2 Blower fan signal*2		

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.
*2: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

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

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

CAN COMMUNICATION

CAN COMMUNICATION : System Description

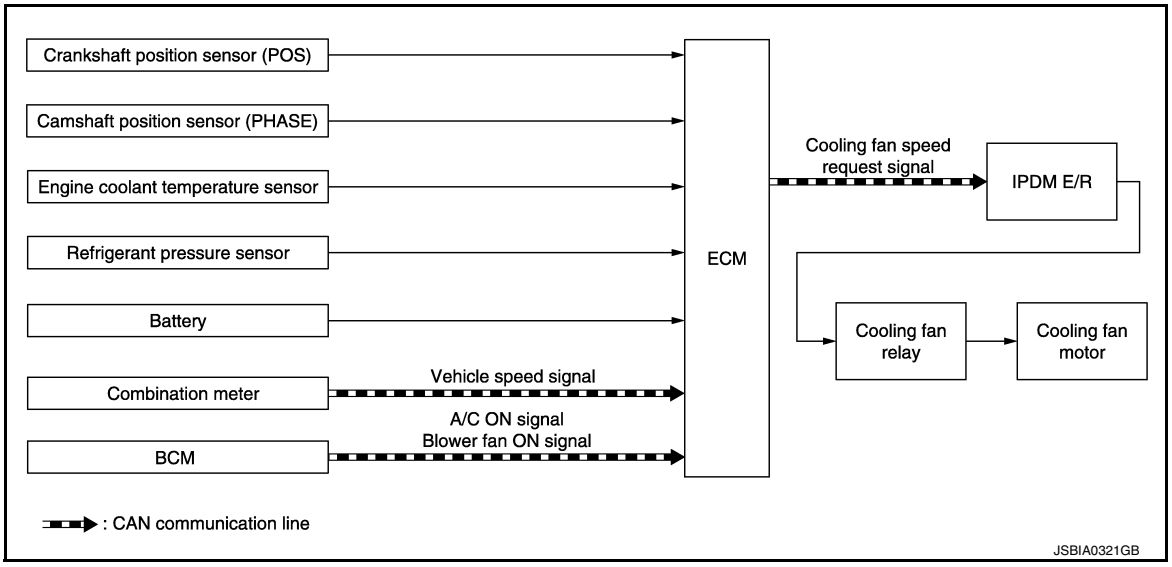
INFOID:0000000009020615

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.
Refer to LAN-29, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart", about CAN communication for detail.

COOLING FAN CONTROL

COOLING FAN CONTROL : System Diagram

INFOID:0000000009020616



COOLING FAN CONTROL : System Description

INFOID:0000000009020617

INPUT/OUTPUT SIGNAL CHART

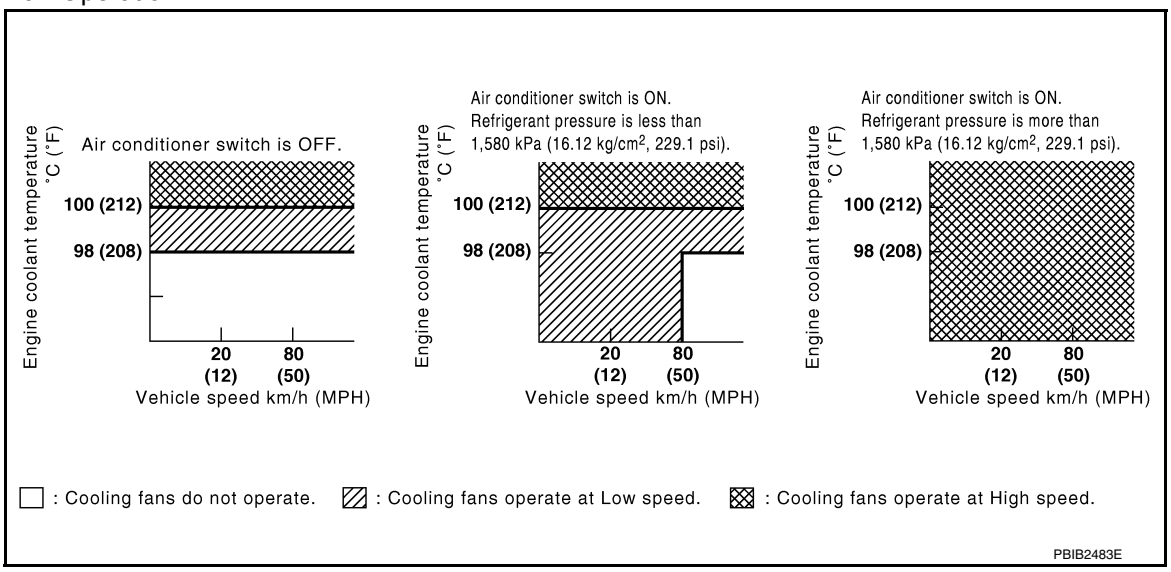
Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1 Piston position	Cooling fan speed request signal	IPDM E/R ↓ Cooling fan relay ↓ Cooling fan motor
Engine coolant temperature sensor	Engine coolant temperature		
Refrigerant pressure sensor	Refrigerant pressure		
Battery	Battery voltage*1		
Combination meter	Vehicle speed*2		
BCM	A/C ON signal*2 Blower fan signal*2		

*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.
*2: This signal is sent to ECM through CAN communication line.

SYSTEM DESCRIPTION (CVT MODELS)

ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, refrigerant pressure, air conditioner ON signal. Then control system has 3-step control [HIGH/LOW/OFF].

Cooling Fan Operation



Cooling Fan Relay Operation

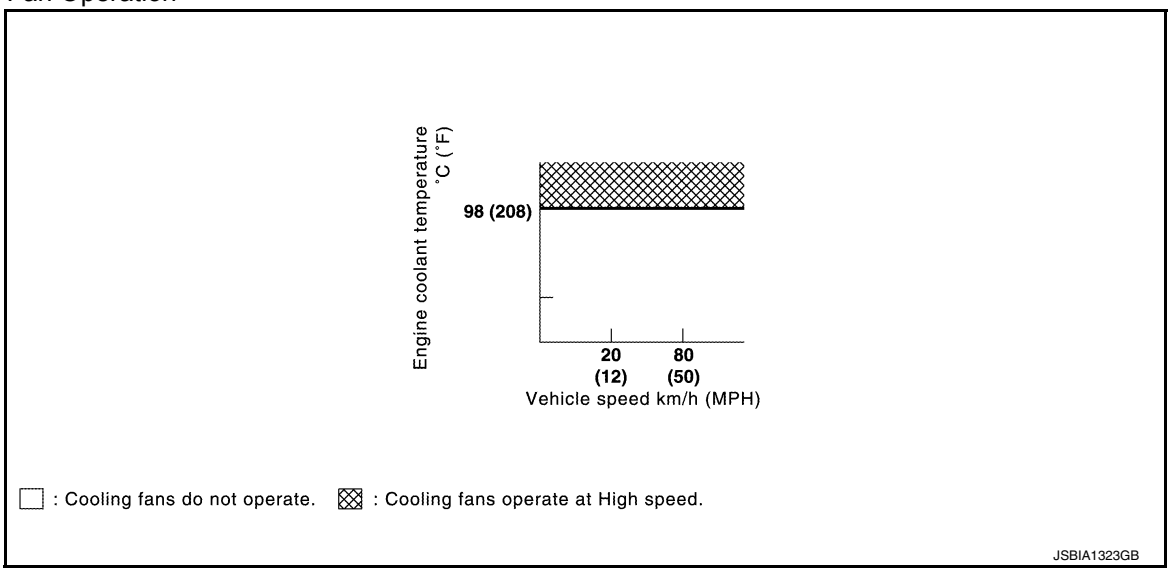
The ECM controls cooling fan relays through CAN communication line.

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

SYSTEM DESCRIPTION (M/T MODELS)

ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, refrigerant pressure, air conditioner ON signal. Then control system has 2-step control [HIGH/OFF].

Cooling Fan Operation



Cooling Fan Relay Operation

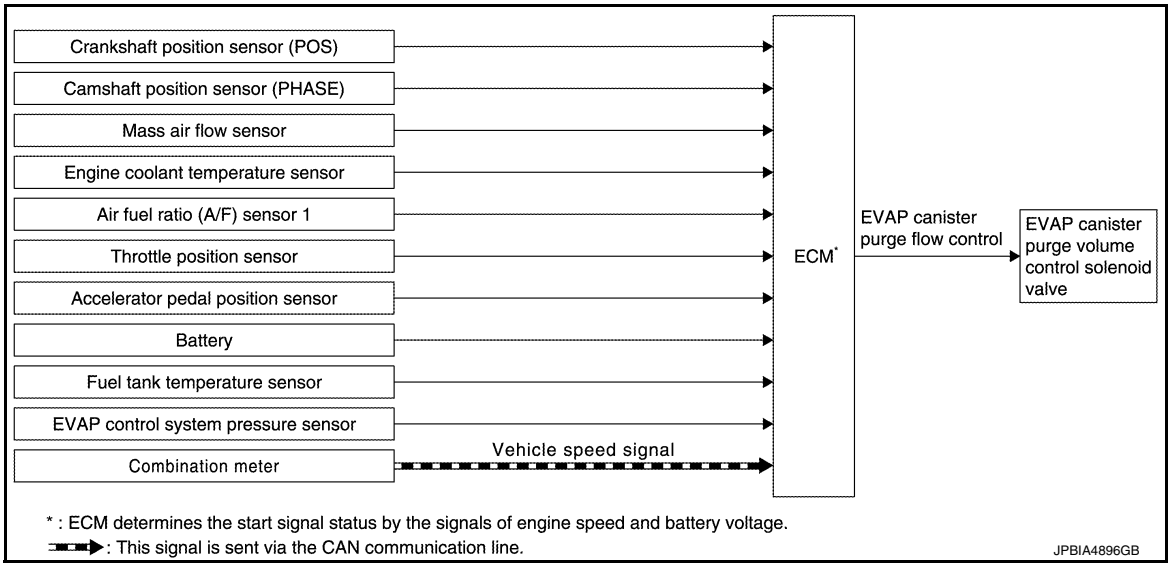
The ECM controls cooling fan relays through CAN communication line.

Cooling fan speed	Cooling fan relay
Stop (OFF)	OFF
Operate (HI)	ON

EVAPORATIVE EMISSION SYSTEM

EVAPORATIVE EMISSION SYSTEM : System Diagram

INFOID:0000000009020618



EVAPORATIVE EMISSION SYSTEM : System Description

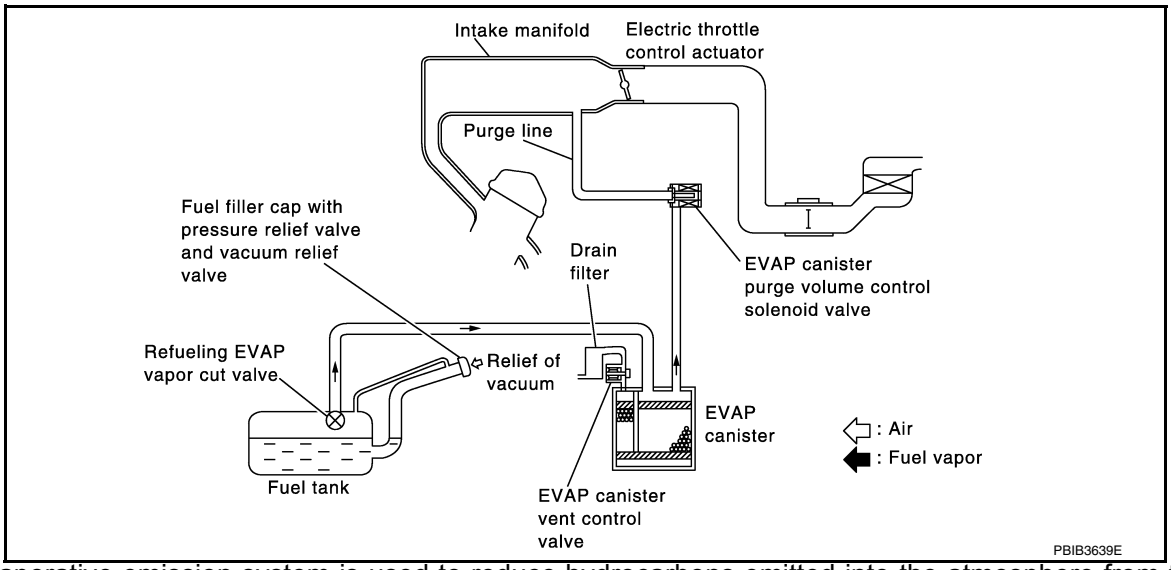
INFOID:0000000009020619

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1 Piston position	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*1		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
EVAP control system pressure sensor	Pressure in purge line		
Combination meter	Vehicle speed*2		

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.
*2: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

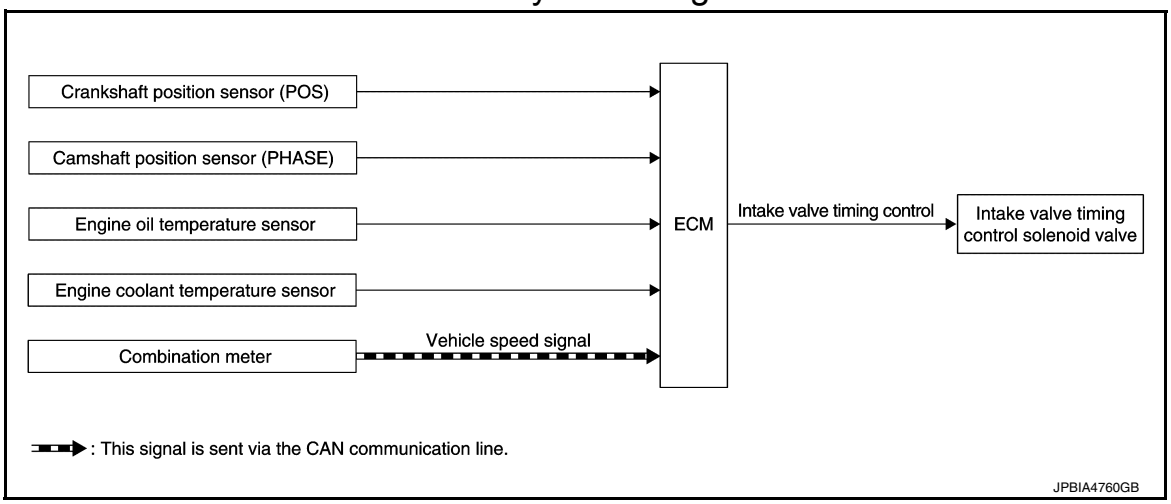


The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating.

INTAKE VALVE TIMING CONTROL

INTAKE VALVE TIMING CONTROL : System Diagram

INFOID:0000000009020620



INTAKE VALVE TIMING CONTROL : System Description

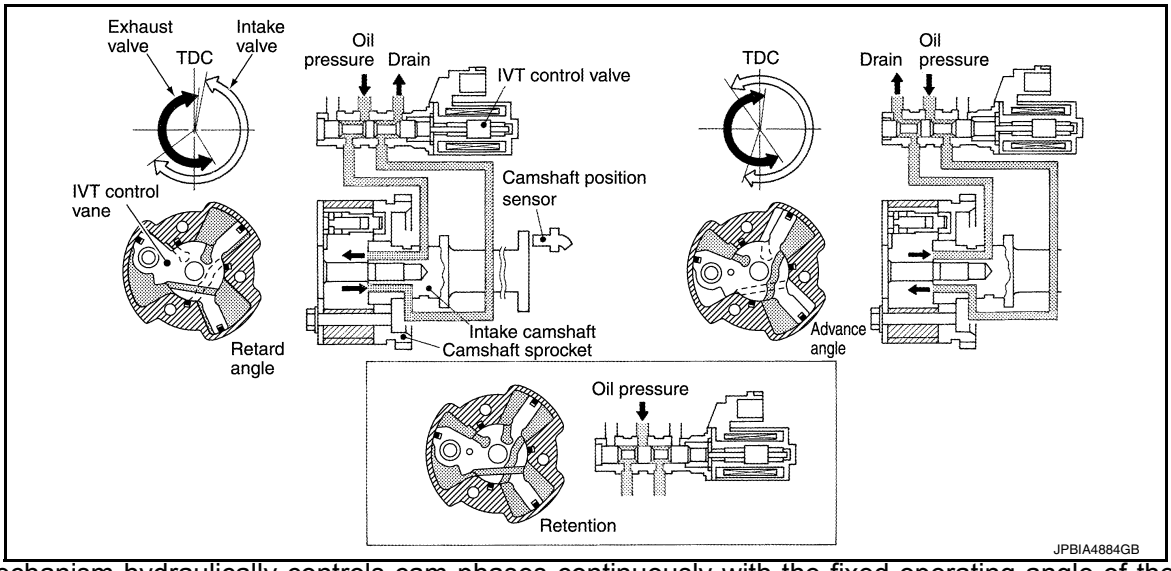
INFOID:0000000009020621

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*1 Piston position	Intake valve timing control	Intake valve timing control solenoid valve
Camshaft position sensor (PHASE)			
Engine oil temperature sensor	Engine oil temperature		
Engine coolant temperature sensor	Engine coolant temperature		
Combination meter	Vehicle speed*2		

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.
*2: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

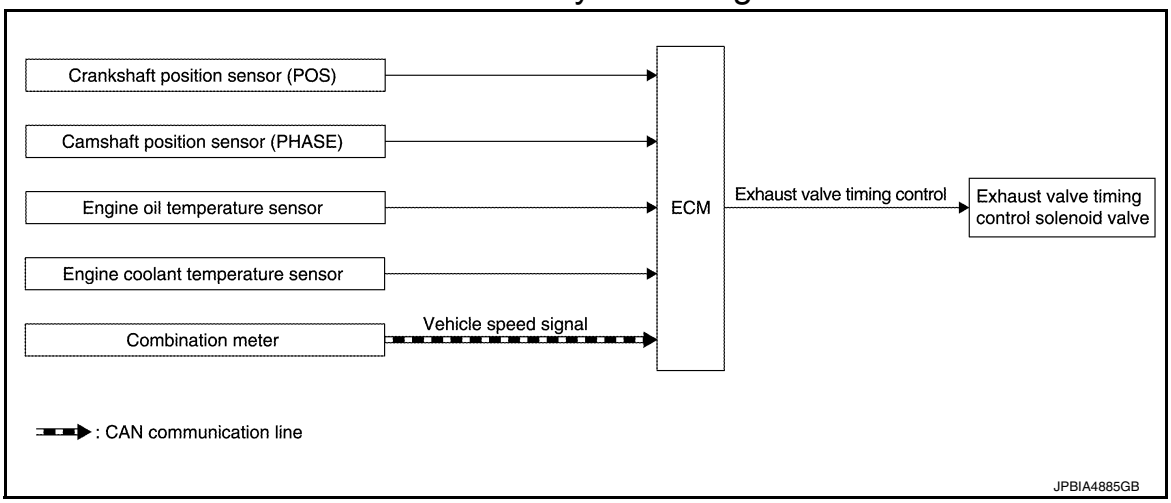


This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.
The ECM receives signals such as crankshaft position, camshaft position, engine speed, engine oil temperature and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing (IVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

EXHAUST VALVE TIMING CONTROL

EXHAUST VALVE TIMING CONTROL : System Diagram

INFOID:0000000009020622



EXHAUST VALVE TIMING CONTROL : System Description

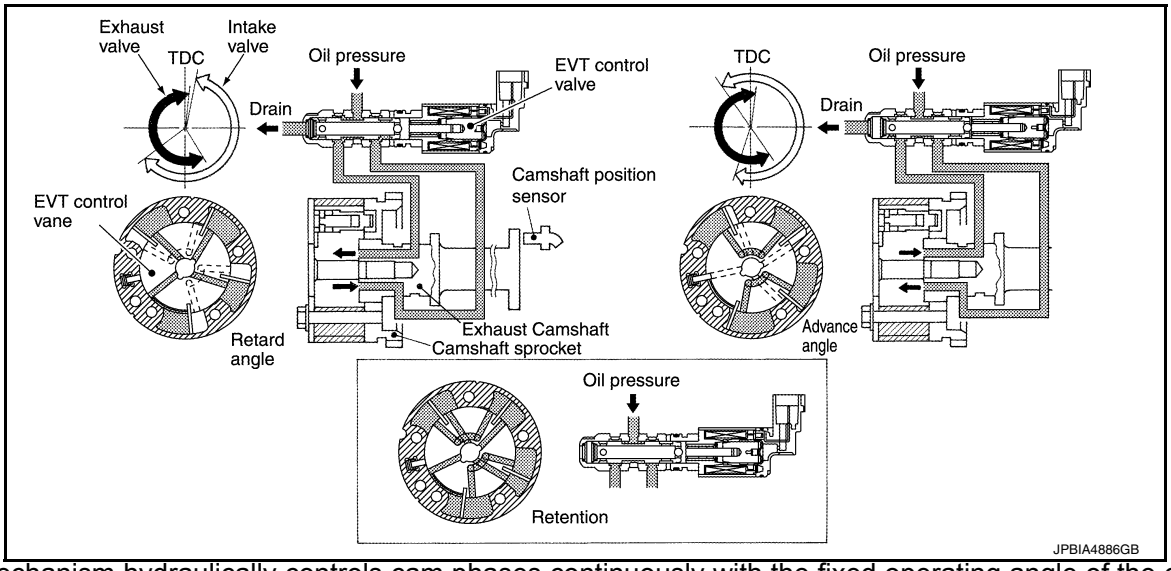
INFOID:0000000009020623

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*1 Piston position	Exhaust valve timing control	Exhaust valve timing control solenoid valve
Camshaft position sensor (PHASE)			
Engine oil temperature sensor	Engine oil temperature		
Engine coolant temperature sensor	Engine coolant temperature		
Combination meter	Vehicle speed*2		

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.
*2: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

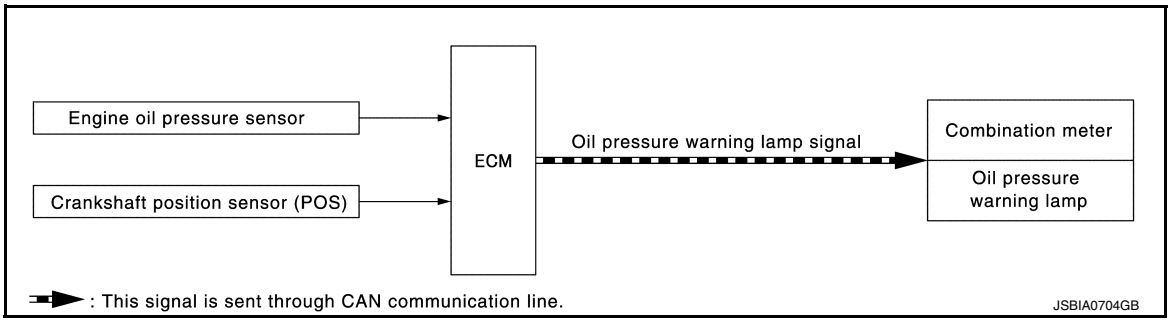


This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the exhaust valve.
The ECM receives signals such as crankshaft position, camshaft position, engine speed, engine oil temperature and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the exhaust valve timing (EVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the exhaust valve to increase engine torque and output in a range of high engine speed.

ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE

ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Diagram

INFOID:0000000009020624



ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description

INFOID:0000000009020625

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Engine oil pressure sensor	Engine pressure	Engine protection control • Oil pressure warning lamp signal	Combination meter • Oil pressure warning lamp
Crankshaft position sensor (POS)	Engine speed		

SYSTEM DESCRIPTION

- The engine protection control at low engine oil pressure warns the driver of a decrease in engine oil pressure by the oil pressure warning lamp a before the engine becomes damaged.
- When detecting a decrease in engine oil pressure at an engine speed less than 1,000 rpm, ECM transmits an oil pressure warning lamp signal to the combination meter. The combination meter turns ON the oil pressure warning lamp, according to the signal.

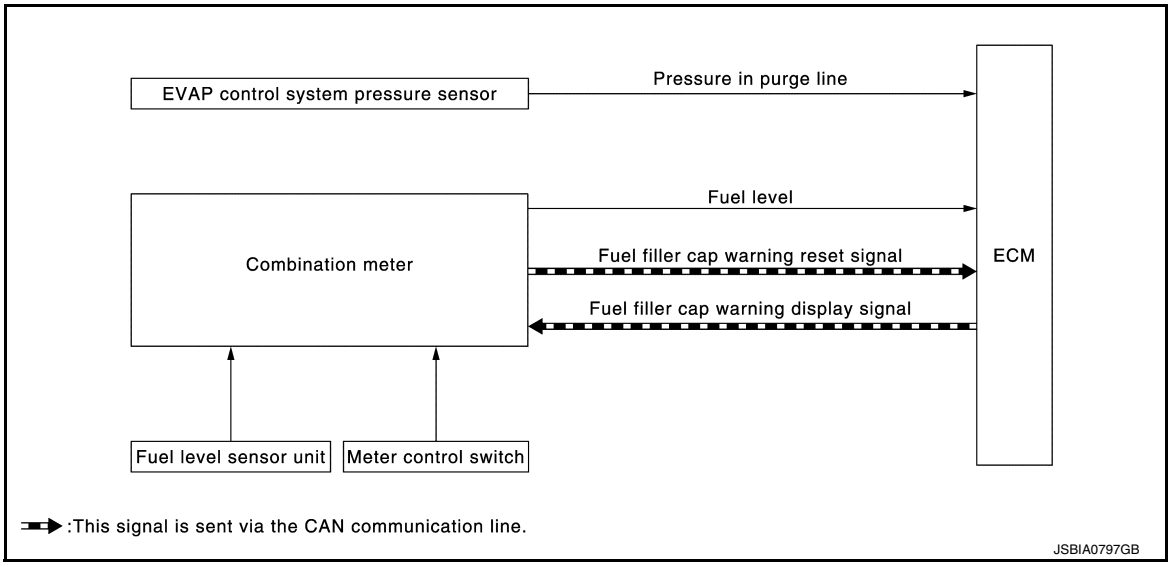
Decrease in engine oil pressure	Engine speed	Combination meter
		Oil pressure warning lamp
Detection	Less than 1,000 rpm	ON*
	1,000 rpm or more	ON

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

FUEL FILLER CAP WARNING SYSTEM

FUEL FILLER CAP WARNING SYSTEM : System Diagram

INFOID:0000000009020626



FUEL FILLER CAP WARNING SYSTEM : System Description

INFOID:0000000009020627

INPUT/OUTPUT SIGNAL CHART

Input

Unit/Sensor	Input signal to ECM	ECM function
EVAP control system pressure sensor	Pressure in purge line	Fuel filler cap warning control
Combination meter	Fuel level	
	Fuel filler cap warning reset signal*	

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

Output

Unit	Output signal	Actuator
ECM	Fuel filler cap warning display signal*	Combination meter

*: This signal is sent to the combination meter via the CAN communication line.

SYSTEM DESCRIPTION

The fuel filler cap warning system alerts the driver to the prevention of the fuel filler being left uncapped and malfunction occurrences after refueling, by turning ON the fuel filler cap warning display on the combination meter.
ECM judges a refueled state, based on a fuel level signal transmitted from the combination meter.
When a very small leak is detected through the EVAP leak diagnosis performed after judging the refueled state, ECM transmits a fuel filler cap warning display signal (request for display ON) to the combination meter via CAN communication.
When receiving the signal, the combination meter turns ON the fuel filler cap warning display.

CAUTION:
Check fuel filler cap installation condition when the fuel filler cap warning display turns ON.

Reset Operation

The fuel filler cap warning lamp tunes OFF, according to any condition listed below:

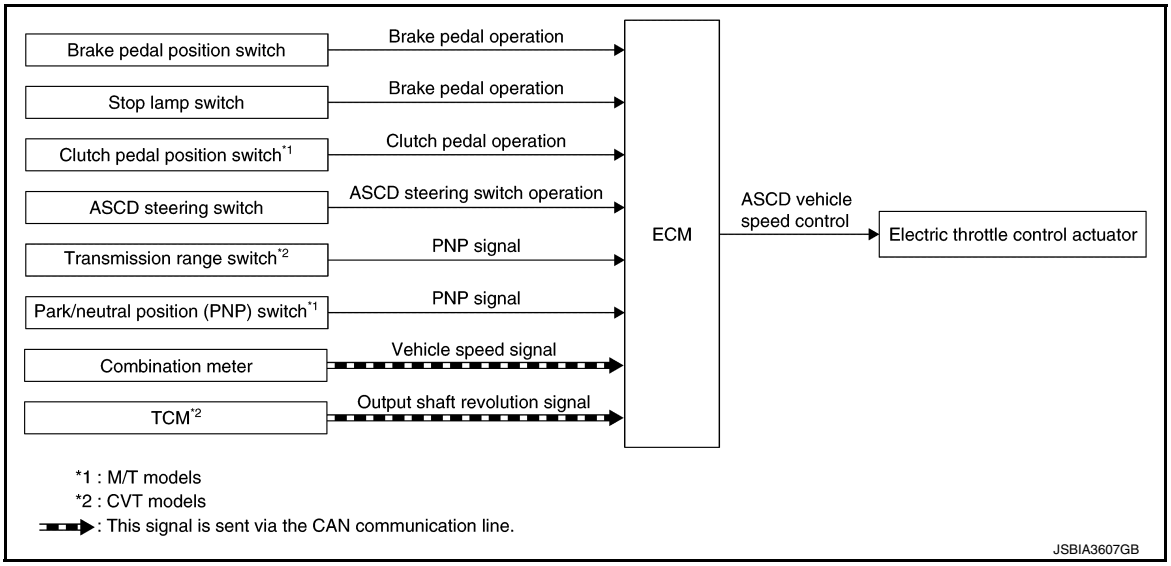
- Reset operation is performed by operating the meter control switch on the combination meter. Refer to MWI-13, "Switch Name and Function".
- When the reset operation is performed, the combination meter transmits a fuel filler cap warning reset signal to ECM via CAN communication. ECM transmits a fuel filler cap warning display signal (request for display OFF) to the combination meter via CAN communication. When receiving the signal, the combination meter turns OFF the fuel filler cap warning display.
- EVAP leak diagnosis result is normal.
- Fuel refilled.
- DTC erased by using CONSULT.

NOTE:
MIL turns ON if a malfunction is detected in leak diagnosis results again at the trip after the fuel filler cap warning display turns ON/OFF.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Diagram

INFOID:0000000009020628



AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description

INFOID:0000000009020629

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD steering switch	ASCD steering switch operation	ASCD vehicle speed control	Electric throttle control actuator
Brake pedal position switch	Brake pedal operation		
Stop lamp switch			
Clutch pedal position switch	Clutch pedal operation		
Transmission range switch	Gear position		
Park/neutral position (PNP) switch	PNP signal		
Combination meter	Vehicle speed signal*		
TCM	Output shaft revolution signal*		

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

BASIC ASCD SYSTEM

Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can be set the vehicle speed in the set speed range.
ECM controls throttle angle of electric throttle control actuator to regulate engine speed.
Operation status of ASCD is indicated in combination meter.
If any malfunction occurs in the ASCD system, it automatically deactivates the ASCD control.

Refer to EC-47, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function" for ASCD operating instructions.

CAUTION:

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

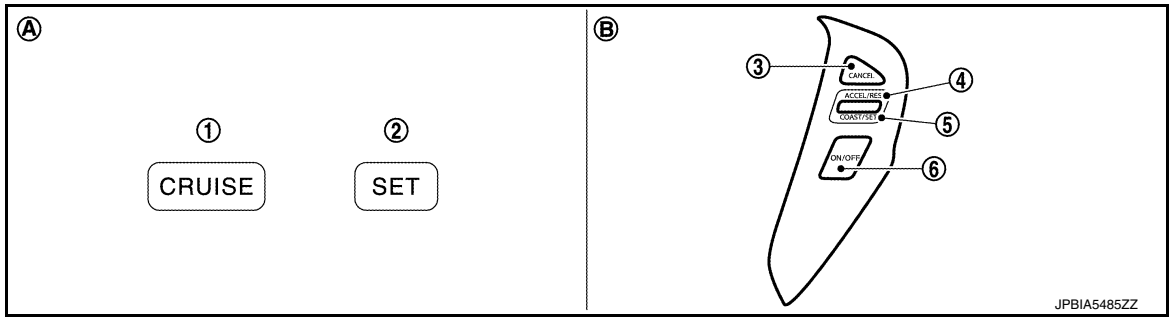
OPERATION

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

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

INFOID:0000000009020630

SWITCHES AND INDICATORS



① CRUISE indicator
② SET indicator
③ CANCEL switch
④ ACCEL/RES switch
⑤ COAST/SET switch
⑥ ASCD MAIN switch
Ⓐ On the combination meter (Information display)
Ⓑ On the steering wheel

SET SPEED RANGE

ASCD system can be set the following vehicle speed.

Minimum speed (Approx.)	Maximum speed (Approx.)
38 km/h (24 MPH)	144 km/h (90 MPH)

SWITCH OPERATION

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

SET OPERATION

Press MAIN switch. (The CRUISE indicator in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 38 km/h (24 MPH) and 144 km/h (90 MPH), press COAST/SET switch.

ACCELERATE OPERATION

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

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.
- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to neutral position. (M/T models)
- Selector lever is changed to N, P or R position (CVT models)
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed

• TCS system is operated

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.

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

COAST OPERATION

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

RESUME OPERATION

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

• Brake pedal is released
• Clutch pedal is released (M/T models)
• Selector lever is in other than P and N positions (CVT models)
• Vehicle speed is greater than 38 km/h (24 MPH) and less than 144 km/h (90 MPH)

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000009020631

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

GST (Generic Scan Tool)

INFOID:0000000009020632

When GST is connected with a data link connector equipped on the vehicle side, it will communicate with the control unit equipped in the vehicle and then enable various kinds of diagnostic tests. Refer to EC-49, "Diagnosis Description".

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

DIAGNOSIS SYSTEM (ECM)
DIAGNOSIS DESCRIPTION
DIAGNOSIS DESCRIPTION : 1st Trip Detection Logic and Two Trip Detection Logic

INFOID:0000000009020633

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not illuminate at this stage. <1st trip>
If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL illuminates. The MIL illuminates at the same time when the DTC is stored. <2nd trip> The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to illuminate or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Illuminated	Blinking	Illuminated				
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0308 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0308 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses (Refer to EC-86, "DTC Index".)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

INFOID:0000000009020634

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not recur, the 1st trip DTC will not be displayed.
If a malfunction is detected during the 1st trip, the 1st trip DTC is saved in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are saved in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.
For malfunctions in which 1st trip DTCs are displayed, refer to EC-86, "DTC Index". These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT.
1st trip DTC is specified in Service $07 of SAE J1979/ISO 15031-5. 1st trip DTC detection occurs without illuminating the MIL and therefore does not warn the driver of a malfunction.
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to EC-118, "Work Flow". Then perform DTC Confirmation Procedure or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

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

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

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 – P0308 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175
2		Except the above items
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was saved in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased.

DIAGNOSIS DESCRIPTION : Counter System

INFOID:0000000009020635

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

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

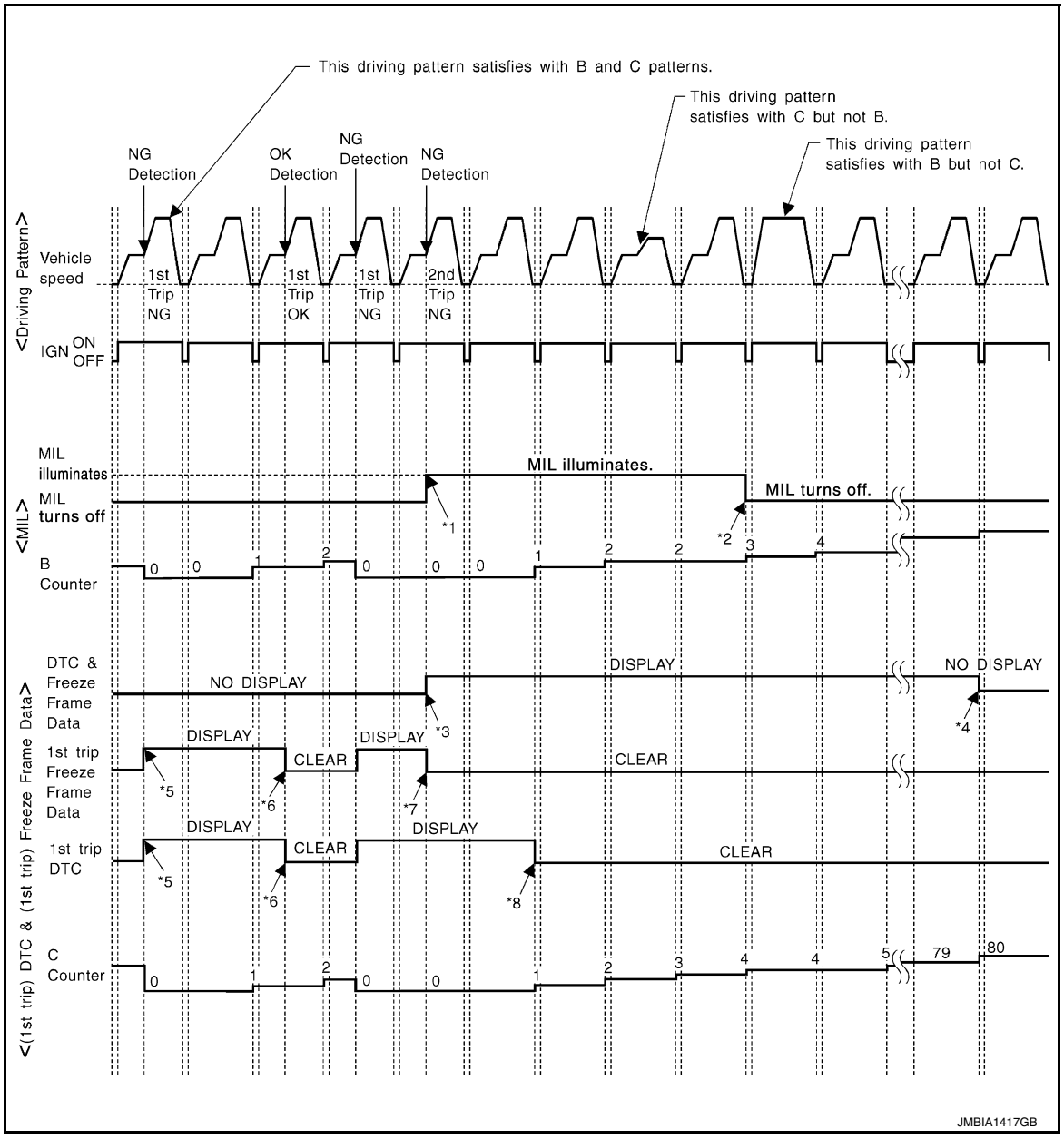
COUNTER SYSTEM CHART

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

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

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

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



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will turn OFF after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

*8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

Explanation for Driving Patterns for “Misfire <Exhaust Quality Deterioration>”, “Fuel Injection System”

Driving Pattern B
Refer to EC-54, "DIAGNOSIS DESCRIPTION : Driving Pattern".

Driving Pattern C

Refer to EC-54, "DIAGNOSIS DESCRIPTION : Driving Pattern".

Example:

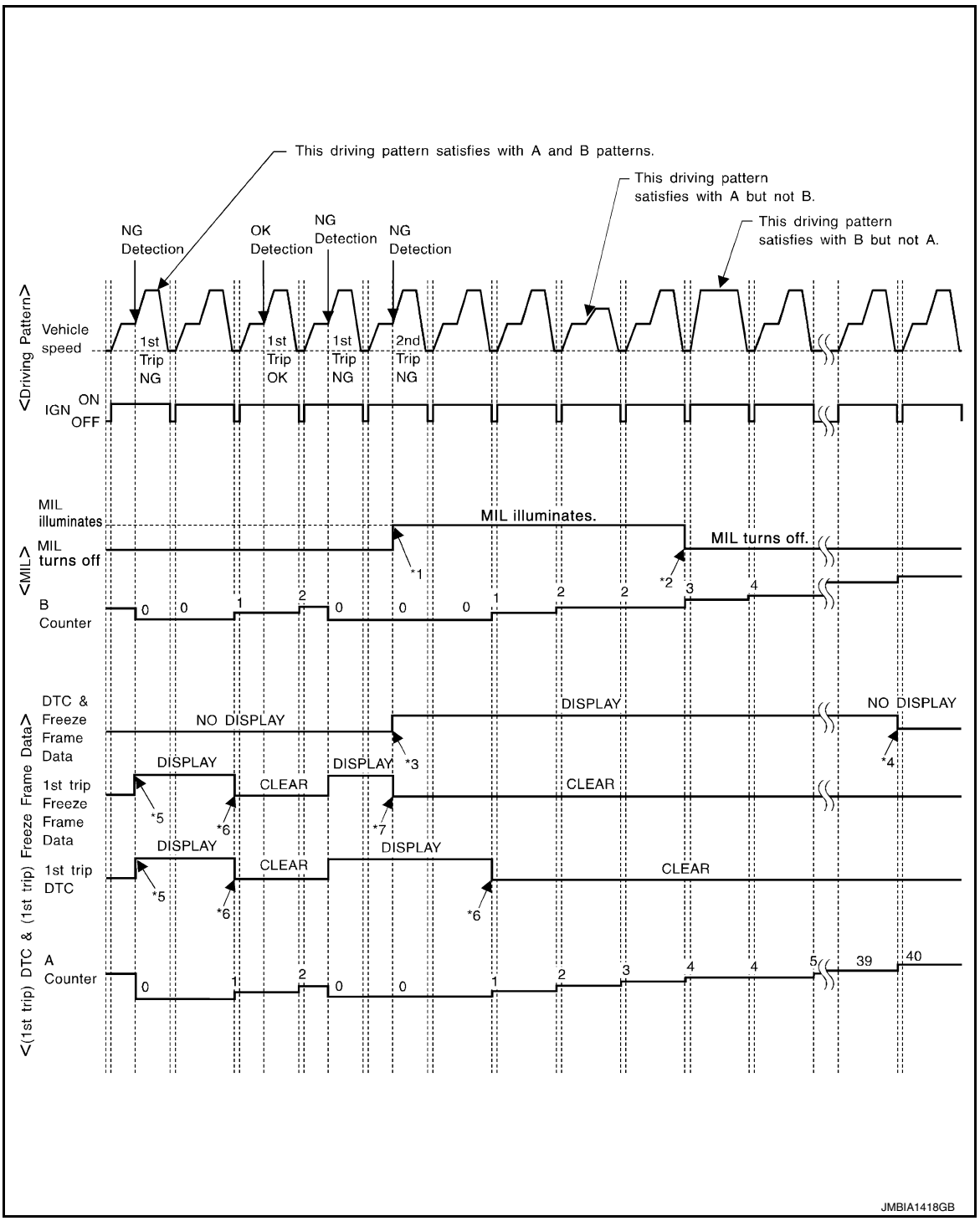
If the stored freeze frame data is as per the following:

Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)

To be satisfied with driving pattern C, the vehicle should run under the following conditions:

Engine speed: 475 – 1,225 rpm, Calculated load value: 27 – 33%, Engine coolant temperature: more than 70°C (158°F)

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



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will turn OFF after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

Explanation for Driving Patterns Except for “Misfire <Exhaust Quality Deterioration>”, “Fuel Injection System”

Driving Pattern A
Refer to EC-54, "DIAGNOSIS DESCRIPTION : Driving Pattern".

Driving Pattern B
Refer to EC-54, "DIAGNOSIS DESCRIPTION : Driving Pattern".

DIAGNOSIS DESCRIPTION : Driving Pattern

INFOID:0000000009020636

CAUTION:
Always drive at a safe speed.

DRIVING PATTERN A

Driving pattern A means a trip satisfying the following conditions.
- Engine speed reaches 400 rpm or more.
- Engine coolant temperature rises by 20°C (36°F) or more after starting the engine.
- Engine coolant temperature reaches 70°C (158°F) or more.
- The ignition switch is turned from ON to OFF.

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

DRIVING PATTERN B

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

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

DRIVING PATTERN C

Driving pattern C means operating vehicle as per the following:
The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ±375 rpm

Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
Engine coolant temperature condition:
- When the freeze frame data shows lower than 70°C (158°F), engine coolant temperature should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), engine coolant temperature should be higher than or equal to 70°C (158°F).

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

DRIVING PATTERN D

Driving pattern D means a trip satisfying the following conditions.
- The state of driving at 40 km/h (25 MPH) reaches 300 seconds or more in total.
- Idle speed lasts 30 seconds or more.
- A lapse of 600 seconds or more after engine start.

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

DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code

INFOID:0000000009020637

System Readiness Test (SRT) code is specified in Service $01 of SAE J1979/ISO 15031-5.
As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.
If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating “INCMP”, use the information in this Service Manual to set the SRT to “CMPLT”.
In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate “CMPLT” for each application system. Once set as “CMPLT”, the SRT status remains “CMPLT” until the self-diagnosis memory is erased.
Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate “INCMP” for these items.

NOTE:
The SRT will also indicate “INCMP” if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.
If, during the state emissions inspection, the SRT indicates “CMPLT” for all test items, the inspector will continue with the emissions test. However, if the SRT indicates “INCMP” for one or more of the SRT items the vehicle is returned to the customer untested.

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

SRT SET TIMING

SRT is set as “CMPLT” after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

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

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

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

—: Self-diagnosis is not carried out.

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

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

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

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

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

  NOTE:

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

DIAGNOSIS DESCRIPTION : Permanent Diagnostic Trouble Code (Permanent DTC)

INFOID:0000000009020638

Permanent DTC is defined in SAE J1979/ISO 15031-5 Service $0A.

ECM stores a DTC issuing a command of turning on MIL as a permanent DTC and keeps storing the DTC as a permanent DTC until ECM judges that there is no presence of malfunction.

Permanent DTCs cannot be erased by using the Erase function of CONSULT or Generic Scan Tool (GST) and by disconnecting the battery to shut off power to ECM. This prevents a vehicle from passing the state emission inspection without repairing a malfunctioning part.

When not passing the state emission inspection due to more than one permanent DTC, permanent DTCs should be erased, referring to this manual.

NOTE:

- The important items in state emission inspection are that MIL is not ON, SRT test items are set, and permanent DTCs are not included.
- Permanent DTCs do not apply for regions that permanent DTCs are not regulated by law.

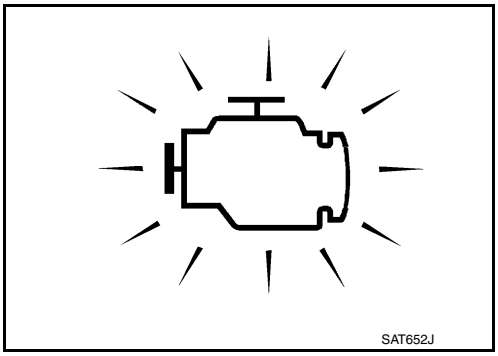
PERMANENT DTC SET TIMING

The setting timing of permanent DTC is stored in ECM with the lighting of MIL when a DTC is confirmed.

DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)

INFOID:0000000009020639

When emission-related ECU detects a malfunction in the emission control systems components and/or the powertrain control components (which affect vehicle emissions), it turns on/blinks MIL to inform the driver that a malfunction has been detected.



1. The MIL illuminates when ignition switch is turned ON (engine is not running).
   NOTE:
   Check the MIL circuit if MIL does not illuminate. Refer to EC-444, "Diagnosis Procedure".
2. When the engine is started, the MIL should go off.
   NOTE:
   If MIL continues to illuminate/blink, perform self-diagnoses and inspect/repair accordingly because an emission-related ECU has detected a malfunction in the emission control systems components and/or the powertrain control components (which affect vehicle emissions).

On Board Diagnosis Function

INFOID:0000000009020640

ON BOARD DIAGNOSIS ITEM

The on board diagnostic system has the following functions.

Diagnostic test mode	Function
Bulb check	MIL can be checked.
SRT status	ECM can read if SRT codes are set.
Malfunction warning	If ECM detects a malfunction, it illuminates or blinks MIL to inform the driver that a malfunction has been detected.
Self-diagnostic results	DTCs or 1st trip DTCs stored in ECM can be read.
Accelerator pedal released position learning	ECM can learn the accelerator pedal released position. Refer to EC-126, "Work Procedure".
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to EC-127, "Work Procedure".
Idle air volume learning	ECM can learn the idle air volume. Refer to EC-128, "Work Procedure".
Mixture ratio self-learning value clear	Mixture ratio self-learning value can be erased. Refer to EC-130, "Work Procedure".

BULB CHECK MODE

Description

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

Operation Procedure

1. Turn ignition switch ON.
2. The MIL on the instrument panel should stay ON.
   If it remains OFF, check MIL circuit. Refer to EC-444, "Diagnosis Procedure".

SRT STATUS MODE

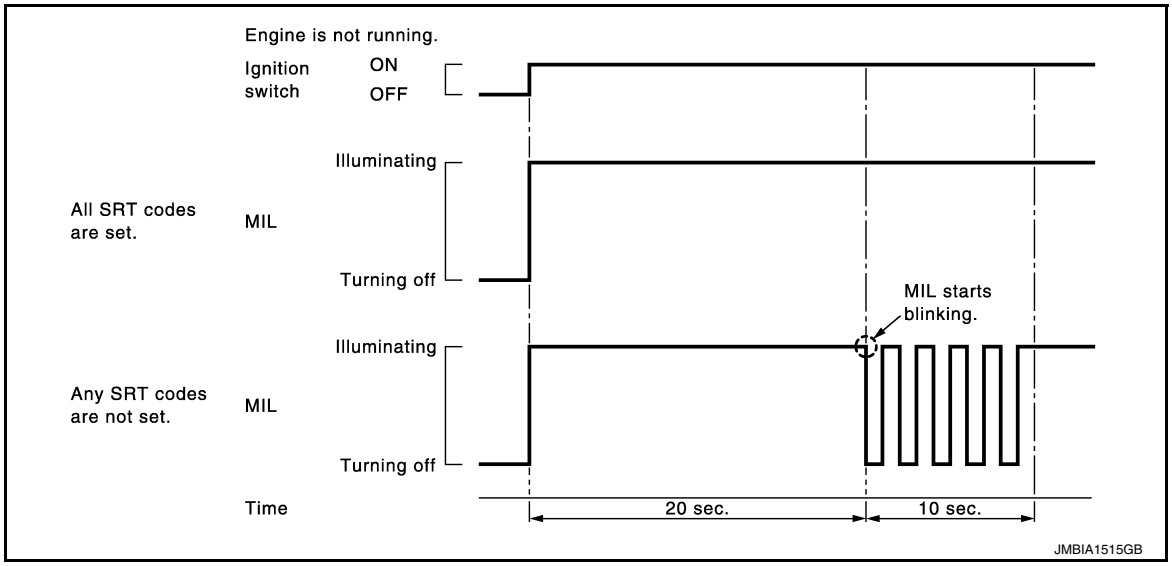
Description

This function allows to read if ECM has completed the self-diagnoses of major emission control systems and components. For SRT, refer to EC-55, "DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code".

Operation Procedure

1. Turn ignition switch ON and wait 20 seconds.
2. SRT status is indicated as shown blow.
   - ECM continues to illuminate MIL if all SRT codes are set.

- ECM blinks MIL for about 10 seconds if all SRT codes are not set.



MALFUNCTION WARNING MODE

Description

In this function ECM turns on or blinks MIL when it detects a malfunction in the emission control system components and/or the powertrain control components (which affect vehicle emissions) to inform the driver that a malfunction has been detected.

Operation Procedure

1. Turn ignition switch ON.
2. Check that MIL illuminates.
   If it remains OFF, check MIL circuit. Refer to EC-444, "Diagnosis Procedure".
3. Start engine and let it idle.
   - For two trip detection logic diagnoses, ECM turns on MIL when it detects the same malfunction twice in the two consecutive driving cycles.
   - For 1st trip detection logic diagnoses, ECM turns on MIL when it detects a malfunction in one driving cycle.
   - ECM blinks MIL when it detects a malfunction that may damage the three way catalyst (misfire).

SELF-DIAGNOSTIC RESULTS MODE

Description

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

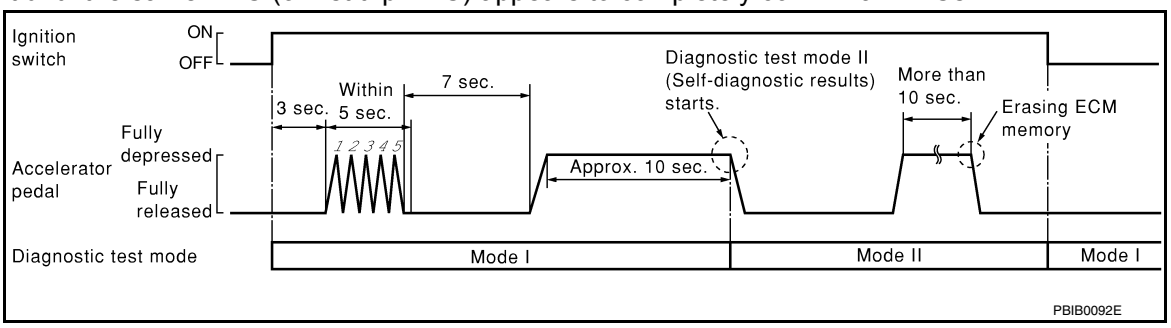
How to Set Self-diagnostic Results Mode

NOTE:

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

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

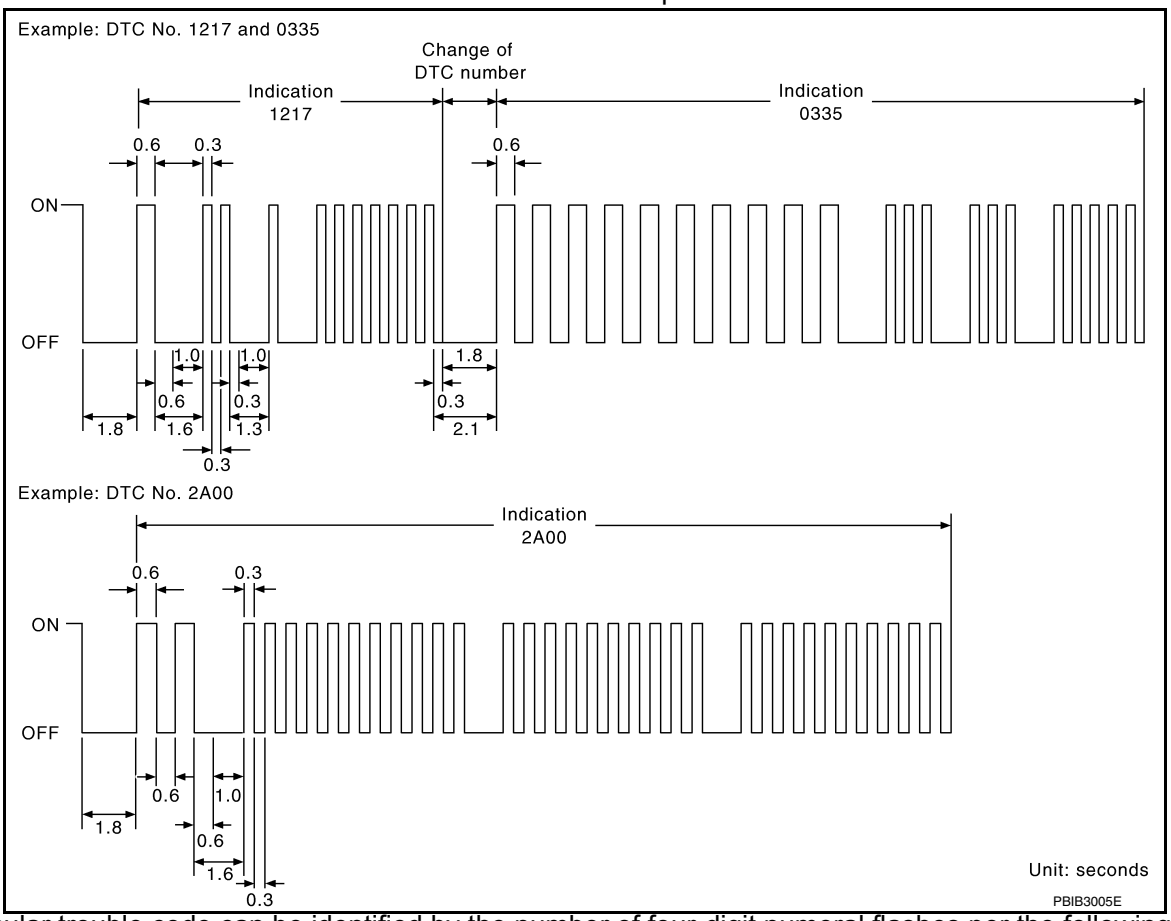
NOTE:
Wait until the same DTC (or 1st trip DTC) appears to completely confirm all DTCs.



How to Read Self-diagnostic Results

The DTC and 1st trip DTC are indicated by the number of blinks of the MIL as shown below.

The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MIL illuminates in “malfunction warning” mode, it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT or GST. A DTC will be used as an example for how to read a code.



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

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

The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-seconds) - OFF (0.6-seconds) cycle.

The 100th-digit numeral and lower digit numerals consist of a 0.3-seconds ON and 0.3-seconds OFF cycle.

A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.

A change from one trouble code to another occurs at an interval of 1.8-seconds OFF.

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. Refer to EC-86, "DTC Index".

How to Erase Self-diagnostic Results

By performing this procedure, ECM memory is erased and the following diagnostic information is erased as well.

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

NOTE:

Also, if a battery terminal is disconnected, ECM memory is erased and the diagnostic information as listed above is erased. (The amount of time required for erasing may vary from a few seconds to several hours.)

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Set ECM in “self-diagnostic results” mode.
6. The diagnostic information has been erased from the backup memory in the ECM.
   Fully depress the accelerator pedal and keep it depressed for more than 10 seconds.
7. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

CONSULT Function

INFOID:0000000009020641

FUNCTION

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

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

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

SELF DIAGNOSTIC RESULT MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-86, "DTC Index".

How to Read DTC and 1st Trip DTC

DTCs and 1st trip DTCs related to the malfunction are displayed in “self-diag results”.

- When ECM detects a 1st trip DTC, “1t” is displayed for “TIME”.
- When ECM has detected a current DTC, “0” is displayed for “TIME”.
- If “TIME” is neither “0” nor “1t”, the DTC occurred in the past and ECM shows the number of times the vehicle has been driven since the last detection of the DTC.

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
Detected DTC	The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to EC-86, "DTC Index".)
FUEL SYS-B1	• "Fuel injection system status" at the moment a malfunction is detected is displayed. • One mode in the following is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment) Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control Mode5: Open loop - has not yet satisfied condition to go to closed loop
FUEL SYS-B2	
CAL/LD VALUE [%]	The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	• "Long-term fuel trim" at the moment a malfunction is detected is displayed. • The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
L-FUEL TRM-B2 [%]	
S-FUEL TRM-B1 [%]	• "Short-term fuel trim" at the moment a malfunction is detected is displayed. • The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
S-FUEL TRM-B2 [%]	
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH·P/S [%]	The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed.
INT MANI PRES [kPa]	These items are displayed but are not applicable to this model.
COMBUST CONDITION	

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

DATA MONITOR MODE

NOTE:

- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- For reference values of the following items, refer toEC-70, "Reference Value".

Monitored Item

Monitored item	Unit	Description	Remarks
IDLE REQUEST*	YES/NO	• Displays the idle request status sent from HPCM. - YES: Idle request received - NO: No idle request	
MIL ON REQUEST*	YES/NO	• Displays the MIL ON request status sent from HPCM. - YES: MIL ON request received - NO: No MIL ON request	
ENGINE NO-LOAD*	YES/NO	• Displays the clutch 1 disengagement/engagement status sent from HPCM. - YES: Clutch 1 disengaged - NO: Clutch 1 engaged	
READY STATE*	YES/NO	• Displays the clutch 1 disengagement/engagement status sent from HPCM. - YES: READY state - NO: Not in READY state	
ENG SPEED	rpm	Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	• Accuracy becomes poor if engine speed drops below the idle rpm. • If the signal is interrupted while the engine is running, an abnormal value may be indicated.

Monitored item	Unit	Description	Remarks
MAS A/F SE-B1	V	The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated. • When engine is running, specification range is indicated in “SPEC”.
B/FUEL SCHDL	ms	“Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	When engine is running, specification range is indicated in “SPEC”.
A/F ALPHA-B1	%	The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • When engine is running, specification range is indicated in “SPEC”. • This data also includes the data for the air-fuel ratio learning control.
COOLAN TEMP/S	°C or °F	The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
A/F SEN1 (B1)	V	The A/F signal computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed.	
HO2S2 (B1)	V	The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S2 MNTR(B1)	RICH/LEAN	• Display of heated oxygen sensor 2 signal. - RICH: means the amount of oxygen after three way catalyst is relatively small. - LEAN: means the amount of oxygen after three way catalyst is relatively large.	When the engine is stopped, a certain value is indicated.
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BATTERY VOLT	V	The power supply voltage of ECM is displayed.	
ACCEL SEN 1	V	The accelerator pedal position sensor signal voltage is displayed.	ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2			
TP SEN 1-B1	V	The throttle position sensor signal voltage is displayed.	TP SEN 2-B1 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
TP SEN 2-B1			
FUEL T/TMP SE	°C or °F	The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.	
EVAP SYS PRES	V	The signal voltage of EVAP control system pressure sensor is displayed.	
FUEL LEVEL SE	V	The signal voltage of the fuel level sensor is displayed.	
START SIGNAL	ON/OFF	Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS	ON/OFF	Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG	ON/OFF	Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
PW/ST SIGNAL	ON/OFF	[ON/OFF] condition of the power steering system (determined by the signal sent from EPS control unit) is indicated.	

Monitored item	Unit	Description	Remarks
LOAD SIGNAL	ON/OFF	• Indicates [ON/OFF] condition of the electrical lode signal. - ON: Rear window defogger switch is ON and/or lighting switch is 2nd position. - OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW	ON/OFF	Indicates [ON/OFF] condition from ignition switch signal.	
HEATER FAN SW	ON/OFF	Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW	ON/OFF	Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1	msec	Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	When the engine is stopped, a certain computed value is indicated.
IGN TIMING	BTDC	Indicates the ignition timing computed by ECM according to the input signals.	When the engine is stopped, a certain value is indicated.
CAL/LD VALUE	%	“Calculated load value” indicates the value of the current air flow divided by peak air flow.	
MASS AIRFLOW	g/s	Indicates the mass air flow computed by ECM according to the signal voltage of the mass air flow sensor.	
PURG VOL C/V	%	• Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
INT/V TIM(B1)	°CA	Indicates [°CA] of intake camshaft advance angle.	
EXH/V TIM B1	°CA	Indicates [°CA] of exhaust camshaft retard angle.	
INT/V SOL(B1)	%	• The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. • The advance angle becomes larger as the value increases.	
AIR COND RLY	ON/OFF	The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY	ON/OFF	Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
VENT CONT/V	ON/OFF	• The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is displayed. - ON: Closed - OFF: Open	
THRTL RELAY	ON/OFF	Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
COOLING FAN	HI/LOW/OFF	• Indicates the condition of the cooling fan (determined by ECM according to the input signals). - HI: High speed operation - LOW: Low speed operation - OFF: Stop	
HO2S2 HTR (B1)	ON/OFF	Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	

Monitored item	Unit	Description	Remarks
ALT DUTY SIG	ON/OFF	• The control condition of the power generation voltage variable control (determined by ECM according to the input signals) is indicated. - ON: Power generation voltage variable control is active. - OFF: Power generation voltage variable control is inactive.	
I/P PULLY SPD	rpm	Indicates the engine speed computed from the input speed sensor signal.	
VEHICLE SPEED	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
IDL A/V LEARN	YET/CMPLT	• Displays the condition of Idle Air Volume Learning. - YET: Idle air volume learning has not been performed yet. - CMPLT: Idle air volume learning has already been performed successfully.	
TRVL AFTER MIL	km or mile	Distance traveled while MI is activated.	
ENG OIL TEMP	°C or °F	The engine oil temperature (determined by the signal voltage of the engine oil temperature sensor) is indicated.	
A/F S1 HTR(B1)	%	• Air fuel ratio (A/F) sensor 1 heater control value computed by ECM according to the input signals. • The current flow to the heater becomes larger as the value increases.	
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
SET VHCL SPD	km/h or mph	The preset vehicle speed is displayed.	
MAIN SW	ON/OFF	Indicates [ON/OFF] condition from ASCD MAIN switch signal.	
CANCEL SW	ON/OFF	Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW	ON/OFF	Indicates [ON/OFF] condition from ACCEL/RES switch signal.	
SET SW	ON/OFF	Indicates [ON/OFF] condition from COAST/SET switch signal.	
BRAKE SW1	ON/OFF	Indicates [ON/OFF] condition from ASCD brake switch signal.	
BRAKE SW2	ON/OFF	Indicates [ON/OFF] condition of stop lamp switch signal.	
VHCL SPD CUT	NON/CUT	• Indicates the vehicle cruise condition. - NON: Vehicle speed is maintained at the ASCD set speed. - CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	
LO SPEED CUT	NON/CUT	• Indicates the vehicle cruise condition. - NON: Vehicle speed is maintained at the ASCD set speed. - CUT: Vehicle speed decreased to excessively low, and ASCD operation is cut off.	
AT OD MONITOR	ON/OFF	Indicates [ON/OFF] condition of CVT O/D according to the input signal from the TCM.	
AT OD CANCEL	ON/OFF	Indicates [ON/OFF] condition of CVT O/D cancel request signal.	

