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SERVICE DATA AND SPECIFICATIONS
(SDS)
Idle Speed
Ignition Timing
Mass Air Flow Sensor

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PRECAUTION PRECAUTIONS

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

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 "SRS AIR BAG" and "SEAT BELT" of this Service Manual.

WARNING:

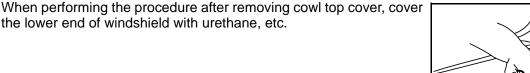
- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the "SRS AIR BAG".
- 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 Air Bag Diagnosis Sensor Unit or other Air Bag 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 3 minutes before performing any service.

Precaution for Procedure without Cowl Top Cover



Precautions For Xenon Headlamp Service

WARNING:

Comply with the following warnings to prevent any serious accident.

 Disconnect the battery cable (negative terminal) or the power supply fuse before installing, removing, or touching the xenon headlamp (bulb included). The xenon headlamp contains high-voltage generated parts.

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- Never work with wet hands.
- Check the xenon headlamp ON-OFF status after assembling it to the vehicle. Never turn the xenon headlamp ON in other conditions. Connect the power supply to the vehicle-side connector. (Turning it ON outside the lamp case may cause fire or visual impairments.)
- Never touch the bulb glass immediately after turning it OFF. It is extremely hot.

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CAUTION:

Comply with the following cautions to prevent any error and malfunction.

- Install the xenon bulb securely. (Insufficient bulb socket installation may melt the bulb, the connector, the housing, etc. by high-voltage leakage or corona discharge.)
- Never perform HID circuit inspection with a tester.
- Never touch the xenon bulb glass with hands. Never put oil and grease on it.
- Dispose of the used xenon bulb after packing it in thick vinyl without breaking it.
- Never wipe out dirt and contamination with organic solvent (thinner, gasoline, etc.).

On Board Diagnostic (OBD) System of Engine and A/T

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[VK56VD]

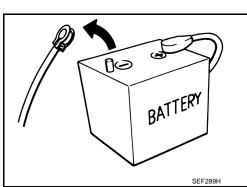
The ECM has an on board diagnostic system. It will illuminate the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

- Always turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to illuminate.
- Always connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to illuminate 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 EC-51, "Diagnosis **Description**".
- Always route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to illuminate due to the short circuit.
- Always connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to illuminate due to the malfunction of the EVAP system or fuel injection system, etc.
- Always erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.

General Precautions

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



- Never 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. Thus, engine operation can vary slightly in this case. However, this is not an indication of a malfunction. Never 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



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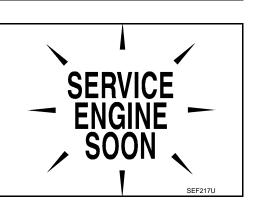
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< PRECAUTION >

• When connecting ECM harness connector (A), fasten (B) it securely with a lever as far as it will go as shown in the figure.

- ECM (1)
- Loosen (C)

- When connecting or disconnecting pin connectors into or from ECM, never damage pin terminals (bends or break). Check that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors.
 A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.
- Keep engine control system parts and harness dry.
- Before replacing ECM, perform ECM Terminals and Reference Value inspection and check that ECM functions properly. Refer to <u>EC-72, "Reference Value"</u>.
- Handle mass air flow sensor carefully to avoid damage.
- Never clean mass air flow sensor with any type of detergent.
- Never disassemble electric throttle control actuator.
- Even a slight leakage in the air intake system can cause serious incidents.
- Never shock or jar the camshaft position sensor, crankshaft position sensor.
- 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.



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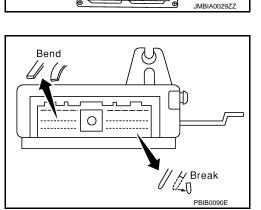
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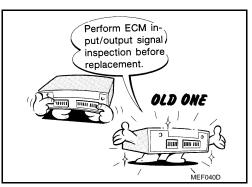
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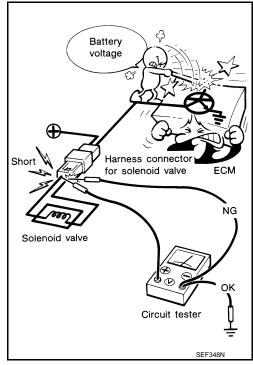
(B)

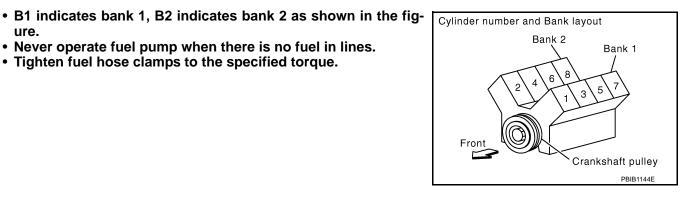
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· When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.





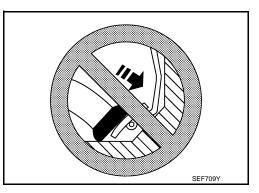


• Never depress accelerator pedal when starting.

Never operate fuel pump when there is no fuel in lines.

• Tighten fuel hose clamps to the specified torque.

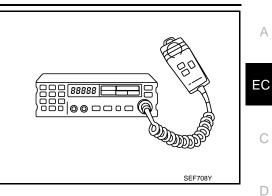
- · Immediately after starting, never rev up engine unnecessarily.
- Never rev up engine just prior to shutdown.



< PRECAUTION >

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- 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. Never 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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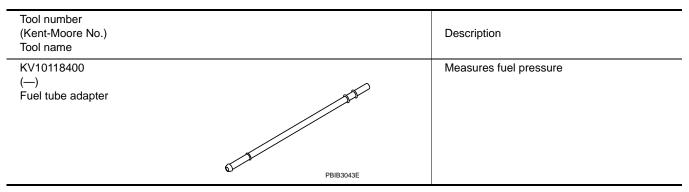
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PREPARATION

Special Service Tools

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Commercial Service Tools

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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)	C A A A A A A A A A A A A A A A A A A A	Applys positive pressure through EVAP service port
Fuel filler cap adapter i.e.: (MLR-8382)	S-NT704	Checks fuel tank vacuum relief valve opening pressure
Socket wrench	S-NT815	Removes and installs engine coolant temperature sensor
	19 mm (0.75 in) Nore than 32 mm (1.26 in) S-NT705	

PREPARATION

< PREPARATION >

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Tool name (Kent-Moore No.)		Description	А
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)	a Mating surface	Reconditions the exhaust system threads before installing a new oxygen sensor. Use with anti- seize lubricant shown below. a: 18 mm diameter with pitch 1.5 mm for Zirco-	EC
	cylinder Flutes	nia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Tita- nia Oxygen Sensor	С
Anti-seize lubricant i.e.: (Permatex TM 133AR or equivalent meeting MIL specification MIL-A-907)		Lubricates oxygen sensor thread cleaning tool when reconditioning exhaust system threads.	D
	S-NT779		E

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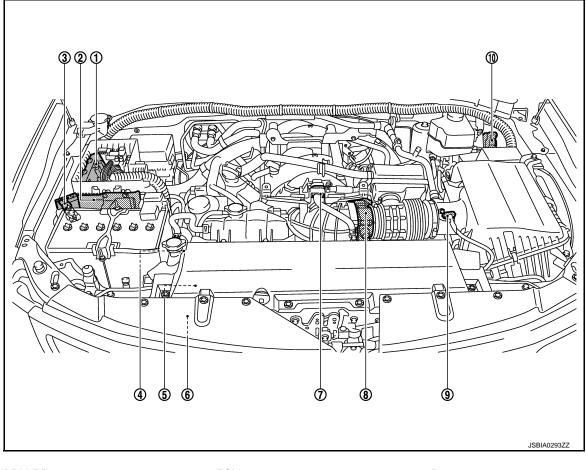
[VK56VD]