Monitored item	Unit	Description	Remarks
CRUISE LAMP	ON/OFF	Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP*	ON/OFF	Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	
ALT DUTY	%	Indicates the duty ratio of the power generation command value. The ratio is calculated by ECM based on the battery current sensor signal.	
BAT CUR SEN	mV	The signal voltage of battery current sensor is displayed.	
A/F ADJ-B1	—	Indicates the correction of a factor stored in ECM. The factor is calculated from the difference between the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 signal.	
P/N POSI SW	ON/OFF	Indicates [ON/OFF] condition from the park/neutral position (PNP) signal.	
INT/A TEMP SE	°C or °F	The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
AC PRESS SEN	V	The signal voltage from the refrigerant pressure sensor is displayed.	
CLUTCH P/P SW	ON/OFF	Indicates [ON/OFF] condition clutch pedal position switch signals.	Models other than M/T models always display OFF.
VTC DTY EX B1	%	• The control value of the exhaust valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. • The advance angle becomes larger as the value increases.	
THRTL STK CNT B1*	—	—	
EVAP LEAK DIAG	YET/CMPLT	• Indicates the condition of EVAP leak diagnosis. YET: EVAP leak diagnosis has not been performed yet. CMPLT: EVAP leak diagnosis has been performed successfully.	
EVAP DIAG READY	ON/OFF	• Indicates the ready condition of EVAP leak diagnosis. ON: Diagnosis has been ready condition. OFF: Diagnosis has not been ready condition.	
A/F SEN1 DIAG1(B1)	INCMP/CMPLT	• Indicates DTC P015A or P015B self-diagnosis condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
A/F SEN1 DIAG2(B1)	INCMP/CMPLT	• Indicates DTC P014C or P014D self-diagnosis condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
A/F SEN1 DIAG3(B1)	ABSNT/PRSNT	• Indicates DTC P014C, P014D, P015A or P015B self-diagnosis condition. - ABSNT: The vehicle condition is not within the diagnosis range. - PRSNT: The vehicle condition is within the diagnosis range.	
HO2 S2 DIAG2(B1)	INCMP/CMPLT	• Indicates DTC P0139 self-diagnosis (slow response) condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
EOP SENSOR	mV	The signal voltage of EOP sensor is displayed.	

Monitored item	Unit	Description	Remarks
HO2 S2 DIAG1(B1)	INCMP/CMPLT	• Indicates DTC P0139 self-diagnosis (delayed response) condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
SYSTEM 1 DIAGNOSIS A B2	INCMP/CMPLT	• Indicates DTC P117A self-diagnosis condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
SYSTEM 1 DIAGNOSIS A B1	INCMP/CMPLT	• Indicates DTC P117B self-diagnosis condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
A/GRLL SHTTR POSITION	F/CLOSE MOVING F/OPEN UNIDTF	• Indicates the status of active grille shutter. - F/CLOSE: Active grille shutter is fully closed. - MOVING: Active grille shutter is in motion. - F/OPEN: Active grille shutter is fully opened. - UNIDTF: Unable to specify the shutter position.	
A/GRLL SHTTR CALIBRATION	INCMP/CMPLT	• Indicates initial position learning status of active grille shutter. - CMPLT: The leaning is complete. - INCOMP: The learning is incomplete.	
A/GRLL SHTTR CIRCUIT DIAG	OK/NG	• Indicates the diagnosis result of active grille shutter circuit. - OK: Normal. - NG: Malfunction detected.	
A/GRLL SHTTR TEMP DIAG	OK/NG	• Indicates the diagnosis result of active grille shutter actuator temperature status. - OK: Normal - NG: Abnormal temperature detected.	
A/GRLL SHTTR VOLT DIAG	OK/NG	• Indicates the diagnosis result of active grille shutter voltage status. - OK: Normal - NG: Abnormal voltage detected.	
A/GRLL SHTTR OVER RUN	OK/NG	• Indicates active grille shutter moves beyond normal moving limit. - OK: Normal - NG: Malfunction detected.	
A/GRLL SHTTR STUCK	OK/NG	• Indicates the diagnosis result of active grille shutter stuck or the operation range less than normal. - OK: Normal - NG: Malfunction detected.	
A/GRLL SHTTR CALIB DIAG	OK/NG	• Indicates the diagnosis result of initial position learning of active grille shutter. - OK: Normal - NG: Deficiency detected.	

*: The item is indicated, but not used.

NOTE:

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

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
IDLE AIR VOL LEARN	The idle air volume that keeps the engine within the specified range is memorized in ECM.	When learning the idle air volume
EVAP SYSTEM CLOSE	Close the EVAP canister vent control valve in order to make EVAP system close under the following conditions. • Ignition switch ON • Engine not running • Ambient temperature is above 0°C (32°F) • No vacuum and no high pressure in EVAP system • Fuel tank temperature is more than 0°C (32°F) • Within 10 minutes after starting “EVAP SYSTEM CLOSE” • When trying to execute “EVAP SYSTEM CLOSE” under the condition except above, CONSULT will discontinue it and display appropriate instruction. **NOTE:** When starting engine, CONSULT may display “Battery voltage is low. Charge battery”, even in using charged battery.	When detecting EVAP vapor leak point of EVAP system
FUEL PRESSURE RELEASE	Fuel pump will stop by touching “START” during idling. Crank a few times after engine stalls.	When releasing fuel pressure from fuel line
TARGET IDLE RPM ADJ*	Idle condition	When setting target idle speed
VIN REGISTRATION	In this mode, VIN is registered in ECM.	When registering VIN in ECM
SELF-LEARNING CONT	The coefficient of self-learning control mixture ratio returns to the original coefficient.	When clearing mixture ratio self-learning value
TARGET IGN TIM ADJ*	Idle condition	When adjusting target ignition timing
CLSD THL POS LEARN	Ignition on and engine stopped.	When learning throttle valve closed position
SAVING DATA FOR REPLC CPU	In this mode, save data that is in ECM.	When ECM is replaced.
WRITING DATA FOR REPLC CPU	In this mode, write data stored by "SAVE DATA FOR CPU REPLC" in work support mode to EC	When ECM is replaced.

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

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	• Engine: Return to the original trouble condition • Change the amount of fuel injection using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Fuel injector • Air fuel ratio (A/F) sensor 1
ENG COOLANT TEMP	• Engine: Return to the original trouble condition • Change the engine coolant temperature using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Engine coolant temperature sensor • Fuel injector
PURG VOL CONT/V	• Engine: After warming up, run engine at 1,500 rpm. • Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT.	Engine speed changes according to the opening percent.	• Harness and connectors • Solenoid valve
FUEL/T TEMP SEN	Change the fuel tank temperature using CONSULT.		
COOLING FAN*	• Ignition switch: ON • Turn the cooling fan “LOW”, “HI” and “OFF” CONSULT.	Cooling fan moves and stops.	• Harness and connectors • IPDM E/R (Cooling fan relay) • Cooling fan motor
ALTERNATOR DUTY	• Engine: Idle • Change duty ratio using CONSULT.	Battery voltage changes.	• Harness and connectors • IPDM E/R • Alternator

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
FUEL PUMP RELAY	• Ignition switch: ON • Turn the fuel pump relay “ON” and “OFF” using CONSULT and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connectors • Fuel pump relay
IGNITION TIMING	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	Perform Idle Air Volume Learning.
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch OFF • Shift lever: P or N (CVT), Neutral (M/T) • Cut off each fuel injector signal one at a time using CONSULT.	Engine runs rough or dies.	• Harness and connectors • Compression • Fuel injector • Power transistor • Spark plug • Ignition coil
VENT CONTROL/V	• Ignition switch: ON • Turn solenoid valve ON and OFF with the CONSULT and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connectors • EVAP canister vent control solenoid valve
INT V/T ASSIGN ANGLE	• Engine: Return to the original nonstandard condition • Change intake valve timing using CONSULT.	If malfunctioning symptom disappears, see CHECK ITEM.	• Harness and connectors • Intake valve timing control solenoid valve
EXH V/T ASSIGN ANGLE	• Engine: Return to the original nonstandard condition • Change exhaust valve timing using CONSULT.	If malfunctioning symptom disappears, see CHECK ITEM.	• Harness and connectors • Exhaust valve timing control solenoid valve
ACTIVE GRILLE SHUTTER	**NOTE:** Initial position learning is required every time when the ignition switch is turned OFF. 1. Engine: Idle speed 2. Touch “CALIBRTN” to perform initial position learning. 3. Touch “OPEN” or “CLOSE” to operate active grille shutter.	Active grille shutter fully opens or fully closes.	• Harness or connector • Active grille shutter actuator • Active grille shutter

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

DTC WORK SUPPORT MODE

Test Item

Test mode	Test item	Corresponding DTC No.	Reference page
A/F SEN1	A/F SEN1 (B1) P1276	P0130	EC-210, "DTC Logic"
EVAPORATIVE SYSTEM	EVP V/S LEAK P0456/P1456	P0456	EC-319, "DTC Logic"
	PURG FLOW P0441	P0441	EC-287, "DTC Logic"
	PURG VOL CN/V P1444	P0443	EC-292, "DTC Logic"
HO2S2	HO2S2 (B1) P1146	P0138	EC-226, "DTC Logic"
	HO2S2 (B1) P1147	P0137	EC-220, "DTC Logic"
	HO2S2 (B1) P0139	P0139	EC-234, "DTC Logic"

SRT & P-DTC MODE

SRT STATUS Mode

- For items whose SRT codes are set, “CMPLT” is displayed on the CONSULT screen; for items whose SRT codes are not set, “INCMP” is displayed.
- “SRT STATUS” provides the presence or absence of permanent DTCs stored in ECM memory.

PERMANENT DTC STATUS Mode

How to display permanent DTC status

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” in “DTC & SRT CONFIRMATION” mode with CONSULT.

NOTE:
Permanent DTCs stored in ECM memory are displayed on the CONSULT screen to show if a driving pattern required for erasing permanent DTCs is complete (CMPLT) or incomplete (INCMP).

CAUTION:
Since the “PERMANENT DTC STATUS” screen displays the previous trip information, repeat the following twice to update the information: “Ignition switch OFF”, “Wait for more than 10 seconds” and “Ignition switch ON”.

PERMANENT DTC & SRT CONFIRMATION : PERMANENT DTC STATUS

CAUTION:
Turn ignition switch from ON to OFF twice to update the information on the status screen.

PERMANENT DTC	DRIVING PATTERN B	DRIVING PATTERN D
XXXX	INCMP	INCMP
XXXX	CMPLT	INCMP
XXXX	INCMP	CMPLT
XXXX	CMPLT	INCMP
XXXX	INCMP	INCMP
XXXX	INCMP	INCMP

The previous trip information is displayed.

JSBIA0062GB

NOTE:
This mode is not used in regions that permanent DTCs are not regulated by law.

SRT WORK SUPPORT Mode

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

PERMANENT DTC WORK SUPPORT Mode

This mode enables a technician to drive a vehicle to complete the driving pattern that is required for erasing permanent DTC.

NOTE:
This mode is not used in regions that permanent DTCs are not regulated by law.

ECU DIAGNOSIS INFORMATION

ECM

Reference Value

INFOID:0000000009020642

VALUES ON THE DIAGNOSIS TOOL

NOTE:

- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- Numerical values in the following table are reference values.
- These values are input/output values that ECM receives/transmits and may differ from actual operations.
  Example: The ignition timing shown by the timing light may differ from the ignition timing displayed on the data monitor.
  This occurs because the timing light shows a value calculated by ECM according to signals received from the camshaft position sensor and other sensors related to ignition timing.
- For outlines of following items, refer to EC-60, "CONSULT Function".

Monitor Item	Condition		Values/Status
IDLE REQUEST	**NOTE:** The item is indicated, but not used.		
MIL ON REQUEST	**NOTE:** The item is indicated, but not used.		
ENGINE NO-LOAD	**NOTE:** The item is indicated, but not used.		
READY STATE	**NOTE:** The item is indicated, but not used.		
ENG SPEED	• Run engine and compare CONSULT value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-149, "Description".		
B/FUEL SCHDL	See EC-149, "Description".		
A/F ALPHA-B1	See EC-149, "Description".		
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158F)
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
HO2S2 (B1)	• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		0 - 0.3 V ←→ Approx. 0.6 - 1.0 V
HO2S2 MNTR (B1)			LEAN ←→ RICH
VHCL SPEED SE	• Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14 V
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9 V
		Accelerator pedal: Fully depressed	4.0 - 4.8 V
ACCEL SEN 2	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9 V
		Accelerator pedal: Fully depressed	3.9 - 4.8 V
TP SEN 1-B1	• Ignition switch: ON (Engine stopped) • Shift lever: 1st	Accelerator pedal: Fully released	More than 0.36 V
		Accelerator pedal: Fully depressed	Less than 4.75 V
TP SEN 2-B1	• Ignition switch: ON (Engine stopped) • Shift lever:1st	Accelerator pedal: Fully released	More than 0.36 V
		Accelerator pedal: Fully depressed	Less than 4.75 V
FUEL T/TMP SE	• Ignition switch: ON		Indicates fuel tank temperature

Monitor Item	Condition		Values/Status
EVAP SYS PRES	• Ignition switch: ON		Approx. 1.8 - 4.8 V
FUEL LEVEL SE	• Ignition switch: ON		Depending on fuel level of fuel tank
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON
		Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	• Engine: After warming up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1	• Engine: After warming up • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
IGN TIMING	• Engine: After warming up • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	4°BTDC (CVT) 10°BTDC (M/T)
		2,000 rpm	25° - 45°BTDC
CAL/LD VALUE	• Engine: After warming up • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	• Engine: After warming up • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0.8 - 4.0 g/s
		2,500 rpm	2.0 - 10.0 g/s
PURG VOL C/V	• Engine: After warming up • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0%
		2,000 rpm	0% - 50%
INT/V TIM(B1)	• Engine: After warming up • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	−5° - 5°CA
		When revving engine up to 2,000rpm Quickly	Approx. 0° - 40°CA

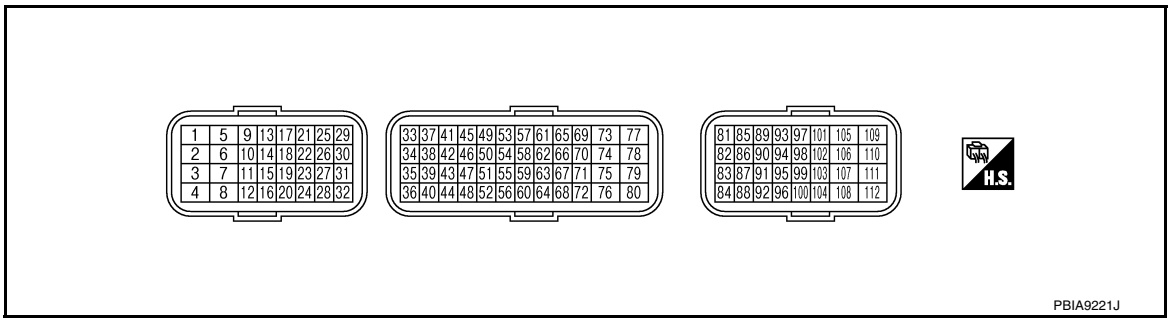
Monitor Item	Condition		Values/Status
EXH/V TIM B1	• Engine: After warming up • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	−5° - 5°CA
		When revving engine up to 2,000rpm Quickly	Approx. 0° - 40°CA
INT/V SOL(B1)	• Engine: After warming up • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0% - 2%
		When revving engine up to 2,000rpm Quickly	Approx. 0% - 90%
AIR COND RLY	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
FUEL PUMP RLY	• For 1 seconds after turning ignition switch: ON • Engine running or cranking		ON
	• Except above		OFF
VENT CONT/V	• Ignition switch: ON		OFF
THRTL RELAY	• Ignition switch: ON		ON
COOLING FAN	• Engine: After warning up, idle the engine • Air conditioner switch: OFF	Engine coolant temperature is 98°C (208°F) or less	OFF
		Engine coolant temperature is between 98°C (208°F) and 99°C (210°F)	LOW
		Engine coolant temperature is 100°C (212°F) or more	HIGH
HO2S2 HTR (B1)	• Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		ON
ALT DUTY SIG	• Power generation voltage variable control: Operating		ON
	• Power generation voltage variable control: Not operating		OFF
I/P PULLY SPD	• Vehicle speed: More than 20 km/h (12 MPH)		Almost the same speed as the tachometer indication
VEHICLE SPEED	• Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as speedometer indication
IDL A/V LEARN	• Engine: running	Idle air volume learning has not been performed yet.	YET
		Idle air volume learning has already been performed successfully.	CMPLT
TRVL AFTER MIL	• Ignition switch: ON	Vehicle has traveled after MI has turned ON.	0 - 65,535 km (0 - 40,723 miles)
ENG OIL TEMP	• Engine: After warming up		More than 70°C (158F)
A/F S1 HTR (B1)	• Engine: After warming up, idle the engine (More than 140 seconds after starting engine)		4 - 100%
VHCL SPEED SE	• Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as speedometer indication
SET VHCL SPD	• Engine: Running	ASCD: Operating	The preset vehicle speed is displayed
MAIN SW	• Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	• Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF

Monitor Item	Condition		Values/Status
RESUME/ACC SW	• Ignition switch: ON	ACCEL/RES switch: Pressed	ON
		ACCEL/RES switch: Released	OFF
SET SW	• Ignition switch: ON	COAST/SET switch: Pressed	ON
		COAST/SET switch: Released	OFF
BRAKE SW1 (ASCD brake switch)	• Ignition switch: ON	COAST/SET switch: Pressed	ON
		COAST/SET switch: Released	OFF
BRAKE SW2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
VHCL SPD CUT	• Ignition switch: ON		NON
LO SPEED CUT	• Ignition switch: ON		NON
AT OD MONITOR	• Ignition switch: ON		OFF
AT OD CANCEL	• Ignition switch: ON		OFF
CRUISE LAMP	• Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	**NOTE:** The item is indicated, but not used.		
ALT DUTY	• Engine: Idle		0 - 80%
BAT CUR SEN	• Engine speed: Idle • Battery: Fully charged • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load		Approx 2,500 - 3,500 mV
A/F ADJ-B1	• Engine running		−0.330 - 0.330
P/N POSI SW	• Ignition switch: ON	Selector lever position: P or N (CVT) or Neutral (M/T)	ON
		Shift lever: Except above	OFF
INT/A TEMP SE	• Ignition switch: ON		Indicates intake air temperature
AC PRESS SEN	• Engine: Idle • Both A/C switch and blower fan switch: ON (Compressor operates.)		1.0 - 4.0 V
CLUTCH P/P SW	• Ignition switch: ON	Clutch pedal: Fully released	OFF
		Clutch pedal: Fully depressed	ON
VTC DTY EX B1	• Engine: After warming up • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0% - 2%
		2,000 rpm	Approx. 0% - 90%
THRTL STK CNT B1	**NOTE:** The item is indicated, but not used.		
EVAP LEAK DIAG	• Ignition switch: ON		Depending on condition of EVAP leak diagnosis
EVAP DIAG READY	• Ignition switch: ON (READY)		Depending on ready condition of EVAP leak diagnosis
A/F SEN1 DIAG1(B1)	• DTC P015A and P015B self-diagnosis is incomplete.		INCMP
	• DTC P015A and P015B self-diagnosis is complete.		CMPLT
A/F SEN1 DIAG2(B1)	• DTC P014C and P014D self-diagnosis is incomplete.		INCMP
	• DTC P014C and P014D self-diagnosis is complete.		CMPLT

Monitor Item	Condition		Values/Status
A/F SEN1 DIAG3(B1)	• The vehicle condition is not within the diagnosis range of DTC P014C, P014D, P015A or P015B.		ABSNT
	• The vehicle condition is within the diagnosis range of DTC P014C, P014D, P015A or P015B.		PRSNT
HO2 S2 DIAG2(B1)	• DTC P0139 self-diagnosis (slow response) is incomplete.		INCMP
	• DTC P0139 self-diagnosis (slow response) is complete.		CMPLT
SYSTEM 1 DIAGNOSIS A B1	DTC P117A self-diagnosis is incomplete.		INCMP
	DTC P117A self-diagnosis is complete.		CMPLT
SYSTEM 1 DIAGNOSIS B B1	DTC P117A self-diagnosis is on standby.		ABSENT
	DTC P117A self-diagnosis is under diagnosis.		PRSENT
EOP SENSOR	• Engine: After warming up • Selector lever position: P or N (CVT) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	Approx 1,000 - 2,000 mV
		2,000 rpm	Approx 1,500 - 3,500 mV
HO2 S2 DIAG1(B1)	• DTC P0139 self-diagnosis (delayed response) is incomplete.		INCMP
	• DTC P0139 self-diagnosis (delayed response) is complete.		CMPLT
A/GRLL SHTTR POSITION	• Engine RPM: idle speed. • Vehicle speed: 0 km/h (0 MPH).		F/OPEN
	• Vehicle speed: 30 km/h (19 MPH) or faster. (Comply the condition of active grille shutter operation).		F/OPEN →MOVING→F/CLOSE
A/GRLL SHTTR CALIBRATION	• Turn ignition switch OFF→ ON • Drive the vehicle at a speed more than 6 km/h (4 MPH) for the first time.		CMPLT
	• Turn ignition switch OFF → ON. • When the vehicle speed does not reach 6 km/h (4 MPH).		INCMP
A/GRLL SHTTR CIRCUIT DIAG	• Malfunction of active grill shutter power supply is detected.		NG
	• Malfunction of active grill shutter power supply is not detected.		OK
A/GRLL SHTTR TEMP DIAG	• Abnormal temperature of active grill shutter actuator is detected.		NG
	• Abnormal temperature of active grill shutter actuator is not detected.		OK
A/GRLL SHTTR VOLT DIAG	• Abnormal voltage of active grill shutter circuit is detected.		NG
	• Abnormal voltage of active grill shutter circuit is not detected.		OK
A/GRLL SHTTR OVERRUN	• Active grill shutter does not stop within normal moving limit.		NG
	• Active grill shutter stops within normal moving limit		OK
A/GRLL SHTTR STUCK	• Detecting the active grille shutter stuck or the operation range less than normal.		NG
	• Not detecting the active grille shutter stuck or the operation range less than normal.		OK
A/GRLL SHTTR CALIB DIAG	• Malfunction of active grill shutter initial position learning is detected.		NG
	• Malfunction of active grill shutter initial position learning is not detected.		OK

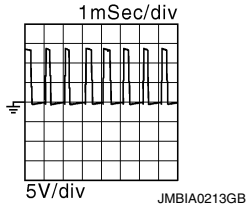
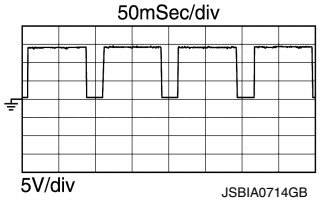
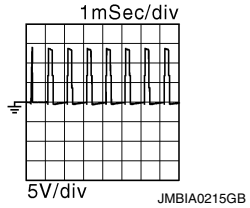
*: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

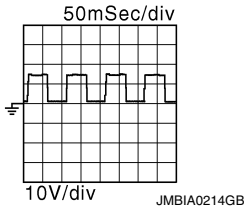
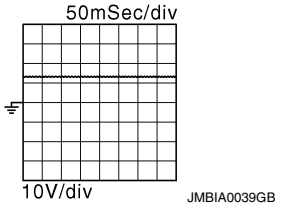
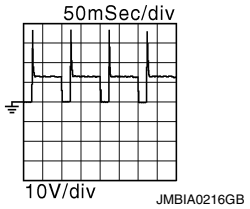
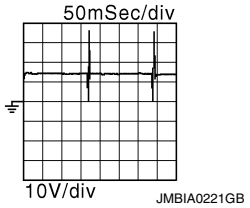
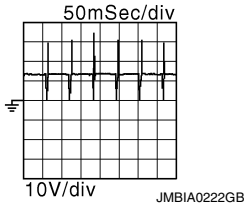
TERMINAL LAYOUT

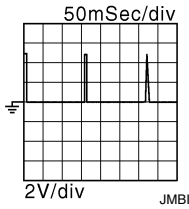
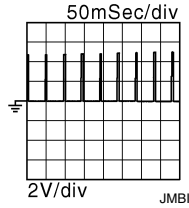


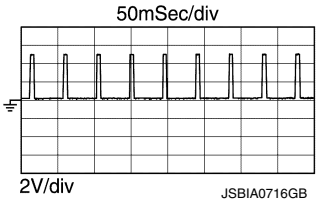
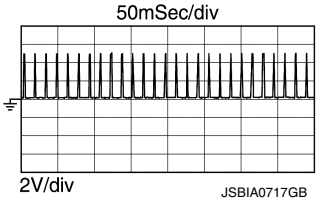
PHYSICAL VALUES

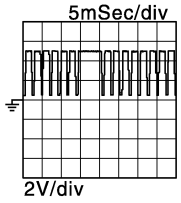
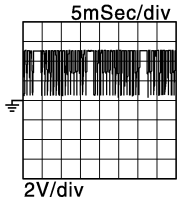
NOTE:
- Connect a break-out box and harness adapter between the ECM and ECM harness connector.
- Use extreme care not to touch 2 pins at one time.
- Data is for comparison and may not be exact.
- Specification data are reference values and are measured between each terminals.
- Pulse signal is measured by CONSULT.

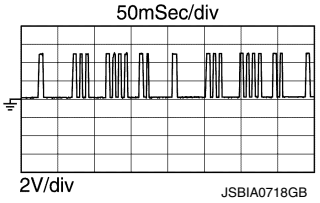
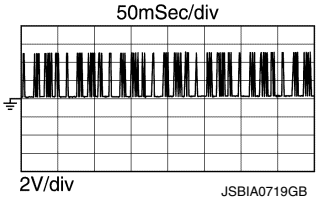
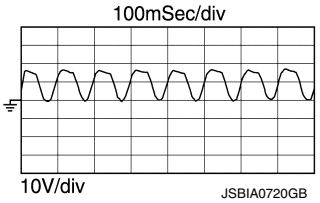
Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
1 (L)	108 (B)	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully de-pressed	2.6 V★ 
2 (L/W)	108 (B)	Throttle control motor power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
3 (G/W)	108 (B)	A/F sensor 1 heater	Output	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8 V★ 
4 (P)	108 (B)	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	1.8 V★ 

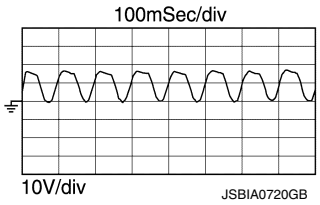
Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
5 (BR/W)	59 (L/Y)	Heated oxygen sensor 2 heater	Output	[Engine is running] • Engine speed: Below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	10 V★  JMBIA0214GB
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
9 (SB)	108 (B)	EVAP canister purge volume control solenoid valve	Output	[Engine is running] • Idle speed	BATTERY VOLTAGE (11 - 14 V)★  JMBIA0039GB
				[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.)	BATTERY VOLTAGE (11 - 14 V)★  JMBIA0216GB
10 (B)	—	ECM ground	—	—	—
11 (B/Y)	—	ECM ground	—	—	—
12 (L/W) 16 (G) 20 (O/W) 24 (R)	108 (B)	Fuel injector No. 1 (Rear) Fuel injector No. 3 (Rear) Fuel injector No. 2 (Rear) Fuel injector No. 4 (Rear)	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14 V)★  JMBIA0221GB
25 (R) 29 (G) 30 (O) 31 (L)		Fuel injector No. 4 (Front) Fuel injector No. 3 (Front) Fuel injector No. 2 (Front) Fuel injector No. 1 (Front)		[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V)★  JMBIA0222GB

Terminal No. +	Terminal No. –	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
15 (G/W)	108 (B)	Throttle control motor relay	Output	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON]	0 - 1.0 V
17 (V)	108 (B)	Ignition signal No. 1	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.3 V★  JMBIA0219GB
18 (Y/B)		Ignition signal No. 2			
21 (W)		Ignition signal No. 4		[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	0.2 - 0.5 V★  JMBIA0220GB
22 (BR)		Ignition signal No. 3			
23 (GR)	108 (B)	Fuel pump relay	Output	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.0 V
				[Ignition switch: ON] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14 V)
26 (P)	108 (B)	EVAP canister vent control valve	Output	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
32 (P)	108 (B)	ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] • A few seconds after turning ignition switch OFF	0 - 1.0 V
				[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
33 (W)	36 (R)	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36 V
				[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75 V
34 (B)	36 (R)	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75 V
				[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36 V
36 (R)	—	Sensor ground (Throttle position sensor)	—	—	—

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
37 (W)	40 (L)	Knock sensor	Input	[Engine is running] • Idle speed	2.5 V
38 (LG/V)	44 (P)	Engine coolant temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.
39 (L)	68 (R)	Battery temperature sensor	Input	[Engine is running] • Battery temperature: 25°C (°F) • Idle speed	3.5 V
40 (L)	—	Sensor ground (Knock sensor shield circuit)	—	—	—
42 (L)	51 (P)	Fuel tank temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with fuel tank temperature.
43 (SB)	68 (R)	EVAP control system pressure sensor	Input	[Ignition switch: ON]	0.5 - 4.6 V
44 (P)	—	Sensor ground (Engine coolant temperature sensor)	—	—	—
45 (G/B)	52 (LG)	Mass air flow sensor	Input	[Ignition switch ON] • Engine stopped	0.4 V
				[Engine is running] • Warm-up condition • Idle speed	0.8 - 1.3 V
				[Engine is running] • Warm-up condition • Engine is revving from idle to about 4,000 rpm	0.8 - 1.3 to 2.4 V (Check for linear voltage rise in response to engine being increased to about 4,000 rpm.)
46 (V)	55 (G/L)	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.
47 (Y)	60 (L)	Engine oil pressure sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.0 - 2.0 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	1.5 - 3.5 V
48 (W/R)	63 (W)	Exhaust valve timing control position sensor	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	4.3 V★ 
				[Engine is running] • Engine speed: 2,000 rpm	4.3 V★ 
49 (G/W)	108 (B)	A/F sensor 1	Input	[Ignition switch: ON]	2.2 V

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
50 (L/R)	59 (L/Y)	Heated oxygen sensor 2	Input	[Engine is running] • Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0 V
51 (P)	—	Sensor ground (Fuel tank temperature sensor)	—	—	—
52 (LG)	—	Sensor ground (Mass air flow sensor)	—	—	—
53 (L)	108 (B)	A/F sensor 1	Input	[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	1.8 V Output voltage varies with air fuel ratio.
54 (BR)	—	Sensor ground (Engine oil temperature sensor)	—	—	—
55 (G/L)	—	Sensor ground (Intake air temperature sensor)	—	—	—
57 (P)	54 (BR)	Engine oil temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine oil temperature.
58 (BR)	68 (R)	Battery current sensor	Input	[Engine is running] • Battery: Fully charged* • Idle speed	2.6 - 3.5 V
59 (L/Y)	—	Sensor ground (Heated oxygen sensor 2)	—	—	—
60 (L)	—	Sensor ground (Engine oil pressure sensor)	—	—	—
61 (L/O)	62 (G)	Crankshaft position sensor	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	4.0 V★  JMBIA2185GB
				[Engine is running] • Engine speed: 2,000 rpm	4.0 V★  JMBIA2186GB
62 (G)	—	Sensor ground (Crankshaft position sensor)	—	—	—
63 (W)	—	Sensor ground (Camshaft position sensor)	—	—	—

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
65 (R/W)	63 (W)	Camshaft position sensor	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	4.3 V★ 
				[Engine is running] • Engine speed is 2,000 rpm	4.3 V★ 
68 (R)	—	Sensor ground (EVAP control system pressure sensor, battery current sensor, battery temperature sensor)	—	—	—
69 (BR)	108 (B)	Park/Neutral position signal	Input	[Ignition switch: ON] • Shift lever: Neutral	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON] • Shift lever: Except above position	0 V
70 (L/Y)	—	Engine communication line	Input/ Output	—	—
71 (Y)	68 (R)	Sensor power supply (EVAP control system pressure sensor, battery current sensor, battery temperature sensor)	—	[Ignition switch: ON]	5 V
72 (W/R)	36 (R)	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5 V
73 (P)	108 (B)	Intake valve timing control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
				[Engine is running] • Warm-up condition • When revving engine up to 2,000rpm quickly	7 - 10 V★ 
74 (O)	60 (L)	Sensor power supply (Engine oil pressure sensor)	—	[Ignition switch: ON]	5 V
75 (O)	62 (G)	Sensor power supply (Crankshaft position sensor)	—	[Ignition switch: ON]	5 V

Terminal No. +	Terminal No. –	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
77 (P/W)	108 (B)	Exhaust valve timing control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
				[Engine is running] • Warm-up condition • When revving engine up to 2,000rpm quickly	7 - 10 V★ 
78 (BR)	63 (W)	Sensor power supply (Camshaft position sensor)	—	[Ignition switch: ON]	5 V
81 (V)	108 (B)	Power supply for ECM (Back-up)	Input	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
83 (P)	—	CAN-L	Input/ Output	—	—
84 (L)	—	CAN-H	Input/ Output	—	—
85 (V)	98 (LG)	Refrigerant pressure sensor	Input	[Engine is running] • Warm-up condition • Both A/C switch and blower fan switch: ON (Compressor operates)	1.0 - 4.0 V
88 (GR)	—	Data link connector	Input/ Output	—	—
92 (R)	—	Clutch pedal position switch	Input	[Ignition switch: ON] • Clutch pedal: Fully released	0 V
				[Ignition switch: ON] • Clutch pedal: Fully depressed	BATTERY VOLTAGE (11 - 14 V)
93 (L)	108 (B)	Ignition switch	Input	[Ignition switch: OFF]	0 V
				[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
94 (Y)	95 (B)	ASCD steering switch	Input	[Ignition switch: ON] • ASCD steering switch: OFF	4 V
				[Ignition switch: ON] • MAIN switch: Pressed	0 V
				[Ignition switch: ON] • CANCEL switch: Pressed	1 V
				[Ignition switch: ON] • ACCEL/RES switch: Pressed	3 V
				[Ignition switch: ON] • COAST/SET switch: Pressed	2 V
95 (B)	—	Sensor ground (ASCD steering switch)	—	—	—
98 (LG)	—	Sensor ground (Refrigerant pressure sensor)	—	—	—
99 (LG)	108 (B)	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0 V
				[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
100 (G)	108 (B)	Brake pedal position switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: OFF] • Brake pedal: Slightly depressed	0 V
101 (W)	98 (LG)	Sensor power supply (Refrigerant pressure sensor)	—	[Ignition switch: ON]	5 V
102 (BR)	104 (Y)	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5 V
103 (GR)	104 (Y)	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4 V
104 (Y)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
105 (G)	108 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
106 (V)	111 (P)	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5 V
108 (B)	—	ECM ground	—	—	—
110 (SB)	111 (P)	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7 V
111 (P)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
*: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-61, "Work Flow".

Fail Safe

INFOID:0000000009020643

NON DTC RELATED ITEM

Detected items	Engine operating condition in fail-safe mode	Remarks	Reference page
Malfunction indicator circuit	Engine speed will not rise more than 2,500 rpm due to the fuel cut	When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system. Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail safe function. The fail safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.	EC-444, "Component Function Check"

DTC RELATED ITEM

DTC No.	Detected items	Engine operating condition in fail safe mode
U0101	CAN communication line	ECM operates active grille shutter to fully-open position.
U0284	Active grille shutter	ECM operates active grille shutter to fully-open position.
U1040	Engine communication line	ECM operates active grille shutter to fully-open position.
P0011	Intake valve timing control	The signal is not energized to the intake valve timing control solenoid valve and the valve control does not function.
P0014	Exhaust valve timing control	The signal is not energized to the exhaust valve timing control solenoid valve and the valve control does not function.
P0101 P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the following conditions. CONSULT displays the engine coolant temperature decided by ECM. Condition: Engine coolant temperature decided (CONSULT display) Just as ignition switch is turned ON or START: 40°C (104°F) Approx. 4 minutes or more after engine starting: 80°C (176°F) Except as shown above: 40 - 80°C (104 - 176°F) (Depends on the time) • When the fail safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running. • ECM operates active grille shutter to fully-open position.
P0116 P0125	Engine coolant temperature sensor	ECM operates active grille shutter to fully-open position.
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.
P0196 P0197 P0198	Engine oil temperature sensor	• Exhaust valve timing control does not function. • ECM operates active grille shutter to fully-open position.
P0500	Vehicle speed sensor	• The cooling fan operates (Highest) while engine is running. • ECM operates active grille shutter to fully-open position.
P0524	Engine oil pressure	• ECM illuminates oil pressure warning lamp on the combination meter. • Engine speed will not rise more than 4,000 rpm due to the fuel cut. • Fail-safe is canceled when ignition switch OFF → ON.
P059F	Active grille shutter	• When a voltage and temperature related malfunction is detected, the active grille shutter stops at the position of detection. • Except for the above case, operates the active grille shutter to fully closed position.

<table>
<tr><th>DTC No.</th><th>Detected items</th><th colspan="2">Engine operating condition in fail safe mode</th></tr>
<tr><td>P0605</td><td>ECM</td><td colspan="2">(When ECM calculation function is malfunctioning:)
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td>P0607</td><td>ECM</td><td colspan="2">ECM operates active grille shutter to fully-open position.</td></tr>
<tr><td>P0643</td><td>Sensor power supply</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td>P1720</td><td>Vehicle speed sensor</td><td colspan="2">ECM operates active grille shutter to fully-open position.</td></tr>
<tr><td rowspan="4">P1805</td><td rowspan="4">Brake switch</td><td colspan="2">ECM controls the electric throttle control actuator by regulating the throttle opening to a small range.
Therefore, acceleration will be poor.</td></tr>
<tr><td>Vehicle condition</td><td>Driving condition</td></tr>
<tr><td>When engine is idling</td><td>Normal</td></tr>
<tr><td>When accelerating</td><td>Poor acceleration</td></tr>
<tr><td>P2100
P2103</td><td>Throttle control motor relay</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td>P2101</td><td>Electric throttle control function</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td>P2118</td><td>Throttle control motor</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td rowspan="3">P2119</td><td rowspan="3">Electric throttle control actuator</td><td colspan="2">(When electric throttle control actuator does not function properly due to the return spring malfunction:)
ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.</td></tr>
<tr><td colspan="2">(When throttle valve opening angle in fail safe mode is not in specified range:)
ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.</td></tr>
<tr><td colspan="2">(When ECM detects the throttle valve is stuck open:)
While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls.
The engine can restart in the Neutral position, and engine speed will not exceed 1,000 rpm or more.</td></tr>
<tr><td>P2122
P2123
P2127
P2128
P2138</td><td>Accelerator pedal position sensor</td><td colspan="2">The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.
The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.
So, the acceleration will be poor.</td></tr>
</table>

DTC Inspection Priority Chart

INFOID:0000000009020644

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

Priority	Detected items (DTC)
1	• U0101 U1001 CAN communication line • U0284 Active grille shutter • U1040 Engine communication line • P0101 P0102 P0103 Mass air flow sensor • P0111 P0112 P0113 P0127 Intake air temperature sensor • P0116 P0117 P0118 P0125 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor • P0128 Thermostat function • P0181, P0182, P0183 Fuel tank temperature sensor • P0196 P0197 P0198 Engine oil temperature sensor • P0327 P0328 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 Camshaft position sensor (PHASE) • P0500 Vehicle speed sensor • P0520 Engine oil pressure sensor • P0605 P0607 ECM • P0643 Sensor power supply • P0850 Park/neutral position (PNP) switch • P1550 P1551 P1552 P1553 P1554 Battery current sensor • P1610 - P1615 NATS • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
2	• P0031 P0032 Air fuel ratio (A/F) sensor 1 heater • P0037 P0038 Heated oxygen sensor 2 heater • P0075 Intake valve timing control solenoid valve • P0078 Exhaust valve timing control solenoid valve • P0130 P0131 P0132 P0133 P014C P014D P015A P015B P2096 P2097 Air fuel ratio (A/F) sensor 1 • P0137 P0138 P0139 Heated oxygen sensor 2 • P0441 EVAP control system purge flow monitoring • P0443, P0444, P0445 EVAP canister purge volume control solenoid valve • P0447, P0448 EVAP canister vent control valve • P0451, P0452, P0453 EVAP control system pressure sensor • P0460, P0461, P0462, P0463 Fuel level sensor • P059F Active grille shutter • P0603 ECM • P1078 Exhaust valve timing control position sensor • P1217 Engine over temperature (OVERHEAT) • P1805 Brake switch • P2100 P2103 Throttle control motor relay • P2101 Electric throttle control function • P2118 Throttle control motor
3	• P0011 Intake valve timing control • P0014 Exhaust valve timing control • P0171 P0172 Fuel injection system function • P0300 - P0304 Misfire • P0420 Three way catalyst function • P0456 EVAP control system (VERY SMALL LEAK) • P0506, P0507 Idle speed control system • P050A P050B P050E Cold start control • P0524 Engine oil pressure • P1148 Closed loop control • P117A Air fuel ratio • P1212 TCS communication line • P1564 ASCD steering switch • P1572 ASCD brake switch • P1574 ASCD vehicle speed sensor • P1715 Input speed sensor • P1720 Vehicle speed sensor • P2119 Electric throttle control actuator

DTC Index

INFOID:0000000009020645

×:Applicable —: Not applicable

DTC*1		Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group*4	Reference page
CONSULT GST*2	ECM*3						
U0101	0101*5	LOST COMM (TCM)	—	1	×	B	EC-162
U0284	0284	LOST COMM (A/GRLL SHTTR MDL A)	—	2	×	B	EC-161
U1001	1001*5	CAN COMM CIRCUIT	—	2	—	—	EC-162
U1040	1040	ENG COMM CIRCUIT	—	2	—	—	EC-163
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	—	—	**—**
P0011	0011	INT/V TIM CONT-B1	×	2	×	B	EC-164
P0014	0014	EXT/V TIM CONT-B1	—	2	×	B	EC-168
P0031	0031	A/F SEN1 HTR (B1)	—	2	×	B	EC-171
P0032	0032	A/F SEN1 HTR (B1)	—	2	×	B	EC-171
P0037	0037	HO2S2 HTR (B1)	—	2	×	B	EC-174
P0038	0038	HO2S2 HTR (B1)	—	2	×	B	EC-174
P0075	0075	INT/V TIM V/CIR-B1	—	2	×	B	EC-177
P0078	0078	EX V/T ACT/CIRC-B1	—	2	×	B	EC-179
P0101	0101	MAF SEN/CIRCUIT-B1	—	2	×	B	EC-182
P0102	0102	MAF SEN/CIRCUIT-B1	—	1	×	B	EC-187
P0103	0103	MAF SEN/CIRCUIT-B1	—	1	×	B	EC-187
P0111	0111	IAT SENSOR 1 B1	—	2	×	A	EC-192
P0112	0112	IAT SEN/CIRCUIT-B1	—	2	×	B	EC-194
P0113	0113	IAT SEN/CIRCUIT-B1	—	2	×	B	EC-194
P0116	0116	ECT SEN/CIRC	—	2	×	A	EC-196
P0117	0117	ECT SEN/CIRC	—	1	×	B	EC-198
P0118	0118	ECT SEN/CIRC	—	1	×	B	EC-198
P0122	0122	TP SEN 2/CIRC-B1	—	1	×	B	EC-200
P0123	0123	TP SEN 2/CIRC-B1	—	1	×	B	EC-200
P0125	0125	ECT SENSOR	—	2	×	B	EC-203
P0127	0127	IAT SENSOR-B1	—	2	×	B	EC-205
P0128	0128	THERMSTAT FNCTN	—	2	×	A	EC-207
P0130	0130	A/F SENSOR1 (B1)	×	2	×	A	EC-210
P0131	0131	A/F SENSOR1 (B1)	—	2	×	B	EC-214
P0132	0132	A/F SENSOR1 (B1)	—	2	×	B	EC-217
P0137	0137	HO2S2 (B1)	×	2	×	A	EC-220
P0138	0138	HO2S2 (B1)	×	2	×	A	EC-226
P0139	0139	HO2S2 (B1)	×	2	×	A	EC-234
P014C	014C	A/F SENSOR1 (B1)	×	2	×	A	EC-240
P014D	014D	A/F SENSOR1 (B1)	×	2	×	A	EC-240
P015A	015A	A/F SENSOR1 (B1)	×	2	×	A	EC-240
P015B	015B	A/F SENSOR1 (B1)	×	2	×	A	EC-240
P0171	0171	FUEL SYS-LEAN-B1	—	2	×	B	EC-245
P0172	0172	FUEL SYS-RICH-B1	—	2	×	B	EC-249

DTC*1		Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group*4	Reference page
CONSULT GST*2	ECM*3						
P0181	0181	FTT SENSOR	—	2	×	A and B	EC-253
P0182	0182	FTT SEN/CIRCUIT	—	2	×	B	EC-257
P0183	0183	ECT SEN/CIRCUIT	—	2	×	B	EC-257
P0196	0196	EOP SENSOR	—	2	×	A and B	EC-259
P0197	0197	EOP SEN/CIRC	—	2	×	B	EC-262
P0198	0198	EOP SEN/CIRC	—	2	×	B	EC-262
P0222	0222	TP SEN 1/CIRC-B1	—	1	×	B	EC-264
P0223	0223	TP SEN 1/CIRC-B1	—	1	×	B	EC-264
P0300	0300	MULTI CYL MISFIRE	—	1 or 2	× or —	B	EC-267
P0301	0301	CYL 1 MISFIRE	—	1 or 2	× or —	B	EC-267
P0302	0302	CYL 2 MISFIRE	—	1 or 2	× or —	B	EC-267
P0303	0303	CYL 3 MISFIRE	—	1 or 2	× or —	B	EC-267
P0304	0304	CYL 4 MISFIRE	—	1 or 2	× or —	B	EC-267
P0327	0327	KNOCK SEN/CIRC-B1	—	2	—	—	EC-273
P0328	0328	KNOCK SEN/CIRC-B1	—	2	—	—	EC-273
P0335	0335	CKP SEN/CIRCUIT	—	2	×	B	EC-275
P0340	0340	CMP SEN/CIRC-B1	—	2	×	B	EC-279
P0420	0420	TW CATALYST SYS-B1	×	2	×	A	EC-282
P0441	0441	EVAP PURG FLOW/MON	×	2	×	A	EC-287
P0443	0443	PURG VOLUME CONT/V	—	2	×	A	EC-292
P0444	0444	PURG VOLUME CONT/V	—	2	×	B	EC-297
P0445	0445	PURG VOLUME CONT/V	—	2	×	B	EC-297
P0447	0447	VENT CONTROL VALVE	—	2	×	B	EC-300
P0448	0448	VENT CONTROL VALVE	—	2	×	B	EC-304
P0451	0451	EVAP SYS PRES SEN	—	2	×	A	EC-308
P0452	0452	EVAP SYS PRES SEN	—	2	×	B	EC-312
P0453	0453	EVAP SYS PRES SEN	—	2	×	A	EC-315
P0456	0456	EVAP VERY SML LEAK	×*8	2	×	A	EC-319
P0460	0460	FUEL LEV SEN SLOSH	—	2	×	A	EC-325
P0461	0461	FUEL LEVEL SENSOR	—	2	×	B	EC-326
P0462	0462	FUEL LEVEL SEN/CIRC	—	2	×	B	EC-328
P0463	0463	FUEL LEVEL SEN/CIRC	—	2	×	B	EC-328
P0500	0500	VEH SPEED SEN/CIRC*6	—	2	×	B	EC-329
P0506	0506	ISC SYSTEM	—	2	×	B	EC-331
P0507	0507	ISC SYSTEM	—	2	×	B	EC-332
P050A	050A	COLD START CONTROL	—	2	×	A	EC-334
P050B	050B	COLD START CONTROL	—	2	×	A	EC-334
P050E	050E	COLD START CONTROL	—	2	×	A	EC-334
P0520	0520	EOP SENSOR/SWITCH	—	2	—	—	EC-336
P0524	0524	ENGINE OIL PRESSURE	—	1	—	—	EC-338
P059F	059F	ACTIVE GRILLE AIR SHUTTER	—	2	×	B	EC-341
P0603	0603	ECM BACK UP/CIRCUIT*7	—	2	×	B	EC-347

DTC*1		Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group*4	Reference page
CONSULT GST*2	ECM*3						
P0605	0605	ECM	—	1 or 2	× or —	B	EC-349
P0607	0607	ECM	—	1*9 2*10	×*9 —*10	B	EC-351
P0643	0643	SENSOR POWER/CIRC	—	1	×	B	EC-352
P0850	0850	P-N POS SW/CIRCUIT	—	2	×	B	EC-354
P1078	1078	EXH TIM SEN/CIRCUIT	—	2	×	B	EC-357
P1148	1148	CLOSED LOOP-B1	—	1	×	A	EC-360
P117A	117A	AIR FUEL RATIO B1	—	2	×	—	EC-341
P1212	1212	TCS/CIRC	—	2	—	—	EC-366
P1217	1217	ENG OVER TEMP	—	1	×	B	EC-367
P1225	1225	CTP LEARNING-B1	—	2	—	—	EC-370
P1226	1226	CTP LEARNING-B1	—	2	—	—	EC-371
P1550	1550	BAT CURRENT SENSOR	—	2	—	—	EC-372
P1551	1551	BAT CURRENT SENSOR	—	2	—	—	EC-374
P1552	1552	BAT CURRENT SENSOR	—	2	—	—	EC-374
P1553	1553	BAT CURRENT SENSOR	—	2	—	—	EC-376
P1554	1554	BAT CURRENT SENSOR	—	2	—	—	EC-378
P1564	1564	ASCD SW	—	1	—	—	EC-381
P1572	1572	ASCD BRAKE SW	—	1	—	—	EC-384
P1574	1574	ASCD VHL SPD SEN	—	1	—	—	EC-389
P1610	1610	LOCK MODE	—	2	—	—	SEC-65 (with I-Key system) SEC-166 (without I-Key system)
P1611	1611	ID DISCORD, IMMU-ECM	—	2	—	—	SEC-66
P1612	1612	CHAIN OF ECM-IMMU	—	2	—	—	SEC-67
P1614	1614	NATS ANTENNA ANP.	—	2	—	—	SEC-167
P1615	1615	DIFFERENCE OF KEY	—	2	—	—	SEC-170
P1715	1715	IN PULY SPEED	—	2	—	—	EC-391
P1720	1720	V/SP SEN (A/T OUT)	—	2	—	—	EC-393
P1805	1805	BRAKE SW/CIRCUIT	—	2	—	—	EC-395
P2096	2096	POST CAT FUEL TRIM SYS B1	—	2	×	—	EC-397
P2097	2097	POST CAT FUEL TRIM SYS B1	—	2	×	—	EC-397
P2100	2100	ETC MOT PWR-B1	—	1	×	B	EC-401
P2101	2101	ETC FNCTN/CIRC-B1	—	1	×	B	EC-404
P2103	2103	ETC MOT PWR	—	1	×	B	EC-401
P2118	2118	ETC MOT-B1	—	1	×	B	EC-408
P2119	2119	ETC ACTR-B1	—	1	×	B	EC-410
P2122	2122	APP SEN 1/CIRC	—	1	×	B	EC-412
P2123	2123	APP SEN 1/CIRC	—	1	×	B	EC-412
P2127	2127	APP SEN 2/CIRC	—	1	×	B	EC-415
P2128	2128	APP SEN 2/CIRC	—	1	×	B	EC-415

DTC*1		Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group*4	Reference page
CONSULT GST*2	ECM*3						
P2135	2135	TP SENSOR-B1	—	1	×	B	EC-418
P2138	2138	APP SENSOR	—	1	×	B	EC-421

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J1979/ ISO 15031-5.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.
*4: Refer to EC-143, "Description".
*5: The troubleshooting for this DTC needs CONSULT.
*6: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.
*7: This self-diagnosis is not for ECM power supply circuit, even though “ECM BACK UP/CIRCUIT” is displayed on CONSULT screen.
*8: SRT code will not be set if the self-diagnostic result is NG.
*9: CVT models.
*10: M/T models.

Test Value and Test Limit

INFOID:0000000009566184

The following is the information specified in Service $06 of SAE J1979/ISO 15031-5.
The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.
These data (test value and test limit) are specified by On Board Monitor ID (OBDMID), Test ID (TID), Unit and Scaling ID and can be displayed on the GST screen.
The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (e.g., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

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

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

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P015D	94H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1
			P0153	95H	04H	Response rate: Response ratio (lean to rich)
			P0153	96H	84H	Response rate: Response ratio (rich to lean)
	06H	Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for test cycle
			P0157	08H	0CH	Maximum sensor output voltage for test cycle
			P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
			P0159	82H	11H	Rear O2 sensor delay response diagnosis
	07H	Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for test cycle
			P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage
			P0165	81H	0CH	Difference in sensor output voltage
CATALYST	21H	Three way catalyst function (Bank1)	P0420	80H	01H	O2 storage index
			P0420	82H	01H	Switching time lag engine exhaust index value
			P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2423	84H	84H	O2 storage index in HC trap catalyst
	22H	Three way catalyst function (Bank2)	P0430	80H	01H	O2 storage index
			P0430	82H	01H	Switching time lag engine exhaust index value
			P2424	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst
EGR SYSTEM	31H	EGR function	P0400	80H	96H	Low flow faults: EGR temp change rate (short term)
			P0400	81H	96H	Low flow faults: EGR temp change rate (long term)
			P0400	82H	96H	Low flow faults: Difference between max EGR temp and EGR temp under idling condition
			P0400	83H	96H	Low flow faults: Max EGR temp
			P1402	84H	96H	High Flow Faults: EGR temp increase rate

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

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
O2 SENSOR HEATER	41H	A/F sensor 1 heater (Bank 1)	Low Input: P0031 High Input: P0032	81H	0BH	Converted value of heater electric current to voltage
	42H	Heated oxygen sensor 2 heater (Bank 1)	Low Input: P0037 High Input: P0038	80H	0CH	Converted value of heater electric current to voltage
	43H	Heated oxygen sensor 3 heater (Bank 1)	P0043	80H	0CH	Converted value of heater electric current to voltage
	45H	A/F sensor 1 heater (Bank 2)	Low Input: P0051 High Input: P0052	81H	0BH	Converted value of heater electric current to voltage
	46H	Heated oxygen sensor 2 heater (Bank 2)	Low Input: P0057 High Input: P0058	80H	0CH	Converted value of heater electric current to voltage
	47H	Heated oxygen sensor 3 heater (Bank 2)	P0063	80H	0CH	Converted value of heater electric current to voltage
SECONDARY AIR	71H	Secondary air system	P0411	80H	01H	Secondary air injection system incorrect flow detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary air injection system insufficient flow
			P2445	82H	01H	Secondary air injection system pump stuck off
			P2448	83H	01H	Secondary air injection system high airflow
			Bank1: P2440 Bank2: P2442	84H	01H	Secondary air injection system switching valve stuck open
			P2440	85H	01H	Secondary air injection system switching valve stuck open
			P2444	86H	01H	Secondary air injection system pump stuck on
FUEL SYSTEM	81H	Fuel injection system function (Bank 1)	P0171 or P0172	80H	2FH	Long term fuel trim
			P0171 or P0172	81H	24H	The number of lambda control clamped
			P117A	82H	03H	Cylinder A/F imbalance monitoring
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	80H	2FH	Long term fuel trim
			P0174 or P0175	81H	24H	The number of lambda control clamped
			P117B	82H	03H	Cylinder A/F imbalance monitoring

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

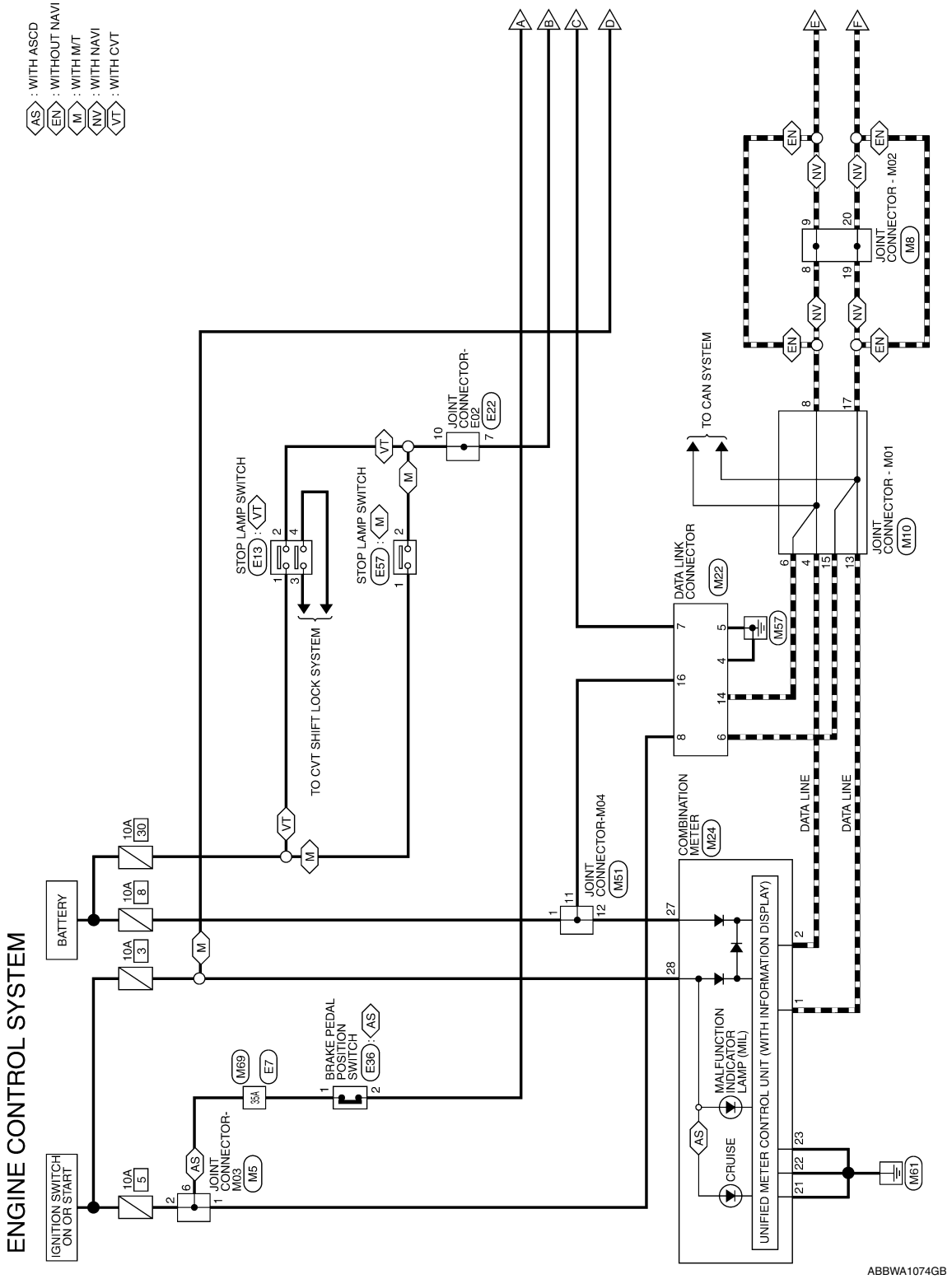
Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A2H	No. 1 cylinder misfire	P0301	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0301	0CH	24H	Misfire counts for last/current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