SYSTEM DESCRIPTION COMPONENT PARTS

Component Parts Location

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ENGINE ROOM COMPARTMENT



1. IPDM E/R

2. ECM

- 4. Power steering pressure sensor
- 7. EVAP canister purge volume control 8. solenoid valve
- 10. VVEL control module

ENGINE COMPARTMENT

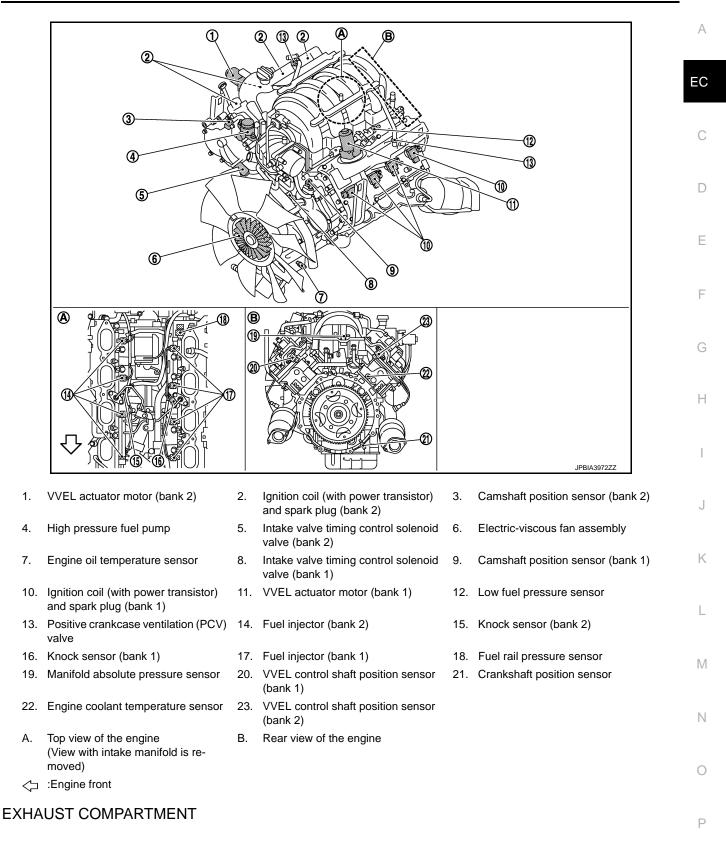
- 5. Alternator
 - Electric throttle control actuator
- 3. Battery current sensor (with battery temperature sensor)
- 6. Refrigerant pressure sensor

9.

Mass air flow sensor (with intake air temperature sensor)

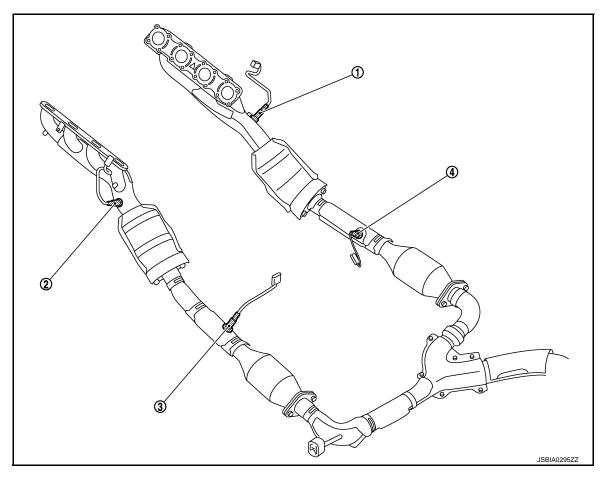
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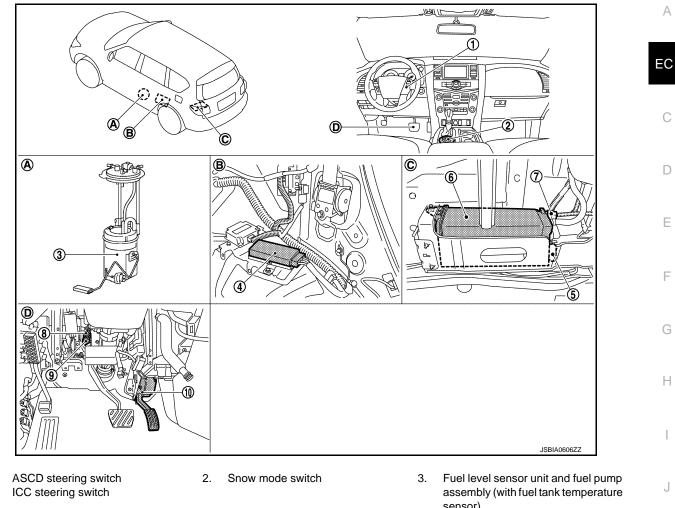


- 1. A/F sensor 1 (bank 2)
- 2. A/F sensor 1 (bank 1) 3. Heated oxygen sensor 2 (bank 1)
- 4. Heated oxygen sensor 2 (bank 2)

BODY COMPARTMENT

< SYSTEM DESCRIPTION >

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4. Fuel pump control module (FPCM)

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- EVAP control system pressure sen-8. 7. sor
- 10. Accelerator pedal position sensor

Component Description

- EVAP canister vent control valve
- Stop lamp switch

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- sensor)
 - EVAP canister ASCD brake switch

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9. ICC brake switch

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Component	Reference
ECM	<u>EC-23, "ECM"</u>
Malfunction indicator lamp (MIL)	EC-30, "Malfunction Indicator Lamp (MIL)"
Ignition coil with power transistor	EC-29, "Ignition Coil With Power Transistor"
Accelerator pedal position sensor	EC-21, "Accelerator Pedal Position Sensor"
Mass air flow sensor	EC-31, "Mass Air Flow Sensor (With Intake Air Temperature Sen-
Intake air temperature sensor	<u>sor)"</u>
Electric throttle control actuator	
Throttle control motor relay	EC-23, "Electric Throttle Control Actuator"
Throttle control motor	
Throttle position sensor	
Crankshaft position sensor	EC-23, "Crankshaft Position Sensor"
Camshaft position sensor	EC-22, "Camshaft Position Sensor"
Engine coolant temperature sensor	EC-25, "Engine Coolant Temperature Sensor"