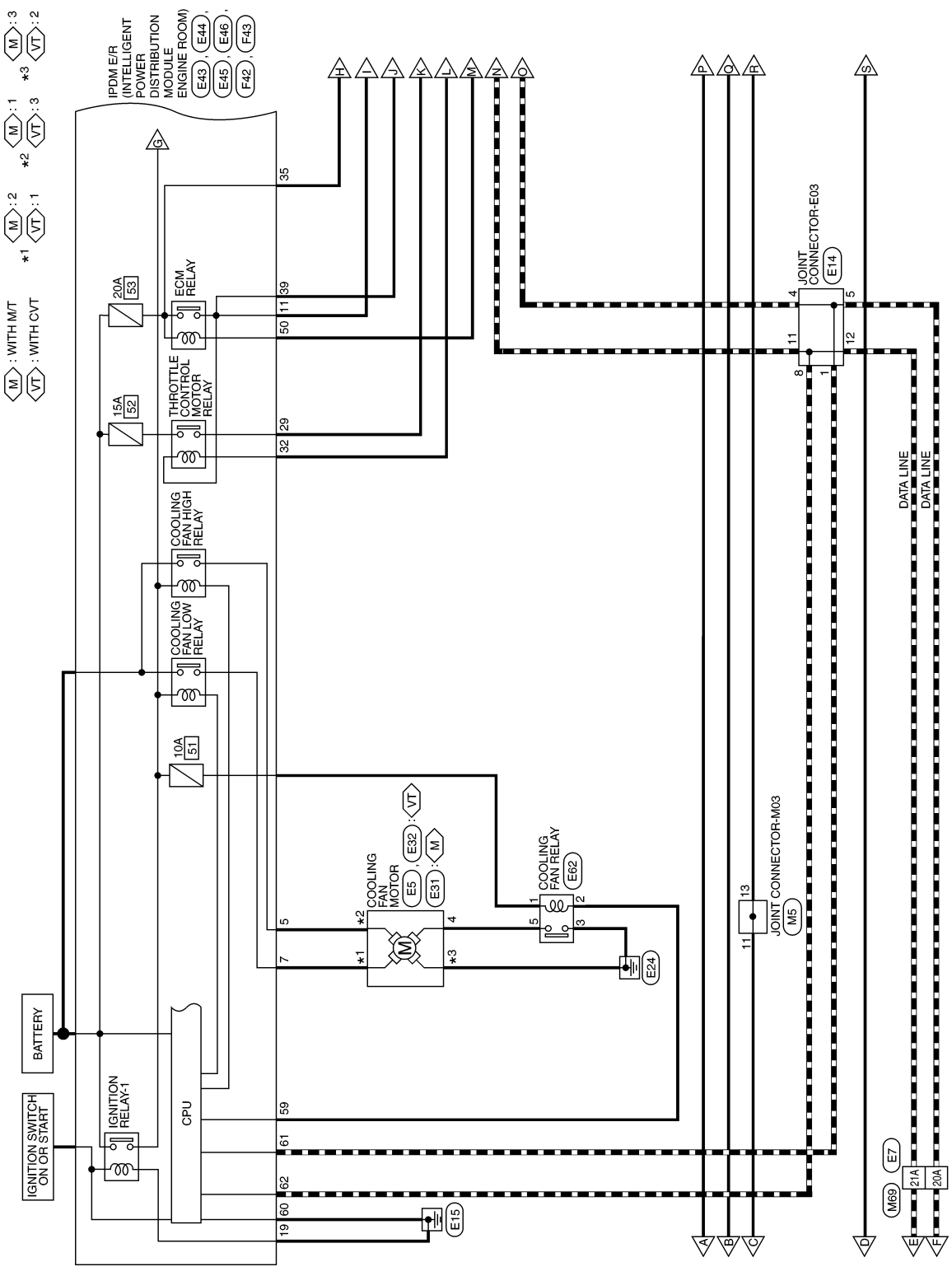
WIRING DIAGRAM

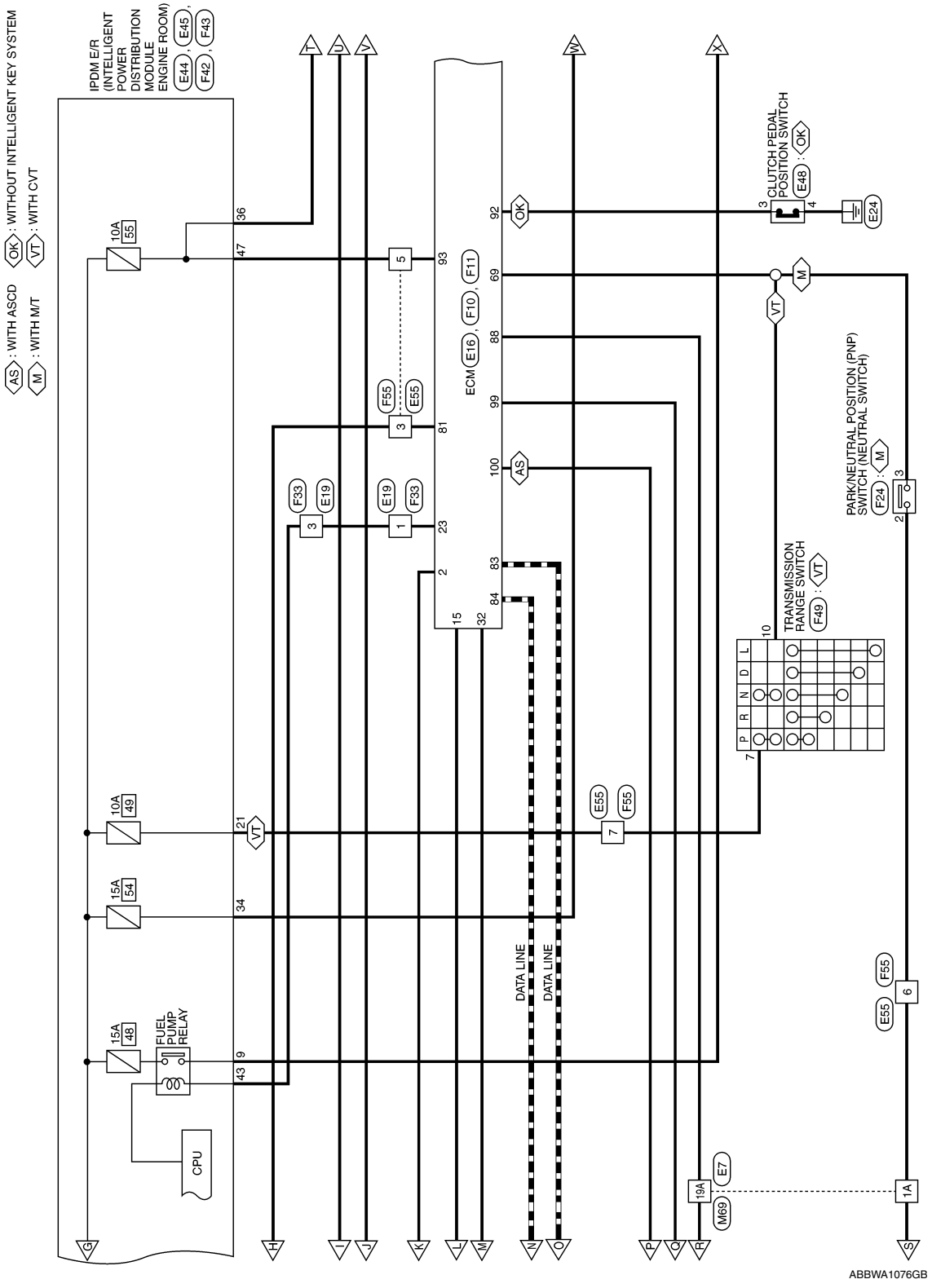
ENGINE CONTROL SYSTEM

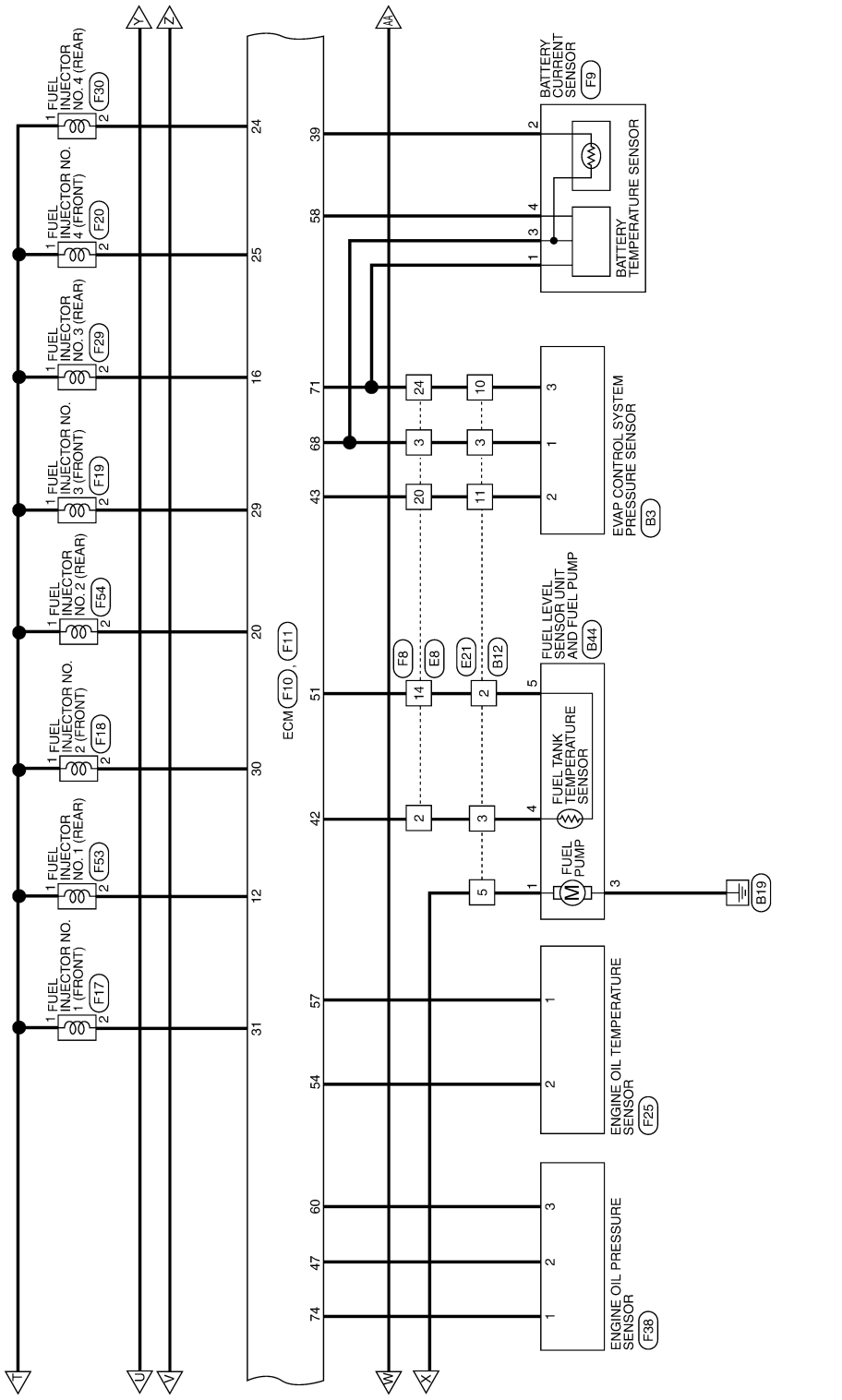
Wiring Diagram

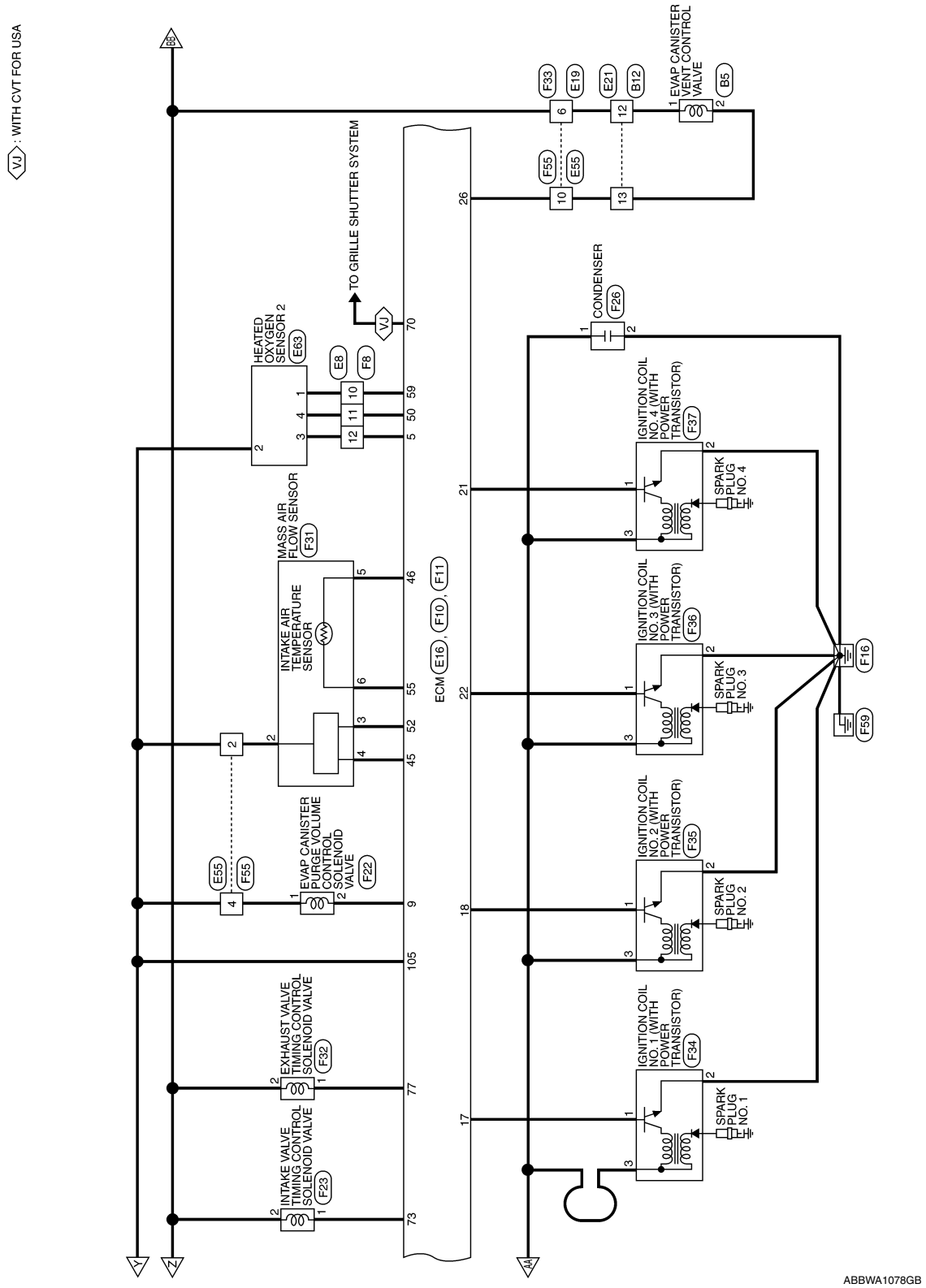
INFOID:0000000009020647

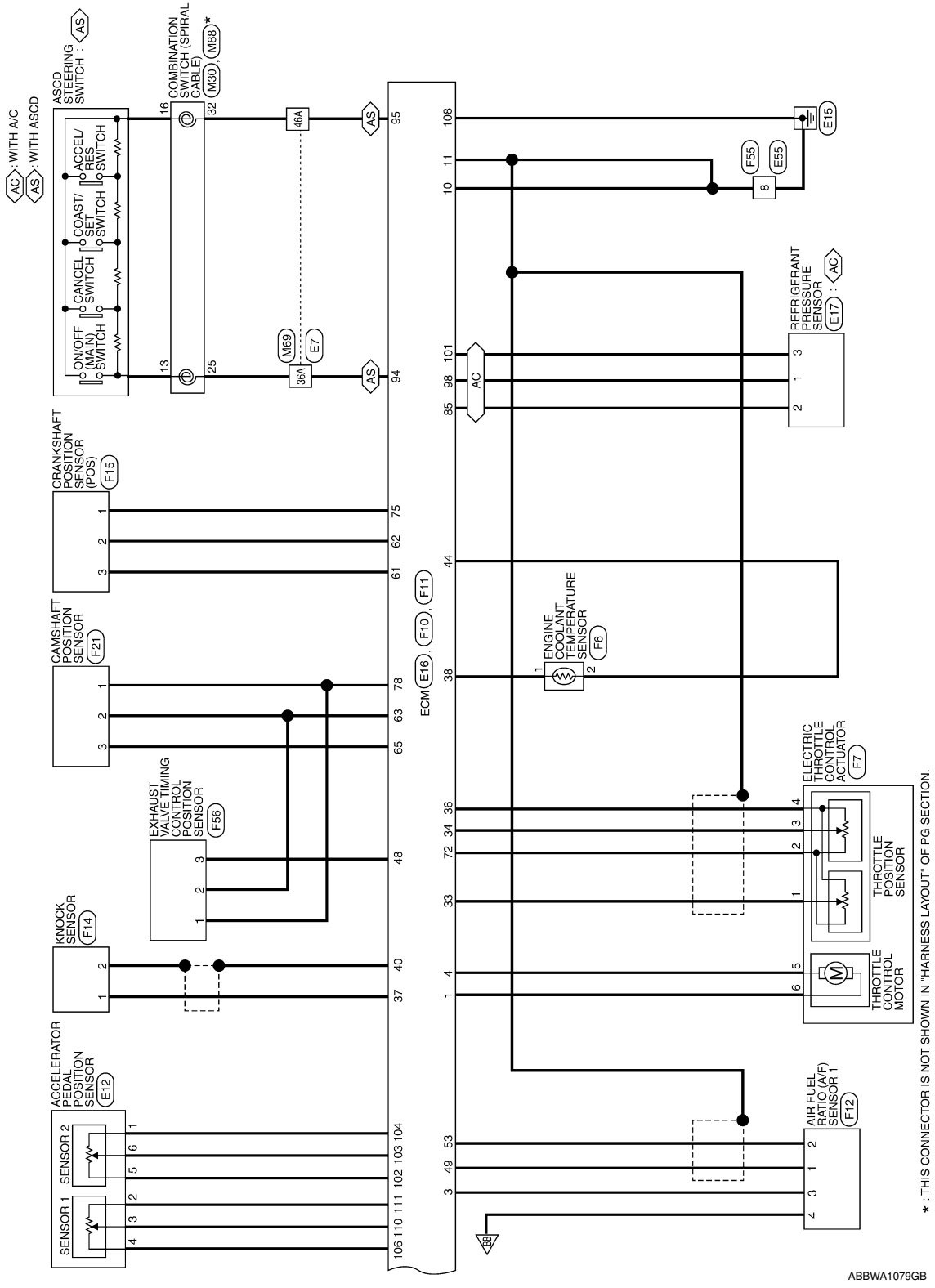



M : WITH M/T
VT : WITH CVT
M : 2 VT : 1 *1
M : 1 VT : 3 *2
M : 3 VT : 2 *3
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
E43, E44, E45, E46, F42, F43
20A 53
15A 52
10A 51
ECM RELAY
THROTTLE CONTROL MOTOR RELAY
COOLING FAN HIGH RELAY
COOLING FAN LOW RELAY
IGNITION RELAY-1
BATTERY
IGNITION SWITCH ON OR START
CPU
COOLING FAN MOTOR
E5, E32, E31
COOLING FAN RELAY
E62
E24
E15
JOINT CONNECTOR-E03
E14
JOINT CONNECTOR-M03
M5
DATA LINE
DATA LINE
M69
E7
21A
20A
ABBWA1075GB


AS : WITH ASCD
M : WITH M/T
OK : WITHOUT INTELLIGENT KEY SYSTEM
VT : WITH CVT
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
E44, E45, F42, F43
10A 55
10A 49
15A 54
15A 48
FUEL PUMP RELAY
CPU
ECM E16, F10, F11
CLUTCH PEDAL POSITION SWITCH E48 : OK
E24
PARK/NEUTRAL POSITION (PNP) SWITCH (NEUTRAL SWITCH) F24 : M
TRANSMISSION RANGE SWITCH F49 : VT
P R N D L
DATA LINE
DATA LINE
F55 E55
E19 F33
M69 : E7
ABBWA1076GB


1 FUEL INJECTOR NO. 4 (REAR) F30
1 FUEL INJECTOR NO. 4 (FRONT) F20
1 FUEL INJECTOR NO. 3 (REAR) F29
1 FUEL INJECTOR NO. 3 (FRONT) F19
1 FUEL INJECTOR NO. 2 (REAR) F54
1 FUEL INJECTOR NO. 2 (FRONT) F18
1 FUEL INJECTOR NO. 1 (REAR) F53
1 FUEL INJECTOR NO. 1 (FRONT) F17
ECM F10, F11
BATTERY CURRENT SENSOR F9
BATTERY TEMPERATURE SENSOR
EVAP CONTROL SYSTEM PRESSURE SENSOR B3
FUEL LEVEL SENSOR UNIT AND FUEL PUMP B44
FUEL TANK TEMPERATURE SENSOR
FUEL PUMP
ENGINE OIL TEMPERATURE SENSOR F25
ENGINE OIL PRESSURE SENSOR F38
B19
ABBWA1077GB

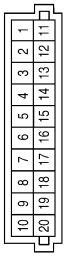

VJ : WITH CVT FOR USA
TO GRILLE SHUTTER SYSTEM
EVAP CANISTER VENT CONTROL VALVE
CONDENSER
HEATED OXYGEN SENSOR 2
MASS AIR FLOW SENSOR
INTAKE AIR TEMPERATURE SENSOR
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
EXHAUST VALVE TIMING CONTROL SOLENOID VALVE
INTAKE VALVE TIMING CONTROL SOLENOID VALVE
ECM E16, F10, F11
IGNITION COIL NO. 4 (WITH POWER TRANSISTOR)
IGNITION COIL NO. 3 (WITH POWER TRANSISTOR)
IGNITION COIL NO. 2 (WITH POWER TRANSISTOR)
IGNITION COIL NO. 1 (WITH POWER TRANSISTOR)
SPARK PLUG NO. 4
SPARK PLUG NO. 3
SPARK PLUG NO. 2
SPARK PLUG NO. 1
ABBWA1078GB


AC : WITH A/C
AS : WITH ASCD
ASCD STEERING SWITCH
ON/OFF (MAIN) SWITCH
CANCEL SWITCH
COAST/ SET SWITCH
ACCEL/ RES SWITCH
COMBINATION SWITCH (SPIRAL CABLE)
M30, M88*
M69
E7
46A
36A
CRANKSHAFT POSITION SENSOR (POS) F15
CAMSHAFT POSITION SENSOR F21
EXHAUST VALVE TIMING CONTROL POSITION SENSOR F56
KNOCK SENSOR F14
ACCELERATOR PEDAL POSITION SENSOR E12
SENSOR 1
SENSOR 2
ECM E16, F10, F11
ENGINE COOLANT TEMPERATURE SENSOR F6
REFRIGERANT PRESSURE SENSOR E17
ELECTRIC THROTTLE CONTROL ACTUATOR F7
THROTTLE POSITION SENSOR
THROTTLE CONTROL MOTOR
AIR FUEL RATIO (A/F) SENSOR 1 F12
E15
F55
E55
8
58
* : THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT" OF PG SECTION.
ABBWA1079GB

ENGINE CONTROL SYSTEM CONNECTORS

Connector No.	M5
Connector Name	JOINT CONNECTOR-M03
Connector Color	BROWN

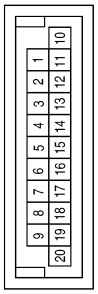
H.S.



Terminal No.	Color of Wire	Signal Name
1	O	–
2	O	–
6	P	–
11	GR	–
13	GR	–

Connector No.	M8
Connector Name	JOINT CONNECTOR-M02
Connector Color	GREEN

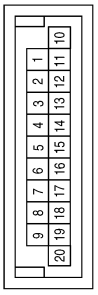
H.S.



Terminal No.	Color of Wire	Signal Name
8	L	–
9	L	–
19	P	–
20	P	–

Connector No.	M10
Connector Name	JOINT CONNECTOR-M01
Connector Color	BLUE

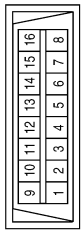
H.S.



Terminal No.	Color of Wire	Signal Name
4	L	–
6	L	–
8	L	–
13	P	–
15	P	–
17	P	–

Connector No.	M22
Connector Name	DATA LINK CONNECTOR
Connector Color	WHITE

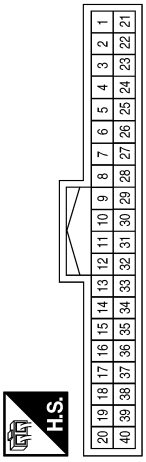
H.S.



Terminal No.	Color of Wire	Signal Name
4	B/W	–
5	B/W	–
6	L	–
7	GR	–
8	O	–
14	P	–
16	LG	–

Connector No.	M24
Connector Name	COMBINATION METER
Connector Color	WHITE

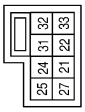
H.S.



Terminal No.	Color of Wire	Signal Name
1	L	CAN-H
2	P	CAN-L
21	B	GND (ILL)
22	B	GND (POWER)
23	B	GND (CIRCUIT)
27	R/W	BAT
28	GR	IGN

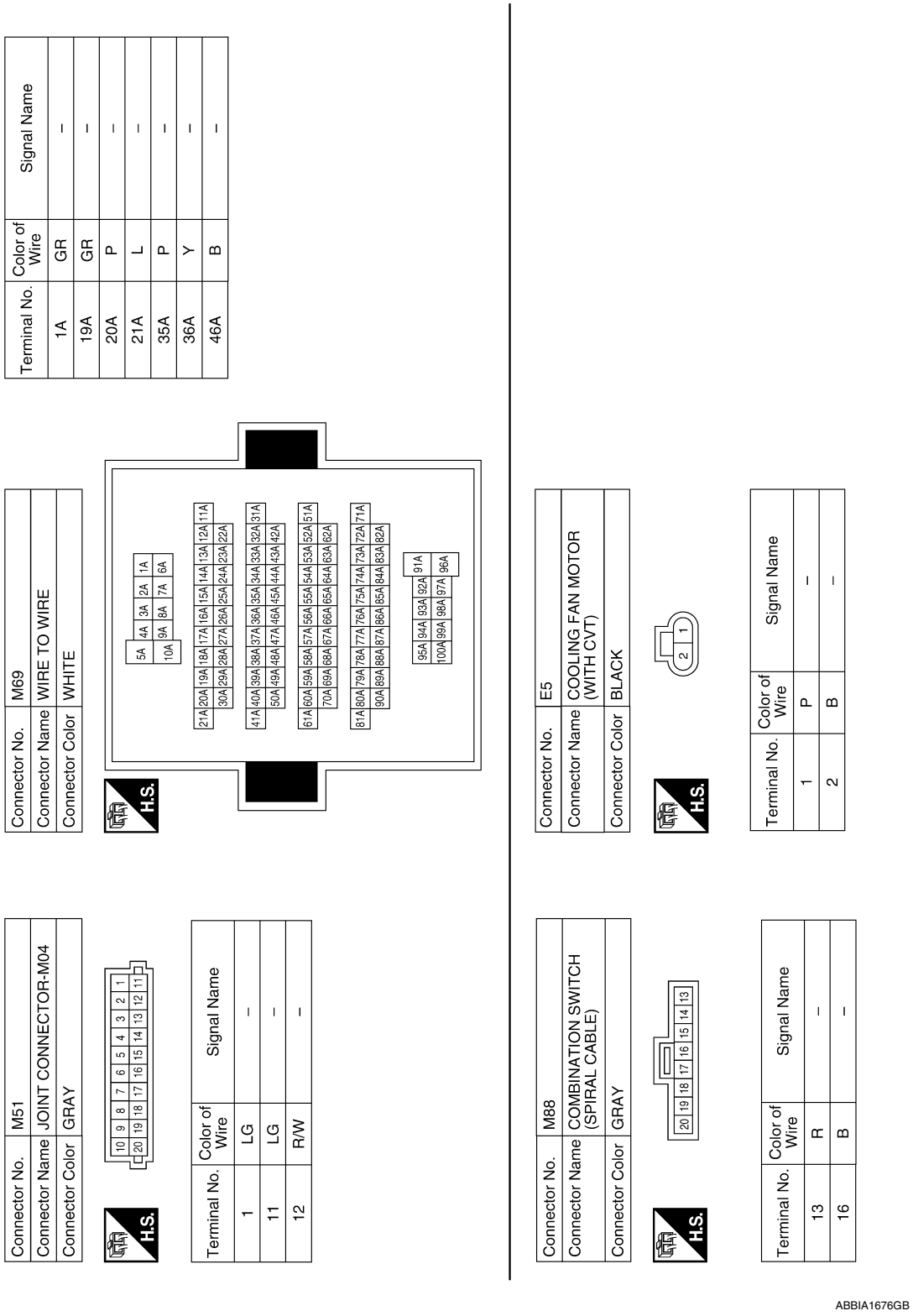
Connector No.	M30
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Color	GRAY

H.S.



Terminal No.	Color of Wire	Signal Name
25	Y	–
32	B	–

ABBIA1675GB



ABBIA1676GB

Connector No.	E8
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

1	2	3	4	5	6	7	8	9	10	11	12
13	14	15	16	17	18	19	20	21	22	23	24

Terminal No.	Color of Wire	Signal Name
2	GR	–
3	R	–
10	R	–
11	L	–
12	BR	–
14	G	–
20	BR	–
24	Y	–

Connector No.	E14
Connector Name	JOINT CONNECTOR-E03
Connector Color	BLUE

H.S.

12	11	10	9	8	7	6	5	4	3	2	1

Terminal No.	Color of Wire	Signal Name
1	P	–
4	P	–
5	P	–
8	L	–
11	L	–
12	L	–

Connector No.	E7
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

				5A
1A	2A	3A	4A	
6A	7A	8A	9A	10A

11A	12A	13A	14A	15A	16A	17A	18A	19A	20A	21A
	22A	23A	24A	25A	26A	27A	28A	29A	30A	
31A	32A	33A	34A	35A	36A	37A	38A	39A	40A	41A
	42A	43A	44A	45A	46A	47A	48A	49A	50A	
51A	52A	53A	54A	55A	56A	57A	58A	59A	60A	61A
	62A	63A	64A	65A	66A	67A	68A	69A	70A	
71A	72A	73A	74A	75A	76A	77A	78A	79A	80A	81A
	82A	83A	84A	85A	86A	87A	88A	89A	90A	

91A	92A	93A	94A	95A	
	96A	97A	98A	99A	100A

Terminal No.	Color of Wire	Signal Name
1A	GR	–
19A	GR	–
20A	P	–
21A	L	–
35A	Y	–
36A	Y	–
46A	B	–

Connector No.	E13
Connector Name	STOP LAMP SWITCH (WITH CVT)
Connector Color	WHITE

H.S.

3	4
1	2

Terminal No.	Color of Wire	Signal Name
1	SB	–
2	LG	–
3	L	–
4	P	–

Connector No.	E12
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Color	BLACK

H.S.

1	2	3	4	5	6

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	P	–
3	SB	–
4	V	–
5	BR	–
6	GR	–

ABBIA1677GB

Connector No.	E16
Connector Name	ECM
Connector Color	BLACK

H.S.

81	85	89	93	97	101	105	109
82	86	90	94	98	102	106	110
83	87	91	95	99	103	107	111
84	88	92	96	100	104	108	112

Terminal No.	Color of Wire	Signal Name
81	V	POWER SUPPLY FOR ECM (BACK-UP)
82	–	–
83	P	CAN-L
84	L	CAN-H
85	V	REFRIGERANT PRESSURE SENSOR
86	–	–
87	–	–
88	GR	DATA LINK CONNECTER

Terminal No.	Color of Wire	Signal Name
89	–	–
90	–	–
91	–	–
92	R	CLUTCH PEDAL POSITION SWITCH
93	L	IGNITION SWITCH
94	Y	ASCD STEERING SWITCH
95	B	SENSOR GROUND (ASCD STEERING SWITCH)
96	–	–
97	–	–
98	LG	SENSOR GROUND (REFRIGERANT PRESSURE SENSOR)
99	LG	STOP LAMP SWITCH
100	G	BRAKE PEDAL POSITION SWITCH
101	W	SENSOR POWER SUPPLY (REFRIGERANT PRESSURE SENSOR)

Terminal No.	Color of Wire	Signal Name
102	BR	SENSOR POWER SUPPLY (APP SENSOR 2)
103	GR	ACCELERATOR PEDAL POSITION SENSOR 2
104	Y	SENSOR GROUND (APP SENSOR 2)
105	G	POWER SUPPLY FOR ECM
106	V	SENSOR POWER SUPPLY (APP SENSOR 1)
107	–	–
108	B	ECM GROUND
109	–	–
110	SB	ACCELERATOR PEDAL POSITION SENSOR 1
111	P	SENSOR GROUND (APP SENSOR 1)
112	–	–

Connector No.	E17
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Color	BLACK

H.S.

1	2	3

Terminal No.	Color of Wire	Signal Name
1	LG	–
2	V	–
3	W	–

Connector No.	E19
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

1	2	3
4	5	6

Terminal No.	Color of Wire	Signal Name
1	GR	–
3	GR	–
6	L	–

Connector No.	E21
Connector Name	WIRE TO WIRE
Connector Color	GRAY

H.S.

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

Terminal No.	Color of Wire	Signal Name
3	R	–
4	GR	–
5	BR	–
10	Y	–
11	BR	–
12	L	–
13	P	–
14	G	–

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Connector No.	E22
Connector Name	JOINT CONNECTOR-E02
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
7	LG	–
10	LG	–

Connector No.	E31
Connector Name	COOLING FAN MOTOR (WITH M/T)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	P	–
3	B	–
4	LG	–

Connector No.	E32
Connector Name	COOLING FAN MOTOR (WITH CVT)
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
3	Y	–
4	LG	–

Connector No.	E36
Connector Name	BRAKE PEDAL POSITION SWITCH
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	G	–

Connector No.	E43
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
5	Y	MOTOR FAN HI
7	P	MOTOR FAN LO

Connector No.	E44
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
9	BR	FUEL PUMP
11	G	ECM VB

ABBIA1679GB

Connector No.	E48
Connector Name	CLUTCH PEDAL POSITION SWITCH
Connector Color	WHITE

H.S.

3	4
1	2

Terminal No.	Color of Wire	Signal Name
3	R	–
4	B	–

Connector No.	E46
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

64	63	62	61	60	59	58	57	56	55	54	53
76	75	74	73	72	71	70	69	68	67	66	65

Terminal No.	Color of Wire	Signal Name
59	Y	MOTOR FAN RLY GND
60	B	GND (SIGNAL)
61	P	CAN-L
62	L	CAN-H
65	BR	RELAY IG

Connector No.	E62
Connector Name	COOLING FAN RELAY
Connector Color	BLUE

H.S.

3		
5		
2		1

Terminal No.	Color of Wire	Signal Name
1	BR	–
2	Y	–
3	B	–
5	LG	–

Connector No.	E45
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BROWN

H.S.

21	20		19	18	17
28	27	26	25	24	23	22

Terminal No.	Color of Wire	Signal Name
19	B	GND (POWER)
21	R	AT ECU (WITH CVT)

Connector No.	E57
Connector Name	STOP LAMP SWITCH (WITH M/T)
Connector Color	BLACK

H.S.

2	1

Terminal No.	Color of Wire	Signal Name
1	SB	–
2	LG	–

Connector No.	E55
Connector Name	WIRE TO WIRE
Connector Color	GRAY

H.S.

1	2	3		4	5
6	7	8	9	10	11	12

Terminal No.	Color of Wire	Signal Name
2	G	–
3	V	–
4	G	–
5	L	–
6	GR	–
7	R	–
8	B	–
10	P	–

ABBIA1680GB

Connector No.	E63
Connector Name	HEATED OXYGEN SENSOR 2
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	R	–
2	G	–
3	BR	–
4	L	–

Connector No.	F6
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	LG/V	–
2	P	–

Connector No.	F7
Connector Name	ELECTRIC THROTTLE CONTROL ACTUATOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	–
2	W/R	–
3	B	–
4	R	–
5	P	–
6	L	–

Connector No.	F8
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
2	L	–
3	R	–
10	L/Y	–
11	L/R	–
12	BR/W	–
14	P	–
20	SB	–
24	Y	–

Connector No.	F9
Connector Name	BATTERY CURRENT SENSOR
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	L	–
3	R	–
4	BR	–

ABBIA1681GB

Terminal No.	Color of Wire	Signal Name
22	BR	IGNITION SIGNAL NO. 3
23	GR	FUEL PUMP RELAY
24	R	FUEL INJECTOR NO. 4 (REAR)
25	R	FUEL INJECTOR NO. 4 (FRONT
26	P	EVAP CANISTER VENT CONTROL VALVE
27	–	–
28	–	–
29	G	FUEL INJECTOR NO. 3 (FRONT)
30	O	FUEL INJECTOR NO. 2 (FRONT)
31	L	FUEL INJECTOR NO. 1 (FRONT)
32	P	ECM RELAY (SELF SHUT-OFF)

Terminal No.	Color of Wire	Signal Name
7	–	–
8	–	–
9	SB	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
10	B	ECM GROUND
11	B/Y	ECM GROUND
12	L/W	FUEL INJECTOR NO. 1 (REAR)
13	–	–
14	–	–
15	G/W	THROTTLE CONTROL MOTOR RELAY
16	G	FUEL INJECTOR NO. 3 (REAR)
17	V	IGNITION SIGNAL NO. 1
18	Y/B	IGNITION SIGNAL NO. 2
19	–	–
20	O/W	FUEL INJECTOR NO. 2 (REAR)
21	W	IGNITION SIGNAL NO. 4

Connector No.	F10
Connector Name	ECM
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	L	THROTTLE CONTROL MOTOR (OPEN)
2	L/W	THROTTLE CONTROL MOTOR POWER SUPPLY
3	G/W	A/F SENSOR 1 HEATER
4	P	THROTTLE CONTROL MOTOR (CLOSE)
5	BR/W	HEATED OXYGEN SENSOR 2 HEATER
6	–	–

ABBIA1682GB

Connector No.	F11
Connector Name	ECM
Connector Color	BROWN

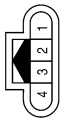
Terminal No.	Color of Wire	Signal Name
33	W	THROTTLE POSITION SENSOR 1
34	B	THROTTLE POSITION SENSOR 2
35	–	–
36	R	SENSOR GROUND (TP SENSOR)
37	W	KNOCK SENSOR
38	LG/V	ENGINE COOLANT TEMPERATURE SENSOR
39	L	BATTERY TEMPERATURE SENSOR
40	L	SENSOR GROUND (KNOCK SENSOR)
41	–	–
42	L	FUEL TANK TEMPERATURE SENSOR
43	SB	EVAP CONTROL SYSTEM PRESSURE SENSOR
44	P	SENSOR GROUND (ECT SENSOR)
45	G/B	MASS AIR FLOW SENSOR

Terminal No.	Color of Wire	Signal Name
46	V	INTAKE AIR TEMPERATURE SENSOR
47	Y	ENGINE OIL PRESSURE SENSOR
48	W/R	EXHAUST VALVE TIMING CONTROL POSITION SENSOR
49	G/W	A/F SENSOR 1
50	L/R	HEATED OXYGEN SENSOR 2
51	P	SENSOR GROUND (FUEL TANK TEMPERATURE SENSOR)
52	LG	SENSOR GROUND (MAF SENSOR/IAT SENSOR)
53	L	A/F SENSOR 1
54	BR	SENSOR GROUND (EOT SENSOR)
55	G/L	SENSOR GROUND (IAT SENSOR)
56	–	–
57	P	ENGINE OIL TEMPERATURE SENSOR
58	BR	BATTERY CURRENT SENSOR
59	L/Y	SENSOR GROUND (HO2S 2)
60	L	SENSOR GROUND (EOP SENSOR)
61	L/O	CRANKSHAFT POSITION SENSOR
62	G	SENSOR GROUND (CKP SENSOR)

Terminal No.	Color of Wire	Signal Name
63	W	SENSOR GROUND (CMP SENSOR / EXHAUST VALVE TIMING POSITION SENSOR)
64	–	–
65	R/W	CAMSHAFT POSITION SENSOR
66	–	–
67	–	–
68	R	SENSOR GROUND (BATTERY CURRENT SENSOR)
69	BR	PARK/NEUTRAL POSITION SIGNAL
70	L/Y	ENGINE COMMUNICATION LINE
71	Y	SENSOR POWER SUPPLY (BATTERY CURRENT SENSOR)
72	W/R	SENSOR POWER SUPPLY (TP SENSOR)
73	P	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
74	O	SENSOR POWER SUPPLY (EOP SENSOR)
75	O	SENSOR POWER SUPPLY (CKP SENSOR)
76	–	–
77	P/W	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE
78	BR	SENSOR POWER SUPPLY (CMP SENSOR / EXHAUST VALVE TIMING POSITION SENSOR)
79	–	–
80	–	–

ABBIA1683GB

Connector No.	F12
Connector Name	AIR FUEL RATIO (A/F) SENSOR 1
Connector Color	BROWN



Terminal No.	Color of Wire	Signal Name
1	G/W	–
2	L	–
3	G/W	–
4	L	–

Connector No.	F14
Connector Name	KNOCK SENSOR
Connector Color	GRAY

Terminal No.	Color of Wire	Signal Name
1	W/G	–
2	L	–

Connector No.	F15
Connector Name	CRANKSHAFT POSITION SENSOR (POS)
Connector Color	BLACK

Terminal No.	Color of Wire	Signal Name
1	O	–
2	G	–
3	L/O	–

Connector No.	F17
Connector Name	FUEL INJECTOR NO. 1 (FRONT)
Connector Color	BLACK

Terminal No.	Color of Wire	Signal Name
1	SB	–
2	L	–

Connector No.	F18
Connector Name	FUEL INJECTOR NO. 2 (FRONT)
Connector Color	BLACK

Terminal No.	Color of Wire	Signal Name
1	SB	–
2	O	–

Connector No.	F19
Connector Name	FUEL INJECTOR NO. 3 (FRONT)
Connector Color	BLACK

Terminal No.	Color of Wire	Signal Name
1	SB	–
2	G	–

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Connector No.	F20
Connector Name	FUEL INJECTOR NO. 4 (FRONT)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	–
2	R	–

Connector No.	F21
Connector Name	CAMSHAFT POSITION SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	BR	–
2	W	–
3	R/W	–

Connector No.	F22
Connector Name	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	G/W	–
2	SB	–

Connector No.	F23
Connector Name	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	P	–
2	L	–

Connector No.	F24
Connector Name	PARK/NEUTRAL POSITION (PNP) SWITCH
Connector Color	GREEN

H.S.

Terminal No.	Color of Wire	Signal Name
2	R	–
3	BR	–

Connector No.	F25
Connector Name	ENGINE OIL TEMPERATURE SENSOR
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	P	–
2	BR	–

ABBIA1685GB

Connector No.	F26
Connector Name	CONDENSER
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	B	–

Connector No.	F29
Connector Name	FUEL INJECTOR NO. 3 (REAR)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	–
2	G	–

Connector No.	F30
Connector Name	FUEL INJECTOR NO. 4 (REAR)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	–
2	R	–

Connector No.	F31
Connector Name	MASS AIR FLOW SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	–	–
2	G	–
3	LG	–
4	G/B	–
5	V	–
6	G/L	–

Connector No.	F32
Connector Name	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	P/W	–
2	L	–

Connector No.	F33
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	GR	–
3	GR	–
6	Y	–

ABBIA1686GB

Connector No.	F34
Connector Name	IGNITION COIL NO. 1 (WITH POWER TRANSISTOR)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	V	–
2	B	–
3	Y	–

Connector No.	F35
Connector Name	IGNITION COIL NO. 2 (WITH POWER TRANSISTOR)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y/B	–
2	B	–
3	Y	–

Connector No.	F36
Connector Name	IGNITION COIL NO. 3 (WITH POWER TRANSISTOR)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	BR	–
2	B	–
3	Y	–

Connector No.	F37
Connector Name	IGNITION COIL NO. 4 (WITH POWER TRANSISTOR)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	–
2	B	–
3	Y	–

Connector No.	F38
Connector Name	ENGINE OIL PRESSURE SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	O	–
2	Y	–
3	L	–

Connector No.	F42
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
29	L/W	ETC
32	G/W	MOTRLY
34	Y	IGN COIL
35	BR	ECM BAT
36	SB	INJECTOR
39	L	ENG SOL

ABBIA1687GB

Connector No.	F43
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
43	GR	FPR
47	R/W	ECM IGNSW
50	P	SSOFF

Connector No.	F49
Connector Name	TRANSMISSION RANGE SWITCH
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
7	R	CAN-L
10	BR	CAN-H

Connector No.	F53
Connector Name	FUEL INJECTOR NO. 1 (REAR)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	–
2	L/W	–

Connector No.	F54
Connector Name	FUEL INJECTOR NO. 2 (REAR)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	–
2	O/W	–

Connector No.	F55
Connector Name	WIRE TO WIRE
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
2	G	–
3	BR	–
4	G/W	–
5	R/W	–
6	R	–
7	R	–
8	B	–
10	P	–

Connector No.	F56
Connector Name	EXHAUST VALVE TIMING CONTROL POSITION SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	BR	–
2	W	–
3	W/R	–

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Connector No.	B3
Connector Name	EVAP CONTROL SYSTEM PRESSURE SENSOR
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	GR	–
2	Y	–
3	V	–

Connector No.	B5
Connector Name	EVAP CANISTER VENT CONTROL VALVE
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	BR	–
2	SB	–

Connector No.	B12
Connector Name	WIRE TO WIRE
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
3	GR	–
4	W	–
5	G	–
11	Y	–
10	V	–
12	BR	–
13	SB	–
14	P	–

Connector No.	B44
Connector Name	FUEL LEVEL SENSOR UNIT AND FUEL PUMP
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	G	–
3	B	–
4	W	–
5	P	–

ABBIA1689GB

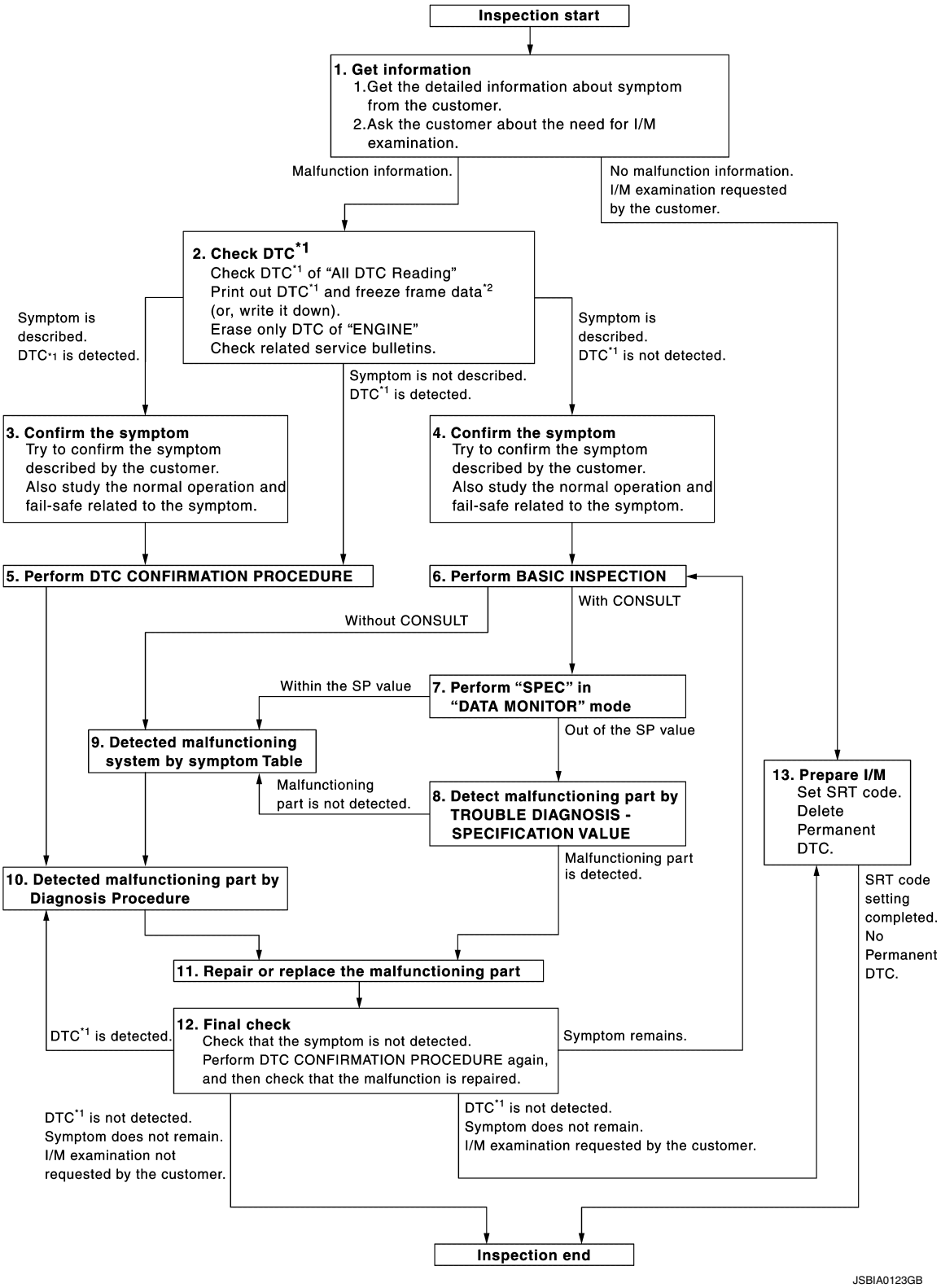
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000009020648

OVERALL SEQUENCE



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

DETAILED FLOW

1.GET INFORMATION FOR SYMPTOM

1. Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the “Diagnostic Work Sheet”. (Refer to EC-121, "Diagnostic Work Sheet".)
2. Ask if the customer requests I/M examination.

Malfunction information, obtained>>GO TO 2.
No malfunction information, but a request for I/M examination>>GO TO 13.

2.CHECK DTC

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

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

With CONSULT: “How to Erase DTC and 1st Trip DTC” in EC-60, "CONSULT Function".
Without CONSULT: “How to Erase Self-diagnostic Results” in EC-57, "On Board Diagnosis Function".

- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to EC-452, "Symptom Table".)

3. Check related service bulletins for information.

Is any symptom described and is any DTC detected?

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

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).
Also study the normal operation and fail safe related to the symptom. Refer to EC-458, "Description" and EC-82, "Fail Safe".
Diagnostic Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
Also study the normal operation and fail safe related to the symptom. Refer to EC-458, "Description" and EC-82, "Fail Safe".
Diagnostic Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then make sure that DTC is detected again.
If two or more DTCs are detected, refer to EC-84, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

NOTE:

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

Is DTC detected?

YES >> GO TO 10.

NO >> Check according to GI-41, "Intermittent Incident".

6.PERFORM BASIC INSPECTION

Perform EC-131, "Work Procedure".

Do you have CONSULT?

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

7.PERFORM “SPEC” IN DATA MONITOR MODE

With CONSULT

Make sure that “MAS A/F SE-B1”, “B/FUEL SCHDL” and “A/F ALPHA-B1” are within the SP value in “SPEC” of “DATA MONITOR” mode with CONSULT. Refer to EC-149, "Component Function Check".

Is the measurement value within the SP value?

YES >> GO TO 9.
NO >> GO TO 8.

8.DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-150, "Diagnosis Procedure".

Is malfunctioning part detected?

YES >> GO TO 11.
NO >> GO TO 9.

9.DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to EC-452, "Symptom Table" based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 10.

10.DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

NOTE:

The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure. For details, refer to GI-44, "Circuit Inspection".

Is malfunctioning part detected?

YES >> GO TO 11.
NO >> Monitor input data from related sensors or check the voltage of related ECM terminals using CONSULT. Refer to EC-70, "Reference Value".

11.REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it.
   With CONSULT: “How to Erase DTC and 1st Trip DTC” in EC-60, "CONSULT Function".
   Without CONSULT: “How to Erase Self-diagnostic Results” in EC-57, "On Board Diagnosis Function".

>> GO TO 12.

12.FINAL CHECK

When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then make sure that the malfunction have been repaired securely.
When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 10.
YES-2 >> Symptom remains: GO TO 6.

NO-1 >> No request for I/M examination from the customer: Before returning the vehicle to the customer, always erase unnecessary DTC in ECM and TCM (With CONSULT: Refer to “How to Erase DTC and 1st Trip DTC” in EC-60, "CONSULT Function", Without CONSULT: Refer to “How to Erase Self-diagnostic Results” in EC-57, "On Board Diagnosis Function").

NO-2 >> I/M examination, requested from the customer: GO TO 13.

13. PREPARE FOR I/M EXAMINATION

1. Set SRT codes. Refer to EC-137, "Description".
2. Erase permanent DTCs. Refer to EC-143, "Description".

>> INSPECTION END

Diagnostic Work Sheet

INFOID:0000000009020649

DESCRIPTION

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

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

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

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

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

KEY POINTS

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

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WORKSHEET SAMPLE

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

MTBL0017

ADDITIONAL SERVICE WHEN REPLACING ECM

Description

INFOID:0000000009020650

When replacing ECM, the following procedure must be performed. (For details, refer to EC-123, "Work Procedure".)

PROGRAMMING OPERATION

NOTE:

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

Work Procedure

INFOID:0000000009020651

1.CHECK ECM PART NUMBER

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

NOTE:

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

Is the ECM a blank ECM?

YES >> GO TO 2.
NO >> GO TO 4.

2.SAVE ECM PART NUMBER

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

NOTE:

- The ECM part number is saved in CONSULT.
- Even when ECM part number is not saved in CONSULT, go to 3.

>> GO TO 3.

3.PERFORM ECM PROGRAMMING

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

NOTE:

- Refer to EC-465, "Removal and Installation" for replacement of ECM.
- During programming, maintain the following conditions:
- Ignition switch: ON
- Electric load: OFF
- Brake pedal: Not depressed
- Battery voltage: 12 – 13.5 V (Be sure to check the value of battery voltage by selecting “BATTERY VOLT” in “Data monitor” of CONSULT.)

>> GO TO 4.

4.REPLACE ECM

Replace ECM. Refer to EC-465, "Removal and Installation".

>> GO TO 5.

5.PERFORM VIN REGISTRATION

Refer to EC-125, "Work Procedure".

>> GO TO 6.

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

Refer to SEC-63, "ECM : Work Procedure"(with I-Key), SEC-165, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement"(without I-Key).

>> GO TO 7.

7.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-126, "Work Procedure".

>> GO TO 8.

8.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-127, "Work Procedure".

>> GO TO 9.

9.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-128, "Work Procedure".

>> END

VIN REGISTRATION

Description

INFOID:0000000009762590

VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced.
NOTE:
Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M).

Work Procedure

INFOID:0000000009762591

1.CHECK VIN

Check the VIN of the vehicle and note it. Refer to GI-34, "Identification Number".

>> GO TO 2.

2.PERFORM VIN REGISTRATION

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

>> END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

Description

INFOID:0000000009020652

Accelerator Pedal Released Position Learning is a function of ECM to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected.

Work Procedure

INFOID:0000000009020653

1.START

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON and wait at least 2 seconds.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and wait at least 2 seconds.
5. Turn ignition switch OFF and wait at least 10 seconds.

>> END

THROTTLE VALVE CLOSED POSITION LEARNING

Description

INFOID:0000000009020654

Throttle Valve Closed Position Learning is a function of ECM to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected or electric throttle control actuator inside is cleaned.

Work Procedure

INFOID:0000000009020655

1.START

WITH CONSULT
1. Turn ignition switch ON.
2. Select “CLSD THL POS LEARN” in “WORK SUPPORT” mode.
3. Follow the instructions on the CONSULT display.
4. Turn ignition switch OFF and wait at least 10 seconds.
   Check that throttle valve moves during the above 10 seconds by confirming the operating sound.

WITHOUT CONSULT
1. Start the engine.
   NOTE:
   Engine coolant temperature is 25°C (77°F) or less before engine starts.
2. Warm up the engine.
   NOTE:
   Raise engine coolant temperature until it reaches 65°C (149°F) or more.
3. Turn ignition switch OFF and wait at least 10 seconds.
   Check that throttle valve moves during the above 10 seconds by confirming the operating sound.

>> END

IDLE AIR VOLUME LEARNING

Description

INFOID:0000000009020656

Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps each engine idle speed within the specific range. It must be performed under any of the following conditions:
- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

Work Procedure

INFOID:0000000009020657

1.PRECONDITIONING

Make sure that all of the following conditions are satisfied.
Learning will be cancelled if any of the following conditions are missed for even a moment.
- Battery voltage: More than 12.9 V (At idle)
- Engine coolant temperature: 70 - 100°C (158 - 212°F)
- Selector lever: P or N (CVT), Neutral (M/T)
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)
- **For vehicles equipped with daytime light systems, perform one of the following procedures before starting engine not to illuminate headlamps.**
- Apply parking brake
- Set lighting switch to the 1st position
- Steering wheel: Neutral (Straight-ahead position) position
- Vehicle speed: Stopped
- Transmission: Warmed-up
- CVT models
- With CONSULT: Drive vehicle until “FLUID TEMP SE” in “DATA MONITOR” mode of “TRANSMISSION” system indicates less than 0.9 V.
- Without CONSULT: Drive vehicle for 10 minutes.
- M/T models
- Drive vehicle for 10 minutes.

Do you have CONSULT?

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

2.IDLE AIR VOLUME LEARNING

With CONSULT
1. Perform ACCELERATOR PEDAL RELEASED POSITION LEARNING. Refer to EC-126, "Work Procedure".
2. Perform THROTTLE VALVE CLOSED POSITION LEARNING. Refer to EC-127, "Work Procedure".
3. Start engine and warm it up to normal operating temperature.
4. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode with CONSULT.
5. Touch “START” and wait 20 seconds.

Is “CMPLT” displayed on CONSULT screen?

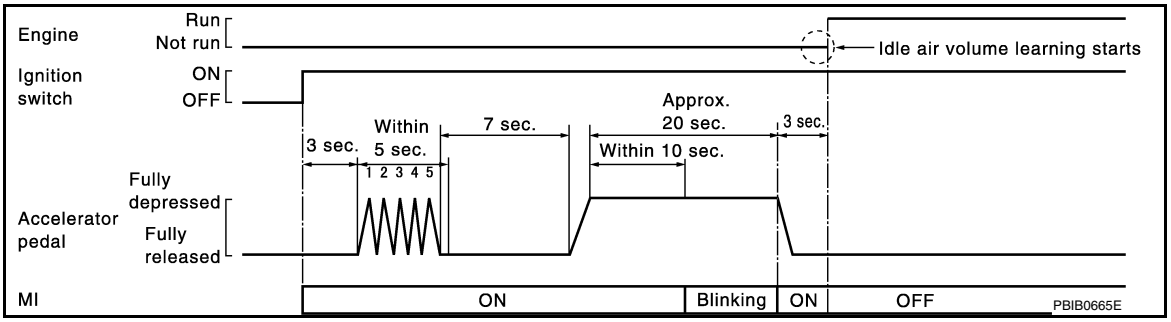
YES >> GO TO 4.
NO >> GO TO 5.

3.IDLE AIR VOLUME LEARNING

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

1. Perform ACCELERATOR PEDAL RELEASED POSITION LEARNING. Refer to EC-126, "Work Procedure".
2. Perform THROTTLE VALVE CLOSED POSITION LEARNING. Refer to EC-127, "Work Procedure".
3. Start engine and warm it up to normal operating temperature.
4. Turn ignition switch OFF and wait at least 10 seconds.

5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
6. Repeat the following procedure quickly five times within 5 seconds.
- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.
7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MI stops blinking and turned ON.
8. Fully release the accelerator pedal within 3 seconds after the MI turned ON.
9. Start engine and let it idle.
10. Wait 20 seconds.



>> GO TO 4.

4. CHECK IDLE SPEED AND IGNITION TIMING

Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.
For specification, refer to EC-466, "Idle Speed" and EC-466, "Ignition Timing".

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following
- Check that throttle valve is fully closed.
- Check PCV valve operation.
- Check that downstream of throttle valve is free from air leakage.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace malfunctioning part.

6. DETECT MALFUNCTIONING PART

Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.
It is useful to perform “TROUBLE DIAGNOSIS - SPECIFICATION VALUE”. Refer to EC-149, "Description".
If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning all over again:
- Engine stalls.
- Erroneous idle.

>> INSPECTION END

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

Description

INFOID:0000000009020658

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

Work Procedure

INFOID:0000000009020659

1.START

With CONSULT

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

With GST

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

>> END

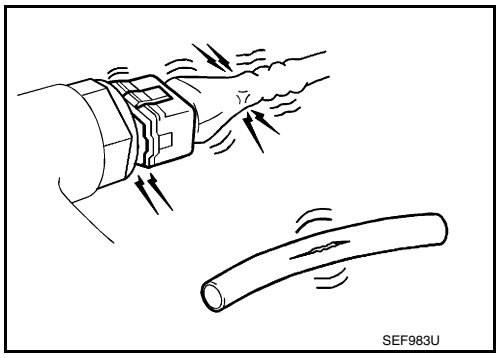
BASIC INSPECTION

Work Procedure

INFOID:0000000009020660

1.INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket
3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
4. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.
   Ensure engine stays below 1,000 rpm.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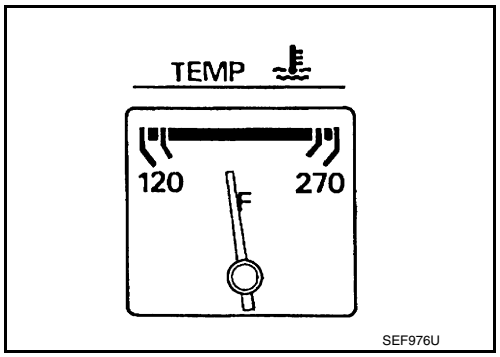

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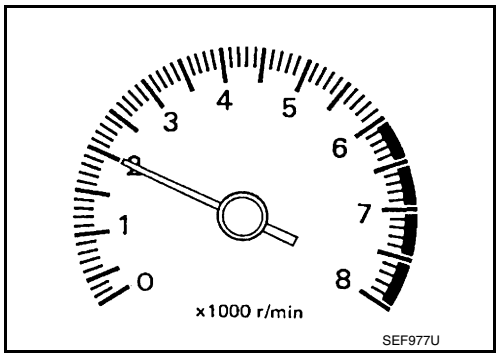
5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT or GST.

Is any DTC detected?

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



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2.REPAIR OR REPLACE

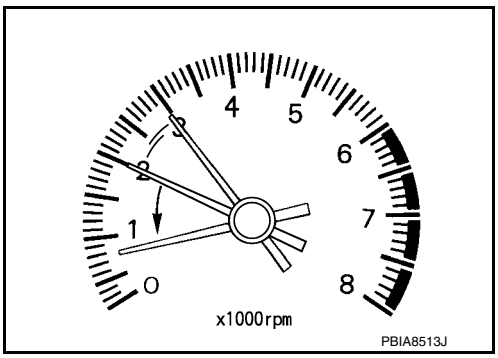
Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3

3.CHECK TARGET IDLE SPEED

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

2. Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
3. Check idle speed.
   For procedure, refer to EC-459, "Inspection".
   For specification, refer to EC-466, "Idle Speed".



Is the inspection result normal?

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

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-126, "Work Procedure".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-127, "Work Procedure".

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-128, "Work Procedure".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 7.
NO >> Follow the instruction of IDLE AIR VOLUME LEARNING. Then GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   For procedure, refer to EC-459, "Inspection".
   For specification, refer to EC-466, "Idle Speed".

Is the inspection result normal?

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

8. DETECT MALFUNCTIONING PART

Check the Following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-279, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-275, "DTC Logic".

Is the inspection result normal?

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

9. CHECK ECM FUNCTION

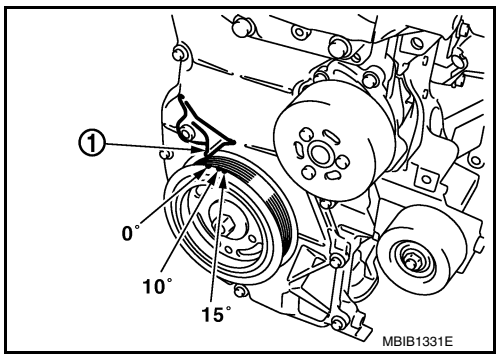
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization and registration of all NATS ignition key IDs. Refer to SEC-165, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement".

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.

2. Check ignition timing with a timing light.
For procedure, refer to EC-460, "Inspection".
For specification, refer to EC-466, "Ignition Timing".
- Timing indicator (1)



Is the inspection result normal?

YES >> GO TO 19.
NO >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-126, "Work Procedure".

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-127, "Work Procedure".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-128, "Work Procedure".

Is idle air volume learning carried out successfully?

YES >> GO TO 14.
NO >> Follow the instruction of IDLE AIR VOLUME LEARNING. Then GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

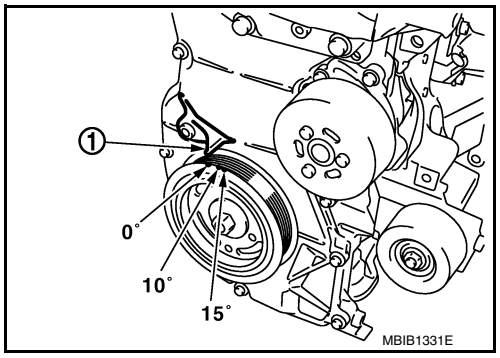
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
For procedure, refer to EC-459, "Inspection".
For specification, refer to EC-466, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 15.
NO >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.
For procedure, refer to EC-460, "Inspection".
For specification, refer to EC-466, "Ignition Timing".
- Timing indicator (1)



Is the inspection result normal?

YES >> GO TO 19.
NO >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-51, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair the timing chain installation. Then GO TO 4.

17. DETECT MALFUNCTIONING PART

Check the following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-279, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-275, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair or replace. Then GO TO 4.

18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to SEC-165, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement".

>> GO TO 4.

19. INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, perform EC-123, "Work Procedure".

>> INSPECTION END

FUEL PRESSURE CHECK

Work Procedure

INFOID:0000000009020661

FUEL PRESSURE RELEASE

1.FUEL PRESSURE RELEASE

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

Without CONSULT
1. Remove fuel pump fuse located in IPDM E/R.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.

>> INSPECTION END

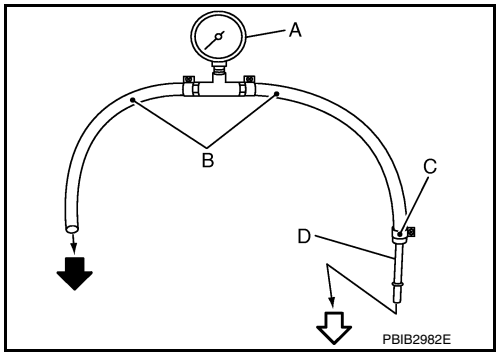
FUEL PRESSURE CHECK

1.FUEL PRESSURE CHECK

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

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

1. Release fuel pressure to zero.
2. Prepare fuel hose for fuel pressure check (B) and fuel tube adapter [SST: KV10118400 or KV10120000] (D), then connect fuel pressure gauge (A).



⇦ **To quick connector**

⬅ **To fuel tube (engine side)**

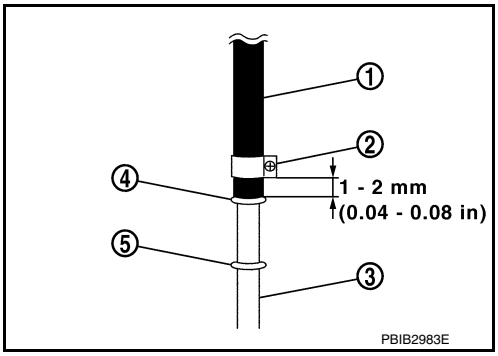
C : Hose clamp

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

3. Remove fuel hose.

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

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



5 : No.2 spool

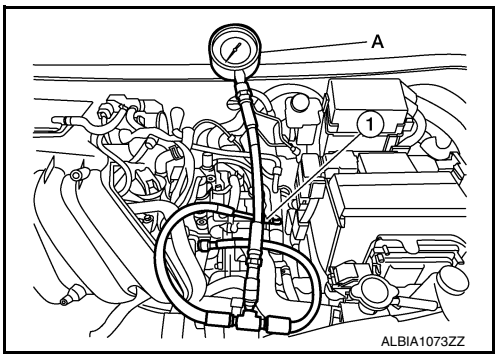
CAUTION:

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

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

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

5. Connect fuel tube adapter to quick connector (1).



A : Fuel pressure gauge

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

CAUTION:

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

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

Is the inspection result normal?

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

2. CHECK FUEL HOSE AND FUEL TUBE

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

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”. Refer to FL-6, "Exploded View".
NO >> Repair or replace.

HOW TO SET SRT CODE

Description

INFOID:0000000009020662

OUTLINE

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

SRT ITEM

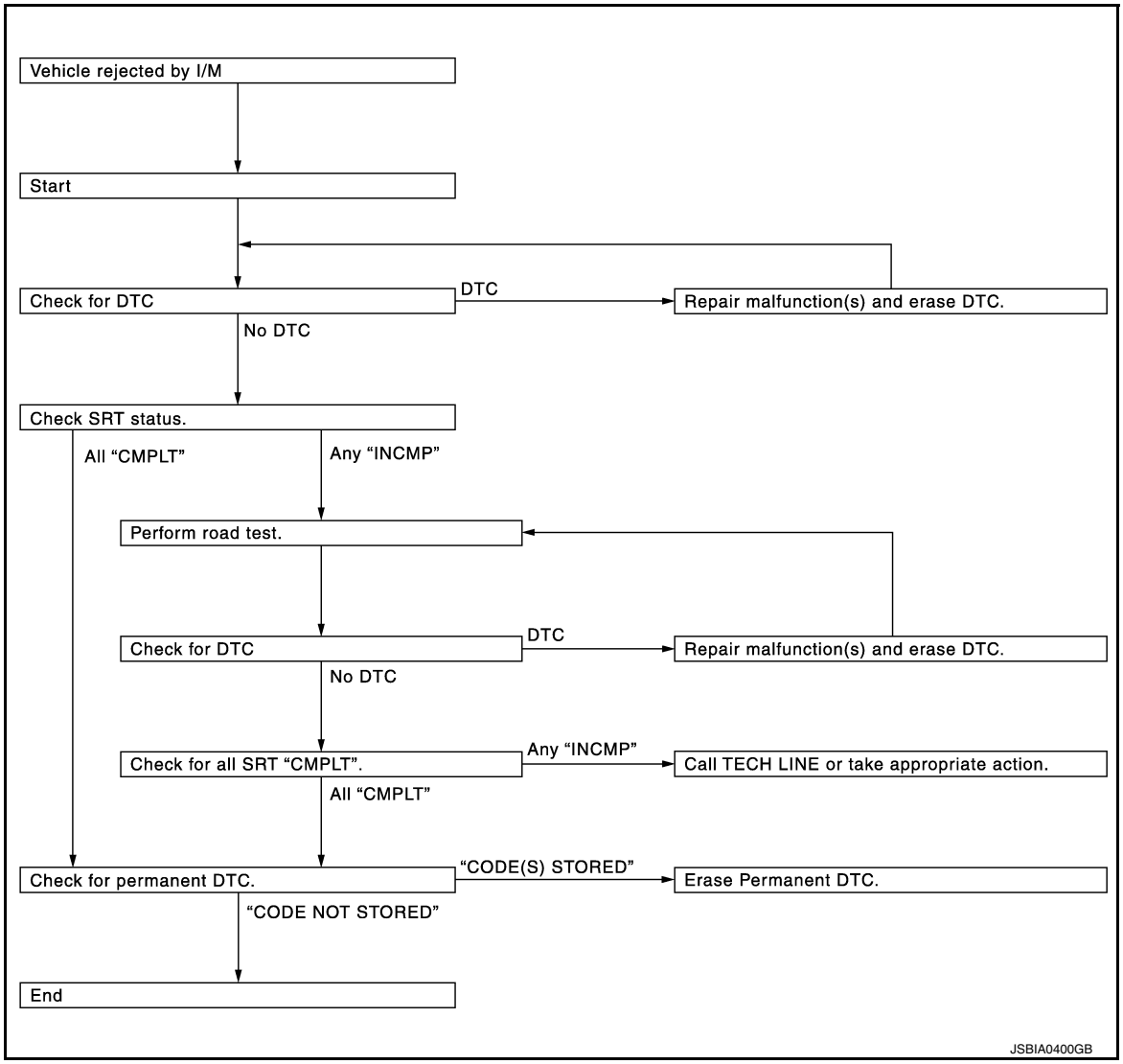
The table below shows required self-diagnostic items to set the SRT to “CMPLT”.

SRT item* (CONSULT indication)	Required self-diagnostic items to set the SRT to “CMPLT”	Corresponding DTC No.
CATALYST	Three way catalyst function	P0420
EVAP SYSTEM	EVAP control system purge flow monitoring	P0441
	EVAP control system	P0456
HO2S	Heated oxygen sensor 2	P0137
	Heated oxygen sensor 2	P0138
	Heated oxygen sensor 2	P0139
EGR/VVT SYSTEM	Intake value timing control function	P0011

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

SRT SERVICE PROCEDURE

If a vehicle has failed the state emissions inspection due to one or more SRT items indicating “INCMP”, review the flowchart diagnostic sequence, referring to the following flowchart.

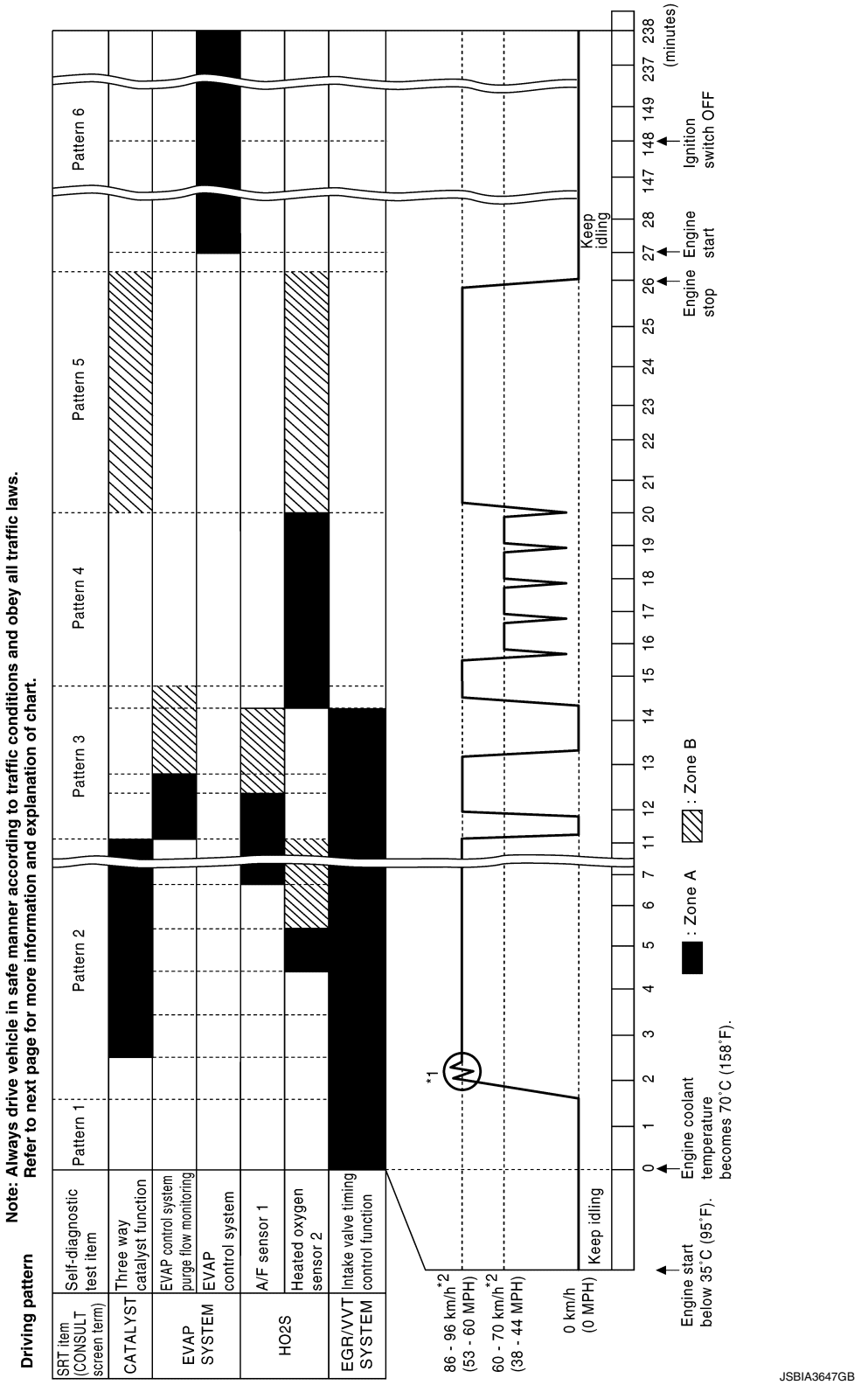


SRT Set Driving Pattern

INFOID:0000000009020663

CAUTION:

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



JSBIA3647GB

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

*2: Checking the vehicle speed with GST is advised.

- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
- “Zone A” is the fastest time where required for the diagnosis under normal conditions*. If the diagnosis is not completed within “Zone A”, the diagnosis can still be performed within “Zone B”.

*: Normal conditions
- Sea level
- Flat road
- Ambient air temperature: 20 – 30°C (68 – 86°F)

NOTE:
Diagnosis is performed as quickly as possible under normal conditions. However, under other conditions, diagnosis may also be performed. [For example: ambient air temperature other than 20 – 30°C (68 – 86°F)]

Work Procedure

INFOID:0000000009020664

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-86, "DTC Index".
NO >> GO TO 2.

2.CHECK SRT STATUS

WITH CONSULT
Select “SRT STATUS” in “DTC & SRT CONFIRMATION” mode of “ENGINE” using CONSULT.
WITHOUT CONSULT
Perform “SRT status” mode with EC-57, "On Board Diagnosis Function".
WITH GST
Select Service $01 with GST.

Is SRT code(s) set?

YES >> GO TO 12.
NO-1 >> With CONSULT: GO TO 3.
NO-2 >> Without CONSULT: GO TO 4.

3.DTC CONFIRMATION PROCEDURE

1. Select “SRT WORK SUPPORT” in “DTC & SRT CONFIRMATION” mode with CONSULT.
2. For SRT(s) that is not set, perform the corresponding “DTC CONFIRMATION PROCEDURE” according to the “Performance Priority” in the “SRT ITEM” table. Refer to EC-55, "DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code".
3. Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-86, "DTC Index".
NO >> GO TO 11.

4.PERFORM ROAD TEST

- Check the “Performance Priority” in the “SRT ITEM” table. Refer to EC-55, "DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code".
- Perform the most efficient SRT set driving pattern to set the SRT properly. Refer to EC-138, "SRT Set Driving Pattern".
  In order to set all SRTs, the SRT set driving pattern must be performed at least once.

>> GO TO 5.

5.PATTERN 1

1. Check the vehicle condition;
- Engine coolant temperature is −10 to 35°C (14 to 95°F).
- Fuel tank temperature is more than 0°C (32°F).
2. Start the engine.
3. Keep engine idling until the engine coolant temperature is greater than 70°C (158°F)

NOTE:
ECM terminal voltage is follows;
- Engine coolant temperature
- −10 to 35°C (14 to 95°F): 3.0 - 4.3 V
- 70°(158°F): Less than 1.4 V

• Fuel tank temperature: Less than 4.1 V
Refer to EC-70, "Reference Value".

>> GO TO 6.

6. PATTERN 2

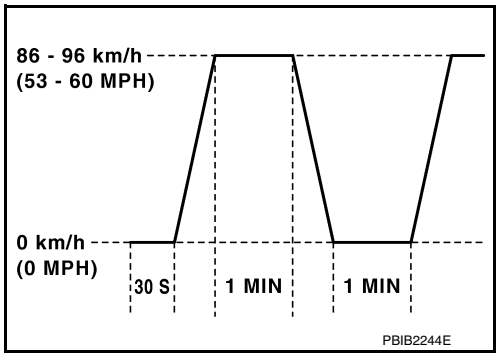
1. Drive the vehicle. And depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds.
2. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again

NOTE:
• Checking the vehicle speed with GST is advised.
• When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

>> GO TO 7.

7. PATTERN 3

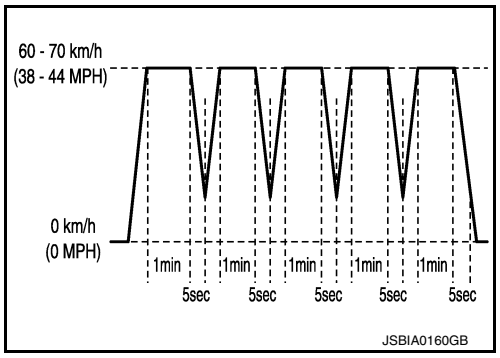
• Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during deceleration of vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).



>> GO TO 8.

8. PATTERN 4

• Operate vehicle following the driving pattern shown in the figure.
- Drive the vehicle in a proper gear at 60 km/h (38 MPH) and maintain the speed.
- Release the accelerator pedal fully at least 5 seconds.
- Repeat the above two steps at least 5 times.



>> GO TO 9.

9. PATTERN 5

• The accelerator pedal must be held very steady during steady-state driving.
• If the accelerator pedal is moved, the test must be conducted again.

>> GO TO 10.

10. PATTERN 6

• Cool down the engine so that the engine coolant temperature lowers between 15 – 35°C (59 – 95°F).
CAUTION:
Never turn the ignition switch ON while cooling down the engine.
• Engine coolant temperature at engine start is between 15 – 35°C (59 – 95°F) and has lowered 45°C (113°F) or more since the latest engine stop.

>> GO TO 11.

11. CHECK SRT STATUS

WITH CONSULT
Select “SRT STATUS” in “DTC & SRT CONFIRMATION” mode of “ENGINE” using CONSULT.
WITHOUT CONSULT
Perform “SRT status” mode with EC-57, "On Board Diagnosis Function".
WITH GST
Select Service $01 with GST.

Is SRT(s) set?

YES >> GO TO 12.
NO >> Call TECH LINE or take appropriate action.

12. CHECK PERMANENT DTC

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

WITH CONSULT
Select “SRT STATUS” in “DTC & SRT CONFIRMATION” mode of “ENGINE” using CONSULT.
WITH GST
Select Service $01 with GST.

Is permanent DTC(s) detected?

YES >> Proceed to EC-149, "Description".
NO >> END

HOW TO ERASE PERMANENT DTC

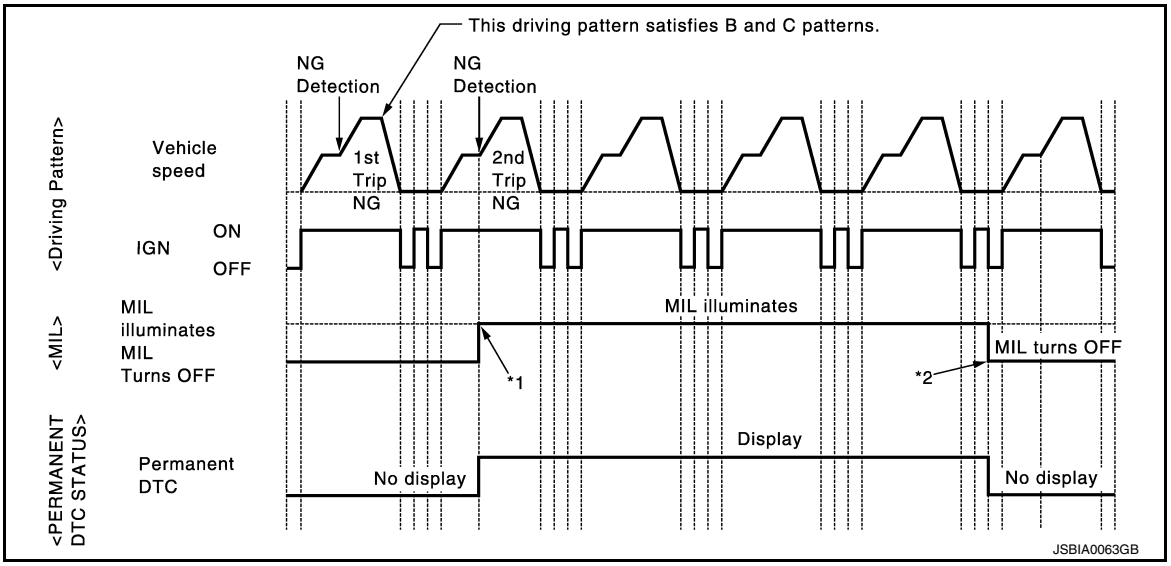
Description

INFOID:0000000009020665

OUTLINE

When a DTC is stored in ECM

When a DTC is stored in ECM and MIL is ON, a permanent DTC is erased with MIL shutoff if the same malfunction is not detected after performing the driving pattern for MIL shutoff three times in a raw.



*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.

*2: MIL will turn off after vehicle is driven 3 times (driving pattern B) without any malfunctions.

When a DTC is not stored in ECM

The erasing method depends on a permanent DTC stored in ECM. Refer to the following table.

NOTE:

If the applicable permanent DTC includes multiple groups, perform the procedure of Group B first. If the permanent DTC is not erased, perform the procedure of Group A.

×: Applicable —: Not applicable

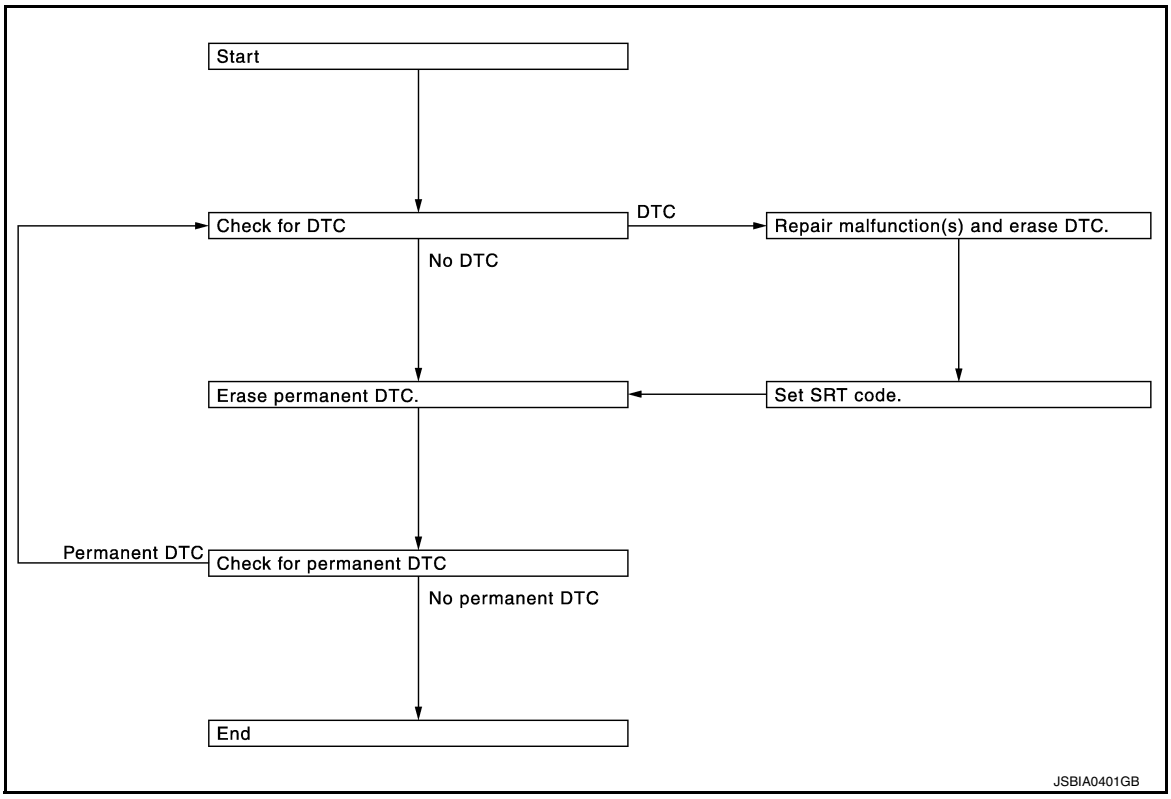
Group*	Perform "DTC CONFIRMATION PROCEDURE" for applicable DTCs.	Driving pattern		Reference
		B	D	
A	×	—	—	EC-144
B	—	×	×	EC-146

*: For group, refer to EC-86, "DTC Index".

PERMANENT DTC ITEM

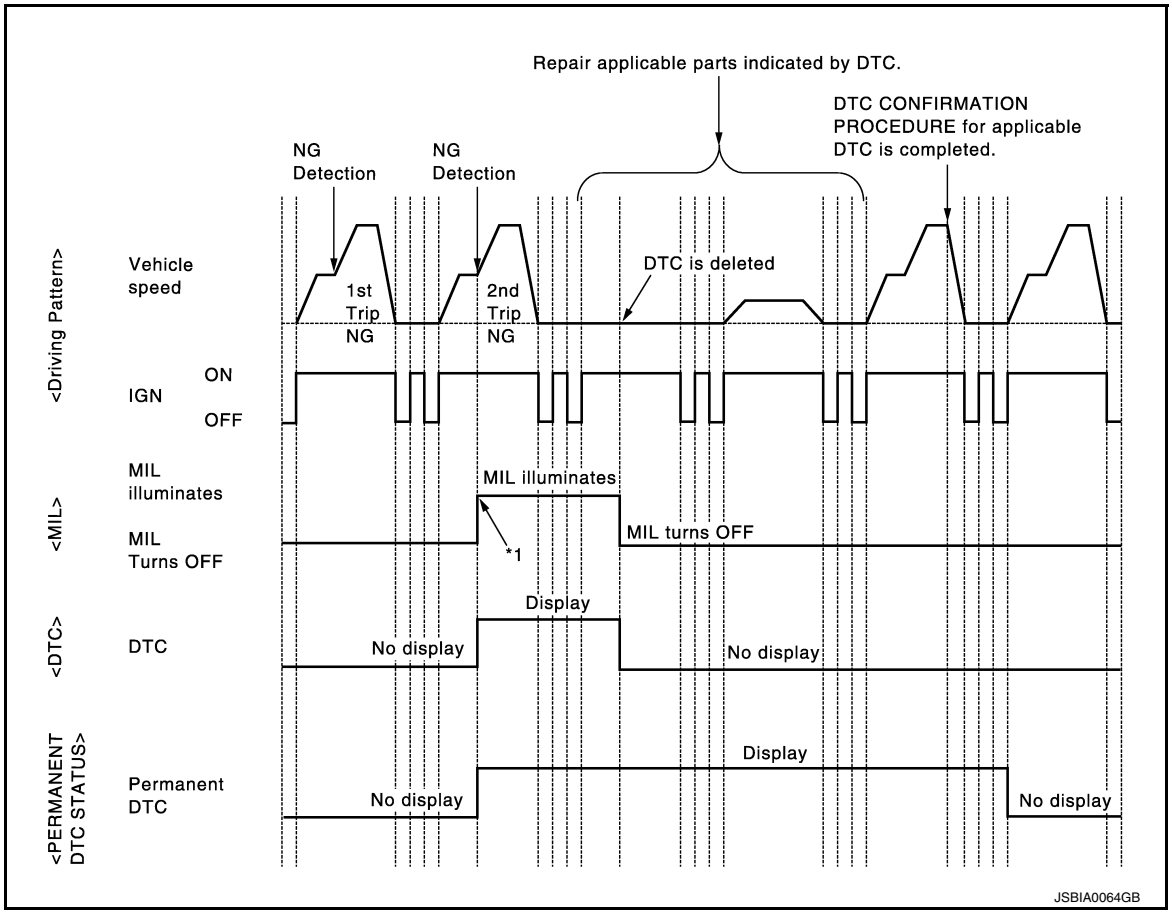
For permanent DTC items, MIL turns ON. Refer to EC-86, "DTC Index".

PERMANENT DTC SERVICE PROCEDURE



Work Procedure (Group A)

INFOID:0000000009020666



*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-57, "On Board Diagnosis Function", EC-60, "CONSULT Function".

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” mode with CONSULT.

With GST

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 Service $0A with GST.

Is any permanent DTC detected?

YES >> GO TO 3.

NO >> END

3.PERFORM DTC CONFIRMATION PROCEDURE

Perform “DTC CONFIRMATION PROCEDURE” for DTCs which are the same as permanent DTCs stored in ECM. Refer to EC-86, "DTC Index".

>> GO TO 4.

4.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” mode with CONSULT.

With GST

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 Service $0A with GST.

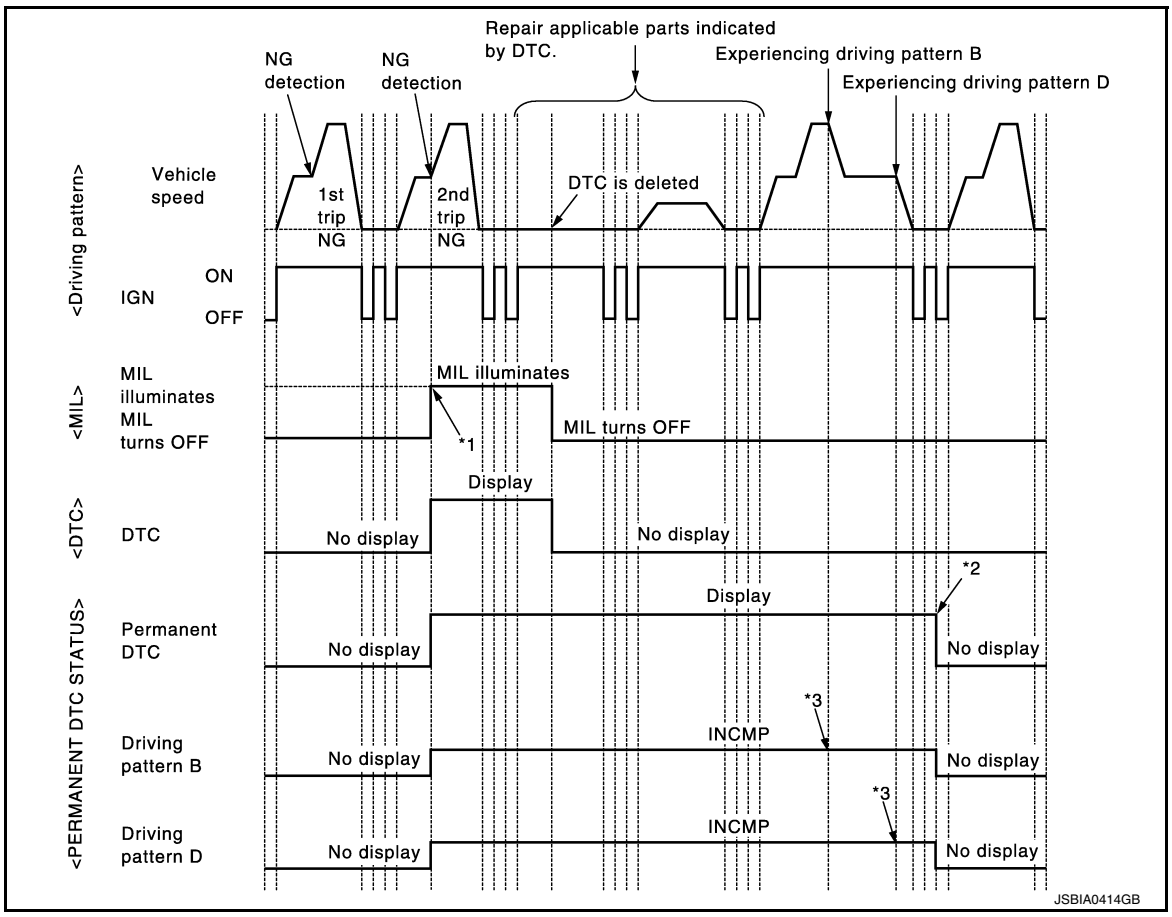
Is any permanent DTC detected?

YES >> GO TO 1.

NO >> END

Work Procedure (Group B)

INFOID:0000000009020667



*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.

*2: After experiencing driving pattern B and D, permanent DTC is erased.

*3: Indication does not change unless the ignition switch is turned from ON to OFF twice even after experiencing driving pattern B or D.

NOTE:
Drive the vehicle according to only driving patterns indicating “INCMP” in driving patterns B and D on the “PERMANENT DTC STATUS” screen.

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-57, "On Board Diagnosis Function", EC-60, "CONSULT Function".

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” mode with CONSULT.

With GST

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 Service $0A with GST.

Is any permanent DTC detected?

YES >> GO TO 3.
NO >> END

3. DRIVE DRIVING PATTERN B

CAUTION:
- **Always drive at a safe speed.**
- **Never erase self-diagnosis results.**
- **If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B and D is reset.**

With CONSULT
1. Start engine and warm it up to normal operating temperature.
2. Use “PERMANENT DTC WORK SUPPORT” mode with CONSULT to drive the vehicle according to driving pattern B. Refer to EC-60, "CONSULT Function", EC-146, "Work Procedure (Group B)".

With GST
1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle according to driving pattern B. Refer to EC-146, "Work Procedure (Group B)".

>> GO TO 4.

4. 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” mode with CONSULT.

With GST
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 Service $0A with GST.

Is any permanent DTC detected?

YES >> GO TO 5.
NO >> END

5. DRIVE DRIVING PATTERN D

CAUTION:
- **Always drive at a safe speed.**
- **Never erase self-diagnosis results.**
- **If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B and D is reset.**

Drive the vehicle according to driving pattern D. Refer to EC-146, "Work Procedure (Group B)".

>> GO TO 6.

6. 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” mode with CONSULT.

With GST
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 Service $0A with GST.

Is any permanent DTC detected?

YES >> GO TO 1.
NO >> END

DTC/CIRCUIT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:0000000009020668

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

Component Function Check

INFOID:0000000009020669

1.START

Make sure that all of the following conditions are satisfied.
- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm^2, 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up
  - CVT models: After the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (CVT fluid temperature sensor signal) indicates more than 60°C (140°F).
  - M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied
  - Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.
- Engine speed: Idle

>> GO TO 2.

2.PERFORM “SPEC” OF “DATA MONITOR” MODE

With CONSULT
NOTE:
Perform “SPEC” in “DATA MONITOR” mode in maximum scale display.
1. Perform EC-131, "Work Procedure".
2. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode with CONSULT.
3. Make sure that monitor items are within the SP value.

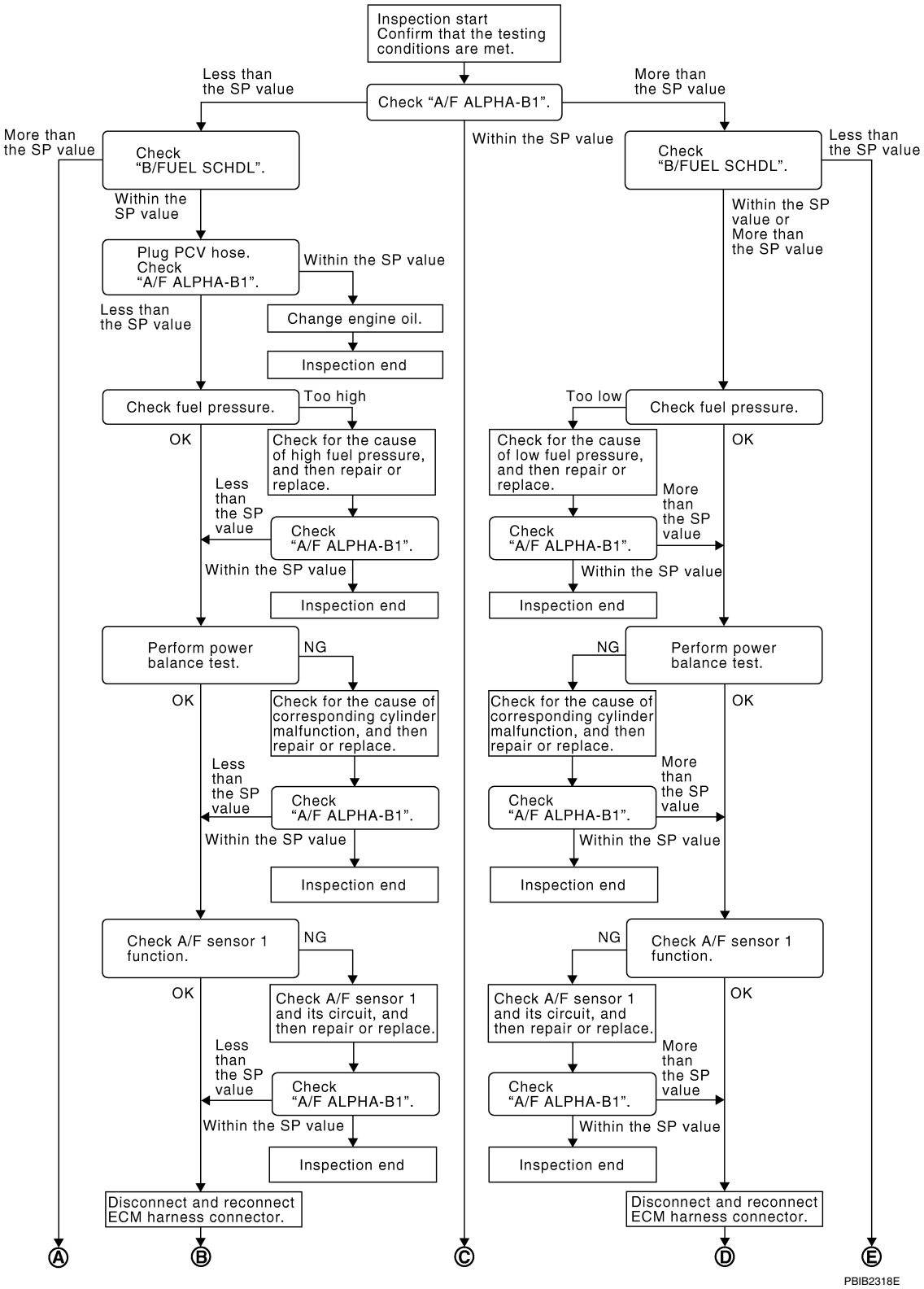
Is the inspection result normal?

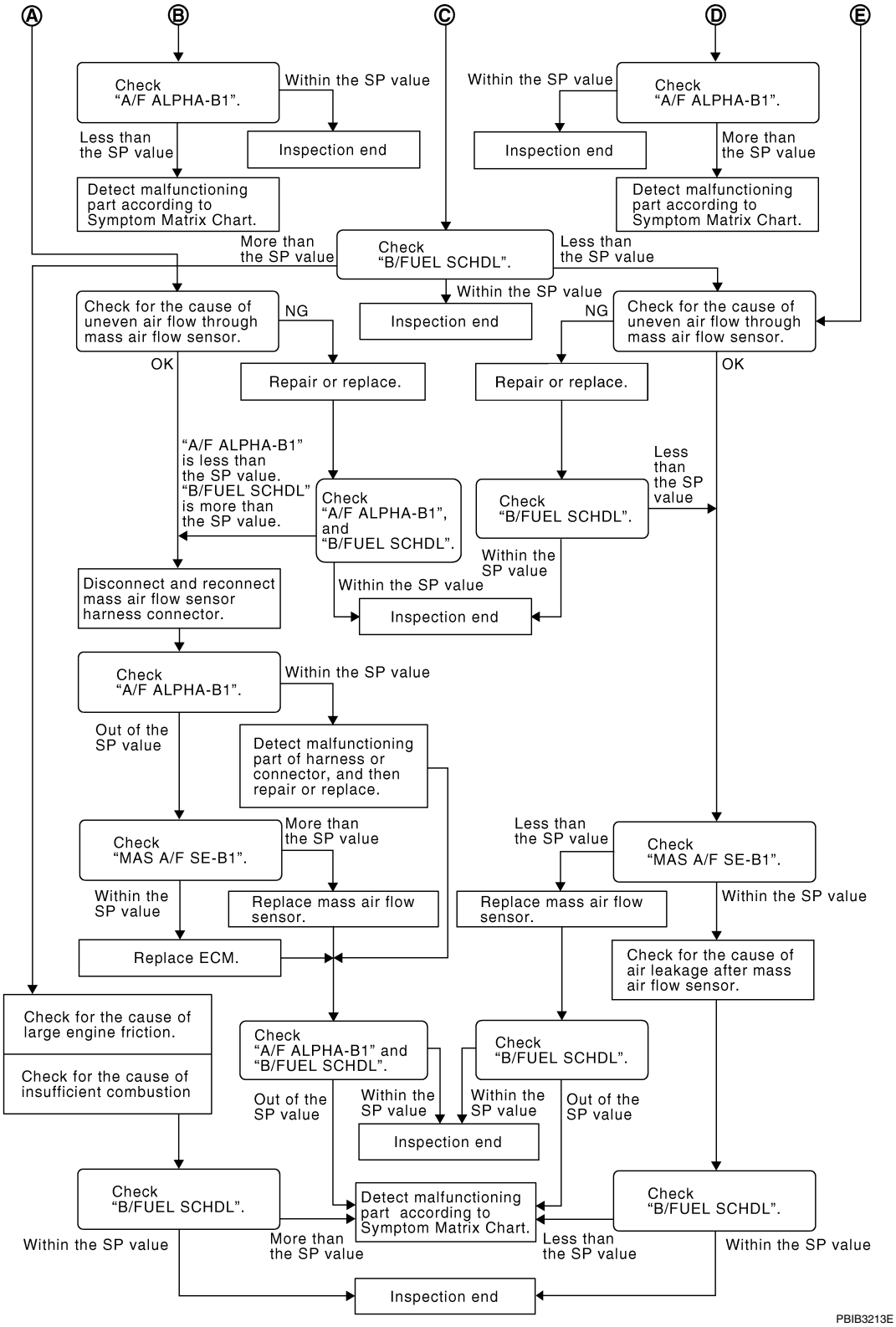
YES >> END
NO >> Go to EC-150, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020670

OVERALL SEQUENCE





DETAILED PROCEDURE

1. CHECK "A/F ALPHA-B1"

With CONSULT

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-149, "Component Function Check".
3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

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

Is the measurement value within the SP value?

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

2. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

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

3. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

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

4. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

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

5. CHANGE ENGINE OIL

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

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

>> **INSPECTION END**

6. CHECK FUEL PRESSURE

Check fuel pressure. (Refer to EC-135, "Work Procedure".)

Is the inspection result normal?

YES >> GO TO 9.
NO-1 >> Fuel pressure is too high: Replace fuel filter and fuel pump assembly (Refer to FL-6, "Exploded View"), and then GO TO 8.
NO-2 >> Fuel pressure is too low: GO TO 7.

7. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging

Is the inspection result normal?

YES >> Replace fuel filter and fuel pump assembly (Refer to FL-6, "Exploded View"), and then GO TO 8.
NO >> Repair or replace and then GO TO 8.

8.CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

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

9.PERFORM POWER BALANCE TEST

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

Is the inspection result normal?

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

10.DETECT MALFUNCTIONING PART

Check the following.
1. Ignition coil and its circuit (Refer to EC-442, "Component Inspection (Ignition Coil with Power Transistor)".)
2. Fuel injector and its circuit (Refer to EC-435, "Component Inspection".)
3. Intake air leakage
4. Low compression pressure (Refer to EM-13, "Inspection".)

Is the inspection result normal?

YES >> Replace fuel injector (Refer to EM-40, "Removal and Installation"), and then GO TO 11.
NO >> Repair or replace malfunctioning part and then GO TO 11.

11.CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

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

12.CHECK A/F SENSOR 1 FUNCTION

Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1.
- For DTC P0130, refer to EC-210, "DTC Logic".
- For DTC P0131, refer to EC-214, "DTC Logic".
- For DTC P0132, refer to EC-217, "DTC Logic".
- For DTC P2096, P2097, refer to EC-397, "DTC Logic".

Is any DTC detected?

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

13.CHECK A/F SENSOR 1 CIRCUIT

Perform DIAGNOSTIC PROCEDURE according to corresponding DTC.

>> GO TO 14.

14.CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

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

15.DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

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

>> GO TO 16.

16. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-452, "Symptom Table".

17. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

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

18. DETECT MALFUNCTIONING PART

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

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

19. CHECK INTAKE SYSTEM

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

Is the inspection result normal?

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

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

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

Is the measurement value within the SP value?

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

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

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

>> GO TO 22.

22. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-187, "DTC Logic". Then GO TO 29.
NO >> GO TO 23.

23. CHECK “MAS A/F SE-B1”

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

Is the measurement value within the SP value?

YES >> GO TO 24.
NO >> More than the SP value: Replace mass air flow sensor (Refer to EM-28, "Removal and Installation"), and then GO TO 29.

24. REPLACE ECM

1. Replace ECM. Refer to EC-465, "Removal and Installation".
2. Perform EC-123, "Work Procedure".

>> GO TO 29.

25. CHECK INTAKE SYSTEM

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

Is the inspection result normal?

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

26. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

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

27. CHECK “MAS A/F SE-B1”

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

Is the measurement value within the SP value?

YES >> GO TO 28.
NO >> Less than the SP value: Replace mass air flow sensor (Refer to EM-28, "Removal and Installation"), and then GO TO 30.

28. CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.
- Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks of PCV valve
- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve

- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts
- Malfunctioning seal of intake air system, etc.

>> GO TO 30.

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

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-452, "Symptom Table".

30. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-452, "Symptom Table".

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000009020671

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

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

ECM		Ground	Continuity
Connector	Terminal		
F10	10	Ground	Existed
	11		
E16	108		

3. Also check harness for short to power.

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E55, F55
- Harness for open or short between ECM and ground

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

4.CHECK ECM POWER SUPPLY CIRCUIT-I

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

ECM		Ground	Voltage
Connector	Terminal		
E16	93	Ground	Battery voltage

Is the inspection result normal?

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

5.DETECT MALFUNCTIONING PART

Check the following.
- 10 A fuse (No. 55)
- Harness for open or short between ECM and fuse

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

6.CHECK ECM POWER SUPPLY CIRCUIT-II

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

Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
E16	105	Ground	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0 V.

Is the inspection result normal?

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

7. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch ON.
2. Check the voltage between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Voltage
Connector	Terminal		
F43	50	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace IPDM E/R. Refer to PCS-31, "Removal and Installation"(WITH I-KEY), PCS-60, "Removal and Installation"(WITHOUT I-KEY).

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

9. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F10	32	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 10.

10. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector F43.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F10	32	F43	50	Existed

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

Is the inspection result normal?

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

11. DETECT MALFUNCTIONING PART

Check the following.

• Harness for open or short between ECM and IPDM E/R

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

12. CHECK 20 A FUSE

1. Disconnect 20 A fuse (No. 53) from IPDM E/R.
2. Check 20 A fuse.

Is the inspection result normal?

YES >> GO TO 14.
NO >> Replace 20 A fuse.

13. CHECK ECM POWER SUPPLY CIRCUIT-VI

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E44.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E16	105	E44	11	Existed

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

Is the inspection result normal?

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

14. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-31, "Removal and Installation"(WITH I-KEY), PCS-60, "Removal and Installation"(WITHOUT I-KEY).
NO >> Repair or replace harness or connectors.

U0101 CAN COMM CIRCUIT

Description

INFOID:0000000009020672

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:0000000009020673

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

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

Diagnosis Procedure

INFOID:0000000009020674

Perform the trouble diagnosis for CAN communication system. Refer to LAN-15, "Trouble Diagnosis Flow Chart".

U0284 ACTIVE GRILLE SHUTTER

DTC Logic

INFOID:0000000009509479

DTC DETECTION LOGIC

NOTE:
If DTC U0284 is displayed with another DTC UXXXX, perform trouble diagnosis for DTC UXXXX first. Refer to EC-86, "DTC Index".

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
U0284	LOST COMM (A/GRLL SHTTR MDL A) (Lost communication with active grille air shutter module A)	When ECM cannot receive the engine communication signal from active grille shutter.	• Harness and connectors (Engine communication line is open or circuit shorted.) • Active grille shutter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If another DTC Confirmation Procedure is conducted just before this procedure, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 10 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-161, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009509480

1.INSPECTION START

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

+		–		Continuity
ECM		Active grille shutter		
Connector	Terminal	Connector	Terminal	
F11	70	E303	2	Existed

Is the inspection result normal?

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

2.CHECK INTERMITTENT INCIDENT

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

Is the inspection result normal?

YES >> Replace active grille shutter. Refer to EXT-31, "Removal and Installation".
NO >> Repair or replace the error-detected parts.

U1001 CAN COMM CIRCUIT

Description

INFOID:0000000009020675

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:0000000009020676

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
U1001	CAN communication line	When ECM is not transmitting or receiving CAN communication signal other than OBD (emission related diagnosis) for 2 seconds or more.	Harness or connectors (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> EC-162, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020677

Go to LAN-15, "Trouble Diagnosis Flow Chart".

U1040 ENG COMM CIRCUIT

DTC Logic

INFOID:0000000009735336

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
U1040	Engine communication line	When ECM unable to transmit engine communication signal	• Harness and connectors (Engine communication line is open or shorted.) • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If another DTC Confirmation Procedure is conducted just before this procedure, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:0000000009735339

1.CHECK ACTIVE GRILLE SHUTTER SIGNAL CIRCUIT

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

+		−		Continuity
ECM		Active grille shutter		
Connector	Terminal	Connector	Terminal	
F11	70	E303	2	Existed

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

Is the inspection result normal?

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

2.CHECK INTERMITTENT INCIDENT

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

Is the inspection result normal?

YES >> Replace ECM. Refer to EC-465, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0011 IVT CONTROL

DTC Logic

INFOID:0000000009020678

DTC DETECTION LOGIC

NOTE:
If DTC P0011 is displayed with DTC P0075, first perform the trouble diagnosis for DTC P0075. Refer to EC-177, "DTC Logic".

DTC No.	Trouble diagnosis content	Detecting condition	Possible cause
P0011	Intake valve timing control performance	There is a gap between angle of target and phase-control angle degree.	• Crankshaft position sensor • Camshaft position sensor • Intake valve timing control solenoid valve • Accumulation of debris to the signal pick-up portion of the camshaft • Timing chain installation • Foreign matter caught in the oil groove for intake valve timing control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10 V and 16 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

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

ENG SPEED	500 - 2,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
Shift lever	P or N position (CVT) Neutral position (M/T)

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

With GST
Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Go to EC-165, "Diagnosis Procedure"
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

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

ENG SPEED	1,200 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 65°C (149°F)
Shift lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:
Always drive at a safe speed.

2. Check 1st trip DTC.

With GST
Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

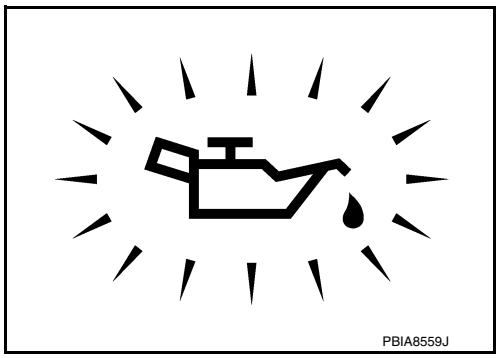
YES >> Go to EC-165, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020679

1.CHECK OIL PRESSURE WARNING LAMP

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


PBIA8559J

Is oil pressure warning lamp illuminated?

YES >> Go to LU-7, "Inspection".
NO >> GO TO 2.

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-166, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace intake valve timing control solenoid valve.Refer to EM-60, "Exploded View".

3.CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-277, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace crankshaft position sensor.Refer to EM-92, "Exploded View".

4.CHECK CAMSHAFT POSITION SENSOR

Refer to EC-281, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace camshaft position sensor. Refer to EM-48, "Exploded View".

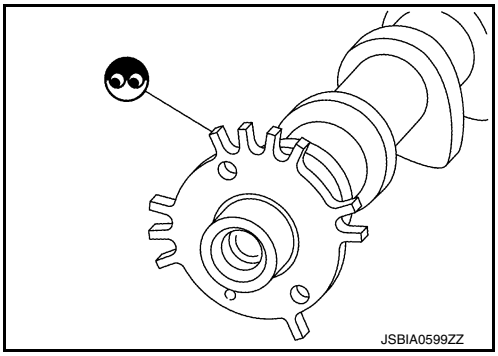
5.CHECK CAMSHAFT (INTAKE)

Check the following.

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-60, "Removal and Installation".



6. CHECK TIMING CHAIN INSTALLATION

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

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

YES >> Check timing chain installation. Refer to EM-51, "Removal and Installation".
NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Perform “Inspection of Camshaft Sprocket (INT) Oil Groove”. Refer to EM-68, "Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000009020680

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

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

Terminals	Resistance [at 20°C (68°F)]
1 and 2	7.0 - 7.7 Ω
1 or 2 and ground	∞ Ω (Continuity should not exist)

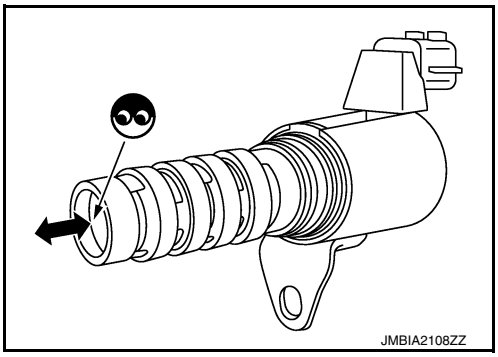
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace intake valve timing control solenoid valve. Refer to EM-60, "Exploded View".

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve. Refer to EM-60, "Exploded View".
2. Apply 12 V between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:
Do not apply 12 V continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.
NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace intake valve timing control solenoid valve. Refer to EM-60, "Exploded View".

P0014 EVT CONTROL

DTC Logic

INFOID:0000000009020681

DTC DETECTION LOGIC

NOTE:
If DTC P0014 is displayed with DTC P0078, first perform trouble diagnosis for DTC P0078. Refer to EC-179, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0014	EXH/V TIM CONT-B1 (Exhaust valve timing control performance)	There is a gap between angle of target and phase-control angle degree.	• Crankshaft position sensor • Exhaust valve timing control position sensor • Exhaust valve timing control solenoid valve • Accumulation of debris to the signal pick-up portion of the camshaft • Timing chain installation • Foreign matter caught in the oil groove for exhaust valve timing control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10 V and 16 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

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

ENG SPEED	1,200 - 2,000 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	P or N position (CVT) Neutral position (M/T)

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

With GST

Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-169, "Diagnosis Procedure"
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT

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

ENG SPEED	1,700 - 2,950 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:
Always drive at a safe speed.

3. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

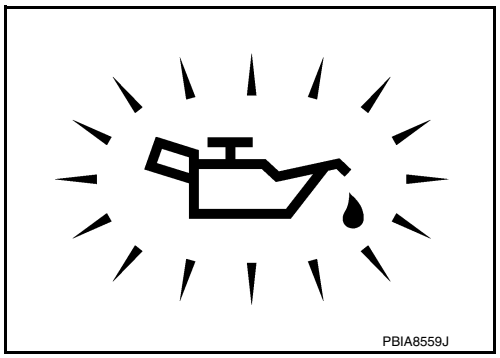
YES >> Proceed to EC-169, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020682

1.CHECK OIL PRESSURE WARNING LAMP

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

YES >> Check the engine oil level. Refer to LU-7, "Inspection".
NO >> GO TO 2.

2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE

Check the exhaust valve timing control solenoid valve. Refer to EC-170, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-60, "Exploded View".

3.CHECK CRANKSHAFT POSITION SENSOR

Check the crankshaft position sensor. Refer to EC-277, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace crankshaft position sensor. Refer to EM-92, "Exploded View".

4.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR

Check the exhaust valve timing control position sensor. Refer to EC-281, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace exhaust valve timing control position sensor. Refer to EM-60, "Exploded View".

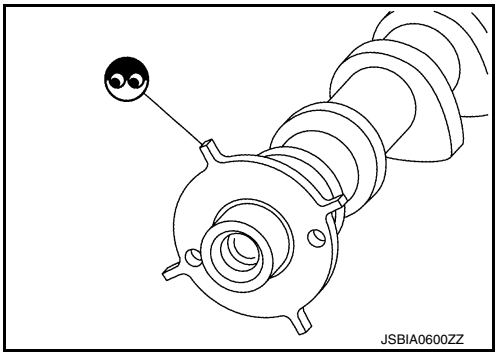
5.CHECK CAMSHAFT (EXHAUST)

Check the following.

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-60, "Removal and Installation".



6. CHECK TIMING CHAIN INSTALLATION

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

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

YES >> Check timing chain installation. Refer to EM-51, "Removal and Installation".
NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to LU-7, "Inspection", “INSPECTION AFTER INSTALLATION”.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Clean lubrication line.

Component Inspection

INFOID:0000000009020683

1. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.
2. Disconnect exhaust valve timing control solenoid valve harness connector.
3. Check resistance between exhaust valve timing control solenoid valve terminals as per the following.

Exhaust valve timing control solenoid valve		Resistance
+	–	
Terminal		
1	2	7.0 - 7.7 Ω [at 20°C (68°F)]
1	Ground	∞ Ω (Continuity should not exist)
2		

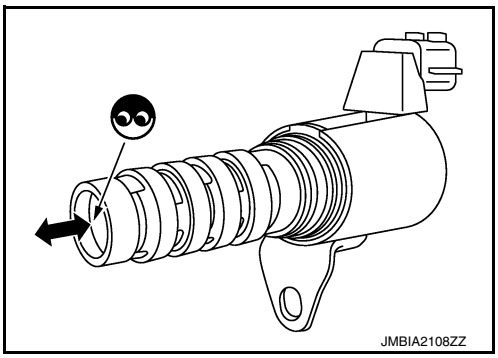
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-60, "Exploded View".

2. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove exhaust valve timing control solenoid valve. Refer to EM-60, "Exploded View".
2. Provide 12 V DC between exhaust valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check that the plunger moves as shown in the figure.

CAUTION:
Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in exhaust valve timing control solenoid valve.
NOTE:
Always replace O-ring when exhaust valve timing control solenoid valve is removed.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-60, "Exploded View".

P0031, P0032 A/F SENSOR 1 HEATER

DTC Logic

INFOID:0000000009020684

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P0031	Air fuel ratio (A/F) sensor 1 heater control circuit low	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)	• Harness or connectors (The A/F sensor 1 heater circuit is open or shorted.) • A/F sensor 1 heater
P0032	Air fuel ratio (A/F) sensor 1 heater control circuit high	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.)	• Harness or connectors (The A/F sensor 1 heater circuit is shorted.) • A/F sensor 1 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10 V and 16 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-171, "Diagnosis Procedure".
NG >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020685

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

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

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

A/F sensor 1		Ground	Voltage
Connector	Terminal		
F12	4	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R harness connector F42
- 20A fuse (No. 53)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK A/F SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	3	F10	3	Existed

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

Is the inspection result normal?

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

5.CHECK A/F SENSOR 1 HEATER

Refer to EC-172, "Component Inspection".

Is the inspection result normal?

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

6.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-31, "Exploded View".

CAUTION:
- **Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

>> Repair or replace.

Component Inspection

INFOID:0000000009020686

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

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Check resistance between A/F sensor 1 terminals as follows.

Terminal	Resistance
3 and 4	1.98 - 2.66 Ω [at 25°C (77°F)]
3 and 1, 2	∞ Ω (Continuity should not exist)
4 and 1, 2	

Is the inspection result normal?

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

2. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-31, "Exploded View".

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

P0037, P0038 HO2S2 HEATER

DTC Logic

INFOID:0000000009020687

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0037	HO2 HTR (B1) (Heated oxygen sensor 2 heater control circuit low)	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	• Harness or connectors (Heated oxygen sensor 2 heater circuit is open or shorted.) • Heated oxygen sensor 2 heater
P0038	HO2 HTR (B1) (Heated oxygen sensor 2 heater control circuit high)	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	• Harness or connectors (Heated oxygen sensor 2 heater circuit is shorted.) • Heated oxygen sensor 2 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

With GST
Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-174, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020688

1.CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between HO2S2 harness connector and ground.

HO2S2		Ground	Voltage
Connector	Terminal		
E63	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK HO2S2 OUTPUT SIGNAL CIRCUIT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E63	3	F10	5	Existed

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

Is the inspection result normal?

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

3.CHECK HEATED OXYGEN SENSOR 2 HEATER

Check the heated oxygen sensor 2 heater. Refer to EC-175, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> GO TO 4.

4.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

Component Inspection

INFOID:0000000009020689

1.CHECK HEATED OXYGEN SENSOR 2 HEATER

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
3. Check resistance between HO2S2 terminals as per the following.

Heated oxygen sensor 2		Resistance
+	–	
Terminal		
2	3	3.4 - 4.4 Ω [at 25°C (77°F)]
1	2	∞ Ω (Continuity should not exist)
	3	
	4	
4	1	
	2	
	3	

Is the inspection result normal?

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

2.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

P0075 IVT CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000009020690

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P0075	Intake valve timing control solenoid valve circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	• Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) • Intake valve timing control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:0000000009020691

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

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

IVT control solenoid valve		Ground	Voltage
Connector	Terminal		
F23	2	Ground	Battery voltage

Is the inspection result normal?

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

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R

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

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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

3. Check the continuity between intake valve timing control solenoid valve harness connector and ECM harness connector.

IVT control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F23	1	F11	73	Existed

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

Is the inspection result normal?

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

4.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-178, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace intake valve timing control solenoid valve. Refer to EM-60, "Exploded View".

5.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000009020692

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

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

Terminals	Resistance [at 20°C (68°F)]
1 and 2	7.0 - 7.7 Ω
1 or 2 and ground	∞ Ω (Continuity should not exist)

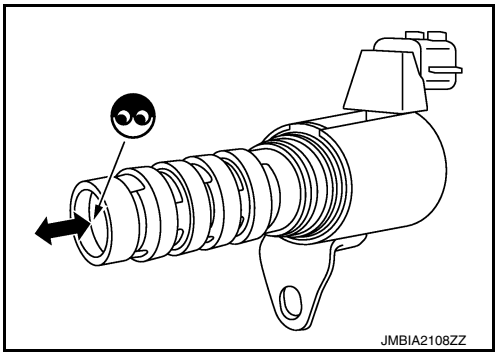
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace intake valve timing control solenoid valve. Refer to EM-60, "Exploded View"

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve. Refer to EM-60, "Exploded View".
2. Apply 12 V between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:
Do not apply 12 V continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.
NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace intake valve timing control solenoid valve. Refer to EM-60, "Exploded View".

P0078 EVT CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000009020693

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0078	EX V/T ACT/CIRC-B1 (Exhaust valve timing control solenoid valve circuit)	An improper voltage is sent to the ECM through exhaust valve timing control solenoid valve.	• Harness or connectors (Exhaust valve timing control solenoid valve circuit is open or shorted.) • Exhaust valve timing control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-179, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020694

1.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY

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

EVT control solenoid valve		Ground	Voltage
Connector	Terminal		
F32	2	Ground	Battery voltage

Is the inspection result normal?

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

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

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

EVT control solenoid valve		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F32	2	F42	39	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

3.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE GROUND CIRCUIT

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

EVT control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F32	1	F11	77	Existed

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

Is the inspection result normal?

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

4.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE

Check the exhaust valve timing control solenoid valve. Refer to EC-180, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-60, "Exploded View".

Component Inspection

INFOID:0000000009020695

1.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.
2. Disconnect exhaust valve timing control solenoid valve harness connector.
3. Check resistance between exhaust valve timing control solenoid valve terminals as per the following.

Exhaust valve timing control solenoid valve		Resistance
+	–	
Terminal		
1	2	7.0 - 7.7 Ω [at 20°C (68°F)]
1	Ground	∞ Ω (Continuity should not exist)
2		

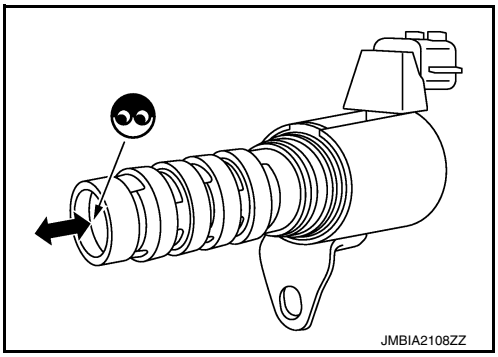
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-60, "Exploded View".

2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove exhaust valve timing control solenoid valve. Refer to EM-60, "Exploded View".
2. Provide 12 V DC between exhaust valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check that the plunger moves as shown in the figure.

CAUTION:
Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in exhaust valve timing control solenoid valve.
NOTE:
Always replace O-ring when exhaust valve timing control solenoid valve is removed.



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-60, "Exploded View".

P0101 MAF SENSOR

DTC Logic

INFOID:0000000009020696

DTC DETECTION LOGIC

NOTE:
If DTC P0101 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0101	MAF SEN/CIRCUIT-B1 [Mass air flow (MAF) sensor circuit range/performance]	• A high voltage from the sensor is sent to ECM under light load driving condition. • A low voltage from the sensor is sent to ECM under heavy load driving condition.	• Harness or connectors (MAF sensor circuit is open or shorted.) • Intake air leaks (e.g. poor connection) • MAF sensor • EVAP control system pressure sensor • Intake air temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle for at least 5 seconds under the following conditions:
   CAUTION:
   Always drive vehicle at safe speed.

Selector lever	Suitable position
Vehicle speed	40 km/h (25 MPH) or more

   NOTE:
   • The gear must be fixed while driving the vehicle.
   • Keep the accelerator pedal as steady as possible during cruising.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-182, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020697

1.CHECK INTAKE SYSTEM

Check the following items to see the installation condition and the connection condition of the joint.
• Air duct
• Vacuum hoses
• Intake air passage between air duct and intake manifold

Is the inspection result normal?

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

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace ground connection.

3. CHECK MASS AIR FLOW (MAF) SENSOR POWER SUPPLY CIRCUIT

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

MAF sensor		Ground	Voltage
Connector	Terminal		
F31	2	Ground	Battery voltage

Is the inspection result normal?

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

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E55, F55
- Harness for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and IPDM E/R

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

5. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	3	F11	52	Existed

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

Is the inspection result normal?

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

6. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between MAF sensor harness connector and ECM harness connector.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	4	F11	45	Existed

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

Is the inspection result normal?

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

7. CHECK INTAKE AIR TEMPERATURE SENSOR

Check the intake air temperature sensor. Refer to EC-193, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace MAF sensor (with intake air temperature sensor). Refer to EM-26, "Removal and Installation".

8.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to EC-310, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace EVAP control system pressure sensor. Refer to FL-19, "Removal and Installation".

9.CHECK MAF SENSOR

Check the MAF sensor. Refer to EC-184, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace MAF sensor. Refer to EM-26, "Removal and Installation".

Component Inspection

INFOID:0000000009020698

1.CHECK MASS AIR FLOW SENSOR-I

With CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select “DATA MONITOR” mode of “ENGINE”.
5. Select “MAS A/F SE-B1” and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.3 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
	Idle to about 4,000 rpm	0.8 - 1.3 V to Approx. 2.4 V*

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

Without CONSULT

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F11	45	52	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.3 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
			Idle to about 4,000 rpm	0.8 - 1.3 V to Approx. 2.4 V*

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

Is the inspection result normal?

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

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

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

- Crushed air ducts
- Malfunctioning seal of air cleaner element

- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

Is the inspection result normal?

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

3. CHECK MASS AIR FLOW SENSOR-II

With CONSULT

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT and select “DATA MONITOR” mode of “ENGINE”.
4. Select “MAS A/F SE-B1” and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.3 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
	Idle to about 4,000 rpm	0.8 - 1.3 V to Approx. 2.4 V*

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

Without CONSULT

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F11	45	52	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.3 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
			Idle to about 4,000 rpm	0.8 - 1.3 V to Approx. 2.4 V*

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

Is the inspection result normal?

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

4. CHECK MASS AIR FLOW SENSOR-III

With CONSULT

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select “DATA MONITOR” mode of “ENGINE”.
5. Select “MAS A/F SE-B1” and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.3 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
	Idle to about 4,000 rpm	0.8 - 1.3 V to Approx. 2.4 V*

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

Without CONSULT

1. Turn ignition switch OFF.

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F11	45	52	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.3 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
			Idle to about 4,000 rpm	0.8 - 1.3 V to Approx. 2.4 V*

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Clean or replace mass air flow sensor. Refer to EM-26, "Removal and Installation".

P0102, P0103 MAF SENSOR

DTC Logic

INFOID:0000000009020699

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leakage • Mass air flow sensor
P0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

Which DTC is detected?

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

1. Start engine and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-187, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-I

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

Is DTC detected?