Revision: 2010 May

< SYSTEM DESCRIPTION >

Component	Reference	
High pressure fuel pump	EC-28, "High Pressure Fuel Pump"	
Low pressure fuel pump	EC-30, "Low Pressure Fuel Pump"	
Fuel pump control module (FPCM)	EC-27, "Fuel Pump Control Module"	
Fuel rail pressure sensor	EC-27, "Fuel Rail Pressure Sensor"	
Low fuel pressure sensor	EC-30, "Low Fuel Pressure Sensor"	
Fuel injector	EC-26, "Fuel Injector"	
Fuel level sensor	EC-26, "Fuel Level Sensor"	
Fuel tank temperature sensor	EC-27, "Fuel Tank Temperature Sensor"	
A/F sensor 1	EC 21 "Air Fuel Datio (A/E) Sensor 1"	
A/F sensor 1 heater	EC-21, "Air Fuel Ratio (A/F) Sensor 1"	
Heated oxygen sensor 2	EC 27 "Heated Owner Senser 2"	
Heated oxygen sensor 2 heater	EC-27, "Heated Oxygen Sensor 2"	
Manifold absolute pressure sensor	EC-31, "Manifold Absolute Pressure Sensor"	
Knock sensor	EC-30, "Knock Sensor"	
Engine oil temperature sensor	EC-25, "Engine Oil Temperature Sensor"	
Power steering pressure sensor	EC-31, "Power Steering Pressure (PSP) Sensor"	
Electrically-controlled cooling fan coupling	EC-24, "Electrically-controlled cooling fan coupling"	
Intake valve timing control solenoid valve	EC-29, "Intake Valve Timing Control Solenoid Valve"	
VVEL control module	EC-32, "VVEL Control Module"	
VVEL actuator motor relay	EC-32, "VVEL Actuator Motor Relay"	
VVEL actuator motor	EC-32, "VVEL Actuator Motor"	
VVEL control shaft position sensor	EC-32, "VVEL Control Shaft Position Sensor"	
EVAP control system pressure sensor	EC-26, "EVAP Control System Pressure Sensor"	
EVAP canister vent control valve	EC-26, "EVAP Canister Vent Control Valve"	
EVAP canister purge volume control solenoid valve	EC-26, "EVAP Canister Purge Volume Control Solenoid Valve"	
Battery current sensor (with battery temperature sensor)	EC-22, "Battery Current Sensor (With Battery Temperature Sen- sor)"	
Refrigerant pressure sensor	EC-32, "Refrigerant Pressure Sensor"	
Stop lamp switch	EC-21, "ASCD Brake Switch & Stop Lamp Switch"	
ASCD brake switch	- EC-21, ASCD Blake Switch & Stop Lamp Switch	
ASCD steering switch	EC-21, "ASCD Steering Switch"	
Information display	EC-49, "AUTMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function"	
Stop lamp switch	EC-29, "ICC Brake Switch & Stop Lamp Switch"	
ICC brake switch		
ICC steering switch	EC-29, "ICC Steering Switch"	

Accelerator Pedal Position Sensor

< SYSTEM DESCRIPTION >

The accelerator pedal position (APP) sensor is installed on 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 engine operations such as fuel cut.

Air Fuel Ratio (A/F) Sensor 1

DESCRIPTION

The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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

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

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of approximately $760^{\circ}C$ (1,400°F).

A/F SENSOR 1 HEATER

A/F sensor 1 heater is integrated in the sensor.

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

ASCD Brake Switch & Stop Lamp Switch

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

ASCD Steering Switch

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

ASCD Indicators

ASCD operation status is indicated by CRUISE indicator in combination meter. ECM transmits the ASCD status signal to the combination meter via CAN communication according to ASCD operation.



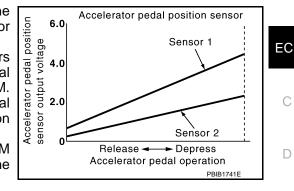
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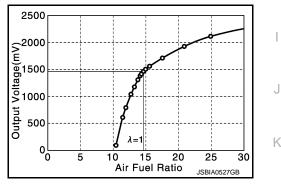
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< SYSTEM DESCRIPTION >

Battery Current Sensor (With Battery Temperature Sensor)

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 to <u>CHG-7. "POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : System Description"</u>.

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 cable at the negative terminal. 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 ambient temperature around the battery. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Temperature [°C (°F)]	Voltage* (V)	Resistance (k Ω)
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 ECM terminals.

Camshaft Position Sensor

The camshaft position (CMP) sensor senses the protrusion of the signal plate installed to the camshaft (INT) front end to identify a particular cylinder. The camshaft position sensor senses the piston position.

The sensor consists of a permanent magnet and Hall IC.

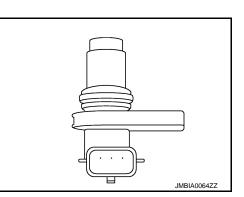
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

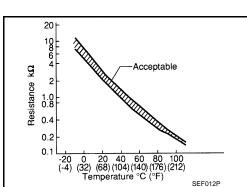
The changing gap causes the magnetic field near the sensor to change.

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

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.