YES >> Go to EC-187, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-II

1. Start engine and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-187, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020700

1.INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2.CHECK INTAKE SYSTEM

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

Is the inspection result normal?

YES >> GO TO 3.
NO >> Reconnect the parts.

3.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

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

4.CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between MAF sensor harness connector and ground.

MAF sensor		Ground	Voltage
Connector	Terminal		
F31	2	Ground	Battery voltage

Is the inspection result normal?

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

5.CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	3	F11	52	Existed

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

Is the inspection result normal?

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

6.CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between MAF sensor harness connector and ECM harness connector.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	4	F11	45	Existed

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

Is the inspection result normal?

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

7.CHECK MASS AIR FLOW SENSOR

Refer to EC-189, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace mass air flow sensor. Refer to EM-26, "Removal and Installation".

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000009020701

1. CHECK MASS AIR FLOW SENSOR-I

With CONSULT
1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select “DATA MONITOR” mode.
5. Select “MAS A/F SE-B1” and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.3 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
	Idle to about 4,000 rpm	0.8 - 1.3 V to Approx. 2.4 V*

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

Without CONSULT
1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector and ground.

ECM			Condition	Voltage
Connector	Terminal			
	+	–		
F11	45 (MAF sensor signal)	52	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.3 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
			Idle to about 4,000 rpm	0.8 - 1.3 V to Approx. 2.4 V*

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

Is the inspection result normal?

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

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

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

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

Is the inspection result normal?

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

3. CHECK MASS AIR FLOW SENSOR-II

With CONSULT
1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT and select “DATA MONITOR” mode.
4. Select “MAS A/F SE-B1” and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.3 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
	Idle to about 4,000 rpm	0.8 - 1.3 V to Approx. 2.4 V*

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

Without CONSULT
1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Check the voltage between ECM harness connector and ground.

ECM			Condition	Voltage
Connector	Terminal			
	+	–		
F11	45 (MAF sensor signal)	52	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.3 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
			Idle to about 4,000 rpm	0.8 - 1.3 V to Approx. 2.4 V*

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

Is the inspection result normal?

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

4. CHECK MASS AIR FLOW SENSOR-III

With CONSULT
1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select “DATA MONITOR” mode.
5. Select “MAS A/F SE-B1” and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.3 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
	Idle to about 4,000 rpm	0.8 - 1.3 V to Approx. 2.4 V*

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

Without CONSULT
1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector and ground.

ECM			Condition	Voltage
Connector	Terminal			
	+	–		
F11	45 (MAF sensor signal)	52	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.3 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
			Idle to about 4,000 rpm	0.8 - 1.3 V to Approx. 2.4 V*

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Clean or replace mass air flow sensor. Refer to EM-26, "Removal and Installation".

P0111 IAT SENSOR

DTC Logic

INFOID:0000000009020702

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0111	IAT SENSOR 1 B1 [Intake air temperature (IAT) sensor circuit range/performance]	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, FTT sensor, and EOT sensor) shows that the voltage signal of the IAT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	• Harness or connectors (High or low resistance in the IAT sensor circuit) • IAT sensor

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

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

2.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-193, "Component Function Check".

NOTE:
Use the component function check to check the overall function of the IAT sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-193, "Diagnosis Procedure".

3.PRECONDITIONING

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

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

TESTING CONDITION:

- **Before performing the following procedure, do not add fuel.**
- **Before performing the following procedure, check that fuel level is between 1/4 and 4/4.**
- **Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.**

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 60 minutes.
2. Move the vehicle to a cool place.
   NOTE:
   Cool the vehicle in an environment of ambient air temperature between −10°C (14°F) and 35°C (95°F).
3. Turn ignition switch OFF and soak the vehicle for 12 hours.
   CAUTION:
   Never turn ignition switch ON during soaking.
   NOTE:
   The vehicle must be cooled with the food open.
4. Start engine and let it idle for 5 minutes or more.
   CAUTION:
   Never turn ignition switch OFF during idling.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-193, "Diagnosis Procedure".
NO >> INSPECTION END

Component Function Check

INFOID:0000000009020703

1.CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR

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

Mass air flow sensor		Condition		Resistance (kΩ)
Terminal				
5	6	Temperature [°C (°F)]	25 (77)	1.800 – 2.200

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Proceed to EC-193, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020704

1.CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR

Check intake air temperature sensor. Refer toEC-193, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to EM-26, "Removal and Installation".

Component Inspection

INFOID:0000000009020705

1.CHECK INTAKE AIR TEMPERATURE SENSOR

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

Mass air flow sensor		Condition		Resistance (kΩ)
Terminals				
5	6	Temperature [°C (°F)]	25 (77)	1.800 - 2.200

Is the inspection result normal?

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

P0112, P0113 IAT SENSOR

DTC Logic

INFOID:0000000009020706

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air temperature sensor
P0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:0000000009020707

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor (with intake air temperature sensor) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between mass air flow sensor harness connector and ground.

MAF sensor		Ground	Voltage
Connector	Terminal		
F31	5	Ground	Approx. 5 V

Is the inspection result normal?

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

3.CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	6	F11	55	Existed

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

Is the inspection result normal?

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

4.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-195, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to EM-26, "Removal and Installation".

5.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000009020708

1.CHECK INTAKE AIR TEMPERATURE SENSOR

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

Terminals	Condition		Resistance
5 and 6	Temperature [°C (°F)]	25 (77)	1.800 - 2.200 kΩ

Is the inspection result normal?

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

P0116 ECT SENSOR

DTC Logic

INFOID:0000000009020709

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0116	ECT SEN/CIRC [Engine coolant temperature (ECT) sensor circuit range/performance]	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, FTT sensor, and EOT sensor) shows that the voltage signal of the ECT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	• Harness or connectors (High or low resistance in the ECT sensor circuit) • ECT sensor

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

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

2.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-197, "Component Function Check".

NOTE:
Use the component function check to check the overall function of the ECT sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

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

3.PRECONDITIONING

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

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

TESTING CONDITION:

- **Before performing the following procedure, do not add fuel.**
- **Before performing the following procedure, check that fuel level is between 1/4 and 4/4.**
- **Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.**

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 60 minutes.
2. Move the vehicle to a cool place.
   NOTE:
   Cool the vehicle in an environment of ambient air temperature between −10°C (14°F) and 35°C (95°F).
3. Turn ignition switch OFF and soak the vehicle for 12 hours.
   CAUTION:
   Never turn ignition switch ON during soaking.
   NOTE:
   The vehicle must be cooled with the food open.
4. Start engine and let it idle for 5 minutes or more.
   CAUTION:
   Never turn ignition switch OFF during idling.

5. Check 1st trip DTC.

Is 1st trip DTC detected?

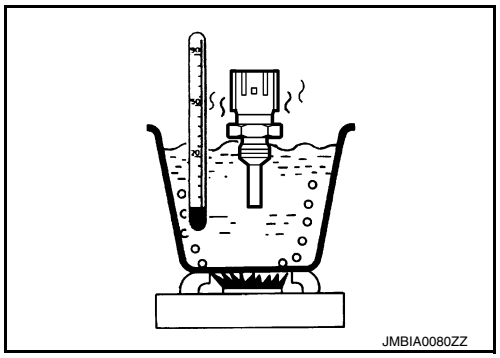
YES >> Proceed to EC-197, "Diagnosis Procedure".
NO >> INSPECTION END

Component Function Check

INFOID:0000000009020710

1.CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

1. Turn ignition switch OFF.
2. Disconnect ECT sensor harness connector.
3. Remove ECT sensor. Refer to CO-24, "Exploded View".
4. Check resistance between ECT sensor terminals by heating with hot water as shown in the figure.



ECT sensor		Condition		Resistance (kΩ)
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.10 – 2.90
			50 (122)	0.68 – 1.00
			90 (194)	0.236 – 0.260

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Proceed to EC-197, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020711

1.CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

Check ECT sensor. Refer to EC-197, "Component Inspection".

Is the inspection result normal?

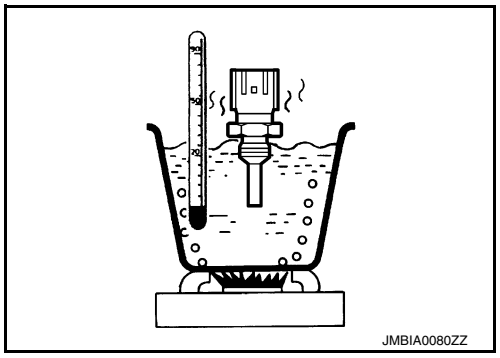
YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace ECT sensor. Refer to CO-24, "Exploded View".

Component Inspection

INFOID:0000000009020712

1.CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

1. Turn ignition switch OFF.
2. Disconnect ECT sensor harness connector.
3. Remove ECT sensor.
4. Check resistance between ECT sensor terminals by heating with hot water as shown in the figure.



ECT sensor		Condition		Resistance (kΩ)
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.10 - 2.90
			50 (122)	0.68 - 1.00
			90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor. Refer to CO-24, "Exploded View".

P0117, P0118 ECT SENSOR

DTC Logic

INFOID:0000000009020713

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Engine coolant temperature sensor
P0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

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

Diagnosis Procedure

INFOID:0000000009020714

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between ECT sensor harness connector and ground.

ECT sensor		Ground	Voltage
Connector	Terminal		
F6	1	Ground	Approx. 5 V

Is the inspection result normal?

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

3.CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

ECT sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F6	2	F11	44	Existed

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

Is the inspection result normal?

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

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-199, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace engine coolant temperature sensor. Refer to CO-24, "Exploded View".

5.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

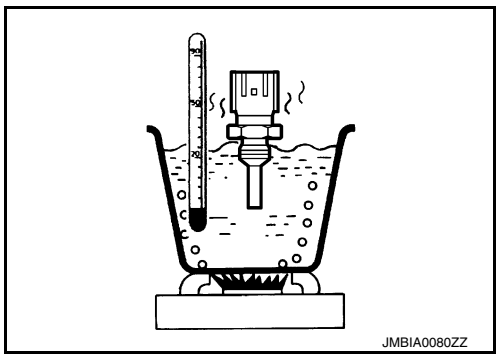
>> INSPECTION END

Component Inspection

INFOID:0000000009020715

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Remove engine coolant temperature sensor. Refer to CO-24, "Exploded View"
4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.



Terminals	Condition		Resistance
1 and 2	Temperature [°C (°F)]	20 (68)	2.10 - 2.90 kΩ
		50 (122)	0.68 - 1.00 kΩ
		90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor. Refer to CO-24, "Exploded View".

P0122, P0123 TP SENSOR

DTC Logic

INFOID:0000000009020716

DTC DETECTION LOGIC

NOTE:
If DTC P0122 or P0123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-352, "DTC Logic".

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	• Harness or connectors (TP sensor 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 2)
P0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to EC-200, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020717

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.
3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F7	2	Ground	Approx. 5 V

Is the inspection result normal?

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

3.CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	4	F11	36	Existed

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

Is the inspection result normal?

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

4.CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	3	F11	34	Existed

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

Is the inspection result normal?

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

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-201, "Component Inspection".

Is the inspection result normal?

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

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-28, "Removal and Installation".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000009020718

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-127, "Work Procedure".
4. Turn ignition switch ON.
5. Set selector lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector and ground.

ECM			Condition		Voltage
Connector	Terminal				
	+	–			
F11	33 (TP sensor 1 signal)	36	Accelerator pedal	Fully released	More than 0.36 V
				Fully depressed	Less than 4.75 V
	34 (TP sensor 2 signal)			Fully released	Less than 4.75 V
				Fully depressed	More than 0.36 V

Is the inspection result normal?

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

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-28, "Removal and Installation".

>> INSPECTION END

P0125 ECT SENSOR

DTC Logic

INFOID:0000000009020719

DTC DETECTION LOGIC

NOTE:

- **If DTC P0125 is displayed with P0116, first perform the trouble diagnosis for DTC P0116. Refer to EC-196, "DTC Logic".**
- **If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to EC-198, "DTC Logic".**

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0125	ECT SENSOR (Insufficient engine coolant temperature for closed loop fuel control)	• Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. • Engine coolant temperature is insufficient for closed loop fuel control.	• Harness or connectors (High resistance in the circuit) • Engine coolant temperature sensor • Thermostat

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check “COOLAN TEMP/S”.

With GST

Follow the procedure “With CONSULT” above.

Is it above 5°C (41°F)?

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

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start engine and run it for 65 minutes at idle speed.
2. Check 1st tip DTC.

If “COOLAN TEMP/S” indication increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.

CAUTION:

Be careful not to overheat engine.

With GST

Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:0000000009020720

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check the engine coolant temperature sensor. Refer to EC-204, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine coolant temperature sensor. Refer to CO-24, "Exploded View".

2.CHECK THERMOSTAT OPERATION

When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.

Is the inspection result normal?

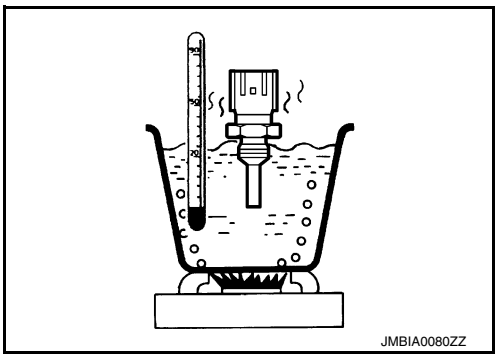
YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Repair or replace thermostat. Refer to CO-21, "Exploded View".

Component Inspection

INFOID:0000000009020721

1.CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

1. Turn ignition switch OFF.
2. Disconnect ECT sensor harness connector.
3. Remove ECT sensor.
4. Check resistance between ECT sensor terminals by heating with hot water as shown in the figure.



ECT sensor		Condition		Resistance (kΩ)
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.10 - 2.90
			50 (122)	0.68 - 1.00
			90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor. Refer to CO-24, "Exploded View".

P0127 IAT SENSOR

DTC Logic

INFOID:0000000009020722

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0127	IAT SENSOR-B1 (Intake air temperature too high)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	• Harness or connectors (Intake air temperature sensor circuit is open or shorted) • Intake air temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Wait until engine coolant temperature is less than 96°C (205°F)

- Turn ignition switch ON.
- Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
- Check the engine coolant temperature.
- If the engine coolant temperature is not less than 96°C (205°F), turn ignition switch OFF and cool down engine.

NOTE:

Perform the following steps before engine coolant temperature is above 96°C (205°F).

2. Turn ignition switch ON.
3. Select “DATA MONITOR” mode of “ENGINE” using CONSULT
4. Start engine.
5. Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.

CAUTION:

Always drive vehicle at a safe speed.

6. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-205, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020723

1.CHECK INTAKE AIR TEMPERATURE SENSOR

Check the intake air temperature sensor. Refer to EC-206, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to EM-26, "Removal and Installation".

Component Inspection

INFOID:0000000009020724

1. CHECK INTAKE AIR TEMPERATURE SENSOR

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

Mass air flow sensor		Condition		Resistance (kΩ)
Terminals				
5	6	Temperature [°C (°F)]	25 (77)	1.800 - 2.200

Is the inspection result normal?

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

P0128 THERMOSTAT FUNCTION

DTC Logic

INFOID:0000000009020725

DTC DETECTION LOGIC

NOTE:
If DTC P0128 is displayed with DTC P0300, P0301, P0302, P0303 or P0304, first perform the trouble diagnosis for P0300, P0301, P0302, P0303, P0304. Refer to EC-267, "DTC Logic".
Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough.
This is due to a leak in the seal or the thermostat being stuck open.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0128	THERMSTAT FNCTN [Coolant thermostat (coolant temperature below thermostat regulating temperature)]	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	• Thermostat • Leakage from sealing portion of thermostat • Engine coolant temperature sensor

DTC CONFIRMATION PROCEDURE

NOTE:
Never refuel before and during the following procedure.

1. PRECONDITIONING-I

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PRECONDITIONING-II

With CONSULT
1. Turn ignition switch ON.
2. Check the following conditions:

Ambient temperature	−10°C (14°F) or more
A/C switch	OFF
Blower fan switch	OFF

3. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
4. Check the following conditions:

COOLAN TEMP/S	−10°C – 52°C (14 – 126°F) (M/T) −10°C – 46°C (14 – 115°F) (CVT)

Is the condition satisfied?

YES >> GO TO 3.
NO >> 1. Satisfy the condition.
2. GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT
1. Start engine.
2. Drive the vehicle until the following condition is satisfied.
CAUTION:
Always drive vehicle at safe speed.
- **STEP 1**

Drive the vehicle under the conditions instructed below until the difference between “COOLAN TEMP/S” and “FUEL T/TMP SE” becomes at least 25°C (45°F).

COOLAN TEMP/S	71°C (160°F) or less (M/T) 65°C (149°F) or less (CVT)
FUEL T/TMP SE	Less than the value calculated by subtracting 25°C (45°F) from “COOLAN TEMP/S”.*

*: Example

COOLAN TEMP/S	FUEL T/TMP SE
70°C (158°F)	47°C (117°F) or less
65°C (149°F)	42°C (108°F) or less
60°C (140°F)	37°C (99°F) or less

- **STEP 2**

Drive the vehicle at 50 km/h (32 MPH) or more with the difference between “COOLAN TEMP/S” and “FUEL T/TMP SE” maintained at 23°C (41°F) or more.

NOTE:

Keep the accelerator pedal as steady as possible during cruising.

- **STEP 3**

Drive the vehicle at 50 km/h (32 MPH) or more until “COOLAN TEMP/S” increases by 6°C (11°F).

NOTE:

Keep the accelerator pedal as steady as possible during cruising.

Is the condition satisfied?

YES >> GO TO 4.
NO >> GO TO 1.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT

1. Drive the vehicle until the following condition is satisfied.

COOLAN TEMP/S	71°C (160°F) or more (M/T) 65°C (149°F) or more (CVT)

CAUTION:

Always drive vehicle at safe speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-208, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020726

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check the engine coolant temperature sensor. Refer to EC-209, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine coolant temperature sensor. Refer to CO-24, "Exploded View".

2. CHECK THERMOSTAT

Check the thermostat. Refer to CO-21, "Removal and Installation".

Is the inspection result normal?

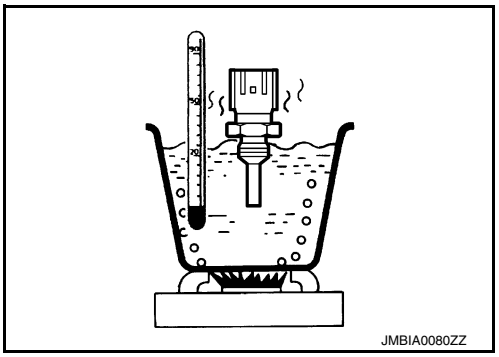
YES >> INSPECTION END
NO >> Replace thermostat. Refer to CO-21, "Removal and Installation".

Component Inspection

INFOID:0000000009020727

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Remove engine coolant temperature sensor. Refer to CO-24, "Exploded View".
4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.



Engine coolant temperature sensor		Condition		Resistance (kΩ)
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.10 - 2.90
			50 (122)	0.68 - 1.00
			90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor. Refer to CO-24, "Exploded View".

P0130 A/F SENSOR 1

DTC Logic

INFOID:0000000009020728

DTC DETECTION LOGIC

To judge malfunctions, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible Cause
P0130	Air fuel ratio (A/F) sensor 1 circuit	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • A/F sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

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

Do you have CONSULT?

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

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

1. Start engine and warm it up to normal operating temperature.
2. Select “ENGINE” using CONSULT.
3. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode.
4. Check “A/F SEN1 (B1)” indication.

Does the indication fluctuate around 2.2 V?

YES >> GO TO 3.
NO >> Go to EC-211, "Diagnosis Procedure".

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION -I

1. Select “ENGINE” using CONSULT.
2. Select “A/F SEN1 (B1) P1276” (for DTC P0130) of “A/F SEN1” in “DTC WORK SUPPORT” mode.
3. Touch “START”.
4. When the following conditions are met, “TESTING” will be displayed on the CONSULT screen.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 mph)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever	D position (CVT models) 5th position (M/T models)

If “TESTING” is not displayed after 20 seconds, retry from step 2.

CAUTION:

Always drive vehicle at a safe speed.

Is “TESTING” displayed on CONSULT screen?

YES >> GO TO 4.
NO >> Check A/F sensor 1 function again. GO TO 2.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION -II

Release accelerator pedal fully.

NOTE:

Never apply brake when releasing the accelerator pedal.

Which does “TESTING” change to?

COMPLETED>>GO TO 5.
OUT OF CONDITION>>Retry DTC CONFIRMATION PROCEDURE. GO TO 3.

5.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION -III

Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT screen?

OK >> INSPECTION END
NG >> Go to EC-211, "Diagnosis Procedure".

6.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION

Perform component function check. Refer to EC-211, "Component Function Check".

NOTE:
Use component function check to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-211, "Diagnosis Procedure".

Component Function Check

INFOID:0000000009020729

1.PERFORM COMPONENT FUNCTION CHECK

With GST

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
3. Shift the selector lever to D position (CVT) or 5th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).
   CAUTION:
   Always drive vehicle at a safe speed.
   NOTE:
   Never apply brake when releasing the accelerator pedal.
4. Repeat steps 2 and 3 for five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Turn ignition switch ON.
7. Turn ignition switch OFF and wait at least 10 seconds.
8. Restart engine.
9. Repeat steps 2 and 3 for five times.
10. Stop the vehicle and connect GST to the vehicle.
11. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-211, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020730

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

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

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage
Connector	Terminal		
F12	4	Ground	Battery voltage

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R harness connector F42
- 20A fuse (No. 53)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	49	Existed
	2		53	

4. Check the continuity between A/F sensor 1 harness connector and ground or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

5. Also check harness for short to power.

Is the inspection result normal?

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

5. CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

Is the inspection result normal?

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

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-31, "Exploded View".

CAUTION:

- **Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

P0131 A/F SENSOR 1

DTC Logic

INFOID:0000000009020731

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately low.

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible Cause
P0131	Air fuel ratio (A/F) sensor 1 circuit low voltage	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0 V.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • A/F sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

>> GO TO 2.

2.CHECK A/F SENSOR FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Select “ENGINE” using CONSULT.
3. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode.
4. Check “A/F SEN1 (B1)” indication.

Is the indication constantly approx. 0 V?

YES >> Go to EC-215, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

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

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

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

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-215, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020732

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

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

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage
Connector	Terminal		
F12	4	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R harness connector F42
- 20A fuse (No. 53)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	49	Existed
	2		53	

4. Check the continuity between A/F sensor 1 harness connector and ground or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

5. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

Is the inspection result normal?

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

6.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-31, "Exploded View".

CAUTION:

- **Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

P0132 A/F SENSOR 1

DTC Logic

INFOID:0000000009020733

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately high.

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible Cause
P0132	Air fuel ratio (A/F) sensor 1 circuit high voltage	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5 V.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • A/F sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

>> GO TO 2.

2.CHECK A/F SENSOR FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Select “ENGINE” using CONSULT.
3. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode.
4. Check “A/F SEN1 (B1)” indication.

Is the indication constantly approx. 5 V?

YES >> Go to EC-218, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

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

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

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

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-218, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020734

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

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

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage
Connector	Terminal		
F12	4	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R harness connector F42
- 20A fuse (No. 53)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	49	Existed
	2		53	

4. Check the continuity between A/F sensor 1 harness connector and ground or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

5. Also check harness for short to power.

Is the inspection result normal?

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

5. CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

Is the inspection result normal?

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

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-31, "Exploded View".

CAUTION:

- **Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

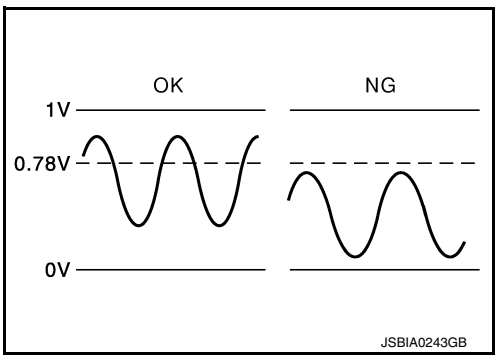
P0137 HO2S2

DTC Logic

INFOID:0000000009020735

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst 1 causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during various driving conditions such as fuel-cut.



DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P0137	Heated oxygen sensor 2 circuit low voltage	The maximum voltage from the sensor does not reach the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

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

2.PRECONDITIONING

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

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

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

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).
7. Open engine hood.
8. Select "HO2S2 (B1) P1147" of "HO2S2" in "DTC WORK SUPPORT" mode of "ENGINE" using CONSULT.
9. Follow the instruction of CONSULT.
   NOTE:

It will take at most 10 minutes until “COMPLETED” is displayed.
10. Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT screen?

OK >> INSPECTION END
NG >> Proceed to EC-222, "Diagnosis Procedure".
CAN NOT BE DIAGNOSED>>GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-221, "Component Function Check".

NOTE:
Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-222, "Diagnosis Procedure".

Component Function Check

INFOID:0000000009020736

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F11	50 (HO2S2)	59	Revving up to 3,600 rpm under no load at least 10 times	The voltage should be above 0.78 V at least once during this procedure.

Is the inspection result normal?

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

2.PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F11	50 (HO2S2)	59	Keeping engine at idle for 10 minutes	The voltage should be above 0.78 V at least once during this procedure.

Is the inspection result normal?

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

3.PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F11	50 (HO2S2)	59	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.78 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-222, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020737

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-130, "Work Procedure".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171. Refer to EC-245, "DTC Logic".
NO >> GO TO 3.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E63	1	F11	59	Existed

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

Is the inspection result normal?

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

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E63	4	F11	50	Existed

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

HO2S2		Ground	Continuity
Connector	Terminal		
E63	4	Ground	Not existed

ECM		Ground	Continuity
Connector	Terminal		
F11	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-223, "Component Inspection".

Is the inspection result normal?

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

6.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to EX-5, "Exploded View"

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000009020738

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

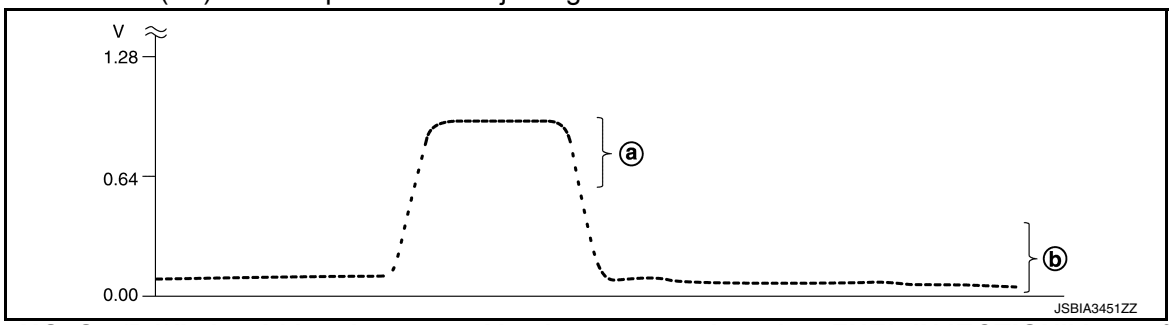
YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

With CONSULT

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

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



ⓐ: **“HO2S2 (B1)” should be above 0.78 V at least once when the “FUEL INJECTION” is +25%.**
ⓑ: **“HO2S2 (B1)” should be below 0.18 V at least once when the “FUEL INJECTION” is −25%.**

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F11	50 (HO2S2)	59	Revving up to 3,600 rpm under no load at least 10 times	The voltage should be above 0.78 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F11	50 (HO2S2)	59	Keeping engine at idle for 10 minutes	The voltage should be above 0.78 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F11	50 (HO2S2)	59	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.78 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

6. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

P0138 HO2S2

DTC Logic

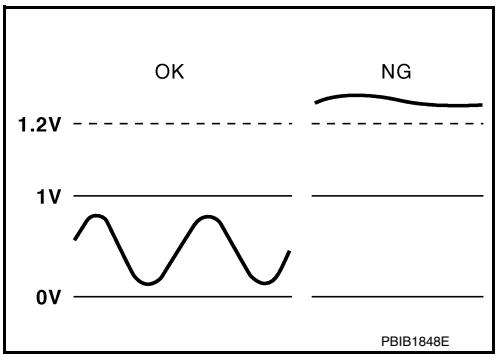
INFOID:0000000009020739

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst 1 causes the longer switching time.

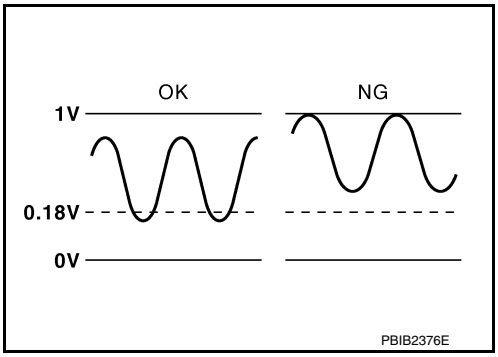
MALFUNCTION A

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during various driving conditions such as fuel cut.



MALFUNCTION B

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during various driving conditions such as fuel cut.



DTC No.	Trouble diagnosis content	DTC detecting condition		Possible cause
P0138	Heated oxygen sensor 2 circuit high voltage	A)	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2
		B)	The minimum voltage from the sensor is not reached to the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING OF DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.

3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 2 minutes.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-228, "Diagnosis Procedure".
NO-1 >> With CONSULT: GO TO 3.
NO-2 >> Without CONSULT: GO TO 5.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

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

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

Which is displayed on CONSULT

OK >> INSPECTION END
NG >> Proceed to EC-228, "Diagnosis Procedure".
CAN NOT BE DIAGNOSED>>GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B AGAIN

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Perform DTC confirmation procedure again.

>> GO TO 3.

5.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to EC-227, "Component Function Check".

NOTE:
Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-228, "Diagnosis Procedure".

Component Function Check

INFOID:0000000009020740

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F11	50 (HO2S2 signal)	59	Revving up to 3,600 rpm under no load at least 10 times	The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

2.PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F11	50 (HO2S2 signal)	59	Keeping engine at idle for 10 minutes	The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

3.PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F11	50 (HO2S2 signal)	59	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-228, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020741

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-226, "DTC Logic".

Which malfunction is detected?

A >> GO TO 2.
B >> GO TO 9.

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace ground connection.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E63	1	F11	59	Existed

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

Is the inspection result normal?

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

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E63	4	F11	50	Existed

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

HO2S2		Ground	Continuity
Connector	Terminal		
E63	4	Ground	Not existed

ECM		Ground	Continuity
Connector	Terminal		
F11	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace harness or connectors.

6.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-231, "Component Inspection".

Is the inspection result normal?

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

7.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

9. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace ground connection.

10. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-130, "Work Procedure".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0172. Refer to EC-249, "DTC Logic".
NO >> GO TO 11.

11. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E63	1	F11	59	Existed

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

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E63	4	F11	50	Existed

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

HO2S2		Ground	Continuity
Connector	Terminal		
E63	4	Ground	Not existed

ECM		Ground	Continuity
Connector	Terminal		
F11	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

13. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-231, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> GO TO 14.

14. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

15. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000009020742

1. INSPECTION START

Do you have CONSULT?

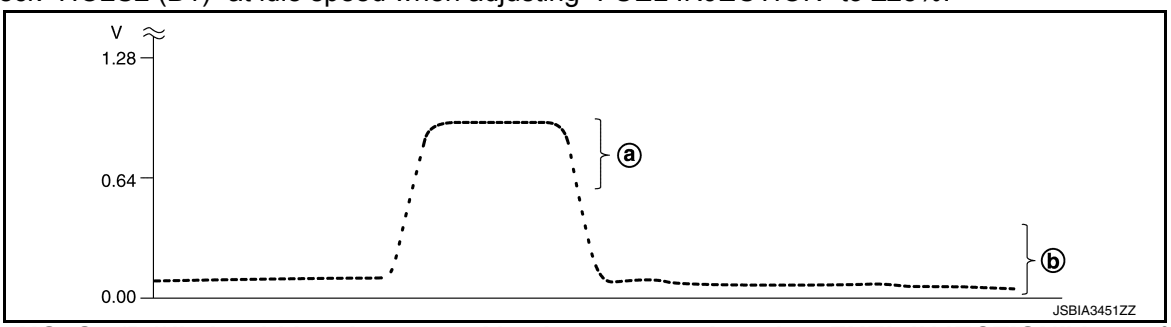
Do you have CONSULT?

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

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT

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



ⓐ: **“HO2S2 (B1)” should be above 0.78 V at least once when the “FUEL INJECTION” is +25%.**
ⓑ: **“HO2S2 (B1)” should be below 0.18 V at least once when the “FUEL INJECTION” is −25%.**

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F11	50 (HO2S2)	59	Revving up to 3,600 rpm under no load at least 10 times	The voltage should be above 0.78 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F11	50 (HO2S2)	59	Keeping engine at idle for 10 minutes	The voltage should be above 0.78 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F11	50 (HO2S2)	59	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.78 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

6. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

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

- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

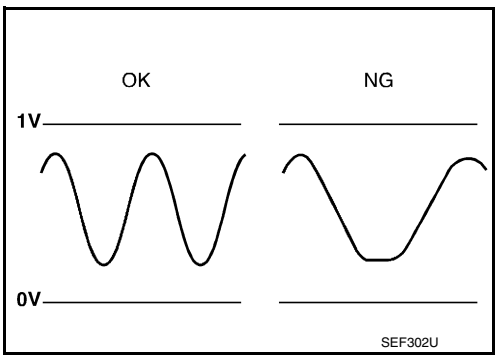
P0139 HO2S2

DTC Logic

INFOID:0000000009020743

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel cut.



DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P0139	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond between rich and lean than the specified time.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

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

2.PRECONDITIONING

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

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

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

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
6. Let engine idle for 1 minute.
7. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
8. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F).
9. Open engine hood.
10. Select "HO2S2 (B1) P0139" in "DTC WORK SUPPORT" mode of "ENGINE" using CONSULT.

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

Is “COMPLETED” displayed on CONSULT screen?

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

4. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Perform DTC confirmation procedure again.

>> GO TO 3.

5. PERFORM SELF-DIAGNOSIS

With CONSULT
Perform ECM self-diagnosis.

Is DTC “P0139” detected?

YES >> Proceed to EC-236, "Diagnosis Procedure".
NO >> INSPECTION END

6. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-235, "Component Function Check".
NOTE:
Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-236, "Diagnosis Procedure".

Component Function Check

INFOID:0000000009020744

1. PERFORM COMPONENT FUNCTION CHECK-I

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

ECM			Condition	Voltage
Connector	Terminal			
	+	–		
F11	50 (HO2S2 signal)	59	Revving up to 3,600 rpm under no load at least 10 times	A change of voltage should be more than 0.12 V for 1 second during this procedure.

Is the inspection result normal?

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

2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM			Condition	Voltage
Connector	Terminal			
	+	–		
F11	50 (HO2S2 signal)	59	Keeping engine speed at idle for 10 minutes	A change of voltage should be more than 0.12 V for 1 second during this procedure.

Is the inspection result normal?

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

3.PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector and ground under the following condition.

ECM			Condition	Voltage
Connector	Terminal			
	+	–		
F11	50 (HO2S2 signal)	59	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	A change of voltage should be more than 0.12 V for 1 second during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-236, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020745

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-130, "Work Procedure".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-245, "DTC Logic" or EC-249, "DTC Logic".
NO >> GO TO 3.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E63	1	F11	59	Existed

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

Is the inspection result normal?

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

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E63	4	F11	50	Existed

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

HO2S2		Ground	Continuity
Connector	Terminal		
E63	4	Ground	Not existed

ECM		Ground	Continuity
Connector	Terminal		
F11	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-237, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

6.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000009020746

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

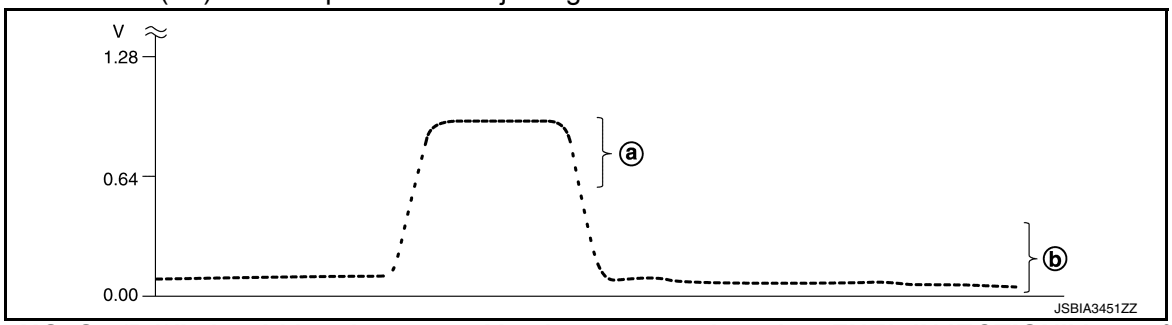
YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

With CONSULT

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

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



ⓐ: **“HO2S2 (B1)” should be above 0.78 V at least once when the “FUEL INJECTION” is +25%.**
ⓑ: **“HO2S2 (B1)” should be below 0.18 V at least once when the “FUEL INJECTION” is −25%.**

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F11	50 (HO2S2)	59	Revving up to 3,600 rpm under no load at least 10 times	The voltage should be above 0.78 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F11	50 (HO2S2)	59	Keeping engine at idle for 10 minutes	The voltage should be above 0.78 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F11	50 (HO2S2)	59	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.78 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

6. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

P014C, P014D, P015A, P015B, A/F SENSOR 1

DTC Logic

INFOID:0000000009020747

DTC DETECTION LOGIC

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

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible Cause
P014C	Air fuel ratio (A/F) sensor 1 (bank 1) circuit slow response	• The response time of a A/F sensor 1 signal delays more than the specified time computed by ECM.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • A/F sensor 1
P014D			
P015A	Air fuel ratio (A/F) sensor 1 (bank 1) circuit delayed response		
P015B			

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

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

Do you have CONSULT?

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

2.PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
6. Let engine idle for 1 minute.
7. Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds.
8. Fully release accelerator pedal and then let engine idle for about 1 minute.
9. Check the items status of “DATA MONITOR” as follows.

NOTE:

If “PRSNT” changed to “ABSNT”, refer to EC-149, "Component Function Check".

Data monitor item	Status
A/F SEN1 DIAG3 (B1)	PRSNT

Is “PRSNT” displayed on CONSULT screen?

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

3.PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

Perform DTC confirmation procedure-1 again.

Is “PRSNT” displayed on CONSULT screen?

YES >> GO TO 4.
NO >> Refer to EC-149, "Component Function Check".

4. PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT
1. Wait for about 20 seconds at idle.
2. Check the items status of “DATA MONITOR” as follows.
   NOTE:
   If “CMPLT” changed to “INCMP”, refer to EC-149, "Component Function Check".

Data monitor item	Status
A/F SEN1 DIAG1 (B1)	CMPLT
A/F SEN1 DIAG2 (B1)	

Is “CMPLT” displayed on CONSULT screen?

YES >> GO TO 5.
NO >> Refer to EC-149, "Component Function Check".

5. PERFORM SELF-DIAGNOSIS

With CONSULT
Check the “SELF-DIAG RESULT”.

Is any DTC detected?

YES >> Proceed to EC-242, "Diagnosis Procedure".
NO >> INSPECTION END

6. CHECK AIR-FUEL RATIO SELF-LEARNING VALUE

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

Is the total percentage within ±15%?

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

7. DETECT MALFUNCTIONING PART

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

>> Repair or replace malfunctioning part.

8. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds.
7. Fully release accelerator pedal and then let engine idle for about 1 minute.
8. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-242, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020748

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

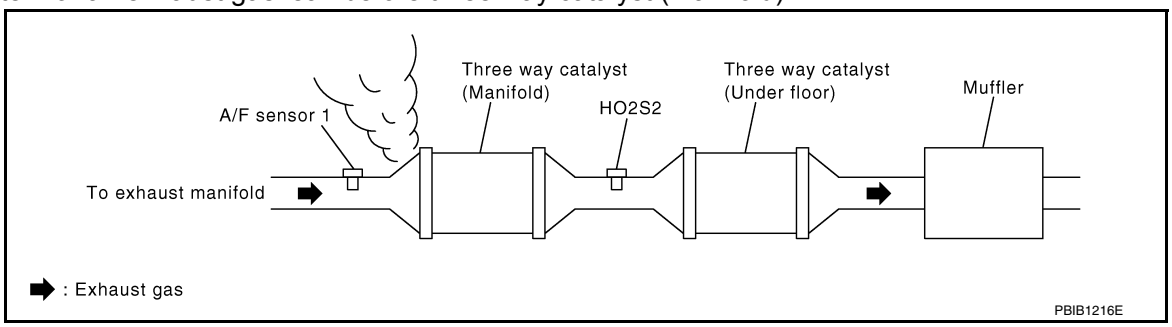
2.RETIGHTEN A/F SENSOR 1

Loosen and retighten the A/F sensor 1. Refer to EM-31, "Exploded View".

>> GO TO 3.

3.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

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

4.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

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

5.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-130, "Work Procedure".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-245, "DTC Logic" or EC-249, "DTC Logic".
NO >> GO TO 6.

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

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage
Connector	Terminal		
F12	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R harness connector F42
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

8. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	49	Existed
	2		53	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

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

Refer to EC-172, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 13.

10. CHECK MASS AIR FLOW SENSOR

Refer to EC-184, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace mass air flow sensor. Refer to EM-26, "Removal and Installation".

11. CHECK PCV VALVE

Refer to EC-464, "Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair or replace PCV valve. Refer to EM-48, "Exploded View".

12. CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

Is the inspection result normal?

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

13. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1. Refer to EM-31, "Exploded View".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000009020749

DTC DETECTION LOGIC

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

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

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P0171	Fuel injection system too lean	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	• Intake air leaks • A/F sensor 1 • Fuel injector • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor • Incorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to EC-130, "Work Procedure".
2. Start engine.

Is it difficult to start engine?

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

3.RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.
Crank engine while depressing accelerator pedal.

NOTE:
When depressing accelerator pedal three-fourths (3/4) or more, the control system may not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Go to EC-246, "Diagnosis Procedure".
NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

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

Is 1st trip DTC detected?

YES >> Go to EC-246, "Diagnosis Procedure".

NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine.
3. Maintain the following conditions for at least 10 consecutive minutes.
   Hold the accelerator pedal as steady as possible.

VHCL SPEED SE	50 – 120 km/h (31 – 75 MPH)

CAUTION:
Always drive vehicle at a safe speed.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

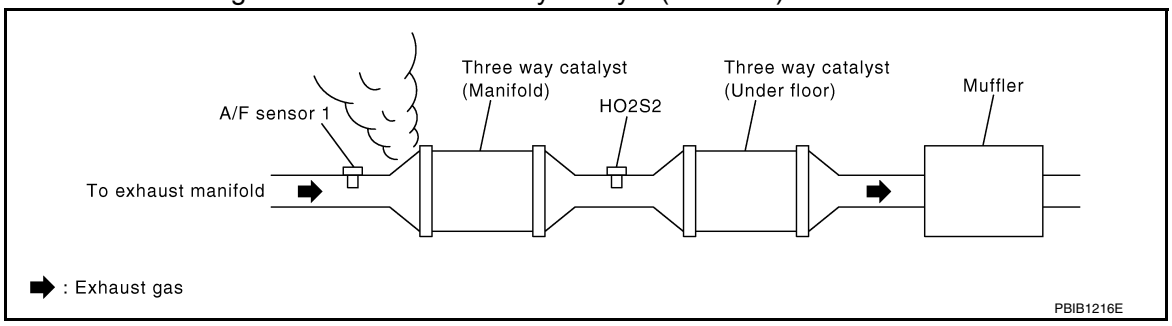
YES >> Go to EC-246, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020750

1.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

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

2.CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

Intake air leak detected?

YES >> Repair or replace.
NO >> GO TO 3.

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect corresponding A/F sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	49	Existed
	2		53	

5. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

6. Also check harness for short to power.

Is the inspection result normal?

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

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-135, "Work Procedure".
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-135, "Work Procedure".

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

Is the inspection result normal?

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

5. CHECK FUEL HOSES AND FUEL TUBES

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”. Refer to FL-6, "Exploded View".
NO >> Repair or replace

6. CHECK MASS AIR FLOW SENSOR

With CONSULT

1. Install all removed parts.
2. Check “MASS AIRFLOW” in “DATA MONITOR” mode with CONSULT.

0.8 - 4.0 g/s : at idling
2.0 - 10.0 g/s : at 2,500 rpm

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.

0.8 - 4.0 g/s : at idling
2.0 - 10.0 g/s : at 2,500 rpm

Is the measurement value within the specification?

YES >> GO TO 7.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-187, "DTC Logic".

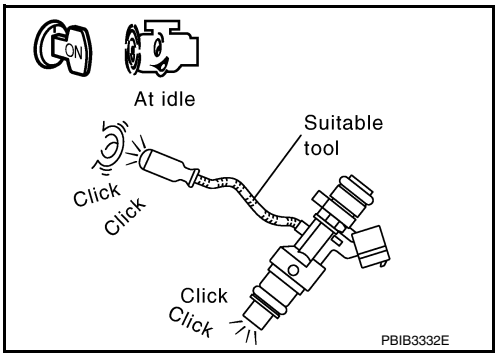
7. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT

1. Let engine idle.
2. Listen to each fuel injector operating sound.



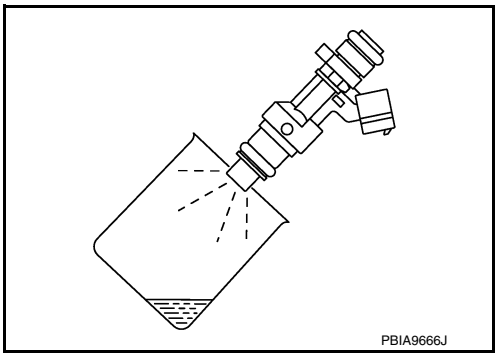
Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for FUEL INJECTOR. Refer to EC-434, "Component Function Check".

8. CHECK FUEL INJECTOR

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



Fuel should be sprayed evenly for each fuel injector.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones. Refer to EM-40, "Removal and Installation".

9. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000009020751

DTC DETECTION LOGIC

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

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

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P0172	Fuel injection system too rich	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	• A/F sensor 1 • Fuel injector • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to EC-130, "Work Procedure".
2. Start engine.

Is it difficult to start engine?

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

3.RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.
Crank engine while depressing accelerator pedal.
NOTE:
When depressing accelerator pedal three-fourths (3/4) or more, the control system may not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Go to EC-250, "Diagnosis Procedure".
NO >> Remove spark plugs and check for fouling, etc.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

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

Is 1st trip DTC detected?

YES >> Go to EC-250, "Diagnosis Procedure".
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine.
3. Maintain the following conditions for at least 10 consecutive minutes.
   Hold the accelerator pedal as steady as possible.

VHCL SPEED SE	50 – 120 km/h (31 – 75 MPH)

CAUTION:
Always drive vehicle at a safe speed.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

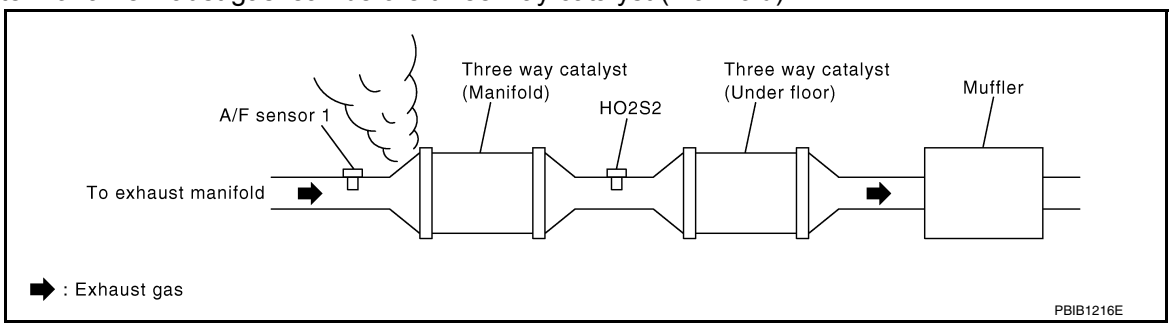
YES >> Go to EC-250, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020752

1.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

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

2.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.
NO >> GO TO 3.

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect corresponding A/F sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	49	Existed
	2		53	

5. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

6. Also check harness for short to power.

Is the inspection result normal?

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

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-135, "Work Procedure".
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-135, "Work Procedure".

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

Is the inspection result normal?

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

5. CHECK FUEL HOSES AND FUEL TUBES

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”. Refer to FL-6, "Exploded View".
NO >> Repair or replace

6. CHECK MASS AIR FLOW SENSOR

With CONSULT

1. Install all removed parts.
2. Check “MASS AIRFLOW” in “DATA MONITOR” mode with CONSULT.

0.8 - 4.0 g/s : at idling
2.0 - 10.0 g/s : at 2,500 rpm

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in “Service $01” with GST.

0.8 - 4.0 g/s : at idling
2.0 - 10.0 g/s : at 2,500 rpm

Is the measurement value within the specification?

YES >> GO TO 7.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-187, "DTC Logic".

7. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT

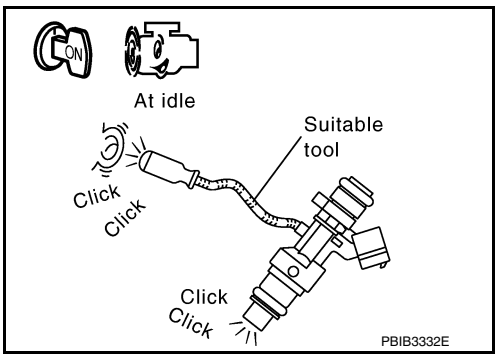
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT

1. Let engine idle.

2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for FUEL INJECTOR. Refer to EC-434, "Component Function Check".

8. CHECK FUEL INJECTOR

1. Remove fuel injector assembly. Refer to EM-40, "Removal and Installation".
   Keep fuel hose and all fuel injectors connected to fuel tube.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all fuel injector harness connectors.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each fuel injectors.
6. Crank engine for about 3 seconds.
   Make sure fuel does not drip from fuel injector.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace the fuel injectors from which fuel is dripping. Always replace O-ring with new one. Refer to EM-40, "Removal and Installation".

9. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

P0181 FTT SENSOR

DTC Logic

INFOID:0000000009020753

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition		Possible cause
P0181	FTT SENSOR [Fuel tank temperature (FTT) sensor circuit range/performance]	A)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from ECT sensor and intake air temperature sensor.	• Harness or connectors (FTT sensor circuit is open or shorted) • FTT sensor • Combination meter
		B)	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, EOT sensor, and FTT sensor) shows that the voltage signal of the FTT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	• Harness or connectors (High or low resistance in the FTT sensor circuit) • FTT sensor

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 7.
NO >> GO TO 2.

2.PRECONDITIONING

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

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

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-I

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

Is 1st trip DTC detected?

YES >> Proceed to EC-255, "Diagnosis Procedure".
NO >> GO TO 4.

4.CHECK ENGINE COOLANT TEMPERATURE

With CONSULT
1. Select “COOLAN TEMP/S” in “DATA MONITOR” of “ENGINE” using CONSULT.
2. Check “COOLAN TEMP/S” value.

With GST
Follow the procedure “With CONSULT” above.

“COOLAN TEMP/S” less than 60°C (140°F)?

YES >> INSPECTION END
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-II

With CONSULT
1. Cool engine down until “COOLAN TEMP/S” is less than 60°C (140°F).

2. Wait at least 10 seconds.
3. Check 1st trip DTC.

With GST
Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-255, "Diagnosis Procedure".
NO >> GO TO 6.

6.PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)

Perform component function check. Refer to EC-254, "Component Function Check".

NOTE:
Use the component function check to check the overall function of the FTT sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-255, "Diagnosis Procedure".

7.PRECONDITIONING

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

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

TESTING CONDITION:

- **Before performing the following procedure, do not add fuel.**
- **Before performing the following procedure, check that fuel level is between 1/4 and 4/4.**
- **Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.**

>> GO TO 8.

8.PERFORM DTC CONFIRMATION PROCEDURE B

1. Start engine and let it idle for 60 minutes.
2. Move the vehicle to a cool place.
   NOTE:
   Cool the vehicle in an environment of ambient air temperature between −10°C (14°F) and 35°C (95°F).
3. Turn ignition switch OFF and soak the vehicle for 12 hours.
   CAUTION:
   Never turn ignition switch ON during soaking.
   NOTE:
   The vehicle must be cooled with the food open.
4. Start engine and let it idle for 5 minutes or more.
   CAUTION:
   Never turn ignition switch OFF during idling.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-255, "Diagnosis Procedure".
NO >> INSPECTION END

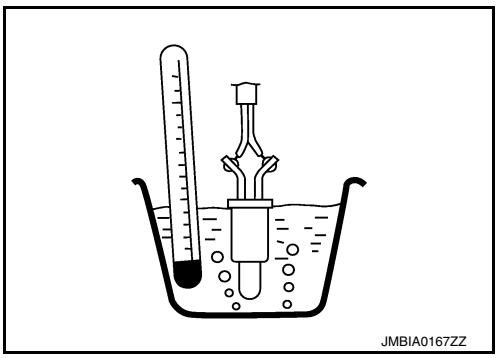
Component Function Check

INFOID:0000000009020754

1.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Remove fuel level sensor unit. Refer to FL-6, "Removal and Installation".

4. Check resistance between fuel level sensor unit and fuel pump terminals by heating with hot water as shown in the figure.



Fuel level sensor unit and fuel pump		Condition		Resistance (kΩ)
Terminal				
4	5	Temperature [°C (°F)]	20 (68)	2.3 – 2.7
			50 (122)	0.79 – 0.90

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Proceed to EC-255, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020755

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-253, "DTC Logic".

Which malfunction is detected?

A >> GO TO 2.
B >> GO TO 6.

2.CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to MWI-15, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Proceed to MWI-21, "DTC Index"

3.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR POWER

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel level sensor unit and fuel pump harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage (Approx.)
Connector	Terminal		
B44	4	Ground	5 V

Is the inspection result normal?

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

4.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel level sensor unit and fuel pump harness connector and ECM harness connector.

Fuel level sensor unit and fuel pump		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B44	4	F11	42	Existed

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

Is the inspection result normal?

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

5.CHECK FTT SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel level sensor unit and fuel pump harness connector and ECM harness connector.

Fuel level sensor unit and fuel pump		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B44	5	F11	51	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

6.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR

Check the FTT sensor. Refer to EC-256, "Component Inspection".

Is the inspection result normal?

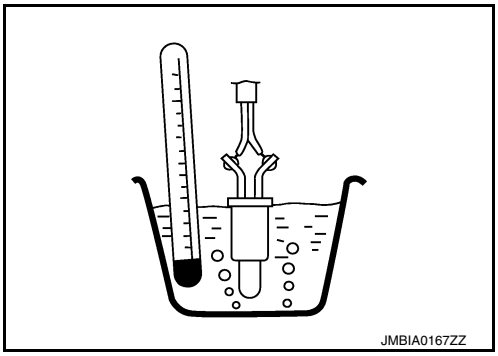
YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace fuel level sensor unit and fuel pump. Refer to FL-6, "Removal and Installation".

Component Inspection

INFOID:0000000009020756

1.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Remove fuel level sensor unit. Refer to FL-6, "Removal and Installation".
4. Check resistance between fuel level sensor unit and fuel pump terminals by heating with hot water as shown in the figure.



Fuel level sensor unit and fuel pump		Condition		Resistance (kΩ)
Terminal				
4	5	Temperature [°C (°F)]	20 (68)	2.3 – 2.7
			50 (122)	0.79 – 0.90

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel level sensor unit and fuel pump. Refer to FL-6, "Removal and Installation".

P0182, P0183 FTT SENSOR

DTC Logic

INFOID:0000000009020757

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0182	FTT SEN/CIRCUIT (Fuel tank temperature sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The FTT sensor circuit is open or shorted.) • Fuel tank temperature sensor • Combination meter
P0183	FTT SEN/CIRCUIT (Fuel tank temperature sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-257, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020758

1.CHECK DTC WITH COMBINATION METER

Refer to MWI-15, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Proceed to MWI-21, "DTC Index"

2.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel level sensor unit and fuel pump harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage (Approx.)
Connector	Terminal		
B44	4	Ground	5 V

Is the inspection result normal?

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

3.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel level sensor unit and fuel pump harness connector and ECM harness connector.

Fuel level sensor unit and fuel pump		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B44	4	F11	42	Existed

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

Is the inspection result normal?

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

4.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel level sensor unit and fuel pump harness connector and ECM harness connector.

Fuel level sensor unit and fuel pump		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B44	5	F11	51	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR

Check the FTT sensor. Refer to EC-258, "Component Inspection".

Is the inspection result normal?

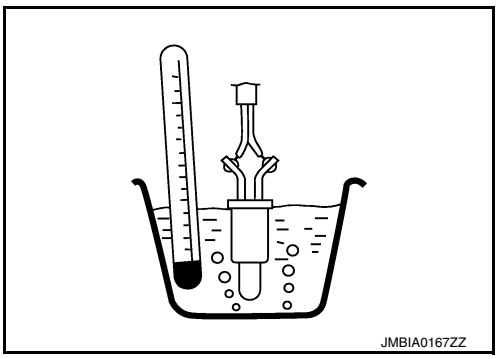
YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace “fuel level sensor unit and fuel pump”. Refer to FL-6, "Removal and Installation".

Component Inspection

INFOID:0000000009020759

1.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Remove fuel level sensor unit. Refer to FL-6, "Removal and Installation".
4. Check resistance between fuel level sensor unit and fuel pump terminals by heating with hot water as shown in the figure.



Fuel level sensor unit and fuel pump		Condition		Resistance (kΩ)
Terminal				
4	5	Temperature [°C (°F)]	20 (68)	2.3 – 2.7
			50 (122)	0.79 – 0.90

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel level sensor unit and fuel pump. Refer to FL-6, "Removal and Installation".

P0196 EOT SENSOR

DTC Logic

INFOID:0000000009020760

DTC DETECTION LOGIC

NOTE:
If DTC P0196 is displayed with DTC P0197 or P0198, first perform the trouble diagnosis for DTC P0197 or P0198. Refer to EC-262, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition		Possible cause
P0196	EOT SENSOR [Engine oil temperature (EOT) sensor circuit range/performance]	A)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from EOT sensor and intake air temperature sensor.	• Harness or connectors (EOT sensor circuit is open or shorted) • EOT sensor
		B)	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, FTT sensor, and EOT sensor) shows that the signal voltage of the EOT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	• Harness or connectors (High or low resistance in the EOT sensor circuit) • EOT sensor

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

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

2.PRECONDITIONING

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

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

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

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-I

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and let it idle for 5 minutes and 10 seconds.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-261, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-II

With CONSULT
1. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Check that “COOLAN TEMP/S” indicates above 80°C (176°F).
   If it is above 80°C (176°F), go to the following steps.

If it is below 80°C (176°F), warm engine up until “COOLAN TEMP/S” indicates more than 80°C (176°F). Then perform the following steps.

3. Turn ignition switch OFF and soak the vehicle in a cool place.
4. Turn ignition switch ON.
   NOTE:
   Do not turn ignition switch OFF until step 8.
5. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
6. Check the following.

COOLAN TEMP/S	Below 40°C (104°F)
INT/A TEMP SE	Below 40°C (104°F)
Difference between “COOLAN TEMP/S” and “INT/A TEMP SE”	Within 6°C (11°F)

If they are within the specified range, perform the following steps.
If they are out of the specified range, soak the vehicle to meet the above conditions. Then perform the following steps.
NOTE:
- **Do not turn ignition switch OFF.**
- **If it is supposed to need a long period of time, do not deplete the battery.**

7. Start engine and let it idle for 5 minutes.
8. Check 1st trip DTC.

With GST
Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-261, "Diagnosis Procedure".
NO >> GO TO 5.

5. PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)

Perform component function check. Refer to EC-261, "Component Function Check".
NOTE:
Use the component function check to check the overall function of the EOT sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-261, "Diagnosis Procedure".

6. PRECONDITIONING

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

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

TESTING CONDITION:
- **Before performing the following procedure, do not add fuel.**
- **Before performing the following procedure, check that fuel level is between 1/4 and 4/4.**
- **Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.**

>> GO TO 7.

7. PERFORM DTC CONFIRMATION PROCEDURE B

1. Start engine and let it idle for 60 minutes.
2. Move the vehicle to a cool place.
   NOTE:
   Cool the vehicle in an environment of ambient air temperature between −10°C (14°F) and 35°C (95°F).
3. Turn ignition switch OFF and soak the vehicle for 12 hours.
   CAUTION:
   Never turn ignition switch ON during soaking.
   NOTE:
   The vehicle must be cooled with the food open.

4. Start engine and let it idle for 5 minutes or more.
CAUTION:
Never turn ignition switch OFF during idling.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

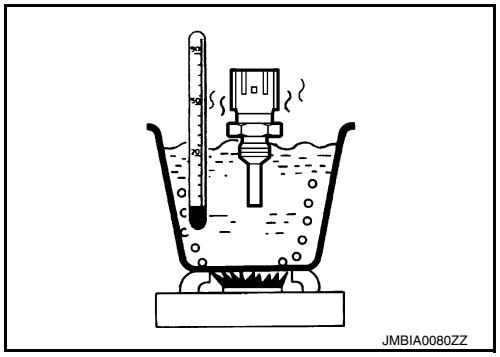
YES >> Proceed to EC-261, "Diagnosis Procedure".
NO >> INSPECTION END

Component Function Check

INFOID:0000000009020761

1.CHECK ENGINE OIL TEMPERATURE (EOT) SENSOR

1. Turn ignition switch OFF.
2. Disconnect EOT sensor harness connector.
3. Remove EOT sensor. Refer to EM-92, "Exploded View".
4. Check resistance between EOT sensor terminals by heating with hot water as shown in the figure.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EOT sensor		Condition		Resistance (kΩ)
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.10 – 2.90
			50 (122)	0.68 – 1.00
			90 (194)	0.236 – 0.260

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Proceed to EC-261, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020762

1.CHECK ENGINE OIL TEMPERATURE (EOT) SENSOR

Check EOT sensor. Refer to EC-261, "Component Inspection".

Is the inspection result normal?

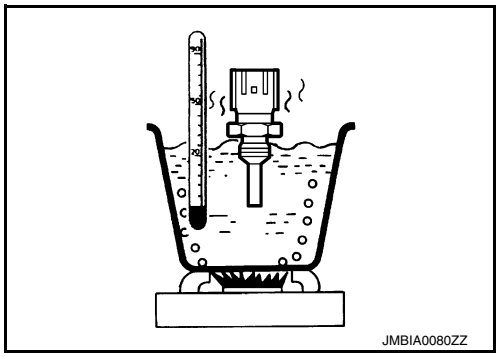
YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace EOT sensor. Refer to EM-92, "Exploded View".

Component Inspection

INFOID:0000000009020763

1.CHECK ENGINE OIL TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine oil temperature sensor harness connector.
3. Remove engine oil temperature sensor.
4. Check resistance between engine oil temperature sensor terminals by heating with hot water as shown in the figure.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Engine oil temperature sensor		Condition		Resistance (kΩ)
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.10 - 2.90
			50 (122)	0.68 - 1.00
			90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine oil temperature sensor. Refer to EM-92, "Exploded View".

P0197, P0198 EOT SENSOR

DTC Logic

INFOID:0000000009020764

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC Detecting Condition	Possible Cause
P0197	EOT SEN/CIRC (Engine oil temperature sensor circuit low input)	An excessively low voltage from the engine oil temperature sensor is sent to ECM.	• Harness or connectors (EOT sensor circuit is open or shorted.) • Engine oil temperature sensor
P0198	EOT SEN/CIRC (Engine oil temperature sensor circuit high input)	An excessively high voltage from the engine oil temperature sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-262, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020765

1.CHECK ENGINE OIL TEMPERATURE SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect engine oil temperature (EOT) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EOT sensor harness connector and ground.

EOT sensor		Ground	Voltage (Approx.)
Connector	Terminal		
F25	1	Ground	5 V

Is the inspection result normal?

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

2.CHECK ENGINE OIL TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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

EOT sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F25	1	F11	57	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

3.CHECK EOT SENSOR GROUND CIRCUIT

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

EOT sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F25	2	F11	54	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

4.CHECK ENGINE OIL TEMPERATURE SENSOR

Check the engine oil temperature sensor. Refer to EC-263, "Component Inspection".

Is the inspection result normal?

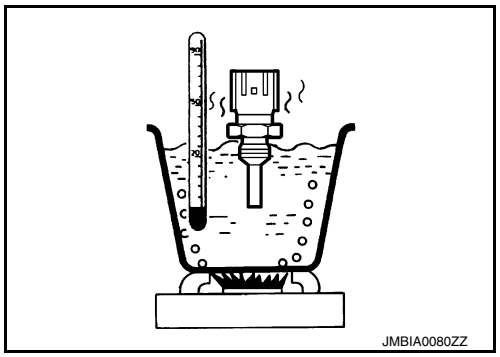
YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace engine oil temperature sensor. Refer to EM-92, "Exploded View".

Component Inspection

INFOID:0000000009020766

1.CHECK ENGINE OIL TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine oil temperature sensor harness connector.
3. Remove engine oil temperature sensor. Refer to EM-92, "Exploded View".
4. Check resistance between engine oil temperature sensor terminals by heating with hot water as shown in the figure.



Engine oil temperature sensor		Condition		Resistance (kΩ)
+	–			
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.10 - 2.90
			50 (122)	0.68 - 1.00
			90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine oil temperature sensor. Refer to EM-92, "Exploded View".

P0222, P0223 TP SENSOR

DTC Logic

INFOID:0000000009020767

DTC DETECTION LOGIC

NOTE:
If DTC P0222 or P0223 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-352, "DTC Logic".

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	• Harness or connectors (TP sensor 1 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1)
P0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to EC-264, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020768

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.
3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F7	2	Ground	Approx. 5 V

Is the inspection result normal?

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

3.CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	4	F11	36	Existed

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

Is the inspection result normal?

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

4. CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	1	F11	33	Existed

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

Is the inspection result normal?

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

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-265, "Component Inspection".

Is the inspection result normal?

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

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-28, "Removal and Installation".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000009020769

1. CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-127, "Work Procedure".
4. Turn ignition switch ON.
5. Set selector lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector and ground.

ECM			Condition		Voltage
Connector	Terminal				
	+	–			
F11	33 (TP sensor 1 signal)	36	Accelerator pedal	Fully released	More than 0.36 V
				Fully depressed	Less than 4.75 V
	34 (TP sensor 2 signal)			Fully released	Less than 4.75 V
				Fully depressed	More than 0.36 V

Is the inspection result normal?

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

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-28, "Removal and Installation".

>> INSPECTION END

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Logic

INFOID:0000000009020770

DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the 1st trip, when a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MI will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MI will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MI will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MI will remain on.
   If another misfire condition occurs that can damage the TWC, the MI will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MI will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	• Improper spark plug • Insufficient compression • Incorrect fuel pressure • The fuel injector circuit is open or shorted • Fuel injector* • Intake air leak • The ignition signal circuit is open or shorted • Lack of fuel • Signal plate • A/F sensor 1 • Incorrect PCV hose connection
P0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	
P0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	
P0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	

*: DTC is detected even where a malfunction occurs one side of the dual injector.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for about 35 minutes.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-268, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
   Hold the accelerator pedal as steady as possible.
   The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.
   CAUTION:
   Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).
	When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).

The time to driving varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 20 minutes
Around 2,000 rpm	Approximately 10 minutes
More than 3,000 rpm	Approximately 7 minutes

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-268, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020771

1.CHECK FOR INTAKE AIR LEAK AND PCV HOSE

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

Is intake air leak detected?

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

2.CHECK FOR EXHAUST SYSTEM CLOGGING

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

Is the inspection result normal?

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

3.PERFORM POWER BALANCE TEST

With CONSULT

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

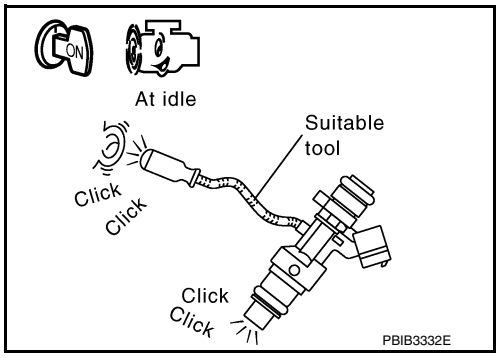
Is the inspection result normal?

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

4. CHECK FUNCTION OF FUEL INJECTOR

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

Clicking noise should be heard.



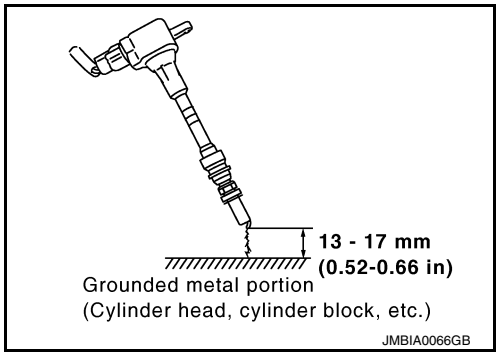
Is the inspection result normal?

YES >> GO TO 5.
NO >> Perform trouble diagnosis for FUEL INJECTOR. Refer to EC-434, "Component Function Check".

5. CHECK FUNCTION OF IGNITION COIL-I

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

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



Spark should be generated.

CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.**

NOTE:
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 6.

6. CHECK FUNCTION OF IGNITION COIL-II

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

Spark should be generated.

Is the inspection result normal?

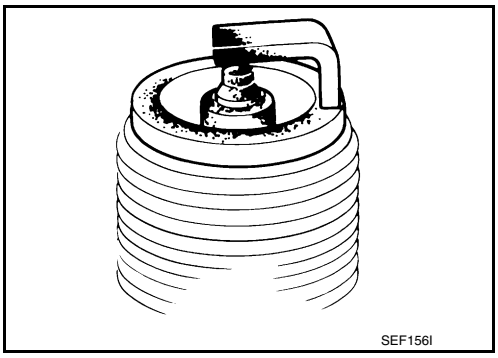
YES >> GO TO 7.
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-439, "Component Function Check".

7. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-116, "Spark Plug".
NO >> Repair or clean spark plug. Then GO TO 8.



8. CHECK FUNCTION OF IGNITION COIL-III

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

Spark should be generated.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-116, "Spark Plug".

9. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-13, "Inspection".

Is the inspection result normal?

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

10. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to EC-135, "Work Procedure".
3. Install fuel pressure gauge and check fuel pressure. Refer to EC-135, "Work Procedure".

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

Is the inspection result normal?

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

11. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”. Refer to FL-6, "Removal and Installation".
NO >> Repair or replace.

12. CHECK IGNITION TIMING

Check the following items.
For procedure, refer to EC-460, "Inspection".
For specification, refer to EC-466, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Follow the EC-131, "Work Procedure".

13. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	49	Existed
	2		53	

5. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

6. Also check harness for short to power.

Is the inspection result normal?

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

14. CHECK A/F SENSOR 1 HEATER

Refer to EC-172, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace A/F sensor 1. Refer to EM-31, "Exploded View".

15. CHECK MASS AIR FLOW SENSOR

With CONSULT

Check “MASS AIRFLOW” in “DATA MONITOR” mode with CONSULT.

0.8 - 4.0 g/s : at idling
2.0 - 10.0 g/s : at 2,500 rpm

With GST

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

0.8 - 4.0 g/s : at idling
2.0 - 10.0 g/s : at 2,500 rpm

Is the measurement value within the specification?

YES >> GO TO 16.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-187, "DTC Logic".

16. CHECK SYMPTOM TABLE

Check items on the rough idle symptom in EC-452, "Symptom Table".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair or replace.

17. ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.
Erase the 1st trip DTC from the ECM memory after performing the tests.

>> GO TO 18.

18. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

P0327, P0328 KS

DTC Logic

INFOID:0000000009020772

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis content	DTC detected condition	Possible cause
P0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Knock sensor
P0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Go to EC-273, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020773

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect knock sensor harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F14	2	F11	40	Existed

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

Is the inspection result normal?

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

3.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F14	1	F11	37	Existed

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

Is the inspection result normal?

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

4.CHECK KNOCK SENSOR

Refer to EC-274, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace knock sensor. Refer to EM-92, "Exploded View".

5.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000009020774

1.CHECK KNOCK SENSOR

1. Turn ignition switch OFF.
2. Disconnect knock sensor harness connector.
3. Check resistance between knock sensor terminals as follows.
   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Terminals	Resistance [at 20°C (68°F)]
1 and 2	Approx. 532 - 588 kΩ

CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace knock sensor. Refer to EM-92, "Exploded View".

P0335 CKP SENSOR (POS)

DTC Logic

INFOID:0000000009020775

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor (POS) circuit	• The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. • The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. • The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	• Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] (Battery current sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Accelerator pedal position sensor 2 circuit is shorted.) • Crankshaft position sensor (POS) • Battery current sensor • Refrigerant pressure sensor • Accelerator pedal position sensor • Signal plate

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-275, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020776

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-I

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between CKP sensor (POS) harness connector and ground.

CKP sensor (POS)		Ground	Voltage
Connector	Terminal		
F15	1	Ground	Approx. 5 V

Is the inspection result normal?

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

3. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F15	1	F11	75	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit.

4. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F11	75	CKP sensor (POS)	F15	1
E16	101	Refrigerant pressure sensor	E17	3
	102	Accelerator pedal position sensor 2	E12	5

Is the inspection result normal?

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

5. CHECK COMPONENTS

Check the following.
- Refrigerant pressure sensor (Refer to EC-450, "Component Function Check").
- Accelerator pedal position sensor (Refer to EC-413, "Component Inspection").

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace refrigerant pressure sensor. Refer to HA-30, "REFRIGERANT PRESSURE SENSOR : Removal and Installation".

6. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F15	2	F11	62	Existed

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

Is the inspection result normal?

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

7. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F15	3	F11	61	Existed

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

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-277, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace crankshaft position sensor (POS). Refer to EM-92, "Exploded View".

9. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace the signal plate. Refer to EM-92, "Exploded View".

10. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

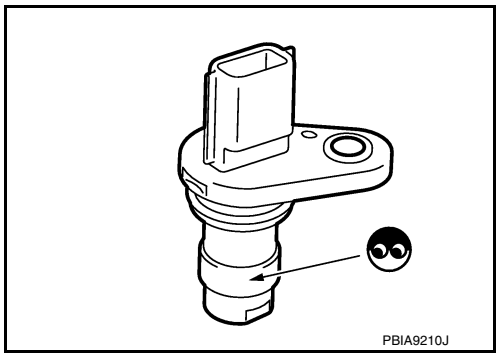
INFOID:0000000009020777

1. CHECK CRANKSHAFT POSITION SENSOR (POS)-I

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect crankshaft position sensor (POS) harness connector.
4. Remove the sensor. Refer to EM-92, "Exploded View".
5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace crankshaft position sensor (POS). Refer to EM-92, "Exploded View".



2. CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check resistance between crankshaft position sensor (POS) terminals as follows.

Terminals (Polarity)	Resistance [at 25°C (77°F)]

1 (+) - 2 (-)	Except 0 or ∞ Ω
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace crankshaft position sensor (POS). Refer to EM-92, "Exploded View".

P0340 CMP SENSOR (PHASE)

DTC Logic

INFOID:0000000009020778

DTC DETECTION LOGIC

NOTE:
If DTC P0340 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-352, "DTC Logic".

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P0340	Camshaft position sensor (PHASE) circuit	• The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. • The cylinder No. signal is not sent to ECM during engine running. • The cylinder No. signal is not in the normal pattern during engine running.	• Harness or connectors (Camshaft position sensor circuit is open or shorted) • Camshaft position sensor • Intake camshaft • Starter motor • Starting system circuit • Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-279, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Keep engine speed at more than 800 rpm for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-279, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020779

1.CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

YES >> GO TO 2.
NO >> Check starting system.

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace ground connection.

3.CHECK CAMSHAFT POSITION SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position sensor (PHASE) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between camshaft position sensor (PHASE) harness connector and ground.

Camshaft position sensor (PHASE)		Ground	Voltage
Connector	Terminal		
F21	1	Ground	Approx. 5 V

Is the inspection result normal?

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

4.CHECK CAMSHAFT POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors.
3. Check the continuity between camshaft position sensor (PHASE) harness connector and ECM harness connector.

Camshaft position sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F21	2	F11	63	Existed

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

Is the inspection result normal?

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

5.CHECK CAMSHAFT POSITION SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between camshaft position sensor (PHASE) harness connector and ECM harness connector.

Camshaft position sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F21	3	F11	65	Existed

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

Is the inspection result normal?

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

6.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-281, "Component Inspection".

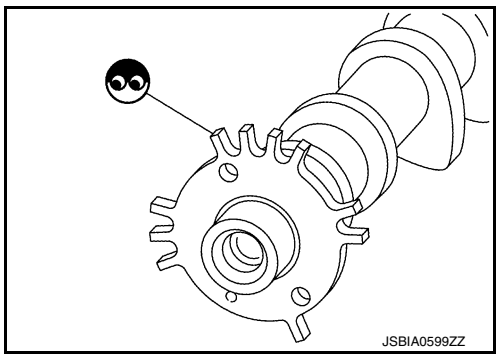
Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace camshaft position sensor (PHASE). Refer to EM-48, "Exploded View".

7.CHECK CAMSHAFT (INT)

Check the following.

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



Is the inspection result normal?

YES >> GO TO 8.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-60, "Removal and Installation".

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

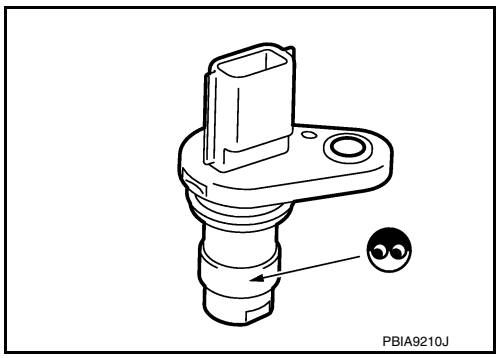
>> INSPECTION END

Component Inspection

INFOID:0000000009020780

1. CHECK CAMSHAFT POSITION SENSOR-I

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect camshaft position sensor harness connector.
4. Remove the sensor. Refer to EM-48, "Exploded View".
5. Visually check the sensor for chipping.



Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace camshaft position sensor. Refer to EM-48, "Exploded View".

2. CHECK CAMSHAFT POSITION SENSOR-II

Check resistance camshaft position sensor terminals as follows.

Terminals (Polarity)	Resistance [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞ Ω
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace camshaft position sensor. Refer to EM-48, "Exploded View".

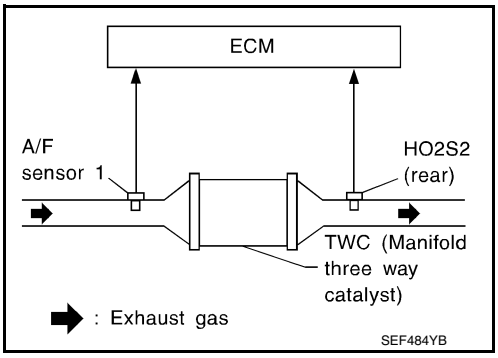
P0420 THREE WAY CATALYST FUNCTION

DTC Logic

INFOID:0000000009020781

DTC DETECTION LOGIC

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2.
A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.
When the frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P0420	Catalyst system efficiency below threshold	• Three way catalyst (manifold) does not operate properly. • Three way catalyst (manifold) does not have enough oxygen storage capacity.	• Three way catalyst (manifold) • Exhaust tube • Intake air leaks • Fuel injector • Fuel injector leaks • Spark plug • Improper ignition timing

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 7.

2.PRECONDITIONING

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

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

TESTING CONDITION:
Do not hold engine speed for more than the specified minutes below.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).
7. Open engine hood.
8. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT.
9. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.

10. Check the indication of “CATALYST”.

Which is displayed on CONSULT screen?

CMPLT >> GO TO 6.
INCMP >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Wait 5 seconds at idle.
2. Rev engine up to 2,000 to 3,000 rpm and maintain it until “INCMP” of “CATALYST” changes to “CMPLT” (It will take approximately 5 minutes).

Does the indication change to “CMPLT”?

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

5. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Stop engine and cool it down to less than 70°C (158°F).
2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

6. PERFORM DTC CONFIRMATION PROCEDURE-III

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-284, "Diagnosis Procedure".
NO >> INSPECTION END

7. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-283, "Component Function Check".

NOTE:
Use component function check to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-284, "Diagnosis Procedure".

Component Function Check

INFOID:0000000009020782

1. PERFORM COMPONENT FUNCTION CHECK

Without CONSULT

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

ECM			Condition	Voltage (V)
Connector	+	–		
	Terminal	Terminal		
F11	50 (HO2S2)	59	Keeping engine speed at 2500 rpm constant under no load	The voltage fluctuation cycle takes more than 5 seconds. • 1 cycle: 0.6 - 1.0 → 0 - 0.3 → 0.6 - 1.0

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-284, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020783

1.CHECK EXHAUST SYSTEM

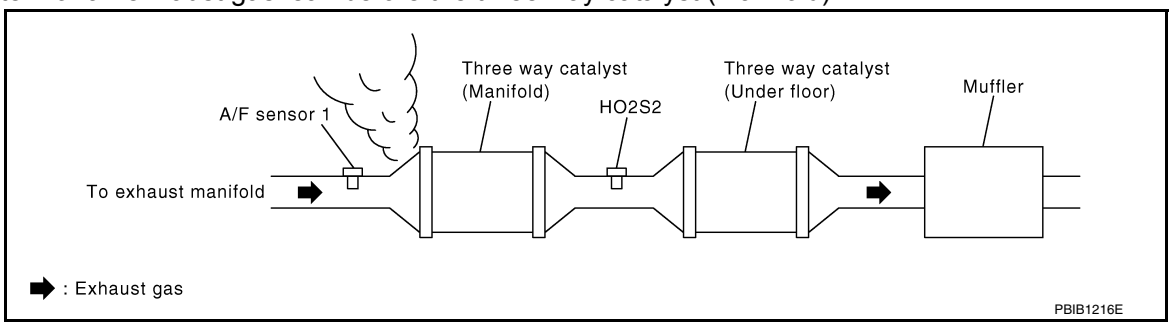
Visually check exhaust tubes and muffler for dent.

Is the inspection result normal?

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

2.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.
NO >> GO TO 3.

3.CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

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

4.CHECK IGNITION TIMING AND IDLE SPEED

Check the following items. Refer to EC-131, "Work Procedure".
For specification, refer to EC-466, "Ignition Timing"
For specification, refer to EC-466, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Follow the EC-131, "Work Procedure".

5.CHECK FUEL INJECTOR

1. Stop engine and then turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

Cylinder		ECM				Voltage
No.	Front / Rear	+		–		
		Connector	Terminal	Connector	Terminal	
1	Front	F10	31	E16	108	Battery voltage
2			30			
3			29			
4			25			
1	Rear		12			
2			20			
3			16			
4			24			

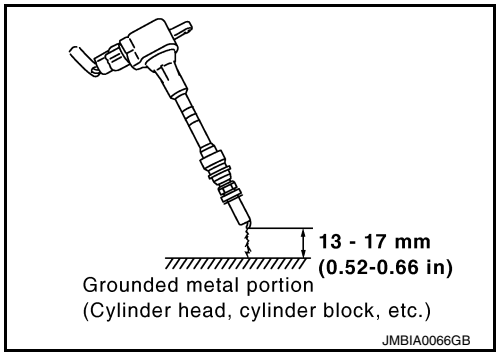
Is the inspection result normal?

YES >> GO TO 6.
NO >> Perform EC-434, "Diagnosis Procedure".

6. CHECK FUNCTION OF IGNITION COIL-I

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

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



Spark should be generated.

CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.**

NOTE:
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-II

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

Spark should be generated.

Is the inspection result normal?

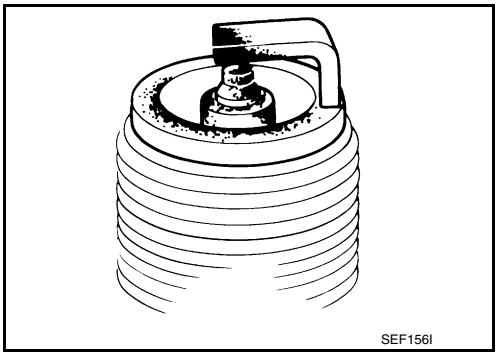
YES >> GO TO 8.
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-439, "Diagnosis Procedure".

8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-116, "Spark Plug".
NO >> Repair or clean spark plug. Then GO TO 9



9. CHECK FUNCTION OF IGNITION COIL-III

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

Spark should be generated.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-116, "Spark Plug".

10. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Remove fuel injector assembly.
   Refer to EM-40, "Removal and Installation".
   Keep fuel hose and all fuel injectors connected to fuel tube.
3. Disconnect all ignition coil harness connectors.
4. Reconnect all fuel injector harness connectors disconnected.
5. Turn ignition switch ON.

Does fuel drip from fuel injector?

YES >> GO TO 11.
NO >> Replace the fuel injector(s) from which fuel is dripping. Refer to EM-40, "Removal and Installation".

11. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the trouble fixed?

YES >> INSPECTION END
NO >> Replace three way catalyst assembly. Refer to EX-5, "Exploded View".

P0441 EVAP CONTROL SYSTEM

DTC Logic

INFOID:0000000009020784

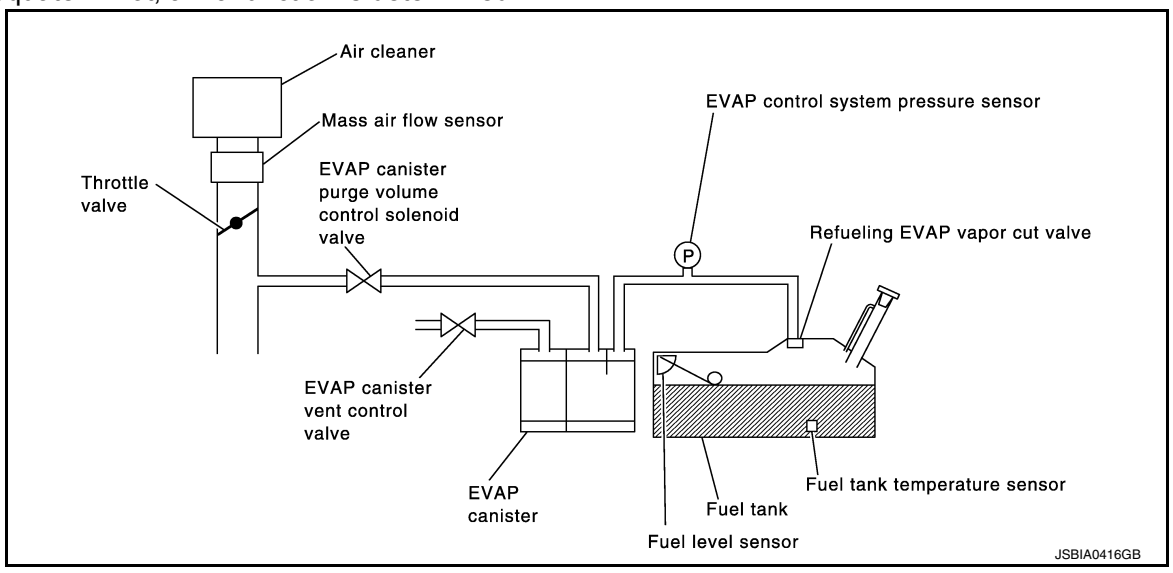
DTC DETECTION LOGIC

NOTE:

If DTC P0441 is displayed with other DTC such as P2122, P2123, P2127, P2128 or P2138, first perform trouble diagnosis for other DTC.

In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a malfunction is determined.



DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0441	EVAP PURG FLOW/MON (EVAP control system incorrect purge flow)	EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	• EVAP canister purge volume control solenoid valve stuck closed • EVAP control system pressure sensor and the circuit • Loose, disconnected or improper connection of rubber tube • Blocked rubber tube • Cracked EVAP canister • EVAP canister purge volume control solenoid valve circuit • Accelerator pedal position sensor • Blocked purge port • EVAP canister vent control valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

Will CONSULT be used?

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

2.PERFORM DTC CONFIRMATION PROCEDURE-I

WITH CONSULT
TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and let it idle for at least 70 seconds.
6. Select “PURG FLOW P0441” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode of “ENGINE” using CONSULT.
7. Touch “START”.

Is “COMPLETED” displayed on CONSULT screen?

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

3.PERFORM DTC CONFIRMATION PROCEDURE-II

When the following conditions are met, “TESTING” will be displayed on the CONSULT screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take at least 35 seconds.)

Selector lever	Suitable position
VHCL SPEED SE	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,800 rpm
B/FUEL SCHDL	1.0 - 10 msec
COOLAN TEMP/S	More than 0°C (32°F)

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
If “TESTING” does not change for a long time, retry from step 2.

Is “COMPLETED” displayed on CONSULT screen?

YES >> GO TO 4.
NO >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 2.

4.PERFORM DTC CONFIRMATION PROCEDURE-III

Touch “SELF-DIAG RESULTS”.

Which is displayed on CONSULT screen?

OK >> INSPECTION END
NG >> Proceed to EC-289, "Diagnosis Procedure".

5.PERFORM COMPONENT FUNCTION CHECK

WITH GST
Perform component function check. Refer to EC-288, "Component Function Check".
NOTE:
Use component function check to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-289, "Diagnosis Procedure".

Component Function Check

INFOID:0000000009020785

1.PERFORM COMPONENT FUNCTION CHECK

1. Lift up drive wheels.
2. Start engine (VDC switch OFF) and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.

4. Start engine and wait at least 70 seconds.
5. Set voltmeter probes to ECM harness connector terminals as per the following.

ECM		
Connector	+	–
	Terminal	
F11	43	68

6. Check EVAP control system pressure sensor value at idle speed and note it.
7. Establish and maintain the following conditions for at least 1 minute.

Air conditioner switch	ON
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Gear position	Any position other than P, N or R

8. Verify that EVAP control system pressure sensor value stays 0.1 V less than the value at idle speed (measured at step 6) for at least 1 second.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-289, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020786

1.CHECK EVAP CANISTER

1. Turn ignition switch OFF.
2. Check EVAP canister for cracks.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 2.
YES-2 >> Without CONSULT: GO TO 3.
NO >> Replace EVAP canister. Refer to FL-14, "Removal and Installation".

2.CHECK PURGE FLOW

WITH CONSULT

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine and let it idle.
3. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
4. Touch “Qd” and “Qu” on CONSULT screen to adjust “PURG VOL CONT/V” opening and check vacuum existence.

PURG VOL CONT/V	Vacuum
100%	Existed
0%	Not existed

Is the inspection result normal?

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

3.CHECK PURGE FLOW

WITHOUT CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.

3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to FL-14, "Exploded View".
4. Start engine and let it idle.
   Never depress accelerator pedal even slightly.
5. Check vacuum gauge indication before 60 seconds pass after starting engine.

   Vacuum should not exist.

6. Rev engine up to 2,000 rpm after 100 seconds pass after starting engine.

   Vacuum should exist.

Is the inspection result normal?

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

4. CHECK EVAP PURGE LINE

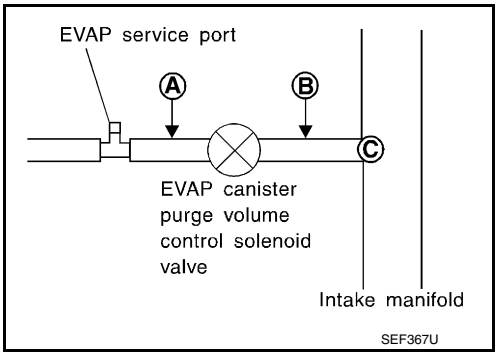
1. Turn ignition switch OFF.
2. Check EVAP purge line for improper connection or disconnection.
   Refer to EC-40, "EVAPORATIVE EMISSION SYSTEM : System Diagram".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair EVAP purge line.

5. CHECK EVAP PURGE HOSE AND PURGE PORT

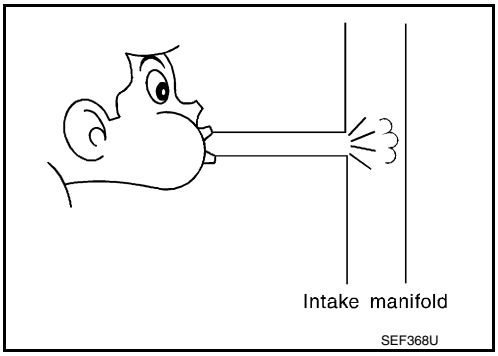
1. Disconnect purge hoses connected to EVAP service port (**A**) and EVAP canister purge volume control solenoid valve (**B**).
2. Blow air into each hose and EVAP purge port (**C**).



3. Check that air flows freely.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 6.
YES-2 >> Without CONSULT: GO TO 7.
NO >> Repair or clean hoses and/or purge port.



6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

WITH CONSULT
1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

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

7.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Check the EVAP canister purge volume control solenoid valve. Refer to EC-295, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to FL-14, "Exploded View".

8.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check that water is not inside connectors.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace EVAP control system pressure sensor. Refer to FL-19, "Removal and Installation".

9.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to EC-312, "DTC Logic" for DTC P0452, EC-315, "DTC Logic" for DTC P0453.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace EVAP control system pressure sensor. Refer to FL-19, "Removal and Installation".

10.CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Clean the rubber tube using an air blower.

11.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the EVAP canister vent control valve. Refer to EC-301, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace EVAP canister vent control valve. Refer to FL-17, "Removal and Installation".

12.CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to EC-40, "EVAPORATIVE EMISSION SYSTEM : System Diagram".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair or replace malfunctioning part.

13.CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 14.

14.CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

>> INSPECTION END

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000009020791

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)		DTC detecting condition	Possible cause
P0443	PURG VOLUME CONT/V (EVAP canister purge volume control solenoid valve)	A	The canister purge flow is detected during the vehicle is stopped while the engine is running, even when EVAP canister purge volume control solenoid valve is completely closed.	• EVAP control system pressure sensor • EVAP canister purge volume control solenoid valve (The valve is stuck open.) • EVAP canister vent control valve • EVAP canister • Hoses (Hoses are connected incorrectly or clogged.)
		B	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

- **Perform DTC CONFIRMATION PROCEDURE when the fuel is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 5 to 60°C (41 to 140°F).**
- **Cool the vehicle so that engine coolant temperature becomes same level as ambient temperature.**

Do you have CONSULT

YES >> GO TO 2.
NO >> GO TO 4.

2.PERFORM DTC CONFIRMATION PROCEDURE A

With CONSULT

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check that the following condition are met.
   FUEL T/TMP SE: 0 - 35°C (32 - 95°F)
4. Start engine and wait at least 60 seconds.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-293, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE B

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “PURG VOL CN/V P1444” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode of “ENGINE” using CONSULT.
5. Touch “START”.
6. Start engine and let it idle until “TESTING” on CONSULT changes to “COMPLETED”. (It will take approximately 10 seconds.)
   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7. Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT?

OK >> INSPECTION END
NG >> Proceed to EC-293, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE A

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

ECM		Ground	Voltage
Connector	Terminal		
F11	43	Ground	3.1 - 4.0 V

3. Start engine and wait at least 60 seconds.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-293, "Diagnosis Procedure".
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE

With GST
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 20 seconds.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-293, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020792

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

EVAP canister purge volume control solenoid valve		Ground	Voltage
Connector	Terminal		
F22	1	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

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

EVAP canister purge volume control solenoid valve		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F22	1	E44	11	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

3.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE GROUND CIRCUIT

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

EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F22	2	F10	9	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace EVAP control system pressure sensor. Refer to FL-19, "Removal and Installation".

5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to EC-295, "Component Inspection".

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 6.
YES-2 >> Without CONSULT: GO TO 7.
NO >> Replace EVAP control system pressure sensor. Refer to FL-19, "Removal and Installation".

6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Start engine.
4. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT. Check that engine speed varies according to the valve opening.

Is the inspection result normal?

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

7.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Check the EVAP canister purge volume control solenoid valve. Refer to EC-295, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to FL-14, "Exploded View".

8.CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Clean the rubber tube using an air blower.

9. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the EVAP canister vent control valve. Refer to EC-301, "Component Inspection".

Is the inspection result normal?

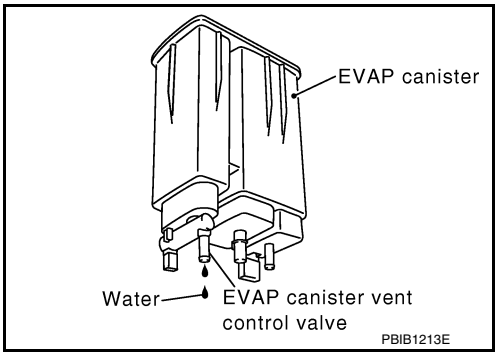
YES >> GO TO 10.
NO >> Replace EVAP canister vent control valve. Refer to FL-17, "Removal and Installation".

10. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

YES >> GO TO 11.
NO >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".



11. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.6 kg (3.5 lb).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-14, "Removal and Installation".

Component Inspection

INFOID:0000000009020793

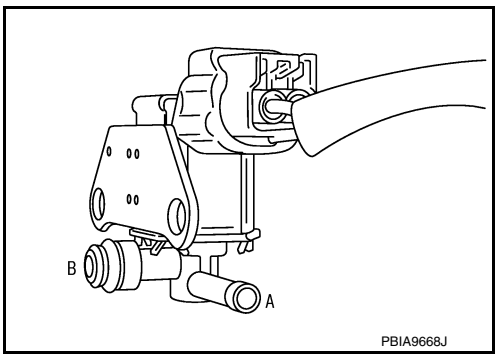
1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Turn ignition switch ON.
5. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.

6. Touch “Qd” and “Qu” on CONSULT screen to adjust “PURG VOL C/V” opening and check air passage continuity of EVAP canister purge volume control solenoid valve as per the following conditions.

Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



Without CONSULT
1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Check air passage continuity of EVAP canister purge volume control solenoid valve as per the following conditions.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to FL-14, "Removal and Installation".

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000009020794

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	• Harness or connectors (The solenoid valve circuit is open or shorted.) • EVAP canister purge volume control solenoid valve
P0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	• Harness or connectors (The solenoid valve circuit is open or shorted.) • EVAP canister purge volume control solenoid valve

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 13 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-297, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020795

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

EVAP canister purge volume control solenoid valve		Ground	Voltage
Connector	Terminal		
F22	1	Ground	Battery voltage

Is the inspection result normal?

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

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector E55, F55
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

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

3.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F22	2	F10	9	Existed

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

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 4.
YES-2 >> Without CONSULT: GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

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

5.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-298, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to FL-14, "Removal and Installation".

6.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

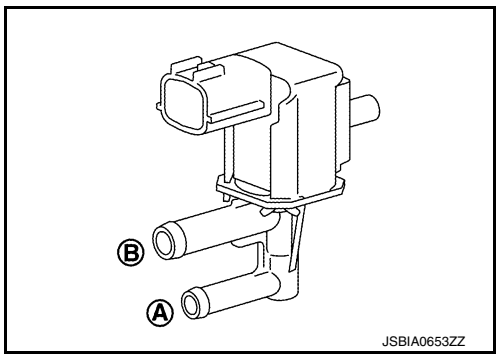
INFOID:0000000009020796

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Turn ignition switch ON.
5. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT.

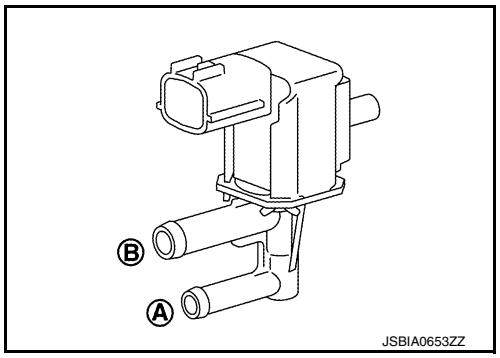
6. Touch “Qd” and “Qu” on CONSULT screen to adjust “PURG VOL C/V” opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed

Without CONSULT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to FL-14, "Removal and Installation".

P0447 EVAP CANISTER VENT CONTROL VALVE

DTC Logic

INFOID:0000000009020797

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0447	VENT CONTROL VALVE (EVAP canister vent control valve circuit open)	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	• Harness or connectors (EVAP canister vent control valve circuit is open or shorted.) • EVAP canister vent control valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 8 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:0000000009020798

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

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

2.CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

With CONSULT

1. Turn ignition switch OFF and then turn ON.
2. Select “VENT CONTROL/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Touch “ON/OFF” on CONSULT screen.
4. Check for operating sound of the valve.

Clicking sound should be heard.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 3.

3.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY

1. Turn ignition switch OFF.
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.

EVAP canister vent control valve		Ground	Voltage
Connector	Terminal		
B5	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. Disconnect IPDM E/R harness connector.
3. Check the continuity between EVAP canister vent control valve harness connector and IPDM E/R harness connector.

EVAP canister vent control valve		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
B5	1	E42	34	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

5. CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP canister vent control valve harness connector and ECM harness connector.

EVAP canister vent control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B5	2	F10	26	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

6. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Clean the rubber tube using an air blower.

7. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the EVAP canister vent control valve. Refer to EC-301, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace EVAP canister vent control valve. Refer to FL-17, "Removal and Installation"

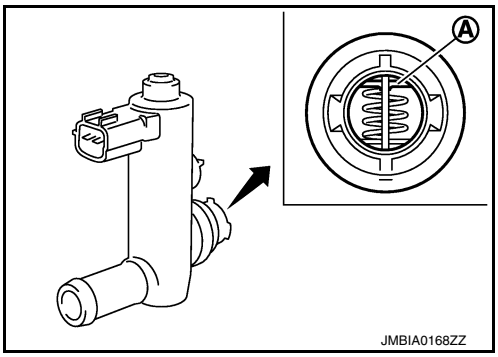
Component Inspection

INFOID:0000000009020799

1. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Turn ignition switch OFF.

2. Remove EVAP canister vent control valve from EVAP canister.
3. Check portion (A) of EVAP canister vent control valve for being rusted.

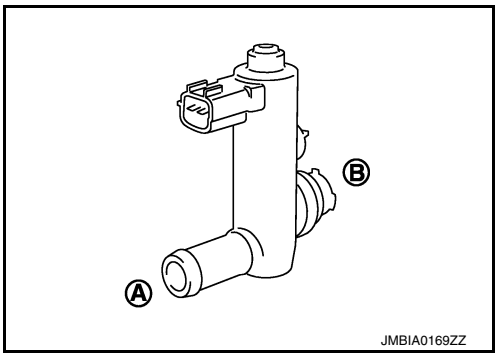


Is it rusted?

YES >> Replace EVAP canister vent control valve. Refer to FL-17, "Removal and Installation".
NO >> GO TO 2.

2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT
1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
4. Check air passage continuity and operation delay time.
Make sure new O-ring is installed properly.



VENT CONT/V condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT
Check air passage continuity and operation delay time under the following conditions.
Make sure new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

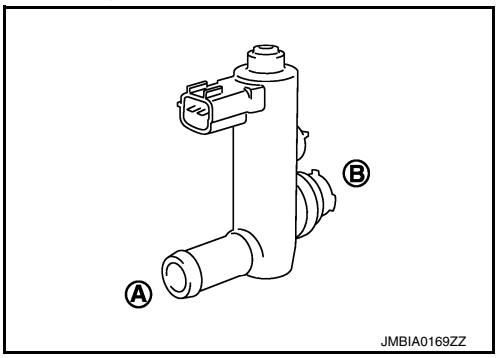
Operation takes less than 1 second.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace EVAP canister vent control valve. Refer to FL-17, "Removal and Installation".

3. CHECK EVAP CANISTER VENT CONTROL VALVE-III

With CONSULT
1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
2. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Check air passage continuity and operation delay time.
Make sure new O-ring is installed properly.



VENT CONT/V condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT
1. Clean the air passage [portion (A) to (B)] 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 new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
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 >> INSPECTION END
NO >> Replace EVAP canister vent control valve. Refer to FL-17, "Removal and Installation".

P0448 EVAP CANISTER VENT CONTROL VALVE

DTC Logic

INFOID:0000000009020800

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0448	VENT CONTROL VALVE (EVAP canister vent control valve close)	EVAP canister vent control valve remains closed under specified driving conditions.	• EVAP canister vent control valve • EVAP control system pressure sensor and the circuit • Blocked rubber tube to EVAP canister vent control valve • EVAP canister is saturated with water

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT.
4. Start engine and let it idle for at least 1 minute.
5. Repeat next procedures three times.

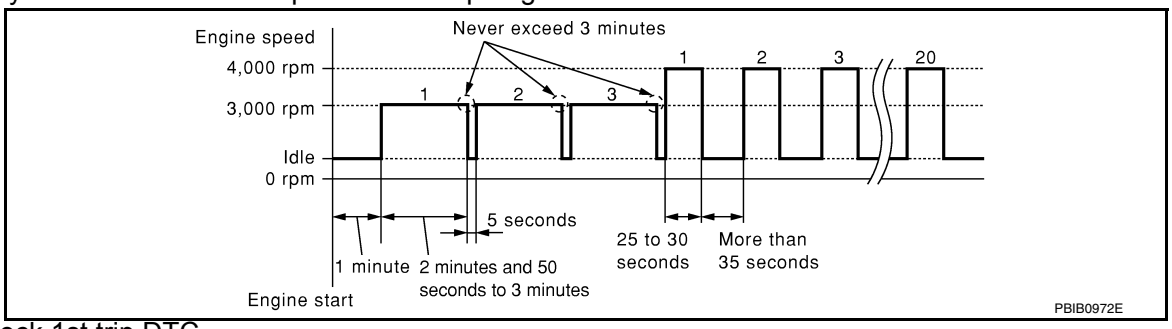
- Increase the engine speed up to 3,000 to 3,500 rpm and keep it for 2 minutes and 50 seconds to 3 minutes.

Never exceed 3 minutes.

- Fully released accelerator pedal and keep engine idle for about 5 seconds.

6. Repeat next procedure 20 times.

- Quickly increase the engine speed up to 4,000 to 4,500 rpm or more and keep it for 25 to 30 seconds.
- Fully released accelerator pedal and keep engine idle for at least 35 seconds.



7. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:0000000009020801

1.CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Disconnect rubber tube connected to EVAP canister vent control valve.
3. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Clean rubber tube using an air blower.

2.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the EVAP canister vent control valve. Refer to EC-306, "Component Inspection".

Is the inspection result normal?

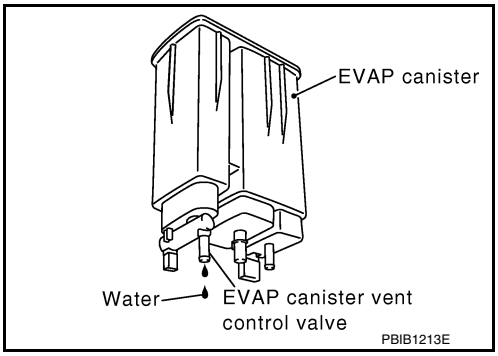
YES >> GO TO 3.
NO >> Replace EVAP canister vent control valve. Refer to FL-17, "Removal and Installation".

3.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Check if water will drain from the EVAP canister.

Does water drain from EVAP canister?

YES >> GO TO 4.
NO >> GO TO 6.



4.CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.6 kg (3.5 lb).

Is the inspection result normal?

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

5.DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-14, "Removal and Installation".

6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace EVAP control system pressure sensor. Refer to FL-19, "Removal and Installation".

7.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to EC-310, "Component Inspection".

Is the inspection result normal?

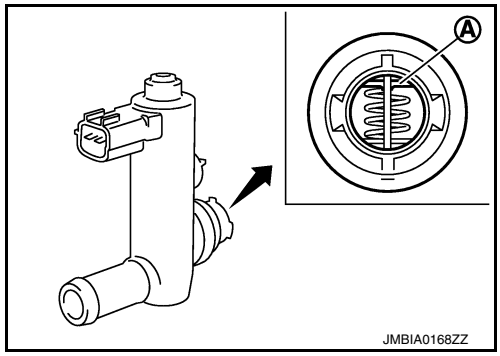
YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace EVAP control system pressure sensor. Refer to FL-19, "Removal and Installation".

Component Inspection

INFOID:0000000009020802

1. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Turn ignition switch OFF.
2. Remove EVAP canister vent control valve from EVAP canister.
3. Check portion (A) of EVAP canister vent control valve for being rusted.



Is it rusted?

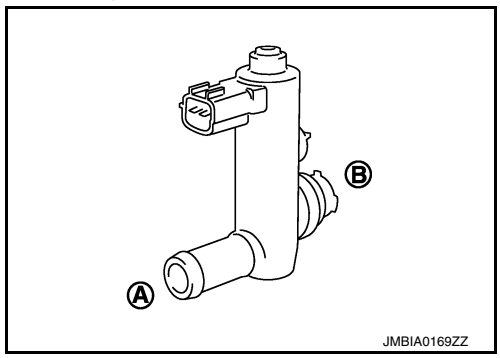
YES >> Replace EVAP canister vent control valve. Refer to FL-17, "Removal and Installation".

NO >> GO TO 2.

2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
4. Check air passage continuity and operation delay time.
   Make sure new O-ring is installed properly.



VENT CONT/V condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT

Check air passage continuity and operation delay time under the following conditions.

Make sure new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
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 3.

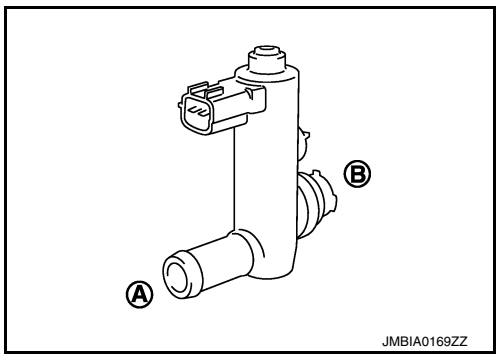
NO >> Replace EVAP canister vent control valve. Refer to FL-17, "Removal and Installation".

3. CHECK EVAP CANISTER VENT CONTROL VALVE-III

With CONSULT

1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
2. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.

3. Check air passage continuity and operation delay time.
Make sure new O-ring is installed properly.



VENT CONT/V condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT
1. Clean the air passage [portion (A) to (B)] 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 new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
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 >> INSPECTION END
NO >> Replace EVAP canister vent control valve. Refer to FL-17, "Removal and Installation".

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

INFOID:0000000009020803

DTC DETECTION LOGIC

NOTE:
If DTC P0451 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-352, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0451	EVAP SYS PRES SEN (EVAP control system pressure sensor performance)	ECM detects a sloshing signal from the EVAP control system pressure sensor	• Harness or connectors (EVAP control system pressure sensor circuit is shorted.) • EVAP control system pressure sensor

DTC CONFIRMATION PROCEDURE

NOTE:
Never remove fuel filler cap during DTC confirmation procedure.

1.PRECONDITIONING

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

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

With CONSULT>>GO TO 2.
Without CONSULT>>GO TO 5.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

1. Start engine and let it idle for least 40 seconds.
   NOTE:
   Do not depress accelerator pedal even slightly.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-309, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

1. Select “EVAP DIAG READY” in “DATA MONITOR” mode of “ENGINE”.
2. Let it idle until “OFF” of “EVAP DIAG READY” changes to “ON”.
   NOTE:
   It will take at most 2 hours until “OFF” of “EVAP DIAG READY” changes to “ON”.
3. Turn ignition switch OFF and wait at least 90 minutes.
   NOTE:
   Never turn ignition switch ON during 90 minutes.
4. Turn ignition switch ON.
5. Select “EVAP LEAK DIAG” in “DATA MONITOR” mode of “ENGINE”.
6. Check that “EVAP LEAK DIAG” indication.

Which is displayed on CONSULT?

CMPLT >> GO TO 4.
YET >> 1. Perform DTC CONFIRMATION PROCEDURE again.
2. GO TO 1.

4.PERFORM DTC CONFIRMATION PROCEDURE-3

With CONSULT
Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-309, "Diagnosis Procedure".
NO >> INSPECTION END

5. PERFORM DTC CONFIRMATION PROCEDURE-4

With GST
1. Start engine and let it idle for least 40 seconds.
   NOTE:
   Do not depress accelerator pedal even slightly.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-309, "Diagnosis Procedure".
NO >> GO TO 6.

6. PERFORM DTC CONFIRMATION PROCEDURE-5

With GST
1. Let it idle for at least 2 hours.
2. Turn ignition switch OFF and wait at least 90 minutes.
   NOTE:
   Never turn ignition switch ON during 90 minutes.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-309, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020804

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

1. Turn ignition switch OFF.
2. Disconnect EVAP control system pressure sensor harness connector.
3. Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

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

2. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

EVAP control system pressure sensor		Ground	Voltage (Approx.)
Connector	Terminal		
B3	3	Ground	5 V

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 EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B3	3	F11	71	Existed

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

Is the inspection result normal?

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

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT

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

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B3	1	F11	68	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SIGNAL CIRCUIT

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B3	2	F11	43	Existed

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

Is the inspection result normal?

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

6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to EC-310, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace EVAP control system pressure sensor. Refer to FL-19, "Removal and Installation".

Component Inspection

INFOID:0000000009020805

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

ECM			Condition [Applied vacuum kPa (kg/cm^2, psi)]	Voltage
Connector	+	–		
	Terminal			
F11	43	68	Not applied	0.5 - 4.6 V
			-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-0.952 kg/cm^2, -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm^2, 14.69 psi).**

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP control system pressure sensor. Refer to FL-19, "Removal and Installation".

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

INFOID:0000000009020806

DTC DETECTION LOGIC

NOTE:
If DTC P0451 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-352, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0452	EVAP SYS PRES SEN (EVAP control system pressure sensor low input)	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (EVAP control system pressure sensor circuit is shorted.) • EVAP control system pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
5. Make sure that “FUEL T/TMP SE” indication is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
7. Check 1st trip DTC.

With GST
1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes to ECM harness connector terminals as per the following.

ECM			Voltage
Connector	+	–	
	Terminal		
F11	43	68	Less than 4.2 V

3. Make sure that the voltage is less than 4.2 V.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and wait at least 20 seconds.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-312, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020807

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

1. Turn ignition switch OFF.
2. Disconnect EVAP control system pressure sensor harness connector.
3. Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

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

2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

EVAP control system pressure sensor		Ground	Voltage (Approx.)
Connector	Terminal		
B3	3	Ground	5 V

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 EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B3	3	F11	71	Existed

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

Is the inspection result normal?

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

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT

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

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B3	1	F11	68	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SIGNAL CIRCUIT

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B3	2	F11	43	Existed

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

Is the inspection result normal?

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

6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to EC-310, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace EVAP control system pressure sensor. Refer to FL-19, "Removal and Installation".

Component Inspection

INFOID:0000000009020808

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

ECM			Condition [Applied vacuum kPa (kg/cm^2, psi)]	Voltage
Connector	+	–		
	Terminal			
F11	43	68	Not applied	0.5 - 4.6 V
			-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-0.952 kg/cm^2, -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm^2, 14.69 psi).**

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP control system pressure sensor. Refer to FL-19, "Removal and Installation".

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

INFOID:0000000009020809

DTC DETECTION LOGIC

NOTE:
If DTC P0451 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-352, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0453	EVAP SYS PRES SEN (EVAP control system pressure sensor high input)	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (EVAP control system pressure sensor circuit is shorted.) • EVAP control system pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
5. Make sure that “FUEL T/TMP SE” indication is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
7. Check 1st trip DTC.

With GST
1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes to ECM harness connector terminals as per the following.

ECM			Voltage
Connector	+	–	
	Terminal		
F11	43	68	Less than 4.2 V

3. Make sure that the voltage is less than 4.2 V.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and wait at least 20 seconds.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-315, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020810

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

1. Turn ignition switch OFF.
2. Disconnect EVAP control system pressure sensor harness connector.
3. Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

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

2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

EVAP control system pressure sensor		Ground	Voltage (Approx.)
Connector	Terminal		
B3	3	Ground	5 V

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 EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B3	3	F11	71	Existed

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

Is the inspection result normal?

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

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT

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

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B3	1	F11	68	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SIGNAL CIRCUIT

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B3	2	F11	43	Existed

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

Is the inspection result normal?

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

6.CHECK RUBBER TUBE

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Clean the rubber tube using an air blower, repair or replace rubber tube.

7.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-301, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace EVAP canister vent control valve. Refer to FL-17, "Removal and Installation".

8.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-318, "Component Inspection".

Is the inspection result normal?

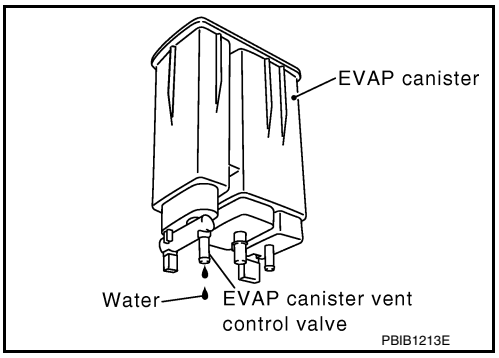
YES >> GO TO 9.
NO >> Replace EVAP control system pressure sensor. Refer to FL-19, "Removal and Installation".

9.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Check if water will drain from the EVAP canister.

Does water drain from EVAP canister?

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



10.CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.6 kg (3.5 lb).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> GO TO 11.

11.DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-14, "Removal and Installation".

Component Inspection

INFOID:0000000009020811

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

ECM			Condition [Applied vacuum kPa (kg/cm^2, psi)]	Voltage
Connector	+	–		
	Terminal			
F11	43	68	Not applied	0.5 - 4.6 V
			-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-0.952 kg/cm^2, -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm^2, 14.69 psi).**

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP control system pressure sensor. Refer to FL-19, "Removal and Installation".

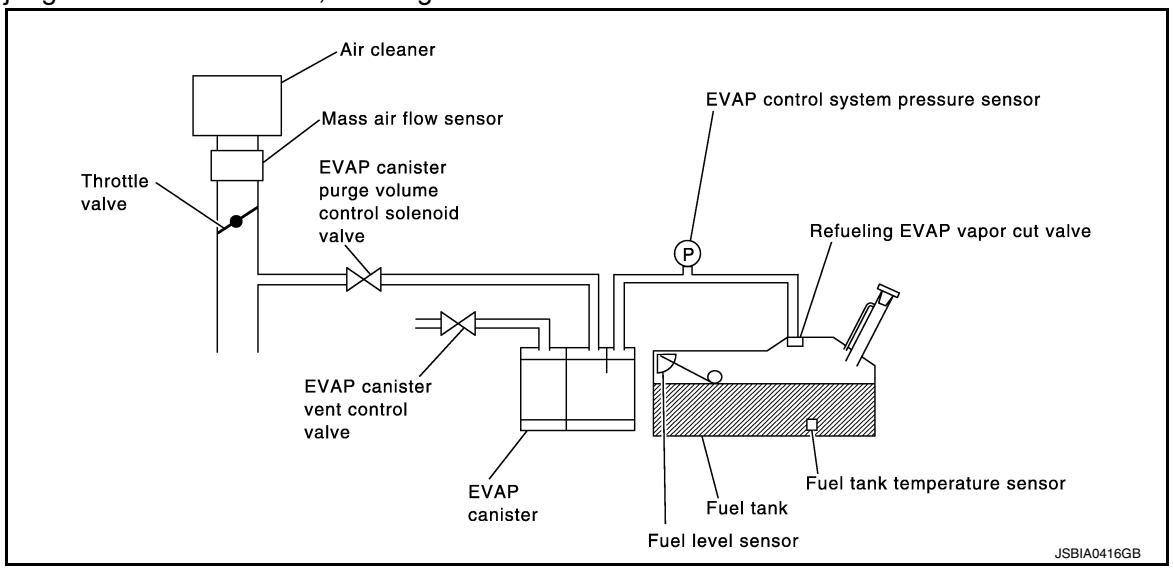
P0456 EVAP CONTROL SYSTEM

DTC Logic

INFOID:0000000009020816

DTC DETECTION LOGIC

This diagnosis detects leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the negative pressure caused by decrease of fuel temperature in the fuel tank after turning ignition switch OFF.
If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0456	EVAP VERY SML LEAK (Evaporative emission control system leak)	• EVAP system has a leak. • EVAP system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or does not close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve and the circuit • Fuel tank temperature sensor • O-ring of EVAP canister vent control valve is missing or damaged • EVAP canister is saturated with water • EVAP control system pressure sensor • Refueling EVAP vapor cut valve • ORVR system leaks • Fuel level sensor and the circuit • Foreign matter caught in EVAP canister purge volume control solenoid valve

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.**
- **If the fuel filler cap is not tightened properly, the MIL may illuminate.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 4.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

WITH CONSULT

1. Turn ignition switch ON and select “EVAP DIAG READY” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Start engine and wait at idle until “OFF” of “EVAP DIAG READY” changes to “ON”.
   NOTE:
   It will take at most 2 hours until “OFF” of “EVAP DIAG READY” changes to “ON”.
3. Turn ignition switch OFF and wait at least 90 minutes.
   NOTE:
   Never turn ignition switch ON during 90 minutes.
4. Turn ignition switch ON and select “EVAP LEAK DIAG” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
5. Check that “EVAP LEAK DIAG” indication.

Which is displayed on CONSULT?

CMPLT >> GO TO 3.
YET >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 1.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed toEC-320, "Diagnosis Procedure".
NO >> INSPECTION END.

4.PERFORM DTC CONFIRMATION PROCEDURE

WITH GST

1. Start engine and wait engine idle for at least 2 hours.
2. Turn ignition switch OFF and wait at least 90 minutes.
   NOTE:
   Never turn ignition switch ON during 90 minutes.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-320, "Diagnosis Procedure".
NO >> INSPECTION END.

Diagnosis Procedure

INFOID:0000000009020817

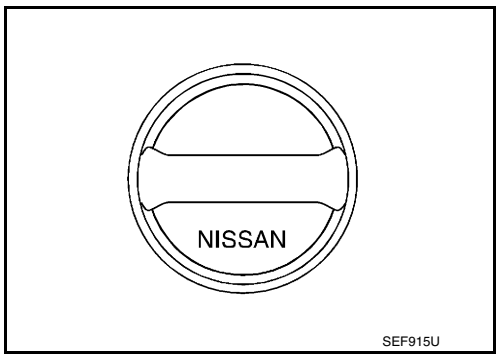
1.CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.

2. Check for genuine NISSAN fuel filler cap design.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace with genuine NISSAN fuel filler cap.



2.CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Then retighten until reteaching sound is heard.

3.CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

Is the inspection result normal?

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

4.CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-324, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace fuel filler cap with a genuine one.

5.CHECK FOR EVAP LEAK

Refer to EC-462, "Inspection".

Is there any leak in EVAP line?

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

6.CHECK EVAP CANISTER VENT CONTROL VALVE

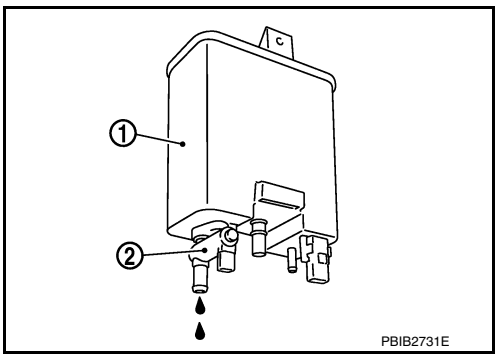
Check the following.
- EVAP canister vent control valve is installed properly.
  Refer to FL-17, "Exploded View".
- EVAP canister vent control valve.
  Refer to EC-301, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace EVAP canister vent control valve and O-ring. Refer to FL-17, "Removal and Installation".

7.CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister (1) with EVAP canister vent control valve (2) and EVAP control system pressure sensor attached.
2. Check if water will drain from the EVAP canister.



Does water drain from EVAP canister?

YES >> GO TO 8.
NO-1 >> With CONSULT: GO TO 10.
NO-2 >> Without CONSULT: GO TO 11.

8. CHECK EVAP CANISTER

Weigh the EVAP canister assembly with the EVAP canister vent control valve and EVAP control system pressure sensor attached. Refer to FL-17, "Removal and Installation".

The weight should be less than 1.6 kg (3.5 lb).

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 10.
YES-2 >> Without CONSULT: GO TO 11.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-14, "Removal and Installation".

10. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT
1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine and let it idle.
3. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
4. Touch “Qu” on CONSULT screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 12.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT
1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 12.

12. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to FL-14, "Exploded View".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair or reconnect the hose.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Check the EVAP canister purge volume control solenoid valve. Refer to EC-295, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to FL-14, "Exploded View".

14. CHECK FUEL TANK TEMPERATURE SENSOR

Check the fuel tank temperature sensor. Refer to EC-256, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace fuel level sensor unit. Refer to FL-6, "Removal and Installation".

15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to FL-19, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace EVAP control system pressure sensor. Refer to FL-19, "Removal and Installation".

16. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-40, "EVAPORATIVE EMISSION SYSTEM : System Description".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair or reconnect the hose.

17. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 18.

18. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-29, "On Board Refueling Vapor Recovery (ORVR)".

Is the inspection result normal?

YES >> GO TO 19.
NO >> Repair or replace hoses and tubes.

19. CHECK RECIRCULATION LINE

Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 20.
NO >> Repair or replace hose, tube or fuel filler tube.

20. CHECK REFUELING EVAP VAPOR CUT VALVE

Check the refueling EVAP vapor cut valve. Refer to EC-447, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

YES >> GO TO 21.
NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-10, "Removal and Installation".

21. CHECK FUEL LEVEL SENSOR

Check the fuel level sensor. Refer to MWI-46, "Component Inspection".

Is the inspection result normal?

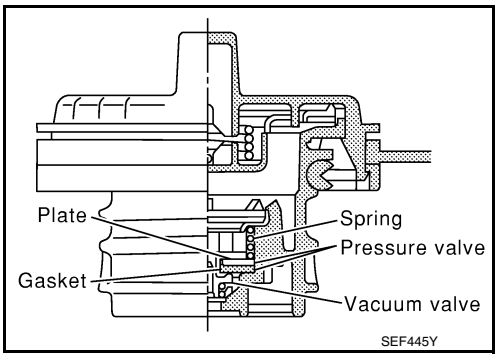
YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace fuel level sensor unit. Refer to FL-6, "Removal and Installation".

Component Inspection

INFOID:0000000009020818

1.CHECK FUEL FILLER CAP

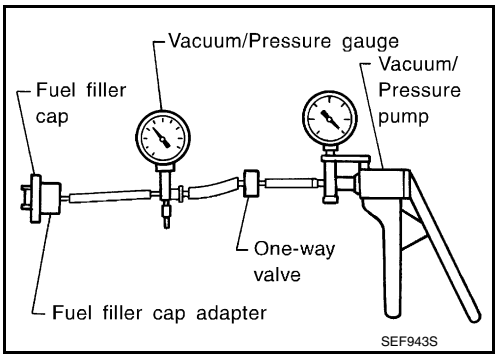
1. Turn ignition switch OFF.
2. Remove fuel filler cap.
3. Wipe clean valve housing.



4. Install fuel filler cap adapter (commercial service tool) to fuel filler cap.
5. Check valve opening pressure and vacuum.

Pressure: **15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)**

Vacuum: **−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)**



Is the inspection result normal?

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

2.REPLACE FUEL FILLER CAP

Replace fuel filler cap.

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.

>> INSPECTION END

P0460 FUEL LEVEL SENSOR

DTC Logic

INFOID:0000000009020819

DTC DETECTION LOGIC

NOTE:

- **If DTC P0460 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P0460 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-351, "DTC Logic".**

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0460	FUEL LEV SEN SLOSH (Fuel level sensor circuit noise)	Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The sensor circuit is open or shorted) • Combination meter • Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait maximum of 2 consecutive minutes.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-325, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020820

1.CHECK COMBINATION METER FUNCTION

Refer to MWI-15, "CONSULT Function".

Is the inspection result normal?

YES >> CHECK INTERMITTENT INCIDENT. Refer to GI-41, "Intermittent Incident".
NO >> Refer to MWI-45, "Component Function Check".

P0461 FUEL LEVEL SENSOR

DTC Logic

INFOID:0000000009020821

DTC DETECTION LOGIC

NOTE:

- **If DTC P0461 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P0461 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-351, "DTC Logic".**

Driving long distances naturally affect fuel gauge level.
This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0461	FUEL LEVEL SENSOR (Fuel level sensor circuit range/ performance)	The output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The sensor circuit is open or shorted) • Combination meter • Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-326, "Component Function Check".
Use component function check to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-327, "Diagnosis Procedure".