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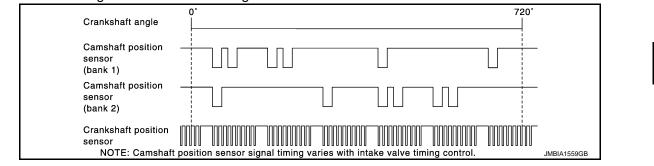
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ECM receives the signals as shown in the figure.



Crankshaft Position Sensor

The crankshaft position (CKP) sensor senses the protrusion of the signal plate installed to the drive plate to identify fluctuation of the engine revolution.

The sensor consists of a permanent magnet and Hall IC.

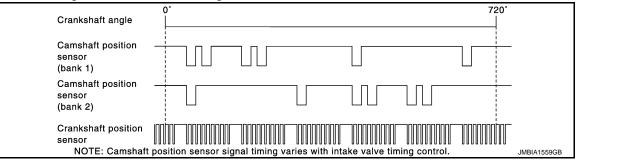
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

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.

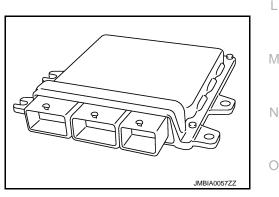
ECM receives the signals as shown in the figure.



ECM

- ECM (Engine Control Module) controls the engine.
- The ECM consists of a microcomputer and connectors for transmitting/receiving signals and for supplying power. Furthermore, the ECM is equipped with an injector driver unit and actuates the fuel injector at a high voltage (approximately 70 V at the maximum).
- ECM is equipped with ECM temperature sensors. If ECM is overheated, ECM controls output torque to prevent damage to itself.
- Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc.

Electric Throttle Control Actuator



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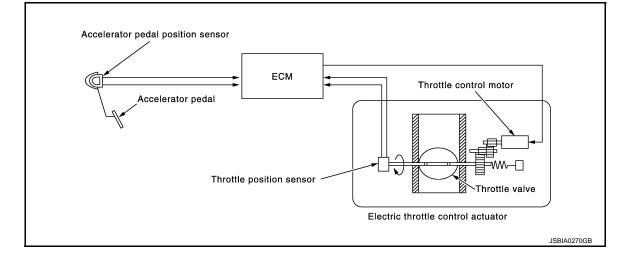
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OUTLINE

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< SYSTEM DESCRIPTION >

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



THROTTLE CONTROL MOTOR

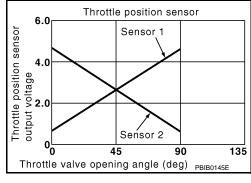
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.

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

THROTTLE POSITION SENSOR

The throttle position (TP) sensor responds to the throttle valve movement.

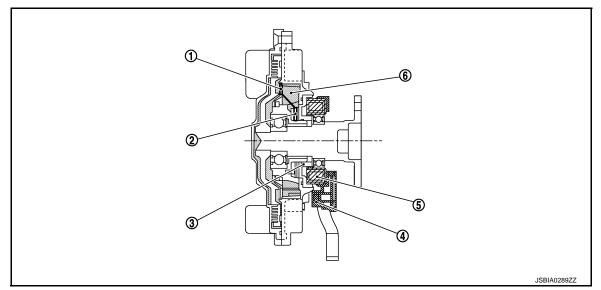
The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle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



Electrically-controlled cooling fan coupling

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Electrically-controlled cooling fan coupling is integrated with a fan coupling, fan coupling driver, and fan speed sensor, mounted to the fan pulley, and actuated by the drive belt to rotate the cooling fan at a speed suitable for a driving condition.



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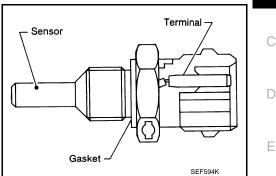
1. Valve

- 2. Armature
- 4. Fan speed sensor

- 5. Coil

Engine Coolant Temperature Sensor

The engine coolant temperature (ECT) 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.

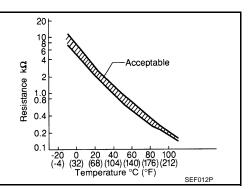


Magnet Loop Element

Silicon oil

<Reference data>

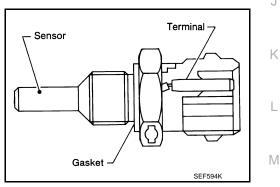
Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (k Ω)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.35 - 2.73
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260



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

Engine Oil Temperature Sensor

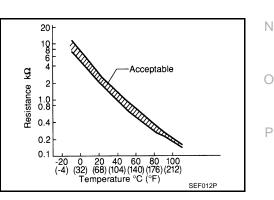
The engine oil temperature sensor is used to detect the engine oil temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine oil temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance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





Engine oil temperature [°C (°F)]	Voltage* (V)	Resistance (k Ω)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.35 - 2.73
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.



< SYSTEM DESCRIPTION >

EVAP Control System Pressure Sensor

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

EVAP Canister Vent Control Valve

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.

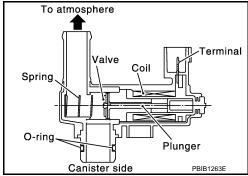
This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System" diagnosis.

EVAP Canister Purge Volume Control Solenoid Valve

The EVAP canister purge volume control solenoid valve is used 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.

For the fuel injector, a high pressure fuel injector is used and this enables a high-pressure fuel injection at a high voltage within a short time. The ECM is equipped with an injector driver unit and actuates the fuel injector at a high voltage (approximately 65 V at the maxi-



Pressure kPa (kg/cm², psi) (Absolute pressure)

Output voltage V 0 4.5 3.5 2.5 1.5 1.5 0.5

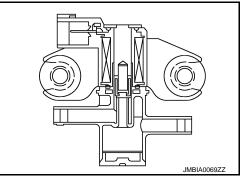
0.5

60.0

(0.61, 8.7)

4.5

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Fuel Level Sensor

Fuel Injector

mum).

The fuel level sensor is mounted in the fuel level sensor unit.

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> 106.7 (1.088, 15.47)

> > PBIB3370E

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< SYSTEM DESCRIPTION >

The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM via the CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

Fuel Pump Control Module

The fuel pump control module (FPCM) controls the discharging volume of the fuel pump by transmitting the FPCM control signals (Low/ Mid/High) depending on driving conditions.

Fuel Rail Pressure Sensor

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

Fuel Tank Temperature Sensor

The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel 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.

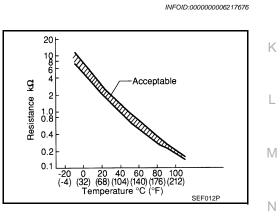
<Reference data>

Fuel temperature [°C (°F)]	Voltage* (V)	Resistance (k Ω)
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

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

Heated Oxygen Sensor 2

DESCRIPTION



NBIBOO062Z



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< SYSTEM DESCRIPTION >

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

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

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

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

HEATED OXYGEN SENSOR 2 HEATER

Heated oxygen sensor 2 heater is integrated in the sensor.

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

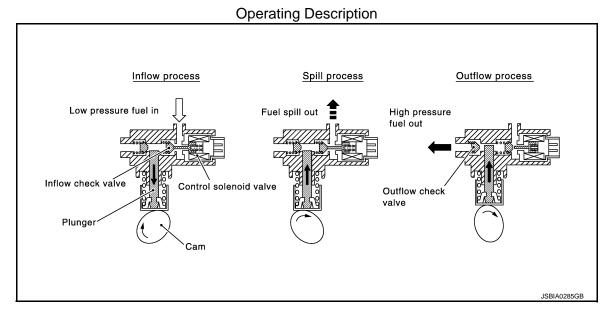
Engine speed	Heated oxygen sensor 2 heater
Above 3,600 rpm	OFF
 Below 3,600 rpm after the following conditions are met. Engine: After warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	ON