Component Function Check

INFOID:0000000009020822

1.PRECONDITIONING

WARNING:
When performing following procedure, be sure to observe the handling of the fuel. Refer to GI-24, "General Precautions".
TESTING CONDITION:
Before starting component function check, preparation of draining fuel and refilling fuel is required.

Do you have CONSULT?

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

2.PERFORM COMPONENT FUNCTION CHECK

With CONSULT
NOTE:
Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to EC-135, "Work Procedure".
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch OFF and wait at least 10 seconds then turn ON.
6. Select “FUEL LEVEL SE” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
7. Check “FUEL LEVEL SE” output voltage and note it.
8. Select “FUEL PUMP RELAY” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
9. Touch “ON” and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.

10. Check “FUEL LEVEL SE” output voltage and note it.
11. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
12. Check “FUEL LEVEL SE” output voltage and note it.
13. Confirm whether the voltage changes more than 0.03 V during step 7 to 10 and 10 to 12.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-327, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

Without CONSULT

NOTE:
Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line. Refer to EC-135, "Work Procedure".
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch ON.
6. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
7. Confirm that the fuel gauge indication varies.
8. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
9. Confirm that the fuel gauge indication varies.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-327, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020823

1.CHECK COMBINATION METER FUNCTION

Refer to MWI-15, "CONSULT Function".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Refer to MWI-45, "Component Function Check".

P0462, P0463 FUEL LEVEL SENSOR

DTC Logic

INFOID:0000000009020824

DTC DETECTION LOGIC

NOTE:

- **If DTC P0462 or P0463 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P0462 or P0463 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-351, "DTC Logic".**

This diagnosis indicates the former, to detect open or short circuit malfunction.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0462	FUEL LEVEL SEN/CIRC (Fuel level sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (CAN communication line is open or shorted) • Harness or connectors (Fuel level sensor circuit is open or shorted) • Combination meter • Fuel level sensor
P0463	FUEL LEVEL SEN/CIRC (Fuel level sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 11 V and 16 V at ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-328, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020825

1.CHECK COMBINATION METER FUNCTION

Refer to MWI-15, "CONSULT Function".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Refer to MWI-45, "Component Function Check".

P0500 VSS

Description

INFOID:0000000009020826

The vehicle speed signal is sent to the combination meter from the “ABS actuator and electric unit (control unit)” by CAN communication line. The combination meter then sends a signal to the ECM by CAN communication line.

DTC Logic

INFOID:0000000009020827

DTC DETECTION LOGIC

NOTE:

- **If DTC P0500 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-351, "DTC Logic".**

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P0500	Vehicle speed sensor	The almost 0 km/h (0 MPH) of vehicle speed signal is sent to ECM even when vehicle is being driven.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The vehicle speed signal circuit is open or shorted) • Combination meter • ABS actuator and electric unit (control unit)

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

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

2.PRECONDITIONING

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

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

>> GO TO 3.

3.CHECK VEHICLE SPEED SENSOR FUNCTION

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

With CONSULT

1. Start engine.
2. Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT. The vehicle speed on CONSULT should exceed 10 km/h (6 mph) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Go to EC-330, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select “DATA MONITOR” mode with CONSULT.
2. Warm engine up to normal operating temperature.
3. Maintain the following conditions for at least 60 consecutive seconds.

CAUTION:

Always drive vehicle at a safe speed.

ENG SPEED	1,400 - 6,000 rpm (CVT) 1,900 - 6,000 rpm (M/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	6.2 - 31.8 msec (CVT) 4.5 - 31.8 msec (M/T)
Shift lever	Except P or N position (CVT) Except Neutral position (M/T)
PW/ST SIGNAL	OFF

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-330, "Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-330, "Component Function Check".
Use component function check to check the overall function of the vehicle speed signal circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-330, "Diagnosis Procedure".

Component Function Check

INFOID:0000000009020828

1.PERFORM COMPONENT FUNCTION CHECK

With GST

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed signal in Service $01 with GST.
   The vehicle speed signal on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-330, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020829

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

Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-41, "DTC Index".

Is the inspection result normal?

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

2.CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to MWI-21, "DTC Index".

>> INSPECTION END

P0506 ISC SYSTEM

Description

INFOID:0000000009020830

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

INFOID:0000000009020831

DTC DETECTION LOGIC

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

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0506	ISC SYSTEM (Idle speed control system RPM lower than expected)	The idle speed is less than the target idle speed by 100 rpm or more.	• Electric throttle control actuator • Intake air leak

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

If the target idle speed is out of the specified value, perform EC-128, "Work Procedure", before conducting DTC Confirmation Procedure.
TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.**
- **Always perform the test at a temperature above −10°C (14°F).**

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and run it for at least 1 minute at idle speed.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-331, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020832

1.CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Discover air leak location and repair.
NO >> Replace ECM. Refer to EC-465, "Removal and Installation".

P0507 ISC SYSTEM

Description

INFOID:0000000009020833

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

INFOID:0000000009020834

DTC DETECTION LOGIC

NOTE:
If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0507	ISC SYSTEM (Idle speed control system RPM higher than expected)	The idle speed is more than the target idle speed by 200 rpm or more.	• Electric throttle control actuator • Intake air leak • PCV system

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

If the target idle speed is out of the specified value, perform EC-128, "Work Procedure", before conducting DTC Confirmation Procedure.
TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.**
- **Always perform the test at a temperature above −10°C (14°F).**

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and run it for at least 1 minute at idle speed.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-332, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020835

1.CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

Is the inspection result normal?

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

2.CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Discover air leak location and repair.
NO >> Replace ECM. Refer to EC-465, "Removal and Installation".

P050A, P050B, P050E COLD START CONTROL

Description

INFOID:0000000009020836

ECM controls ignition timing and engine idle speed when engine is started with pre-warming up condition. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

DTC Logic

INFOID:0000000009020837

DTC DETECTION LOGIC

NOTE:
If DTC P050A, P050B or P050E is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P050A	Cold start idle air control system performance	ECM does not control engine idle speed properly when engine is started with pre-warming up condition.	• Lack of intake air volume • Fuel injection system • ECM
P050B	Cold start ignition timing performance	ECM does not control ignition timing properly when engine is started with pre-warming up condition.	
P050E	Cold start engine exhaust temperature too low	The temperature of the catalyst inlet does not rise to the proper temperature when the engine is started with pre-warming up condition.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Select “DATA MONITOR” mode with CONSULT.
4. Check the indication of “COOLAN TEMP/S”.

With GST

Follow the procedure “With CONSULT” above.

Is the value of “COOLAN TEMP/S” between 15°C (59°F) and 36°C (97°F)?

YES >> GO TO 3.
NO-1 [If it is below 15°C (59°F)]>>Warm up the engine until the value of “COOLAN TEMP/S” reaches 15°C (59°F) or more. Retry from step 1.
NO-2 [If it is above 36°C (97°F)]>>Cool engine down to less than 36°C (97°F). Retry from step 1.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT

1. Set the select lever in N range.
2. Start the engine and warm up in idle with the value of “COOLAN TEMP/S” between 15°C (59°F) and 40°C (104°F) for more than 15 seconds.
3. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Go to EC-335, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020838

1.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-128, "Work Procedure".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 2.
NO >> Follow the instruction of Idle Air Volume Learning.

2.CHECK INTAKE SYSTEM

Check for the cause of intake air volume lacking. Refer to the following.

- Crushed intake air passage
- Intake air passage clogging
- Clogging of throttle body

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace malfunctioning part

3.CHECK FUEL INJECTION SYSTEM FUNCTION

Perform DTC Confirmation Procedure for DTC P0171. Refer to EC-245, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Go to EC-246, "Diagnosis Procedure" for DTC P0171.

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC Confirmation Procedure.
   See EC-334, "DTC Logic".

Is the 1st trip DTC P050A, P050B or P050E displayed again?

YES >> GO TO 5.
NO >> INSPECTION END

5.REPLACE ECM

Replace ECM. Refer to EC-465, "Removal and Installation".

>> INSPECTION END

P0520 EOP SENSOR

DTC Logic

INFOID:0000000009020839

DTC DETECTION LOGIC

NOTE:
If DTC P0520 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-352, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	Detecting condition	Possible cause
P0520	EOP SENSOR/SWITCH [Engine oil pressure sensor circuit]	ECM detects the following status continuously for 5 seconds or more: • A voltage signal transmitted from the engine oil pressure sensor is lower than 0.3 V. • A voltage signal transmitted from the engine oil pressure sensor is higher than 5.02 V.	• Harness or connectors (Engine oil pressure sensor circuit is open or shorted.) • Engine oil pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.CHECK ENGINE OIL LEVEL

Check engine oil level. Refer to LU-7, "Inspection".

Is inspection result normal?

YES >> GO TO 3.
NO >> Check engine oil leak. Refer to LU-7, "Inspection".

3.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-336, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020840

1.CHECK ENGINE OIL PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect engine oil pressure sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between engine oil pressure sensor harness connector terminals.

Engine oil pressure sensor		Ground	Voltage (Approx.)
Connector	Terminal		
F38	1	Ground	5 V

Is inspection result normal?

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

2.CHECK ENGINE OIL PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Engine oil pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F38	3	F11	60	Existed

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

Is inspection result normal?

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

3.CHECK ENGINE OIL PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Engine oil pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F38	2	F11	47	Existed

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

Is inspection result normal?

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

4.CHECK ENGINE OIL PRESSURE SENSOR

Refer to EC-337, "Component Inspection".

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace engine oil pressure sensor. Refer to EM-92, "Exploded View".

Component Inspection

INFOID:0000000009020841

1.CHECK ENGINE OIL PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine oil pressure sensor harness connector.
3. Check resistance between engine oil pressure sensor connector terminals.

Engine oil pressure sensor		Condition	Resistance (kΩ)
Terminal			
1	2	None	4 – 10
	3		2 – 8
2	1		4 – 10
	3		1 – 3
3	1		2 – 8
	2		1 – 3

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Replace engine oil pressure sensor. Refer to EM-92, "Exploded View".

P0524 ENGINE OIL PRESSURE

DTC Logic

INFOID:0000000009020842

DTC DETECTION LOGIC

NOTE:
If DTC P0524 is displayed with DTC P0520 or P0075, perform trouble diagnosis for DTC P0520 or P0075 first. Refer to EC-336, "DTC Logic" or EC-177, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	Detecting condition	Possible cause
P0524	ENGINE OIL PRESSURE (Engine oil pressure too low)	An engine oil pressure sensor signal voltage applied to ECM remains lower than the specified value continuously for 10 seconds or more when the engine speed is 1,000 rpm or more.	• Decrease in engine oil pressure • Decrease in engine oil level • Engine oil condition • Engine oil pressure sensor • Engine body

DTC CONFIRMATION PROCEDURE

CAUTION:
If "Diagnosis Procedure" is unfinished, be sure to perform Step 3 and 4.

1.PRECONDITIONING-I

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

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

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

>> GO TO 2.

2.PRECONDITIONING-II

Is "Diagnosis Procedure" of DTC P0524 finished?

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

3.CHECK ENGINE OIL LEVEL

Check engine oil level. Refer to LU-7, "Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Proceed to EC-339, "Diagnosis Procedure"

4.CHECK ENGINE OIL PRESSURE

WITH CONSULT
1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Start the engine and check that "EOP SENSOR" changes, according to engine speeds.

Monitor item	Condition		Value (Approx.)
EOP SENSOR	• Engine oil temperature: 80°C (176°F) • Selector lever: P or N position (CVT), Neutral position (M/T) • Air conditioner switch: OFF • No load	Engine speed: 600 rpm	1,053 mV or more
		Engine speed: 2,000 rpm	1,802 mV or more

Without CONSULT

Check engine oil level. Refer to LU-7, "Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Proceed to EC-339, "Diagnosis Procedure"

5.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Maintain the following conditions for about 10 consecutive seconds.

Selector lever	P or N position (CVT) Neutral position (M/T)
Engine coolant temperature	70°C (158°F) or more
Engine speed	1,000 rpm or more

NOTE:
With engine speed set around 4,000 rpm, the phenomenon can be reproduced more easily.

3. Check DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-339, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020843

1.CHECK ENGINE OIL LEVEL

1. Turn ignition switch OFF.
2. Check engine oil level. Refer to LU-7, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 4.

2.CHECK ENGINE OIL PRESSURE

WITH CONSULT

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Start the engine and check that “EOP SENSOR” changes, according to engine speeds.

Monitor item	Condition		Value (Approx.)
EOP SENSOR	• Engine oil temperature: 80°C (176°F) • Selector lever: P or N position (CVT), Neutral position (M/T) • Air conditioner switch: OFF • No load	Engine speed: 600 rpm	1,053 mV or more
		Engine speed: 2,000 rpm	1,802 mV or more

Without CONSULT

Check engine oil level. Refer to LU-7, "Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check oil pressure. Refer to LU-7, "Inspection".

3.CHECK ENGINE OIL PRESSURE SENSOR

Check engine oil pressure sensor. Refer to EC-337, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace engine oil pressure sensor. Refer to EM-92, "Exploded View".

4.CHECK ENGINE OIL LEAKAGE

Check engine oil leakage. Refer to LU-7, "Inspection".

Is the inspection result normal?

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

5.CHECK CAUSE OF ENGINE OIL CONSUMPTION

Check the following item.

Step	Inspection item	Equipment	Standard	Reference
1	PCV valve	EC-464, "Inspection"		
2	Exhaust front tube	Visual	• No blocking • No abnormal sounds	—
3	Oil pump	Visual	• No blocking • No damage	—
4	• Piston • Piston pin • Piston ring	• Piston to piston pin oil clearance EM-101, "Inspection" • Piston ring side clearance EM-101, "Inspection" • Piston ring end gap EM-101, "Inspection"		
5	Cylinder block	• Cylinder block top surface distortion EM-101, "Inspection" • Piston to cylinder bore clearance EM-101, "Inspection"		

>> Repair or replace error-detected parts.

Component Inspection

INFOID:0000000009020844

1.CHECK ENGINE OIL PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine oil pressure sensor harness connector.
3. Check the resistance between engine oil pressure sensor connector terminals.

Engine oil pressure sensor		Resistance (kΩ)
+	–	
Terminal		
1	2	4 – 10
	3	2 – 8
2	1	4 – 10
	3	1 – 3
3	1	2 – 8
	2	1 – 3

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine oil pressure sensor. Refer to EM-92, "Exploded View".

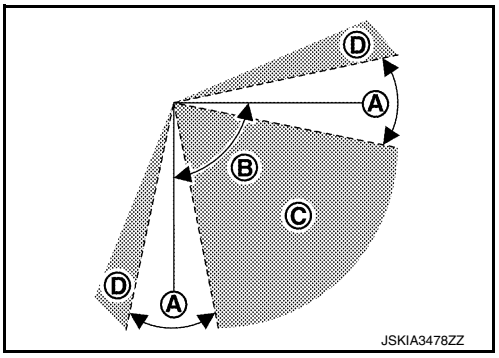
P059F ACTIVE GRILLE SHUTTER

DTC Logic

INFOID:0000000009509489

DTC DETECTION LOGIC

Active grille shutter normally stops within zone Ⓐ which is defined by zone Ⓑ (90°±20°).
If the active grille shutter stops within zone Ⓒ stuck error is detected, and if the active grille shutter stops at position beyond zone Ⓓ over-run error is detected.



NOTE:
If DTC P059F displayed with DTC UXXXX, P0116, P0117, P0118, P0125, P0196, P0197, P0198, P0500, P0607, or P1720 first perform the trouble diagnosis for DTC UXXXX, P0116, P0117, P0118, P0125, P0196, P0197, P0198, P0500, P0607, or P1720. Refer to EC-86, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition		Possible cause
P059F	ACTIVE GRILLE AIR SHUTTER A (Active grille air shutter A performance/stuck off)	ECM records the DTCs when it receives following diagnosis signals from active grille shutter actuator.		• Harness or connectors (Active grille shutter circuit is open or shorted.) • Active grille shutter
		A	Detects the malfunction of initial position learning or operational malfunctions for specified times.	
		B	• Active grille shutter power supply voltage is lower than 7.5 V for more than 5 seconds consecutively. • Active grille shutter power supply voltage is more than 17.5 V for more than 5 seconds consecutively.	
		C	Detects the temperature of active grille shutter actuator is more than 155°C (311°F) for more than 600 seconds for accumulation.	
		D	Detects the temperature of active grille shutter actuator is more than 155°C (311°F) for more than specified times.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If another DTC Confirmation Procedure is conducted just before this procedure, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 11V and 16V with ignition switch ON.

With CONSULT >>GO TO 2.
Without CONSULT>>GO TO 5.

2.DTC CONFIRMATION PROCEDURE B

With CONSULT
1. Start the engine and let it idle for 5 seconds or more.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-343, "Diagnosis Procedure".
NO >> GO TO 3.

3. DTC CONFIRMATION PROCEDURE A AND D

With CONSULT
1. Turn ignition switch OFF and wait 10 seconds or more.
2. Turn ignition switch ON.
3. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
4. Start the engine if the following conditions are met.

INT/A TEMP SE	0°C (32°F) or more
COOLANT TEMP/S	0°C (32°F) or more

5. Select “ACTIVE GRILLE SHUTTER” in “ACTIVE TEST”of “ENGINE” using CONSULT.
6. Touch “CALIBRTN”at least 60 seconds.
7. Check 1st trip DTC.

Is 1st trip DTC is detected?

YES >> Proceed to EC-343, "Diagnosis Procedure".
NO >> GO TO 4.

4. DTC CONFIRMATION PROCEDURE C

With CONSULT
1. Drive 10 minutes or more under the status that following conditions are met.

VHCL SPEED SE	40 km/h (25 MPH) or more
INT/A TEMP SE	50°C (122°F) or less

CAUTION:
Always drive at a safe speed.
NOTE:
Maintain the conditions for 10 minutes or more for accumulation.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-343, "Diagnosis Procedure".
NO >> INSPECTION END

5. DTC CONFIRMATION PROCEDURE A, B AND D

1. Start the engine when the following conditions are met.

Intake air temperature	0°C (32°F) or more
Engine coolant temperature	0°C (32°F) or more

2. Drive the vehicle at 10 km/h (7 MPH) or more for at least 60 seconds.
3. Check DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-343, "Diagnosis Procedure".
NO >> GO TO 6.

6. DTC CONFIRMATION PROCEDURE C

1. Drive the vehicle for 10 minutes or more with the following conditions.

Vehicle speed	40 km/h (25 MPH) or more
Intake air temperature	50°C (122°F) or less

CAUTION:
Always drive at a safe speed.
NOTE:
Maintain the conditions for 10 minutes or more for accumulation.

2. Check DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-343, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009509490

1.CHECK ACTIVE GRILL SHUTTER

1. Turn ignition switch OFF.
2. Check if any foreign objects interferes with active grille shutter.
3. Check the installation condition of active grille shutter.

Is the inspection result normal?

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

2.CHECK ACTIVE GRILLE SHUTTER POWER SUPPLY

1. Disconnect active grille shutter harness connector.
2. Check the voltage between active grille shutter harness connector and ground as follows.

+		–	Condition	Voltage (Approx.)
Active grille shutter				
Connector	Terminal			
E303	4	Ground	Ignition switch: ON	Battery voltage
			Ignition switch: OFF	0 V

Is the inspection result normal?

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

3.CHECK ACTIVE GRILLE SHUTTER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between active grille shutter harness connector and ground.

+		–	Continuity
Active grille shutter			
Connector	Terminal		
E303	1	Ground	Existed

Is the inspection result normal?

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

4.CHECK ACTIVE GRILLE SHUTTER SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and active grille shutter harness connector.

+		–		Continuity
ECM		Active grille shutter		
Connector	Terminal	Connector	Terminal	
F11	70	E303	2	Existed

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

Is the inspection result normal?

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

5.CHECK ACTIVE GRILLE SHUTTER

Check active grille shutter. Refer to EC-345, "Component Inspection (Active Grille Shutter)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace active grille shutter. Refer to EXT-31, "Removal and Installation".

6.CHECK ACTIVE GRILLE SHUTTER POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Remove active grille shutter relay.
3. Check the continuity between active grille shutter harness connector and active grille shutter relay harness connector.

+		–		Continuity
Active grille shutter		Active grille shutter relay		
Connector	Terminal	Connector	Terminal	
E303	4	E72	3	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

7.CHECK ACTIVE GRILLE SHUTTER RELAY POWER SUPPLY CIRCUIT - 1

Check the voltage between active grille shutter harness connector and ground.

+		–	Voltage (Approx.)
Active grille shutter relay			
Connector	Terminal		
E72	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 11.

8.CHECK ACTIVE GRILLE SHUTTER RELAY SIGNAL CIRCUIT - 1

1. Check the voltage between active grille shutter harness connector and ground as follows.

+		–	Condition	Voltage (Approx.)
Active grille shutter relay				
Connector	Terminal			
E72	2	Ground	Ignition switch: ON	Battery voltage
			Ignition switch: OFF	0 V

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

Is the inspection result normal?

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

9.CHECK ACTIVE GRILLE SHUTTER RELAY GROUND CIRCUIT

1. Turn ignition switch OFF

2. Check the continuity between active grille shutter relay harness connector and ground.

+		–	Continuity
Active grille shutter relay			
Connector	Terminal		
E72	1	Ground	Existed

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace the error-detected parts.

10. CHECK ACTIVE GRILLE SHUTTER RELAY

Check active grille shutter relay. Refer to EC-346, "Component Inspection (Active Grille Shutter Relay)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace active grille shutter relay.

11. CHECK ACTIVE GRILLE SHUTTER RELAY POWER SUPPLY CIRCUIT - 2

1. Check 5A fuse (No. 27).
2. Check the continuity between active grille shutter relay harness connector and fuse socket.

+		Fuse No.	Continuity
Active grille shutter relay			
Connector	Terminal		
E72	5	27	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

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

12. CHECK ACTIVE GRILLE SHUTTER RELAY SIGNAL CIRCUIT - 2

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

+		–		Continuity
Active grille shutter relay		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E72	2	F42	39	Existed

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

Is the inspection result normal?

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

Component Inspection (Active Grille Shutter)

INFOID:0000000009509491

1. CHECK ACTIVE GRILLE SHUTTER

With CONSULT

1. Start the engine.
2. Select “ACTIVE GRILLE SHUTTER” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Touch “CALIBRTN”.
4. After the calibration completes, check the operation of active grille shutter as follows.

Condition	Active grille shutter
Select “CLOSE”	Close → Open
Select “OPEN”	Open → Close

⊗Without CONSULT
1. Turn ignition switch OFF.
2. Operate shutter by hands to close position.
3. Check the operation of active grille shutter as follows.

Condition	Active grille shutter
Ignition switch: ON	Close → Open

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace active grille shutter. Refer to EXT-31, "Removal and Installation".

Component Inspection (Active Grille Shutter Relay)

INFOID:0000000009731738

1.CHECK ACTIVE GRILLE SHUTTER RELAY

1. Turn ignition switch OFF.
2. Remove active grille shutter relay.
3. Apply battery voltage to active grille shutter relay terminal, and check the continuity as follows.

Active grille shutter relay		Condition	Continuity
+	–		
Terminal			
5	3	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	None

Is the inspection result normal?

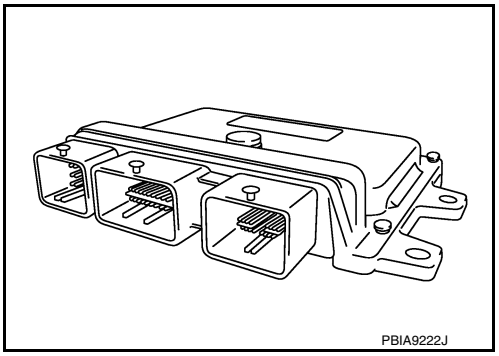
YES >> INSPECTION END
NO >> Replace active grille shutter relay.

P0603 ECM POWER SUPPLY

Description

INFOID:0000000009020845

ECM has the memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the Idle Air Volume Learning value memory, etc. even when the ignition switch is turned OFF.


PBIA9222J

DTC Logic

INFOID:0000000009020846

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON wait at least 10 seconds.
2. Turn ignition switch OFF and wait at least 5 minutes
3. Turn ignition switch ON, wait at least 10 seconds.
4. Repeat step 2 and 3 for five times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-347, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020847

1.INSPECTION START

1. Erase DTC.
2. Perform DTC CONFIRMATION PROCEDURE.
   See EC-347, "DTC Logic".

Is the 1st trip DTC P0603 displayed again?

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

2.REPLACE ECM

1. Replace ECM. Refer to EC-465, "Removal and Installation".
2. Perform EC-123, "Work Procedure".

>> INSPECTION END

P0605 ECM

DTC Logic

INFOID:0000000009020848

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

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

Is 1st trip DTC detected?

YES >> Go to EC-349, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

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

Is 1st trip DTC detected?

YES >> Go to EC-349, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

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

Is 1st trip DTC detected?

YES >> Go to EC-349, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020849

1.INSPECTION START

1. Erase DTC.
2. Perform DTC CONFIRMATION PROCEDURE.
   See EC-349, "DTC Logic".

Is the 1st trip DTC P0605 displayed again?

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

2.REPLACE ECM

1. Replace ECM. Refer to EC-465, "Removal and Installation".
2. Perform EC-123, "Work Procedure".

>> INSPECTION END

P0607 ECM

DTC Logic

INFOID:0000000009020850

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to EC-351, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020851

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to EC-351, "DTC Logic".
4. Check DTC.

Is the DTC P0607 displayed again?

YES >> Replace ECM. Refer to EC-465, "Removal and Installation".
NO >> INSPECTION END

P0643 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000009020852

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P0643	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	• Harness or connectors (Accelerator pedal position 1 circuit is shorted.) (Throttle position sensor 1 circuit is shorted.) (Camshaft position sensor circuit is shorted.) (Exhaust valve timing control position sensor circuit is shorted.) (Engine oil pressure sensor circuit is shorted.) • Accelerator pedal position sensor • Throttle position sensor • Camshaft position sensor • Exhaust valve timing control position sensor • Engine oil pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to EC-352, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020853

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK SENSOR POWER SUPPLY

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

ECM		Ground	Voltage (Approx.)
Connector	Terminal		
F11	72	Ground	5 V
	74		
	78		
E16	106		

Is the inspection result normal?

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

3.CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Item	Connector	Terminal
F11	72	Throttle position sensor 1	F7	2
	74	Engine oil pressure sensor	F38	1
	78	Camshaft position sensor	F21	1
		Exhaust valve timing control position sensor	F56	
E16	106	Accelerator pedal position sensor 1	E12	4

Is the inspection result normal?

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

4.CHECK COMPONENTS

Check the following.
- Throttle position sensor 1 (Refer to EC-265, "Component Inspection".)
- Engine oil pressure sensor (Refer to EC-337, "Component Inspection".)
- Camshaft position sensor (Refer to EC-281, "Component Inspection".)
- Exhaust valve timing control position sensor (Refer to EC-281, "Component Inspection".)
- Accelerator pedal position sensor 1 (Refer to EC-413, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning component.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

P0850 PNP SWITCH

Description

INFOID:0000000009020854

When the selector lever position is Neutral position, park/neutral position (PNP) signal is ON.

DTC Logic

INFOID:0000000009020855

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P0850	Park/neutral position signal	The park/neutral position (PNP) signal is not changed in the process of engine starting and driving.	• Harness or connectors [The park/neutral position (PNP) signal circuit is open or shorted.] • Transmission range switch (CVT models) • Park/neutral position (PNP) switch (M/T models)

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

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

2.PRECONDITIONING

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

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

>> GO TO 3.

3.CHECK PNP SIGNAL FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT. Then check “P/N POSI SW” signal under the following conditions.

Shift lever position	Known-good signal
N or P position (CVT) Neutral position (M/T)	ON
Except above position	OFF

Is the inspection result normal?

YES >> GO TO 4.
NO >> Proceed to EC-355, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select “DATA MONITOR” mode with CONSULT.
2. Start engine and warm it up to normal operating temperature.
3. Maintain the following conditions for at least 50 consecutive seconds.

CAUTION:
Always drive vehicle at a safe speed.

ENG SPEED	1,000 - 6,375 rpm
COOLAN TEMP/S	More than 65°C (149°F)
B/FUEL SCHDL	2.0 - 31.9 msec
VHCL SPEED SE	More than 64 km/h (40 mph)
Shift lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-355, "Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-355, "Component Function Check".

NOTE:
Use component function check the overall function of the park/neutral position (PNP) signal circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-355, "Diagnosis Procedure".

Component Function Check

INFOID:0000000009020856

1.PERFORM COMPONENT FUNCTION CHECK

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

ECM				Condition		Voltage
+		–				
Connector	Terminal	Connector	Terminal			
F11	69 (PNP signal)	E16	108	Shift lever	P or N (CVT) Neutral (M/T)	Battery voltage
					Except above	Approx. 0 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-355, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020857

1.CHECK TRANSMISSION RANGE SWITCH (CVT) OR PARK/NEUTRAL POSITION (PNP) SWITCH (M/T) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect transmission range switch (CVT) or PNP switch (M/T) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between transmission range switch (CVT) or PNP switch (M/T) harness connector and ground.

Transmission range switch (CVT) / PNP switch (M/T)		Ground	Voltage
Connector	Terminal		
F49 (CVT)	7	Ground	Battery voltage
F24 (M/T)	2		

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, M69 (M/T)
- Harness connectors E55, F55
- IPDM E/R harness connector E45 (CVT)
- 10 A fuse (No. 3) (M/T)
- 10 A fuse (No. 49) (CVT)
- Harness for open or short between transmission range switch (CVT) or PNP switch (M/T) and fuse

Is the inspection result normal?

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

3.CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between transmission range switch (CVT) or PNP switch (M/T) harness connector and ECM harness connector.

Transmission range switch (CVT) / PNP switch (M/T)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F49 (CVT)	10	F11	69	Existed
F24 (M/T)	3			

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

Is the inspection result normal?

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

4.CHECK TRANSMISSION RANGE SWITCH (CVT) OR PNP SWITCH (M/T)

Refer to TM-147, "Component Inspection (Transmission Range Switch)" (CVT) or TM-15, "PARK/NEUTRAL POSITION (PNP) SWITCH : Component Inspection" (M/T).

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace transmission range switch (CVT) or PNP switch (M/T). Refer to TM-252, "Removal and Installation" (CVT) or TM-24, "Removal and Installation" (M/T).

5.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

P1078 EVT CONTROL POSITION SENSOR

DTC Logic

INFOID:0000000009020858

DTC DETECTION LOGIC

NOTE:
If DTC P0340 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-352, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1078	EXH TIM SEN/CIRC-B1 (Exhaust valve timing control position sensor)	An excessively high or low voltage from the sensor is sent to ECM.	• Harness or connectors (Exhaust valve timing control position sensor circuit is open or shorted) • Accumulation of debris to the signal pick-up portion of the camshaft • Exhaust valve timing control position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-279, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020859

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect exhaust valve timing control position sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between exhaust valve timing control position sensor harness connector and ground.

Exhaust valve timing control position sensor		Ground	Voltage
Connector	Terminal		
F56	1	Ground	Approx. 5 V

Is the inspection result normal?

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

3. CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Exhaust valve timing control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F56	2	F11	63	Existed

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

Is the inspection result normal?

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

4. CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between exhaust valve timing control position sensor harness connector and ECM harness connector.

Exhaust valve timing control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F56	3	F11	48	Existed

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

Is the inspection result normal?

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

5. CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR

Refer to EC-359, "Component Inspection".

Is the inspection result normal?

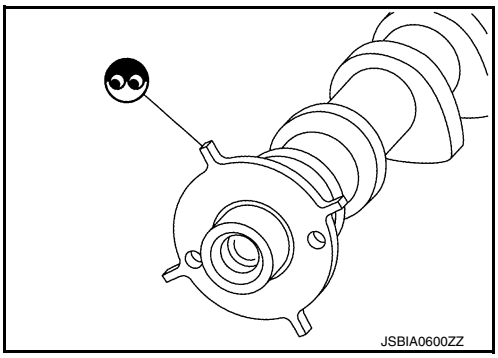
YES >> GO TO 6.
NO >> Replace exhaust valve timing control position sensor. Refer to EM-48, "Exploded View".

6. CHECK CAMSHAFT (EXT)

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

Is the inspection result normal?

YES >> GO TO 7.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-60, "Removal and Installation".



7. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

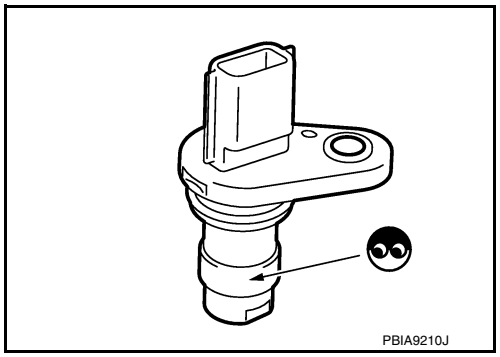
INFOID:0000000009020860

1. EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR-I

1. Turn ignition switch OFF.
2. Disconnect EVT control position sensor harness connector.
3. Loosen the fixing bolt of the sensor.
4. Remove the sensor. Refer to EM-48, "Exploded View".
5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace camshaft position sensor. Refer to EM-48, "Exploded View".



2. CHECK CAMSHAFT POSITION SENSOR-II

Check resistance camshaft position sensor terminals as follows.

Terminals (Polarity)	Resistance [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞ Ω
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace camshaft position sensor. Refer to EM-48, "Exploded View".

P1148 CLOSED LOOP CONTROL

DTC Logic

INFOID:0000000009020861

DTC DETECTION LOGIC

NOTE:
DTC P1148 is displayed with DTC for A/F sensor 1.
When the DTC is detected, perform the trouble diagnosis of DTC corresponding to A/F sensor 1.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1148	CLOSED LOOP-B1 (Closed loop control function)	The closed loop control function does not operate even when vehicle is being driven in the specified condition.	• Harness or connectors (A/F sensor 1 circuit is open or shorted.) • A/F sensor 1 • A/F sensor 1 heater

Diagnosis Procedure

INFOID:0000000009020862

DTC P1148 is displayed with DTC for A/F sensor 1.
When the DTC is detected, perform the trouble diagnosis of DTC corresponding to A/F sensor 1.
Refer to EC-86, "DTC Index".

P117A AIR FUEL RATIO

DTC Logic

INFOID:0000000009555272

DTC DETECTION LOGIC

NOTE:
If DTC P117A is displayed with other DTC, first perform the trouble diagnosis for the other DTC. Refer to EC-86, "DTC Index".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P117A	AIR FUEL RATIO B1 (AIR FUEL RATIO B1)	ECM detects a lean/rich air fuel ratio state in any cylinder for a specified length of time.	• Fuel injector • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor • Intake air leaks • Lack of fuel • Incorrect PCV hose connection • Improper spark plug • Insufficient compression • The fuel injector circuit is open or shorted • Ignition coil • The ignition signal circuit is open or shorted

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING-1

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

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

>> GO TO 2.

2.PRECONDITIONING-2

1. Turn ignition switch ON.
2. Clear the mixture ratio self-learning value. Refer to EC-130, "Work Procedure".

Will CONSULT be used?

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

3.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Turn ignition switch ON.
2. Select “COOLAN TEMP/S” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Start engine.
4. Make sure that “COOLAN TEMP/S” indicates more than 80°C (176°F).

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT
1. Select “SYSTEM 1 DIAGNOSIS B B1” and “SYSTEM 1 DIAGNOSIS A B1” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Drive vehicle under the following conditions for at least 5 consecutive seconds.

CAUTION:

- **Always drive vehicle at a safe speed.**

ENG SPEED	1,000 – 1,250rpm
COOLAN TEMP/S	More than 80°C (176°F)
B/FUEL SCHDL	4 – 8 msec
Selector lever	D position
SYSTEM 1 DIAGNOSIS B B1	PRSENT

NOTE:
- Drive the vehicle at approximately 88 km/h (55MPH) allows easy diagnosis.
- Keep the accelerator pedal as possible during cruising.

3. Check “SYSTEM 1 DIAGNOSIS A B1” indication.

Is “CMPLT” displayed?

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

5.PERFORM DTC CONFIRMATION PROCEDURE-3

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-362, "Diagnosis Procedure".
NO >> INSPECTION END

6.PERFORM DTC CONFIRMATION PROCEDURE-4

Without CONSULT

1. Start the engine and warm it up to normal operating temperature.
2. Drive vehicle under the following conditions for at least 5 consecutive seconds.

CAUTION:
- **Always drive vehicle at a safe speed.**

Engine speed	1,000 – 1,250 rpm
Calculated load value	26 – 46 %
Selector lever	D position

NOTE:
- Drive the vehicle at approximately 88 km/h (55MPH) allows easy diagnosis.
- Keep the accelerator pedal as possible during cruising.

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-362, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009555273

1.CHECK FOR INTAKE AIR LEAK

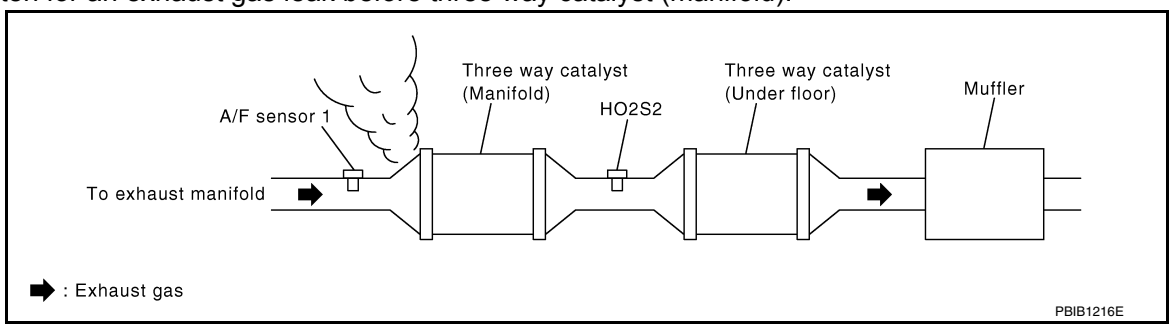
1. Stop engine and check the following for connection.
- Air duct
- Vacuum hoses
- PCV hose
- Intake air passage between air duct to intake manifold
2. Start engine and let it idle.
3. Listen for an intake air leak after the mass air flow sensor.

Is the inspection result normal?

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

2.CHECK EXHAUST GAS LEAK

1. Stop engine and visually check exhaust tube, three way catalyst and muffler for dents connection.
2. Start engine and let it idle.
3. Listen for an exhaust gas leak before three way catalyst (manifold).



Is the inspection result normal?

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

3.CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-135, "Work Procedure".
2. Check fuel pressure. Refer to EC-135, "Work Procedure".

Is the inspection result normal?

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

4.CHECK MASS AIR FLOW SENSOR

With CONSULT
Check “MASS AIR FLOW” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
For specification, refer to EC-466, "Mass Air Flow Sensor".

With GST
Check mass air flow sensor signal in Service $01 using GST.
For specification, refer to EC-466, "Mass Air Flow Sensor".

Is the inspection result normal?

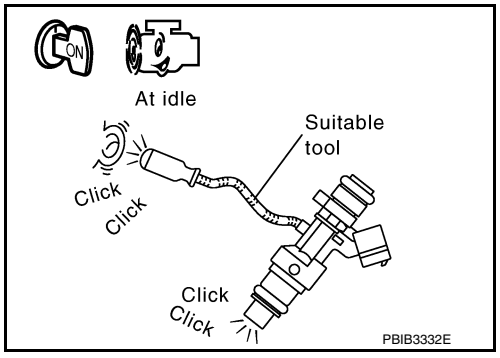
YES >> GO TO 5.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-182, "Diagnosis Procedure".

5.CHECK FUNCTION OF FUEL INJECTOR-1

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

Without CONSULT
1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



Is the inspection result normal?

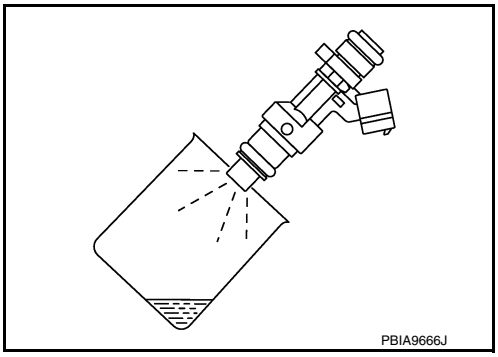
YES >> GO TO 6.
NO >> Perform trouble diagnosis for fuel injector, refer to EC-434, "Component Function Check".

6.CHECK FUNCTION OF FUEL INJECTOR-2

CAUTION:

Perform the following procedure in a place with no combustible objects and good ventilation.

1. Turn ignition switch OFF.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all fuel injector harness connectors.
4. Remove fuel tube assembly. Refer to EM-40, "Removal and Installation".
   Keep fuel hose and all fuel injectors connected to fuel tube.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each fuel injector.
7. Crank engine for approximately 3 seconds.



- **Fuel should be sprayed evenly for each fuel injector.**
- **Fuel must not drip from the tip of fuel injector.**

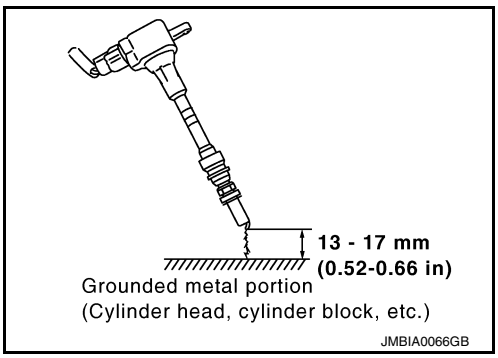
Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace fuel injector. Refer to EM-40, "Removal and Installation".

7. CHECK FUNCTION OF IGNITION COIL-1

CAUTION:
Perform the following steps in a well-ventilated area with no combustibles.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse from IPDM E/R to release fuel pressure.
   NOTE:
   CONSULT must not be used to release fuel pressure. It develops again during the following steps, if released by using CONSULT.
3. Start the engine.
4. After an engine stall, crank the engine two or three times to release all the fuel pressure.
5. Turn ignition switch OFF.
6. Disconnect all the harness connectors of ignition coil to prevent electric discharge from occurring in ignition coil.
7. Remove ignition coil assembly and spark plug of cylinder. Refer to EM-47, "Removal and Installation".
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Allow a 13-17mm (0.52-0.66 in) spacing between spark plug and grounded metal portion as shown in the figure to fix the ignition coil with a rope or an equivalent.
11. Crank the engine for approximately 3 seconds to see if sparking occurs between spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **The discharge voltage becomes 20 kV or higher. Therefore, always stay away from the spark plug and ignition coil at least 50 cm (19.7 in) during the inspection.**
- **Leaving a space of more than 17mm (0.66 in) may damage the ignition coil.**

NOTE:
When the gap is less than 13 mm (0.52 in), a the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

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

8. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-13, "Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

9. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace fuel filter and fuel pump assembly. Refer to FL-6, "Removal and Installation".
NO >> Repair or replace error-detected parts.

10. CHECK FUNCTION OF IGNITION COIL-2

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

Spark should be generated.

Is the inspection result normal?

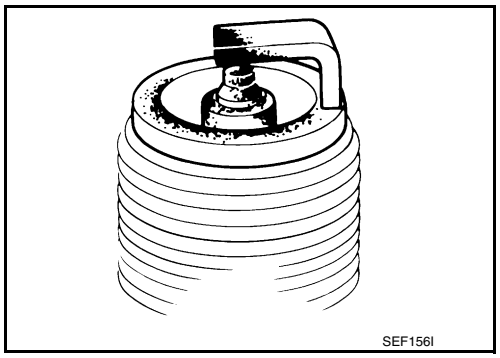
YES >> GO TO 11.
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-439, "Component Function Check".

11. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

YES >> 1. Repair or clean spark plug. Refer to EM-21, "Removal and Installation".
2. GO TO 12.
NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-116, "Spark Plug".



12. CHECK FUNCTION OF IGNITION COIL-3

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

Spark should be generated.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-116, "Spark Plug".

P1212 TCS COMMUNICATION LINE

Description

INFOID:0000000009020863

This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and “ABS actuator and electric unit (control unit)”.
Be sure to erase the malfunction information such as DTC not only for “ABS actuator and electric unit (control unit)” but also for ECM after TCS related repair.

DTC Logic

INFOID:0000000009020864

DTC DETECTION LOGIC

NOTE:
- **If DTC P1212 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-162, "DTC Logic".**
- **If DTC P1212 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-351, "DTC Logic".**

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1212	TCS/CIRC (TCS communication line)	ECM can not receive the information from “ABS actuator and electric unit (control unit)” continuously.	• Harness or connectors (CAN communication line is open or shorted.) • ABS actuator and electric unit (control unit) • Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-366, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020865

Perform the trouble diagnosis for TCS. Refer to BRC-50, "Work Flow".
NOTE:
If DTC P1212 is displayed with DTC UXXXX and/or P0607, perform the following trouble diagnosis.
- Trouble diagnosis for DTC UXXXX Refer to EC-86, "DTC Index".
- Trouble diagnosis for DTC P0607 Refer to EC-351, "DTC Logic".

P1217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000009020866

DTC DETECTION LOGIC

NOTE:

- **If DTC P1217 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P1217 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-351, "DTC Logic".**

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P1217	Engine over temperature (Overheat)	• Cooling fan does not operate properly (Overheat). • Cooling fan system does not operate properly (Overheat). • Engine coolant was not added to the system using the proper filling method. • Engine coolant is not within the specified range.	• Harness or connectors (The cooling fan circuit is open or shorted.) • IPDM E/R (Cooling fan low relay, high relay) • Cooling fan relay • Cooling fan motor • Radiator hose • Radiator • Radiator cap • Reservoir tank • Water pump • Thermostat

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to CO-9, "Refilling". Also, replace the engine oil. Refer to LU-8, "Refilling".

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-12, "Anti-Freeze Coolant Mixture Ratio".**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-367, "Component Function Check".

NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-368, "Diagnosis Procedure".

Component Function Check

INFOID:0000000009020867

1.PERFORM COMPONENT FUNCTION CHECK-I

WARNING:

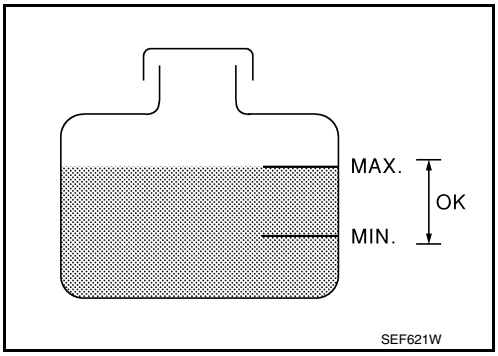
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

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

Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.

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

YES >> Go to EC-368, "Diagnosis Procedure".
NO >> GO TO 2



2. PERFORM COMPONENT FUNCTION CHECK-II

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

YES >> Go to EC-368, "Diagnosis Procedure".
NO >> GO TO 3.

3. PERFORM COMPONENT FUNCTION CHECK-III

With CONSULT
1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT and touch “LOW” on the CONSULT screen.
3. Make sure that cooling fan operates at low speed.

Without CONSULT
1. Start engine and let it idle.
2. Turn air conditioner switch and blower fan switch ON.
3. Make sure that cooling fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Go to EC-368, "Diagnosis Procedure".

4. PERFORM COMPONENT FUNCTION CHECK-IV

With CONSULT
1. Touch “HI” on the CONSULT screen.
2. Make sure that cooling fan operates at higher speed than low speed.

Without CONSULT
1. Turn ignition switch OFF.
2. Turn air conditioner switch and blower fan switch OFF.
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
5. Restart engine and make sure that cooling fan operates at higher speed than low speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-368, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020868

1. CHECK COOLING FAN OPERATION

With CONSULT
1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT.
3. Make sure that cooling fan motor operate at each speed (LOW/HI).

Without CONSULT
1. Perform IPDM E/R auto active test and check cooling fan motor operation. Refer to PCS-10, "Diagnosis Description" (with I-Key), PCS-39, "Diagnosis Description" (without I-Key).
2. Make sure that cooling fan motor operate at each speed (Low/High).

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-429, "Diagnosis Procedure".

2. CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to CO-8, "Inspection".

Is leakage detected?

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

3. CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak.
- Hose (Refer to CO-8, "Inspection".)
- Radiator (Refer to CO-12, "RADIATOR : Inspection".)
- Water pump (Refer to CO-19, "Removal and Installation".)

>> Repair or replace malfunctioning part.

4. CHECK RADIATOR CAP

Check radiator cap. Refer to CO-12, "RADIATOR CAP : Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace radiator cap. Refer to CO-14, "Exploded View".

5. CHECK THERMOSTAT

Check thermostat. Refer to CO-21, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace thermostat. Refer to CO-21, "Removal and Installation".

6. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-199, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace engine coolant temperature sensor. Refer to CO-24, "Exploded View".

7. OVERHEATING CAUSE ANALYSIS

If the cause cannot be isolated, check CO-6, "Troubleshooting Chart".

>> INSPECTION END

P1225 TP SENSOR

DTC Logic

INFOID:0000000009020869

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P1225	Closed throttle position learning performance	Closed throttle position learning value is excessively low.	Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

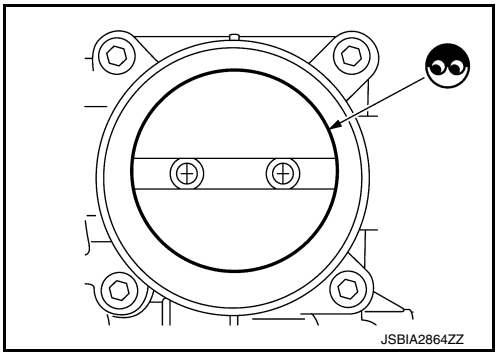
YES >> Go to EC-370, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020870

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct. Refer to EM-26, "Removal and Installation".
3. Check if foreign matter is caught between the throttle valve and the housing.



Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to EC-127, "Work Procedure".

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-26, "Removal and Installation".

>> INSPECTION END

P1226 TP SENSOR

DTC Logic

INFOID:0000000009020871

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 2 and 3 for 32 times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

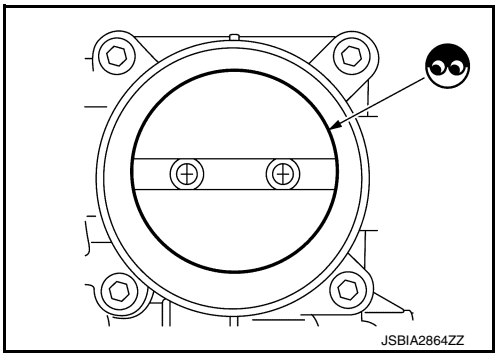
YES >> Go to EC-371, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020872

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct. Refer to EM-26, "Removal and Installation".
3. Check if foreign matter is caught between the throttle valve and the housing.



Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to EC-127, "Work Procedure".

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-26, "Removal and Installation".

>> INSPECTION END

P1550 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000009429297

DTC DETECTION LOGIC

NOTE:
If DTC P1550 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-372, "DTC Logic".

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P1550	Battery current sensor circuit range/performance	The output voltage of the battery current sensor remains within the specified range while engine is running.	• Harness or connectors (The sensor circuit is open or shorted.) • Battery current sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-372, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009429298

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect battery current sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between battery current sensor harness connector and ground.

Battery current sensor		Ground	Voltage
Connector	Terminal		
F9	1	Ground	Approx. 5V

Is the inspection result normal?

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

3.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F9	3	F11	68	Existed

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

Is the inspection result normal?

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

4.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F9	4	F11	58	Existed

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

Is the inspection result normal?

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

5.CHECK BATTERY CURRENT SENSOR

Refer to EC-373, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace battery negative cable assembly.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

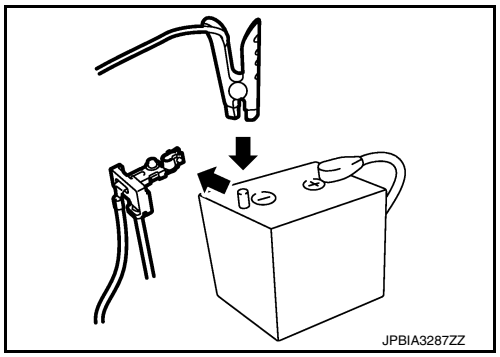
>> INSPECTION END

Component Inspection

INFOID:0000000009429299

1.CHECK BATTERY CURRENT SENSOR

1. Reconnect harness connectors disconnected.
2. Disconnect battery negative cable.
3. Install jumper cable between battery negative terminal and body ground.
4. Turn ignition switch ON.
5. Check the voltage between ECM harness connector and ground.



ECM		Ground	Voltage
Connector	Terminal		
F11	58 (Battery current sensor signal)	Ground	Approx. 2.5V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly.

P1551, P1552 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000009429301

DTC DETECTION LOGIC

NOTE:
If DTC P1551 or P1552 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-374, "DTC Logic".

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P1551	Battery current sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Battery current sensor
P1552	Battery current sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V with ignition switch ON

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Go to EC-374, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009429302

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect battery current sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between battery current sensor harness connector and ground.

Battery current sensor		Ground	Voltage
Connector	Terminal		
F9	1	Ground	Approx. 5V

Is the inspection result normal?

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

3.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F9	3	F11	68	Existed

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

Is the inspection result normal?

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

4.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F9	4	F11	58	Existed

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

Is the inspection result normal?

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

5.CHECK BATTERY CURRENT SENSOR

Refer to EC-375, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace battery negative cable assembly.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

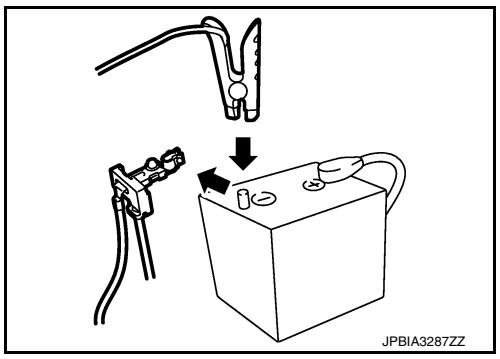
>> INSPECTION END

Component Inspection

INFOID:0000000009429303

1.CHECK BATTERY CURRENT SENSOR

1. Reconnect harness connectors disconnected.
2. Disconnect battery negative cable.
3. Install jumper cable between battery negative terminal and body ground.
4. Turn ignition switch ON.
5. Check the voltage between ECM harness connector and ground.



ECM		Ground	Voltage
Connector	Terminal		
F11	58 (Battery current sensor signal)	Ground	Approx. 2.5V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly.

P1553 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000009429305

DTC DETECTION LOGIC

NOTE:
If DTC P1553 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-376, "DTC Logic".

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P1553	Battery current sensor performance	The signal voltage transmitted from the sensor to ECM is higher than the amount of the maximum power generation.	• Harness or connectors (The sensor circuit is open or shorted.) • Battery current sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-376, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009429306

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect battery current sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between battery current sensor harness connector and ground.

Battery current sensor		Ground	Voltage
Connector	Terminal		
F9	1	Ground	Approx. 5V

Is the inspection result normal?

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

3.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F9	3	F11	68	Existed

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

Is the inspection result normal?

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

4.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F9	4	F11	58	Existed

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

Is the inspection result normal?

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

5.CHECK BATTERY CURRENT SENSOR

Refer to EC-377, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace battery negative cable assembly.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

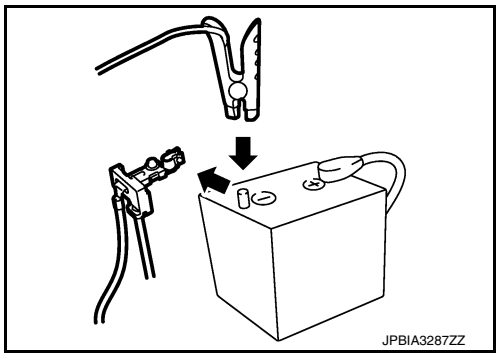
>> INSPECTION END

Component Inspection

INFOID:0000000009429307

1.CHECK BATTERY CURRENT SENSOR

1. Reconnect harness connectors disconnected.
2. Disconnect battery negative cable.
3. Install jumper cable between battery negative terminal and body ground.
4. Turn ignition switch ON.
5. Check the voltage between ECM harness connector and ground.



ECM		Ground	Voltage
Connector	Terminal		
F11	58 (Battery current sensor signal)	Ground	Approx. 2.5V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly.

P1554 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000009429309

DTC DETECTION LOGIC

NOTE:
If DTC P1554 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-378, "DTC Logic".

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P1554	Battery current sensor performance	The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough.	• Harness or connectors (The sensor circuit is open or shorted.) • Battery current sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-378, "Component Function Check".
NOTE:
Use component function check to check the overall function of the battery current sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-379, "Diagnosis Procedure".

Component Function Check

INFOID:0000000009429310

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK

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

Without CONSULT
1. Start engine and let it idle.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F11	58 (Battery current sensor signal)	Ground	Above 2.3V at least once

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-379, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009429311

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect battery current sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between battery current sensor harness connector and ground.

Battery current sensor		Ground	Voltage
Connector	Terminal		
F9	1	Ground	Approx. 5V

Is the inspection result normal?

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

3.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F9	3	F11	68	Existed

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

Is the inspection result normal?

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

4.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F9	4	F11	58	Existed

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

Is the inspection result normal?

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

5.CHECK BATTERY CURRENT SENSOR

Refer to EC-380, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace battery negative cable assembly.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

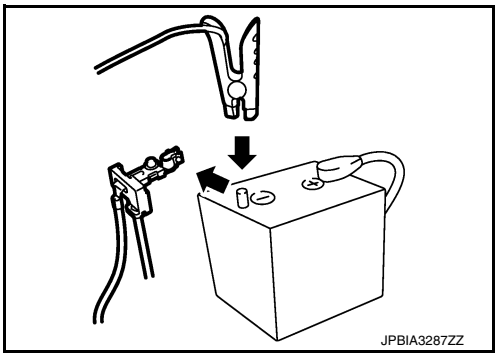
>> INSPECTION END

Component Inspection

INFOID:0000000009429312

1.CHECK BATTERY CURRENT SENSOR

1. Reconnect harness connectors disconnected.
2. Disconnect battery negative cable.
3. Install jumper cable between battery negative terminal and body ground.
4. Turn ignition switch ON.
5. Check the voltage between ECM harness connector and ground.



ECM		Ground	Voltage
Connector	Terminal		
F11	58 (Battery current sensor signal)	Ground	Approx. 2.5V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly.

P1564 ASCD STEERING SWITCH

DTC Logic

INFOID:0000000009020873

DTC DETECTION LOGIC

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-349, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1564	ASCD SW (ASCD steering switch)	• An excessively high voltage signal from the ASCD steering switch is sent to ECM. • ECM detects that input signal from the ASCD steering switch is out of the specified range. • ECM detects that the ASCD steering switch is stuck ON.	• Harness or connectors (ASCD steering switch circuit is open or shorted.) • ASCD steering switch • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Wait at least 10 seconds.
3. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press ACCEL/RES switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press COAST/SET switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Check DTC.

Is DTC detected?

YES >> Proceed to EC-381, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020874

1.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT

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

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
		Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
		Released	OFF
RESUME/ACC SW	ACCEL/RES switch	Pressed	ON
		Released	OFF

Monitor item	Condition		Indication
SET SW	COAST/SET switch	Pressed	ON
		Released	OFF

⊗ Without CONSULT
1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals.

ECM			Condition	Voltage (Approx.)
Connector	+	-		
	Terminal			
E16	94	95	MAIN switch: Pressed	0 V
			CANCEL switch: Pressed	1 V
			COAST/SET switch: Pressed	2 V
			ACCEL/RES switch: Pressed	3 V
			All ASCD steering switches: Released	4 V

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> GO TO 2.

2.CHECK ASCD STEERING SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect combination switch (spiral cable) harness connector.
4. Check the continuity between combination switch (spiral cable) and ECM harness connector.

Combination switch (Spiral cable)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M30	32	E16	95	Existed

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

Is the inspection result normal?

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

3.CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT

1. Check the continuity between ECM harness connector and combination switch.

Combination switch (Spiral cable)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M30	25	E16	94	Existed

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

Is the inspection result normal?

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

4.CHECK ASCD STEERING SWITCH

Refer to EC-383, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace ASCD steering switch. Refer to ST-8, "Removal and Installation".

Component Inspection

INFOID:0000000009020875

1. CHECK ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector.
2. Check the resistance between combination switch harness connector terminals as per the following conditions.

Combination switch (Spiral cable)			Condition	Resistance (Approx.)
Connector	+	–		
	Terminals			
M88	13	16	MAIN switch: Pressed	0 Ω
			CANCEL switch: Pressed	250 Ω
			COAST/SET switch: Pressed	660 Ω
			ACCEL/RES switch: Pressed	1,480 Ω
			All ASCD steering switches: Released	4,000 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD steering switch. Refer to ST-8, "Removal and Installation".

P1572 ASCD BRAKE SWITCH

DTC Logic

INFOID:0000000009020876

DTC DETECTION LOGIC

NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-349, "DTC Logic".**
- **This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.**

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition		Possible cause
P1572	ASCD BRAKE SW (ASCD brake switch)	A)	When the vehicle speed is above 30 km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to the ECM at the same time.	• Harness or connectors (Stop lamp switch circuit is shorted.) (ASCD brake switch circuit is shorted.) • Stop lamp switch • ASCD brake switch • Incorrect stop lamp switch installation • Incorrect ASCD brake switch installation • ECM
		B)	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

NOTE:

Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

1. Start engine.
2. Press MAIN switch and make sure that CRUISE indicator is displayed in combination meter.
3. Drive the vehicle for at least 5 consecutive seconds as per the following conditions.

   CAUTION:

   Always drive vehicle at a safe speed.

   NOTE:

   This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position

4. Check DTC.

Is DTC detected?

YES >> Proceed to EC-389, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Drive the vehicle for at least 5 consecutive seconds as per the following conditions.

   CAUTION:

Always drive vehicle at a safe speed.
NOTE:
This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-389, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020877

1.CHECK OVERALL FUNCTION-I

With CONSULT
1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check “BRAKE SW1” indication as per the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT
1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as per the following.

ECM			Condition		Voltage (Approx.)
Connector	+	–			
	Terminal				
E16	100	108	Brake pedal	Slightly depressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

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

2.CHECK OVERALL FUNCTION-II

With CONSULT
Select “BRAKE SW2” and check indication as per the following conditions.

Monitor item	Condition		Indication
BRAKE SW2	Brake pedal	Slightly depressed	ON
		Fully released	OFF

Without CONSULT
Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition		Voltage (Approx.)
Connector	+	–			
	Terminal				
E16	99	108	Brake pedal	Slightly depressed	Battery voltage
				Fully released	0 V

Is the inspection result normal?

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

3.CHECK ASCD BRAKE SWITCH POWER SUPPLY

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

ASCD brake switch		Ground	Voltage
Connector	Terminal		
E36	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT

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

ASCD brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E36	2	E16	100	Existed

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

Is the inspection result normal?

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

5.CHECK ASCD BRAKE SWITCH

Check the ASCD brake switch. Refer to EC-426, "Component Inspection (ASCD Brake Switch)"

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace ASCD brake switch. Refer to BR-19, "Exploded View".

6.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E13	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.
NO >> Perform the trouble diagnosis for power supply circuit.

7.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between stop lamp switch harness connector and ECM harness connector.

Stop lamp switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E13	2	E16	99	Existed

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

Is the inspection result normal?

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

8.CHECK STOP LAMP SWITCH

Check the stop lamp switch. Refer to EC-387, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace stop lamp switch. Refer to BR-19, "Exploded View".

Component Inspection (ASCD Brake Switch)

INFOID:0000000009020878

1.CHECK ASCD BRAKE SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check the continuity between ASCD brake switch terminals as per the following conditions.

ASCD brake switch		Condition		Continuity
Terminals				
1	2	Brake pedal	Fully released	Existed
			Slightly depressed	Not existed

Is the inspection result normal?

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

2.CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-8, "Inspection and Adjustment".
2. Check the continuity between ASCD brake switch terminals as per the following conditions.

ASCD brake switch		Condition		Continuity
Terminals				
1	2	Brake pedal	Fully released	Existed
			Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD brake switch. Refer to BR-19, "Exploded View".

Component Inspection (Stop Lamp Switch)

INFOID:0000000009020879

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch Terminals		Condition		Continuity
1	2	Brake pedal	Fully released	Not existed
			Slightly depressed	Existed

Is the inspection result normal?

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

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-20, "Inspection and Adjustment".
2. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch Terminals		Condition		Continuity
1	2	Brake pedal	Fully released	Not existed
			Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch. Refer to BR-19, "Exploded View".

P1574 ASCD VEHICLE SPEED SENSOR

Description

INFOID:0000000009020880

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to EC-45, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description" for ASCD functions.

DTC Logic

INFOID:0000000009020881

DTC DETECTION LOGIC

NOTE:

- **If DTC P1574 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-162, "DTC Logic".**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-329, "DTC Logic"**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-349, "DTC Logic"**
- **If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-351, "DTC Logic".**

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1574	ASCD VHL SPD SEN (ASCD vehicle speed sensor)	ECM detects a difference between two vehicle speed signals is out of the specified range.	• Harness or connectors (CAN communication line is open or shorted.) • ABS actuator and electric unit (control unit) • TCM • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. Drive the vehicle at more than 40 km/h (25 MPH).
   CAUTION:
   Always drive vehicle at a safe speed.
   NOTE:
   This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EC-389, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020882

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-93, "CONSULT Function".

Is DTC detected?

NO >> GO TO 2.
YES >> Perform trouble shooting relevant to DTC indicated.

2.CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-30, "CONSULT Function (ABS)".

Is DTC detected?

NO >> INSPECTION END
YES >> Perform trouble shooting relevant to DTC indicated.

P1715 INPUT SPEED SENSOR

Description

INFOID:0000000009020883

ECM receives input speed sensor signal from TCM via the CAN communication line. ECM uses this signal for engine control.

DTC Logic

INFOID:0000000009020884

DTC DETECTION LOGIC

NOTE:

- **If DTC P1715 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to EC-275, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer to EC-279, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-349, "DTC Logic".**

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P1715	Input speed sensor (TCM output)	Input speed sensor signal is different from the theoretical value calculated by ECM from output speed sensor signal and engine rpm signal.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (Input speed sensor circuit is open or shorted) • TCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and drive the vehicle at more than 50 km/h (31 MPH) for at least 5 seconds.
   CAUTION:
   Always drive vehicle at a safe speed.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-391, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020885

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-112, "DTC Index".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM. Refer to TM-237, "Removal and Installation".

>> INSPECTION END

P1720 VSS

Description

INFOID:0000000009020886

ECM receives two vehicle speed signals via the CAN communication line. One is sent from “ABS actuator and electric unit (control unit)” via combination meter, and the other is from TCM (Transmission control module). ECM uses these signals for engine control.

DTC Logic

INFOID:0000000009020887

DTC DETECTION LOGIC

NOTE:

- **If DTC P1720 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P1720 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-349, "DTC Logic".**
- **If DTC P1720 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-351, "DTC Logic".**

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P1720	Vehicle speed sensor (TCM output)	The difference between two vehicle speed signals is out of the specified range.	• Harness or connectors (Secondary speed sensor circuit is open or shorted.) (Wheel sensor circuit is open or shorted.) • TCM • Secondary speed sensor • ABS actuator and electric unit (control unit) • Wheel sensor • Combination meter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. Drive vehicle at a speed of 20 km/h (12 MPH) or more for at least 5 seconds without depressing the brake pedal.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-393, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020888

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-112, "DTC Index".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble shooting relevant to DTC indicated.

2.CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Check DTC with “ABS actuator and electric unit (control unit)”. Refer to BRC-41, "DTC Index".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble shooting relevant to DTC indicated.

3.CHECK COMBINATION METER FUNCTION

Check combination meter function. Refer to MWI-21, "DTC Index".

>> INSPECTION END

P1805 BRAKE SWITCH

DTC Logic

INFOID:0000000009020889

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	• Harness or connectors (Stop lamp switch circuit is open or shorted.) • Stop lamp switch

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase DTC.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-395, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020890

1.CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E57 (M/T) E13 (CVT)	1	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
• 10 A fuse (No. 30)
• Harness for open or short between stop lamp switch and battery

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

4.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect stop lamp switch harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and stop lamp switch harness connector.

ECM		Stop lamp switch		Continuity
Connector	Terminal	Connector	Terminal	
E16	99	E57 (M/T) E13 (CVT)	2	Existed

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

Is the inspection result normal?

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

5.CHECK STOP LAMP SWITCH

Refer to EC-396, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace brake pedal assembly. Refer to BR-19, "Removal and Installation".

6.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000009020891

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

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

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-20, "Inspection and Adjustment".
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace brake pedal assembly. Refer to BR-19, "Removal and Installation".

P2096, P2097 A/F SENSOR 1

DTC Logic

INFOID:0000000009445313

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P2096	POST CAT FUEL TRIM SYS B1 (Post catalyst fuel trim system too lean bank 1)	The output voltage computed by ECM from the A/F sensor 1 signal is shifts to the lean side for a specified period.	• A/F sensor 1 • A/F sensor 1 heater • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks • Exhaust gas leaks
P2097	POST CAT FUEL TRIM SYS B1 (Post catalyst fuel trim system too rich bank 1)	The A/F signal computed by ECM from the A/F sensor 1 signal is shifts to the rich side for a specified period.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11 at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Clear the mixture ratio self-learning value. Refer to EC-130, "Work Procedure".
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
4. Let engine idle for 1 minute.
5. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-397, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009445314

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.RETIGHTEN A/F SENSOR 1 AND HEATED OXYGEN SENSOR 2

Loosen and retighten the A/F sensor 1 and heated oxygen sensor 2. Refer to EM-31, "Removal and Installation".

>> GO TO 3.

3.CHECK FOR EXHAUST GAS LEAK

1. Start engine and run it at idle.

2. Listen for an exhaust gas leak before the three way catalyst 2.

Is exhaust gas detected?

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

4. CHECK FOR INTAKE AIR LEAK

1. Start engine and run it at idle.
2. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.
NO >> GO TO 5.

5. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-130, "Work Procedure".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171or P0172. Refer to EC-245, "DTC Logic" or EC-249, "DTC Logic".
NO >> GO TO 6.

6. CHECK HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Check harness connector for water.

Water should not exit.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace harness connector.

7. CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage
Connector	Terminal		
F12	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R harness connector F42
- 20A fuse (No. 53)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

9. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	49	Existed
	2		53	

4. Check the continuity between ECM harness connector or A/F sensor 1 harness connector and ground.

A/F sensor 1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F12	1	F11	49	Ground	Not existed
	2		53		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK A/F SENSOR 1 HEATER

Refer to EC-172, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 13.

11.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-223, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

12.CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair or replace.

13.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1. Refer to EM-31, "Removal and Installation".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using oxygen sensor thread cleaner tool [commercial service tool: (J-43897-18) or (J-43897-12)] and approved anti-seize lubricant (commercial service tool).**

Do you have CONSULT?

YES >> GO TO 14.
NO >> GO TO 15.

14.CONFIRM A/F ADJUSTMENT DATA

With CONSULT

1. Turn ignition switch ON.
2. Select “A/F ADJ-B1” in “DATA MONITOR” mode with CONSULT.
3. Make sure that “0.000” is displayed on CONSULT screen.

Is “0.000” displayed?

YES >> INSPECTION END
NO >> GO TO 15.

15. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

Clear the mixture ratio self-learning value. Refer to EC-130, "Work Procedure".

Do you have CONSULT?

YES >> GO TO 16.
NO >> INSPECTION END

16. CONFIRM A/F ADJUSTMENT DATA

With CONSULT

1. Turn ignition switch ON.
2. Select “A/F ADJ-B1” in “DATA MONITOR” mode with CONSULT.
3. Make sure that “0.000” is displayed on CONSULT screen.

>> INSPECTION END

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

DTC Logic

INFOID:0000000009020892

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P2100	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	• Harness or connectors (Throttle control motor relay circuit is open) • Throttle control motor relay
P2103	Throttle control motor relay circuit short	ECM detect the throttle control motor relay is stuck ON.	• Harness or connectors (Throttle control motor relay circuit is shorted) • Throttle control motor relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V.

Witch DTC is detected?

P2100 >> GO TO 2.
P2103 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-401, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-401, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020893

1.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Check voltage between ECM harness connector and ground.

ECM				Voltage
+		–		
Connector	Terminal	Connector	Terminal	
F10	15	E16	108	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 2.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector F115.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F10	15	F42	32	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R connector F42
- Harness for open or short between IPDM E/R and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUSE

1. Disconnect 20 A fuse (No. 53) from IPDM E/R.
2. Check 20 A fuse for blown.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace 20 A fuse.

5.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check voltage between ECM harness connector and ground under the following conditions.

ECM				Conditions	Voltage
+		–			
Connector	Terminal	Connector	Terminal		
F10	2	E16	108	Ignition switch: OFF	Approx. 0 V
				Ignition switch: ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 6.

6.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector F42.
4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F10	2	F42	29	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R connector F42
- Harness for open or short between IPDM E/R and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK FUSE

1. Disconnect 15 A fuse (No. 52) from IPDM E/R.
2. Check 15 A fuse for blown.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace 15 A fuse.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-31, "Removal and Installation" (with I-Key), PCS-60, "Removal and Installation" (without I-Key).
NO >> Repair or replace harness or connectors.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

DTC Logic

INFOID:0000000009020894

DTC DETECTION LOGIC

NOTE:

- **If DTC P2101 is displayed with DTC P2100, first perform the trouble diagnosis for DTC P2100. Refer to EC-401, "DTC Logic".**
- **If DTC P2101 is displayed with DTC P2119, first perform the trouble diagnosis for DTC P2119. Refer to EC-410, "DTC Logic".**

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P2101	Electric throttle control performance	Electric throttle control function does not operate properly.	• Harness or connectors (Throttle control motor circuit is open or shorted) • Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when engine is running.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-404, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020895

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM				Condition	Voltage
+		–			
Connector	Terminal	Connector	Terminal		
F10	2	E16	108	Ignition switch OFF	Approx. 0 V
				Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 3.

3.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Check voltage between ECM harness connector and ground.

ECM				Voltage
+		–		
Connector	Terminal	Connector	Terminal	
F10	15	E16	108	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 4.

4.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector F42.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F42	32	F10	15	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R connector F42
- Harness for open or short between IPDM E/R and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK FUSE

1. Disconnect 20 A fuse (No. 53) from IPDM E/R.
2. Check 20 A fuse for blown.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace 20 A fuse.

7.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-III

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector F42.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F42	29	F10	2	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R connector F42
- Harness for open or short between IPDM E/R and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK FUSE

1. Disconnect 15 A fuse (No. 52) from IPDM E/R.
2. Check 15 A fuse for blown.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace 15 A fuse.

10. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-31, "Removal and Installation".
NO >> Repair or replace harness or connectors.

11. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	5	F10	1	Not existed
			4	Existed
F7	6	F10	1	Existed
			4	Not existed

5. Also check harness for short to ground and short to power.

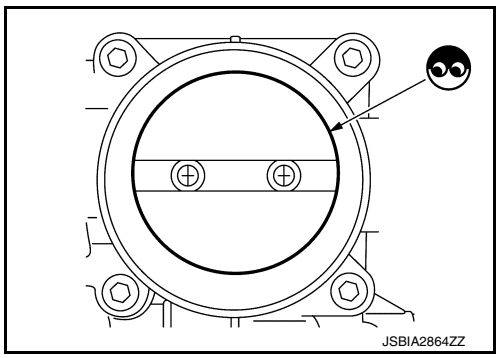
Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair or replace harness or connectors.

12. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct. Refer to EM-26, "Removal and Installation"

2. Check if foreign matter is caught between the throttle valve and the housing.



Is the inspection result normal?

YES >> GO TO 13.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to EC-127, "Work Procedure".

13. CHECK THROTTLE CONTROL MOTOR

Refer to EC-407, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.
NO >> GO TO 15.

14. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Repair or replace harness or connectors.

15. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace malfunction electric throttle control actuator. Refer to EM-28, "Removal and Installation".

>> INSPECTION END

Component Inspection

INFOID:0000000009020896

1. CHECK THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between electric throttle control actuator terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
5 and 6	Approx. 1 - 15 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-28, "Removal and Installation".

>> INSPECTION END

P2118 THROTTLE CONTROL MOTOR

DTC Logic

INFOID:0000000009020897

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P2118	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	• Harness or connectors (Throttle control motor circuit is shorted.) • Electric throttle control actuator (Throttle control motor)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-408, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020898

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect electric throttle control actuator harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	5	F10	1	Not existed
			4	Existed
F7	6	F10	1	Existed
			4	Not existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness or connectors.

3.CHECK THROTTLE CONTROL MOTOR

Refer to EC-409, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 5.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connectors.

5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-28, "Removal and Installation".

>> INSPECTION END

Component Inspection

INFOID:0000000009020899

1.CHECK THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between electric throttle control actuator terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
5 and 6	Approx. 1 - 15 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-28, "Removal and Installation".

>> INSPECTION END

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Logic

INFOID:0000000009020900

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis content	DTC detecting condition		Possible cause
P2119	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detect the throttle valve is stuck open.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND B

1. Turn ignition switch ON and wait at least 1 second.
2. Set selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
3. Set selector lever to P (CVT) or Neutral (M/T) position.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 1 second.
6. Set selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
7. Set selector lever to P (CVT) or Neutral (M/T) position.
8. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
9. Check DTC.

Is DTC detected?

YES >> Go to EC-410, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Set selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
3. Set selector lever to P (CVT) or Neutral (M/T) position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.

Is DTC detected?

YES >> Go to EC-410, "Diagnosis Procedure".
NO >> INSPECTION END

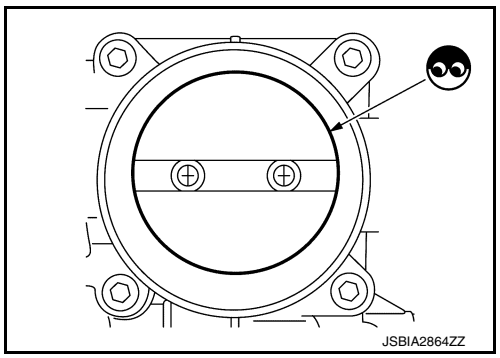
Diagnosis Procedure

INFOID:0000000009020901

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct. Refer to EM-26, "Removal and Installation".

3. Check if foreign matter is caught between the throttle valve and the housing.



Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to EC-127, "Work Procedure".

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-28, "Removal and Installation".

>> INSPECTION END

P2122, P2123 APP SENSOR

DTC Logic

INFOID:0000000009020902

DTC DETECTION LOGIC

NOTE:
If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-352, "DTC Logic".

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	• Harness or connectors (APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1)
P2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-412, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020903

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage (Approx.)
Connector	Terminal		
E12	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	2	E16	111	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK APP SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	3	E16	110	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK APP SENSOR

Refer to EC-413, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Exploded View".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000009020904

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM			Condition		Voltage
Connector	Terminal				
	+	–			
E16	110 (APP sensor 1 signal)	111	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	103 (APP sensor 2 signal)	104		Fully released	0.3 - 0.6 V
				Fully depressed	1.95 - 2.4 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Exploded View".

>> INSPECTION END

P2127, P2128 APP SENSOR

DTC Logic

INFOID:0000000009020905

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	• Harness or connectors (APP sensor 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor
P2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-415, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020906

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E12	5	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	5	E16	102	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Item	Connector	Terminal
F11	75	Crankshaft position sensor (POS)	F15	1
E16	101	Refrigerant pressure sensor	E17	3
	102	APP sensor	E12	5

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair short to ground or short to power in harness or connectors.

5.CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-277, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-450, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace malfunctioning component.

6.CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	1	E16	104	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	6	E16	103	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK APP SENSOR

Refer to EC-417, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Exploded View".

>> INSPECTION END

10.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000009020907

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM			Condition		Voltage
Connector	Terminal				
	+	–			
E16	110 (APP sensor 1 signal)	111	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	103 (APP sensor 2 signal)	104		Fully released	0.3 - 0.6 V
				Fully depressed	1.95 - 2.4 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Exploded View".

>> INSPECTION END

P2135 TP SENSOR

DTC Logic

INFOID:0000000009020908

DTC DETECTION LOGIC

NOTE:
If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-352, "DTC Logic".

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P2135	Throttle position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	• Harness or connector (TP sensor 1 and 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-418, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020909

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.
3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F7	2	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	4	F11	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	1	F11	33	Existed
	3		34	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-419, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-28, "Removal and Installation".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000009020910

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-127, "Work Procedure".
4. Turn ignition switch ON.
5. Set selector lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector and ground.

ECM			Condition		Voltage
Connector	Terminal				
	+	–			
F11	33 (TP sensor 1 signal)	36	Accelerator pedal	Fully released	More than 0.36 V
				Fully depressed	Less than 4.75 V
	34 (TP sensor 2 signal)			Fully released	Less than 4.75 V
				Fully depressed	More than 0.36 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-28, "Removal and Installation".

>> INSPECTION END

P2138 APP SENSOR

DTC Logic

INFOID:0000000009020911

DTC DETECTION LOGIC

NOTE:
If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-352, "DTC Logic".

DTC No.	Trouble diagnosis content	DTC detecting condition	Possible cause
P2138	Accelerator pedal position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	• Harness or connector (APP sensor 1 and 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1 and 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-421, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020912

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E12	4	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E12	5	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 4.

4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	5	E16	102	Existed

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

5.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Item	Connector	Terminal
F11	75	Crankshaft position sensor (POS)	F15	1
E16	101	Refrigerant pressure sensor	E17	3
	102	APP sensor	E12	5

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair short to ground or short to power in harness or connectors.

6.CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-277, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-450, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace malfunctioning component.

7.CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector as follows.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	1	E16	104	Existed
	2		111	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

8.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector as follows.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	3	E16	110	Existed
	6		103	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

9.CHECK APP SENSOR

Refer to EC-423, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 10.

10.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Exploded View".

>> INSPECTION END

11.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000009020913

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM			Condition		Voltage
Connector	Terminal				
	+	–			
E16	110 (APP sensor 1 signal)	111	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	103 (APP sensor 2 signal)	104		Fully released	0.3 - 0.6 V
				Fully depressed	1.95 - 2.4 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Exploded View".

>> INSPECTION END

ASCD BRAKE SWITCH

Component Function Check

INFOID:0000000009020916

1.CHECK ASCD BRAKE SWITCH FUNCTION

With CONSULT
1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check “BRAKE SW1” indication as per the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT
1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as per the following.

ECM			Condition		Voltage (Approx.)
Connector	+	–			
	Terminal				
E16	100	108	Brake pedal	Slightly depressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-425, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020917

1.CHECK ASCD BRAKE SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Voltage
Connector	Terminal		
E36	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E36	2	E16	100	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK ASCD BRAKE SWITCH

Check the ASCD brake switch. Refer to EC-426, "Component Inspection (ASCD Brake Switch)"

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
NO >> Replace ASCD brake switch. Refer to ACC-3, "Exploded View".

Component Inspection (ASCD Brake Switch)

INFOID:0000000009020918

1.CHECK ASCD BRAKE PEDAL POSITION SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check the continuity between ASCD brake switch terminals as per the following conditions.

ASCD brake switch		Condition		Continuity
Terminal				
1	2	Brake pedal	Fully released	Existed
			Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-20, "Inspection and Adjustment".
2. Check the continuity between ASCD brake switch terminals as per the following conditions.

ASCD brake switch		Condition		Continuity
Terminal				
1	2	Brake pedal	Fully released	Existed
			Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD brake switch. Refer to BR-19, "Exploded View".

CLUTCH PEDAL POSITION SWITCH

Component Function Check

INFOID:0000000009762984

1.CHECK CLUTCH PEDAL POSITION SWITCH FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Select “ENGINE” using CONSULT.
3. Select “CLUTCH P/P SW” in “DATA MONITOR” mode.
4. Check “CLUTCH P/P SW” indication under the following conditions.

Monitor item	Condition		Indication
CLUTCH P/P SW	Clutch pedal	Fully released	OFF
		Fully depressed	ON

Without CONSULT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM				Condition		Voltage
+		–				
Connector	Terminal	Connector	Terminal			
E16	92 (Clutch pedal position switch signal)	E16	108	Clutch pedal	Fully released	Approx. 0V
					Fully depressed	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-427, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009762985

1.CHECK CLUTCH PEDAL POSITION SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect clutch pedal position switch harness connector.
3. Check the continuity between clutch pedal position switch harness connector and ground.

Clutch pedal position switch		Ground	Continuity
Connector	Terminal		
E48	4	Ground	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair open circuit or short to power in harness or connectors.

2.CHECK CLUTCH PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between clutch pedal position switch harness connector and ECM harness connector.

Clutch pedal position switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E48	3	E16	92	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK CLUTCH PEDAL POSITION SWITCH

Refer to EC-428, "Component Inspection (Clutch Pedal Position Switch)".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace clutch pedal position switch. Refer to CL-10, "Exploded View".

4.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Clutch Pedal Position Switch)

INFOID:0000000009762986

1.CHECK CLUTCH PEDAL POSITION SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect clutch pedal position switch harness connector.
3. Check the continuity between clutch pedal position switch terminals under the following conditions.

Clutch pedal position switch		Condition		Continuity
Connector	Terminals			
E48	3 and 4	Clutch pedal	Fully released	Existed
			Fully depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK CLUTCH PEDAL POSITION SWITCH-II

1. Adjust clutch pedal position switch installation. Refer to CL-11, "Inspection and Adjustment".
2. Check the continuity between clutch pedal position switch terminals under the following conditions.

Clutch pedal position switch		Condition		Continuity
Connector	Terminals			
E48	3 and 4	Clutch pedal	Fully released	Existed
			Fully depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace clutch pedal position switch. Refer to CL-10, "Exploded View".

COOLING FAN

Component Function Check

INFOID:0000000009020919

1.CHECK COOLING FAN FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT.
3. Touch “LOW” and “Hi” on the CONSULT screen.
4. Check that cooling fan operates.

NOTE:

The cooling fan operates at high speeds even when “LOW” is selected in CONSULT “ACTIVE TEST”. (For single connector cooling fan with M/T models)

Without CONSULT

1. Perform IPDM E/R auto active test and check cooling fan motor operation. Refer to PCS-10, "Diagnosis Description".
2. Check that cooling fan operates.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Refer to EC-429, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020920

1.CHECK COOLING FAN MOTOR CIRCUIT

1. Disconnect cooling fan motor harness connector.
2. Check the continuity between IPDM E/R harness connector and cooling fan motor harness connector.

CVT models

IPDM E/R		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E43	7	E5	1	Existed
	5	E32	3	

M/T models

IPDM E/R		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E43	7	E31	2	Existed
	5		1	

3. Check the continuity between cooling fan relay harness connector and cooling fan motor harness connector.

CVT models

Cooling fan relay		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E62	5	E32	4	Existed

M/T models

Cooling fan relay		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E62	5	E31	4	Existed

4. Check the continuity between cooling fan motor harness connector and ground.

CVT models

Cooling fan motor		Ground	Continuity
Connector	Terminal		
E5	2	Ground	Existed

M/T models

Cooling fan motor		Ground	Continuity
Connector	Terminal		
E31	3	Ground	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2.CHECK COOLING FAN RELAY CIRCUIT

1. Disconnect cooling fan relay harness connector.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and cooling fan relay harness connector.

IPDM E/R		Cooling fan relay		Continuity
Connector	Terminal	Connector	Terminal	
E46	65	E62	1	Existed
	59		2	

4. Check the continuity between cooling fan relay harness connector and ground.

Cooling fan relay		Ground	Continuity
Connector	Terminal		
E62	3	Ground	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK COOLING FAN RELAY

Refer to EC-431, "Component Inspection (Cooling Fan Relay)".

YES or NO

YES >> GO TO 4.
NO >> Replace cooling fan relay.

4.CHECK COOLING FAN MOTOR

Refer to EC-431, "Component Inspection (Cooling Fan Motor)".

YES or NO

YES >> GO TO 5.
NO >> Replace cooling fan motor. Refer to CO-17, "Exploded View".

5.CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

YES or NO

YES >> Replace IPDM E/R. Refer to PCS-31, "Removal and Installation"(with I-Key), PCS-60, "Removal and Installation"(without I-Key).
NO >> Repair or replace harness or connector.

Component Inspection (Cooling Fan Motor)

INFOID:0000000009020921

1.CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector.
3. Supply cooling fan motor terminals with battery voltage and check operation.

CVT models

Cooling fan motor			Operation
Connector	+	–	
	terminals		
E5	1	2	Cooling fan motor operates
E32	3	4	

M/T models

Cooling fan motor			Operation
Connector	+	–	
	terminals		
E31	2	3	Cooling fan motor operates
	1	4	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan motor. Refer to CO-17, "Exploded View".

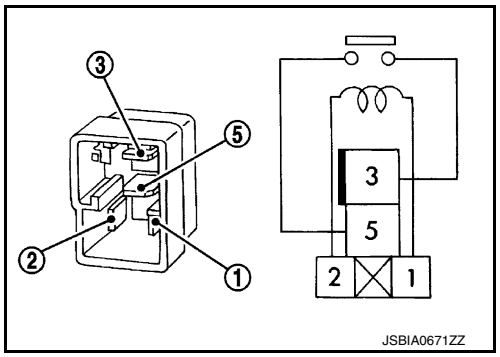
Component Inspection (Cooling Fan Relay)

INFOID:0000000009020922

1.CHECK COOLING FAN RELAY

1. Turn ignition switch OFF.
2. Remove cooling fan relay.
3. Check continuity between cooling fan relay terminals under the following conditions.

Cooling fan relay terminals		Conditions	Continuity
3	5	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed



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Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan relay.

ELECTRICAL LOAD SIGNAL

Description

INFOID:0000000009020923

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred to ECM through the CAN communication line.

Component Function Check

INFOID:0000000009020924

1.CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT.
3. Select “LOAD SIGNAL” and check indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Rear window defogger switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-432, "Diagnosis Procedure".

2.CHECK LIGHTING SWITCH FUNCTION

Check “LOAD SIGNAL” indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Lighting switch	ON at 2nd position	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.
NO >> Go to EC-432, "Diagnosis Procedure".

3.CHECK HEATER FAN CONTROL SWITCH FUNCTION

Select “HEATER FAN SW” and check indication under the following conditions.

Monitor item	Condition		Indication
HEATER FAN SW	Heater fan control switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-432, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020925

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to EC-432, "Component Function Check".

Which circuit is related to the incident?

Rear window defogger>>GO TO 2
Headlamp>>GO TO 3.
Heater fan>>GO TO 4.

2.CHECK REAR WINDOW DEFOGGER SYSTEM

Perform trouble diagnosis of rear window defogger system. Refer to DEF-17, "Work Flow".

>> INSPECTION END

3. CHECK HEADLAMP SYSTEM

Perform trouble diagnosis of headlamp system. Refer to EXL-66, "Work Flow".

>> INSPECTION END

4. CHECK AIR CONDITIONING SYSTEM

Perform trouble diagnosis of air conditioning system. Refer to HA-12, "Workflow".

>> INSPECTION END

FUEL INJECTOR

Component Function Check

INFOID:0000000009020926

1.INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.
NO >> Go to EC-434, "Diagnosis Procedure".

2.CHECK FUEL INJECTOR FUNCTION

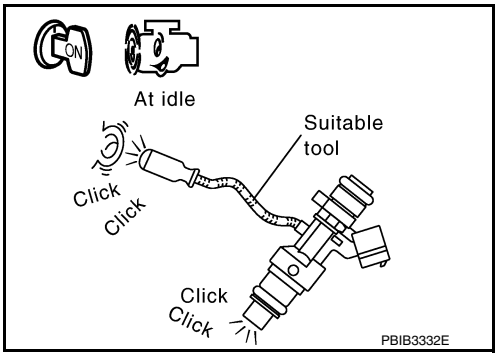
With CONSULT

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT

1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-434, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020927

1.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel injector harness connector and ground.

Fuel injector				Ground	Voltage
Cylinder	Connector	Front / Rear	Terminal		
1	F17	Front	1	Ground	Battery voltage
	F53	Rear			
2	F18	Front	1		
	F54	Rear			
3	F19	Front	1		
	F29	Rear			
4	F20	Front	1		
	F30	Rear			

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R connector F42

- 10 A fuse (No. 55)
- Harness for open or short between fuel injector and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector				ECM		Continuity
Cylinder	Connector	Front / Rear	Terminal	Connector	Terminal	
1	F17	Front	2	F10	31	Existed
	F53	Rear			12	
2	F18	Front	2		30	
	F54	Rear			20	
3	F19	Front	2		29	
	F29	Rear			16	
4	F20	Front	2		25	
	F30	Rear			24	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL INJECTOR

Refer to EC-435, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning fuel injector. Refer to EM-40, "Removal and Installation"

5. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-31, "Removal and Installation".
NO >> Repair or replace harness or connectors.

Component Inspection

INFOID:0000000009020928

1. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as follows.

Terminals	Resistance
1 and 2	11.1 - 14.5 Ω [at 10 - 60°C (50 - 140°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning fuel injector. Refer to EM-40, "Removal and Installation".

FUEL PUMP

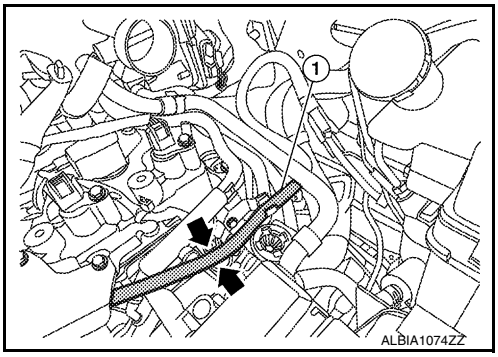
Component Function Check

INFOID:0000000009020929

1.CHECK FUEL PUMP FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose (1) with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.



Is the inspection result normal?

YES >> INSPECTION END
NO >> EC-436, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020930

1.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ECM harness connector and ground.

ECM				Voltage
+		–		
Connector	Terminal	Connector	Terminal	
F10	23	E16	108	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and ECM harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F43	43	F10	23	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect “fuel level sensor unit and fuel pump” harness connector.
4. Turn ignition switch ON.
5. Check the voltage between “fuel level sensor unit and fuel pump” harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage
Connector	Terminal		
B44	1	Ground	Battery voltage should for exist 1 second after ignition switch is turn ON.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 4.

4.CHECK FUSE

1. Turn ignition switch OFF.
2. Disconnect 15 A fuse (No. 48) from IPDM E/R.
3. Check 15 A fuse.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace 15 A fuse.

5.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and “fuel level sensor unit and fuel pump” harness connector.

IPDM E/R		Fuel level sensor unit and fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E44	9	B44	1	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

6.CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between “fuel level sensor unit and fuel pump” harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Continuity
Connector	Terminal		
B44	3	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to power in harness or connectors.

7.CHECK FUEL PUMP

Refer to EC-438, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace “fuel level sensor unit and fuel pump”.Refer to FL-6, "Exploded View".

8.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-31, "Removal and Installation".
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

Component Inspection

INFOID:0000000009020931

1.CHECK FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.
3. Check resistance between “fuel level sensor unit and fuel pump” terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
1 and 3	0.2 - 5.0 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace “fuel level sensor unit and fuel pump”. Refer to FL-6, "Exploded View".

IGNITION SIGNAL

Component Function Check

INFOID:0000000009020932

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES-1 >> With CONSULT: GO TO 2.
YES-2 >> Without CONSULT: GO TO 3.
NO >> Go to EC-439, "Diagnosis Procedure".

2.IGNITION SIGNAL FUNCTION

With CONSULT

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT.
2. Make sure that each circuit produces a momentary engine speed drop.

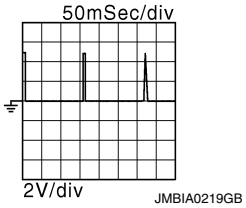
Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-439, "Diagnosis Procedure".

3.IGNITION SIGNAL FUNCTION

Without CONSULT

1. Let engine idle.
2. Check the voltage signal between ECM harness connector and ground with an oscilloscope.

ECM				Voltage signal
+		–		
Connector	Terminal	Connector	Terminal	
F7	17	E16	108	
	18			
	21			
	22			

NOTE:
The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-439, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020933

1.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
2. Check the voltage between ECM harness connector and ground.

ECM			Voltage
Connector	Terminal		
	+	–	
E16	105	108	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-157, "Diagnosis Procedure".

2.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Turn ignition switch ON.
4. Check the voltage between condenser harness connector and ground.

Condenser		Ground	Voltage
Connector	Terminal		
F26	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 3.

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector F42.
3. Check the continuity between IPDM E/R harness connector and condenser harness connector.

IPDM E/R		Condenser		Continuity
Connector	Terminal	Connector	Terminal	
F42	34	F26	1	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between IPDM E/R and condenser

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between condenser harness connector and ground.

Condenser		Ground	Continuity
Connector	Terminal		
F26	2	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK CONDENSER

Refer to EC-443, "Component Inspection (Condenser)"

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace condenser.

7.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

1. Reconnect all harness connectors disconnected.
2. Disconnect ignition coil harness connector.

3. Turn ignition switch ON.
4. Check the voltage between ignition coil harness connector and ground.

Ignition coil			Ground	Voltage
Cylinder	Connector	Terminal		
1	F34	3	Ground	Battery voltage
2	F35	3		
3	F36	3		
4	F37	3		

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

Ignition coil			Ground	Continuity
Cylinder	Connector	Terminal		
1	F34	2	Ground	Existed
2	F35	2		
3	F36	2		
4	F37	2		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to power in harness or connectors.

9. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ignition coil harness connector.

Ignition coil			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F34	1	F10	17	Existed
2	F35	1		18	
3	F36	1		22	
4	F37	1		21	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-442, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-47, "Removal and Installation".

11. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000009020934

1. CHECK IGNITION COIL WITH POWER TRANSISTOR-I

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

Terminals	Resistance
1 and 2	Except 0 or ∞ Ω [at 25°C (77°F)]
1 and 3	Except 0 Ω [at 25°C (77°F)]
2 and 3	

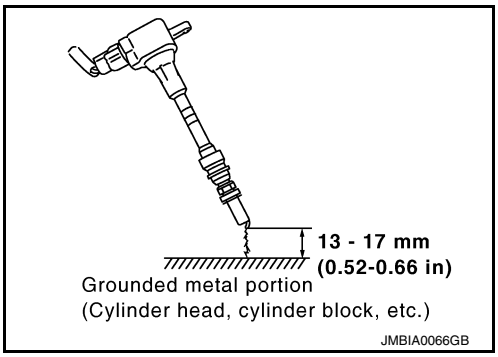
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-47, "Removal and Installation".

2. CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.
4. Start engine.
5. After engine stalls, crank it two or three times to release all fuel pressure.
6. Turn ignition switch OFF.
7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
8. Remove ignition coil and spark plug of the cylinder to be checked.
9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
10. Connect spark plug and harness connector to ignition coil.
11. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:
- **Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.**

NOTE:
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-47, "Removal and Installation".

Component Inspection (Condenser)

INFOID:0000000009020935

1.CHECK CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check resistance between condenser terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
1 and 2	Above 1 MΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace condenser.

MALFUNCTION INDICATOR LAMP

Component Function Check

INFOID:0000000009020936

1.CHECK MIL FUNCTION

1. Turn ignition switch ON.
2. Make sure that MIL lights up.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-444, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020937

1.CHECK DTC

Check that DTC UXXXX is not displayed.

Is DTC detected?

YES >> Perform trouble diagnosis for DTC UXXXX.
NO >> GO TO 2.

2.CHECK COMBINATION METER

Check DTC with combination meter. Refer to MWI-21, "DTC Index".

Is DTC detected?

YES >> Perform troubleshooting relevant to DTC indicated.
NO >> GO TO 3.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-54, "Removal and Installation".
NO >> Repair or replace harness or connectors.

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

Component Function Check

INFOID:0000000009020938

1.CHECK ORVR FUNCTION

Check whether the following symptoms are present.
- Fuel odor from EVAP canister is strong.
- Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

Is any symptom present?

YES >> Go to EC-445, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009020939

1.INSPECTION START

Check whether the following symptoms are present.
A: Fuel odor from EVAP canister is strong.
B: Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

Which symptom is present?

A >> GO TO 2.
B >> GO TO 8.

2.CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
   The weight should be less than 1.6 kg (3.5 lb).

Is the inspection result normal?

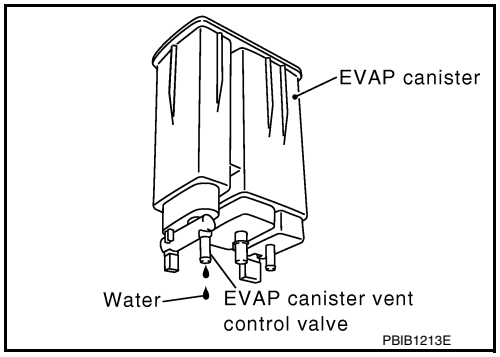
YES >> GO TO 3.
NO >> GO TO 4.

3.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

YES >> GO TO 4.
NO >> GO TO 7.



4.REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 5.

5.CHECK DRAIN FILTER

Refer to EC-449, "Component Inspection (Drain filter)".

Is the inspection result normal?

OK >> GO TO 6.
NO >> Replace drain filter.

6.DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

7.CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-447, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace refueling EVAP vapor cut valve with fuel tank.

8.CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
   The weight should be less than 1.6 kg (3.5 lb).

Is the inspection result normal?

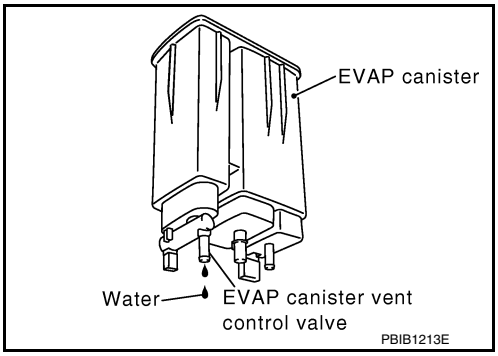
YES >> GO TO 9.
NO >> GO TO 10.

9.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

YES >> GO TO 10.
NO >> GO TO 13.



10.REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 11.

11.CHECK DRAIN FILTER

Refer to EC-449, "Component Inspection (Drain filter)".

Is the inspection result normal?

OK >> GO TO 12.
NO >> Replace drain filter.

12.DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

13.CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair or replace hoses and tubes.

14.CHECK RECIRCULATION LINE

Check recirculation line for clogging, dents and cracks.

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace fuel filler tube.

15. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-447, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace refueling EVAP vapor cut valve with fuel tank.

16. CHECK FUEL FILLER TUBE

Check fuel filler tube and hose connected to the fuel tank for clogging, dents and cracks.

Is the inspection result normal?

YES >> GO TO 17.
NO >> Replace fuel filler tube.

17. CHECK ONE-WAY FUEL VALVE-I

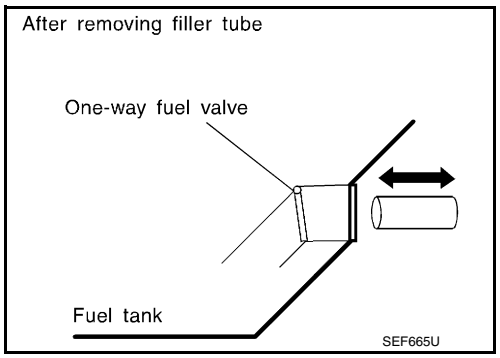
Check one-way valve for clogging.

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair or replace one-way fuel valve with fuel tank.

18. CHECK ONE-WAY FUEL VALVE-II

1. Make sure that fuel is drained from the tank.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as per the following.
   When a stick is inserted, the valve should open, when removing stick it should close.
   Do not drop any material into the tank.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel filler tube or replace one-way fuel valve with fuel tank.

Component Inspection (Refueling EVAP vapor cut valve)

INFOID:0000000009020940

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 3.

2. CHECK REFUELING EVAP VAPOR CUT VALVE

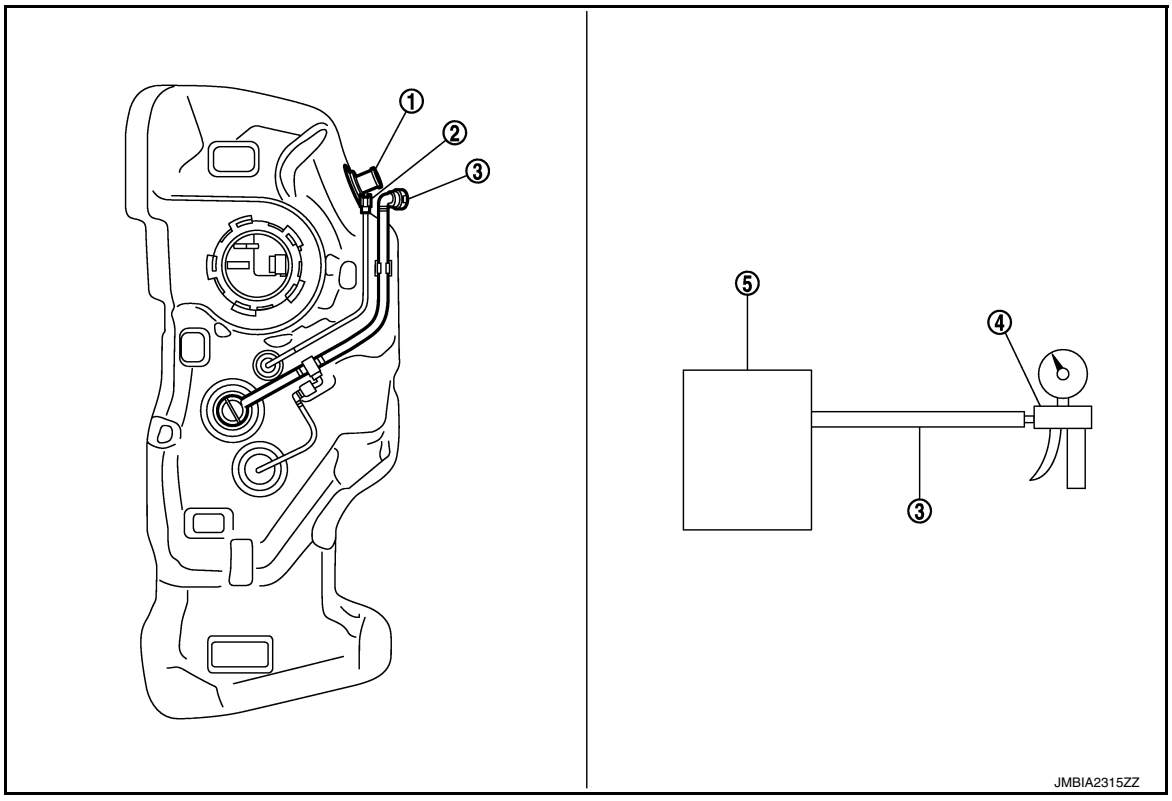
With CONSULT

1. Remove fuel tank. Refer to FL-10, "Removal and Installation".
2. Drain fuel from the tank as per the following:
- Remove fuel feed hose located on the fuel gauge retainer.
- Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
- Drain fuel using “FUEL PUMP RELAY” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Check refueling EVAP vapor cut valve for being stuck to close as per the following.
   Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
4. Check refueling EVAP vapor cut valve for being stuck to open as per the following.

- Connect vacuum pump to hose end.
- Remove fuel gauge retainer with fuel gauge unit.

Always replace O-ring with new one.

- Put fuel tank upside down.
- Apply vacuum pressure to hose end [−13.3 kPa (−0.136 kg/cm^3, −1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.



1. Filler tube
2. Recirculation line
3. EVAP/ORVR line
4. Vacuum/pressure handy pump
5. Fuel tank

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-10, "Removal and Installation".

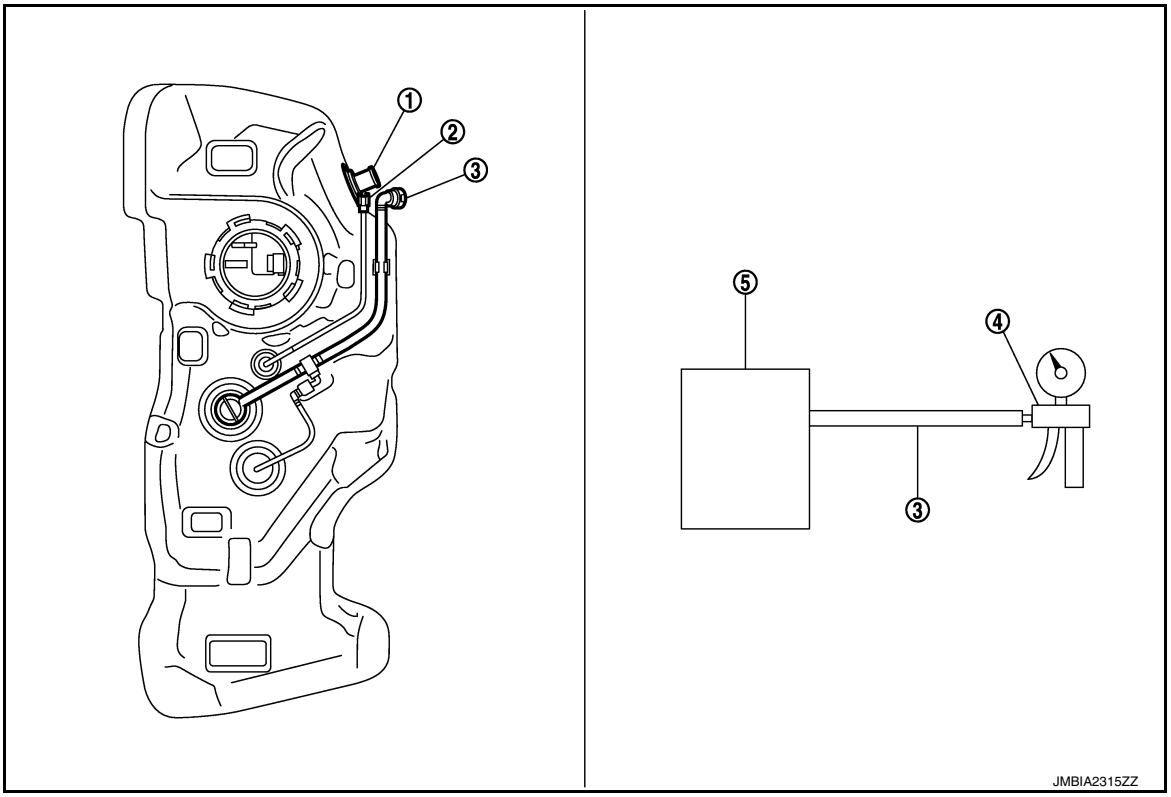
3.CHECK REFUELING EVAP VAPOR CUT VALVE

Without CONSULT

1. Remove fuel tank. Refer to FL-10, "Removal and Installation".
2. Drain fuel from the tank as per the following:
- Remove fuel gauge retainer.
- Drain fuel from the tank using a handy pump into a fuel container.
3. Check refueling EVAP vapor cut valve for being stuck to close as per the following.
Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
4. Check refueling EVAP vapor cut valve for being stuck to open as per the following.
- Connect vacuum pump to hose end.
- Remove fuel gauge retainer with fuel gauge unit.

Always replace O-ring with new one.

- Put fuel tank upside down.
- Apply vacuum pressure to hose end [−13.3 kPa (−0.136 kg/cm^3, −1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.



1. Filler tube
2. Recirculation line
3. EVAP/ORVR line
4. Vacuum/pressure handy pump
5. Fuel tank

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-10, "Removal and Installation".

Component Inspection (Drain filter)

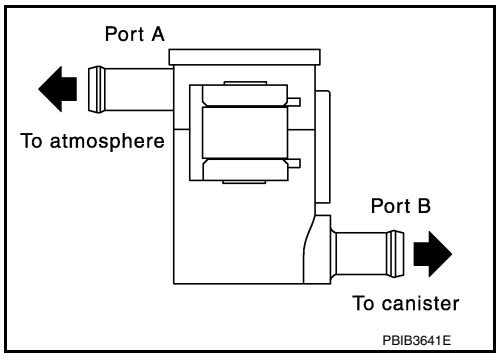
INFOID:0000000009020941

1. CHECK DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace drain filter.



REFRIGERANT PRESSURE SENSOR

Component Function Check

INFOID:0000000009020942

1.CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower fan switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM			Voltage
Connector	Terminal		
	+	–	
E16	101 (Refrigerant pressure sensor signal)	98	1.0 - 4.0V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-450, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009020943

1.CHECK GROUND CONNECTION

1. Turn A/C switch and blower fan switch OFF.
2. Stop engine.
3. Turn ignition switch OFF.
4. Check ground connection E15. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between refrigerant pressure sensor harness connector and ground.

Refrigerant pressure sensor		Ground	Voltage
Connector	Terminal		
E17	3	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E17	1	E16	98	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and refrigerant pressure sensor harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E17	2	E16	85	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor. Refer to HA-30, "REFRIGERANT PRESSURE SENSOR : Removal and Installation".
NO >> Repair or replace.

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:0000000009020944

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-436, "Component Function Check"
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-135, "Work Procedure"
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-434, "Component Function Check"
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-40, "EVAPORATIVE EMISSION SYSTEM : System Description"
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-464, "Inspection"
	Incorrect idle speed adjustment						1	1	1	1		1			EC-131, "Work Procedure"
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-404, "DTC Logic" EC-408, "DTC Logic" EC-410, "DTC Logic"
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-460, "Inspection"
	Ignition signal circuit	1	1	2	2	2		2	2			2			EC-439, "Diagnosis Procedure"
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-157, "Diagnosis Procedure"

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Mass air flow sensor circuit	1	1		2	2		2	2			2			EC-187, "DTC Logic"
Engine coolant temperature sensor circuit				3		3			3					EC-198, "DTC Logic"
Air fuel ratio (A/F) sensor 1 circuit			2											EC-210, "DTC Logic" EC-214, "DTC Logic" EC-217, "DTC Logic" EC-240, "DTC Logic" EC-397, "DTC Logic"
Throttle position sensor circuit						2			2					EC-200, "DTC Logic" EC-264, "DTC Logic" EC-370, "DTC Logic" EC-371, "DTC Logic" EC-418, "DTC Logic"
Accelerator pedal position sensor circuit			3	2	1									EC-412, "DTC Logic" EC-415, "DTC Logic" EC-421, "DTC Logic"
Heated oxygen sensor 2 circuit			6		6		6	6			5			EC-220, "DTC Logic" EC-226, "DTC Logic" EC-234, "DTC Logic"
Knock sensor circuit			2								3			EC-273, "DTC Logic"
Engine oil temperature sensor circuit			4		2						3			EC-262, "DTC Logic"
Engine oil pressure sensor circuit			4		4	3	3	3			3			EC-336, "DTC Logic"

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Crankshaft position sensor circuit	2	2												EC-275, "DTC Logic"
Camshaft position sensor circuit	3	2												EC-279, "DTC Logic"
Vehicle speed signal circuit		2	3		3						3			EC-329, "DTC Logic"
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-347, "DTC Logic" EC-349, "DTC Logic"
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-164, "DTC Logic"
Exhaust valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-168, "DTC Logic"
PNP signal circuit			3		3		3	3			3			EC-354, "DTC Logic"
Refrigerant pressure sensor circuit		2				3			3		4			EC-450, "Diagnosis Procedure"
Electrical load signal circuit							3							EC-432, "Diagnosis Procedure"
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-31, "Workflow"
ABS actuator and electric unit (control unit)			4											BRC-50, "Work Flow"

1 - 6: The numbers refer to the order of inspection.

(continued on next table)

SYSTEM — ENGINE MECHANICAL & OTHER

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FL-13, "Inspection"
	Fuel piping			5	5	5		5	5			5			FL-9, "Inspection"
	Vapor lock														—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—
Air	Air duct	5	5	5	5	5	5	5	5	5		5			EM-26, "Removal and Installation"
	Air cleaner														EM-26, "Exploded View"
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)														EM-26, "Exploded View"
	Electric throttle control actuator														EM-28, "Exploded View"
	Air leakage from intake manifold/Collector/Gasket														EM-28, "Exploded View"
Cranking	Battery	1	1	1		1		1	1			1		1	PG-61, "Work Flow"
	Generator circuit														CHG-14, "Work Flow (With EXP-800 NI or GR8-1200 NI)" CHG-17, "Work Flow (Without EXP-800 NI or GR8-1200 NI)"
	Starter circuit	3										1			STR-21, "Work Flow (With GR8-1200 NI)" STR-24, "Work Flow (Without GR8-1200 NI)"
	Signal plate	6													EM-92, "Exploded View"
	PNP signal	4													TM-15, "BACK-UP LAMP SWITCH : Component Inspection", TM-143, "Diagnosis Procedure"

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-79, "Inspection"
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-101, "Inspection"
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5			EM-51, "Removal and Installation"
	Camshaft														EM-68, "Inspection"
	Intake valve timing control														EM-48, "Removal and Installation"
	Exhaust valve timing control														EM-48, "Removal and Installation"
	Intake valve												3		EM-68, "Inspection"
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EX-4, "Inspection" EM-31, "Removal and Installation"
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-34, "Removal and Installation (Lower Oil Pan)" EM-37, "Removal and Installation (Upper Oil Pan)" LU-10, "Removal and Installation" LU-11, "Removal and Installation" LU-13, "Removal and Installation"
	Oil level (Low)/Filthy oil														LU-7, "Inspection"

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-12, "RADIATOR : Inspection" CO-12, "RADIATOR CAP : Inspection"
	Thermostat									5					CO-21, "Removal and Installation"
	Water pump														CO-19, "Removal and Installation"
	Water gallery														CO-4, "Engine Cooling System"
	Cooling fan									5					CO-17, "Removal and Installation"
	Coolant level (Low)/Contaminated coolant														CO-8, "Inspection"
NATS (NISSAN Vehicle Immobilizer System)		1	1												SEC-162, "Work Flow"

1 - 6: The numbers refer to the order of inspection.

NORMAL OPERATING CONDITION

Description

INFOID:0000000009020945

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 2,400 rpm under no load (for example, the shift lever position is neutral and engine speed is over 2,400 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 2,000 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, EC-32, "MULTIPORT FUEL INJECTION SYSTEM : System Description".

PERIODIC MAINTENANCE

IDLE SPEED

Inspection

INFOID:0000000009020946

1.CHECK IDLE SPEED

With CONSULT
Check idle speed in “DATA MONITOR” mode with CONSULT.

Without CONSULT
Check idle speed by installing the pulse type tachometer clamp on the loop wire or on suitable high-tension wire which installed between No.1 ignition coil and No.1 spark plug.

With GST
Check idle speed with Service $01 of GST.

>> INSPECTION END

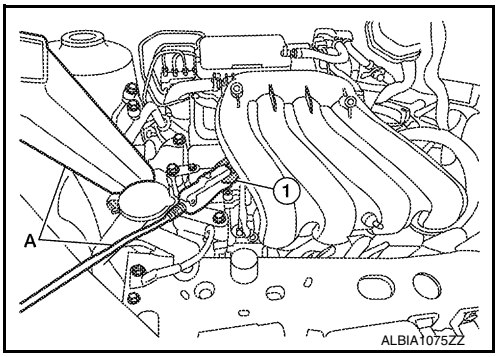
IGNITION TIMING

Inspection

INFOID:0000000009020947

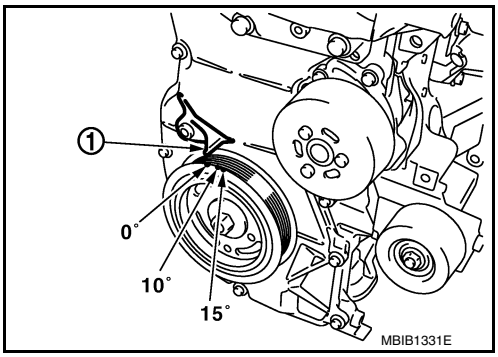
1.CHECK IGNITION TIMING

1. Attach timing light (A) to loop wire (1) as shown.



2. Check ignition timing.

1 : Timing indicator



>> INSPECTION END

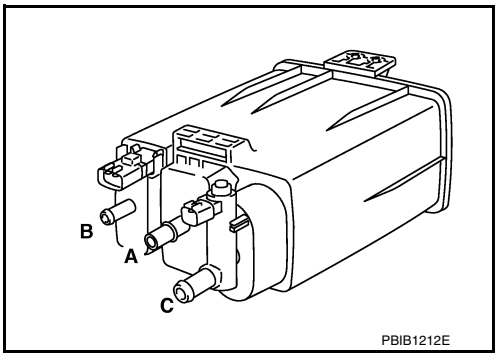
EVAPORATIVE EMISSION SYSTEM

Inspection

INFOID:0000000009020948

1. CHECK EVAP CANISTER

1. Block port (B).
2. Blow air into port (A) and check that it flows freely out of port (C).
3. Release blocked port (B).
4. Apply vacuum pressure to port (B) and check that vacuum pressure exists at the ports (A) and (C).
5. Block port (A) and (B).
6. Apply pressure to port (C) and check that there is no leakage.



>> INSPECTION END

EVAP LEAK CHECK

Inspection

INFOID:0000000009020949

CAUTION:

- **Do not use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in EVAP system.**

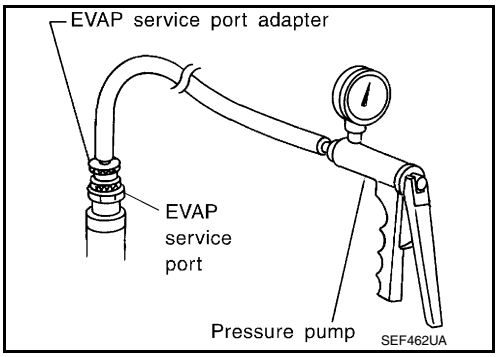
NOTE:

- Do not start engine.
- Improper installation of EVAP service port adapter [commercial service tool: (J-41413-OBD)] to the EVAP service port may cause a leak.

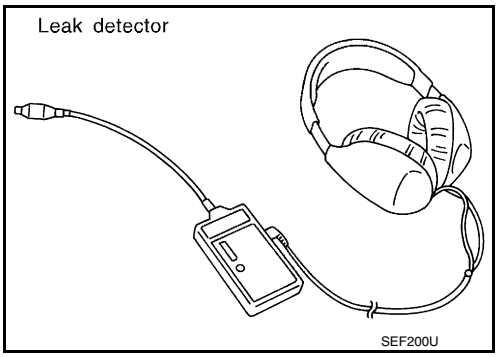
1. EVAP LEAK CHECK

With CONSULT

1. Install EVAP service port adapter [commercial service tool: (J-41413-OBD)] and pressure pump to EVAP service port.
2. Turn ignition switch ON.
3. Select the “EVAP SYSTEM CLOSE” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.
4. Touch “START”. A bar graph (Pressure indicating display) will appear on the screen.
5. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
6. Remove EVAP service port adapter [commercial service tool: (J-41413-OBD)] and hose with pressure pump.

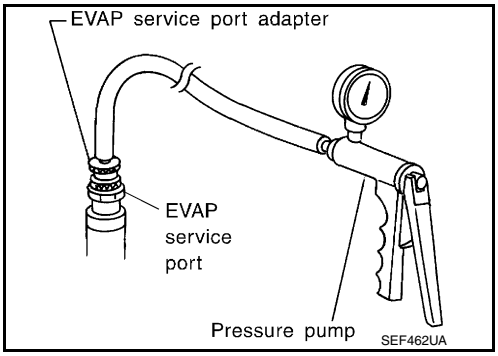


7. Locate the leak using a leak detector [commercial service tool: (J-41416)]. Refer to EC-40, "EVAPORATIVE EMISSION SYSTEM : System Description".

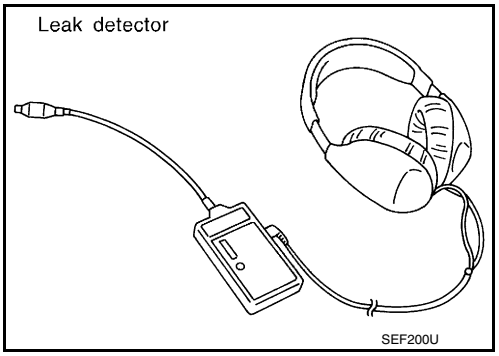


Without CONSULT

1. Install EVAP service port adapter [commercial service tool: (J-41413-OBD)] and pressure pump to EVAP service port.
2. Apply battery voltage between the terminals of EVAP canister vent control valve to make a closed EVAP system.
3. To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm^2, 0.2 to 0.4 psi).
4. Remove EVAP service port adapter [commercial service tool: (J-41413-OBD)] and hose with pressure pump.



5. Locate the leak using a leak detector [commercial service tool: (J-41416)]. Refer to EC-40, "EVAPORATIVE EMISSION SYSTEM : System Description".



>> INSPECTION END

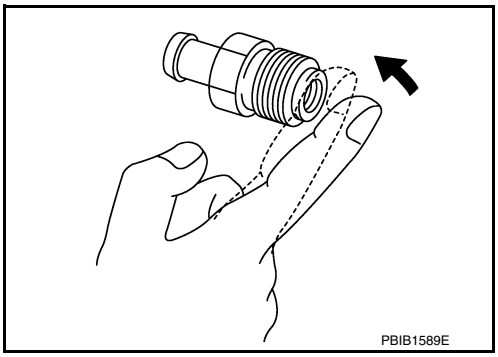
POSITIVE CRANKCASE VENTILATION

Inspection

INFOID:0000000009020950

1.CHECK PCV VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.



Is the inspection result normal?

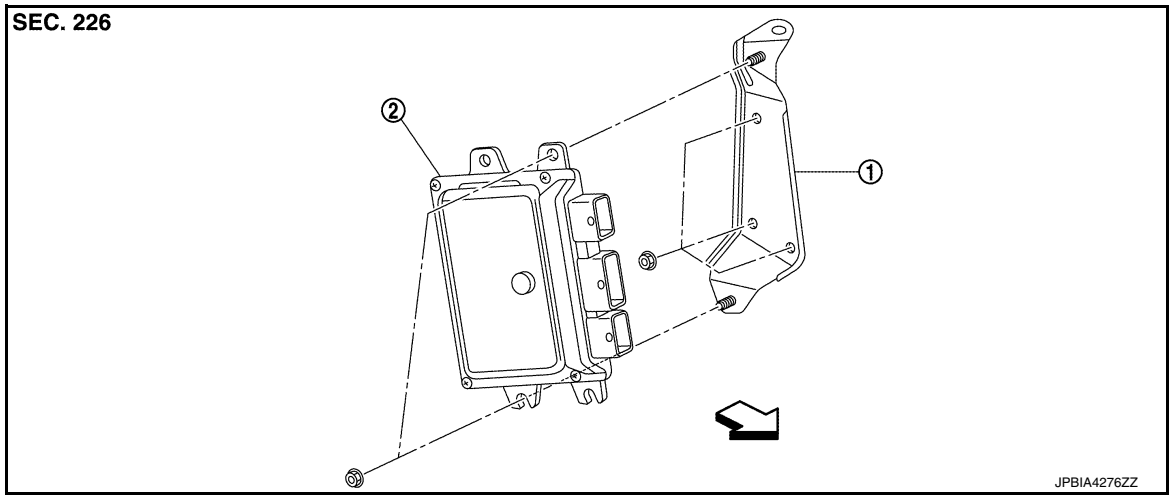
YES >> INSPECTION END
NO >> Replace PCV valve. Refer to EM-48, "Exploded View".

REMOVAL AND INSTALLATION

ECM

Exploded View

INFOID:0000000009020951



① ECM bracket ② ECM
⇦ : Vehicle front

Removal and Installation

INFOID:0000000009020952

CAUTION:
Perform ADDITIONAL SERVICE WHEN REPLACING ECM. Refer to EC-123, "Work Procedure".

REMOVAL

1. Remove fusible link bracket. Keep a service area.
2. Disconnect ECM harness connectors. Refer to HARNESS CONNECTOR (LEVER LOCKING TYPE) in PG-53, "Description".
3. Remove ECM mounting nuts, and then remove ECM.

INSTALLATION
Install in the reverse order of removal.

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:0000000009020953

Transmission	Condition	Specification
CVT	No load* (in P or N position)	650 ± 50 rpm
M/T	No load* (in Neutral position)	650 ± 50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Timing

INFOID:0000000009020954

Transmission	Condition	Specification
CVT	No load* (in P or N position)	4 ± 5°BTDC
M/T	No load* (in Neutral position)	10 ± 5°BTDC

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

INFOID:0000000009020955

Condition	Specification (Using CONSULT or GST)
At idle	10 – 35%
At 2,500 rpm	10 – 35%

Mass Air Flow Sensor

INFOID:0000000009020956

Supply voltage	Battery voltage (11 – 14 V)
Output voltage at idle	0.8 – 1.3 V*
Mass air flow (Using CONSULT or GST)	0.8 – 4.0 g/s at idle* 2.0 – 10.0 g/s at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.