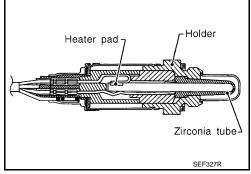
High Pressure Fuel Pump

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[VK56VD]

The high pressure fuel pump is installed at the front of the engine bank 2 side and activated by the camshaft. ECM controls the high pressure fuel pump control solenoid valve built into the high pressure fuel pump and adjusts the amount of discharge by changing the suction timing of the low pressure fuel.

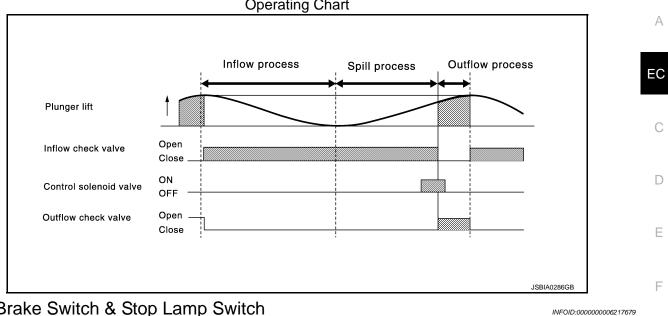




< SYSTEM DESCRIPTION >

Operating Chart

[VK56VD]



ICC Brake Switch & Stop Lamp Switch

Stop lamp switch and ICC brake switch are installed to brake pedal bracket. When the brake pedal is depressed, ICC brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by those two types of input (ON/OFF signal). ECM transmits ICC brake switch signal to ADAS control unit via CAN communication line.

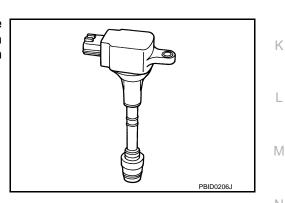
ICC Steering Switch

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

ECM transmits ICC steering switch signal to ADAS control unit via CAN communication line.

Ignition Coil With Power Transistor

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



Intake Valve Timing Control Solenoid Valve

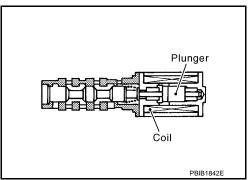
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

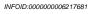
The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.

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.





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< SYSTEM DESCRIPTION >

Knock Sensor

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.

Low Fuel Pressure Sensor

The low fuel pressure sensor is installed to low fuel pressure piping and measures the low fuel pressure. The sensor transmits voltage signal to the ECM. As the pressure increases, the voltage rises.

Low Pressure Fuel Pump

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

Malfunction Indicator Lamp (MIL)

The Malfunction Indicator Lamp (MIL) is located on the combination meter.

The MIL will illuminate when the ignition switch is turned ON without the engine running. This is a bulb check.

When the engine is started, the MIL should turn off. If the MIL remains illuminated, the on board diagnostic system has detected an engine system malfunction.

For details, refer to EC-51, "Diagnosis Description".

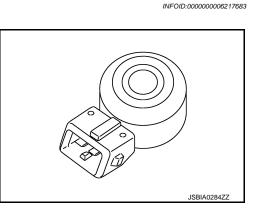
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[VK56VD]

Manifold Absolute Pressure Sensor

< SYSTEM DESCRIPTION >

The manifold absolute pressure (MAP) sensor is installed on the intake manifold collector. Detects intake manifold pressure, and transmits a voltage signal to the ECM.

The sensor uses a silicon diaphragm which is sensitive to the change in pressure. As the pressure increases, the voltage rises.

Mass Air Flow Sensor (With Intake Air Temperature Sensor)

MASS AIR FLOW SENSOR

The mass air flow (MAF) 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 greater air flow, the greater the heat loss.

Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.

INTAKE AIR TEMPERATURE SENSOR

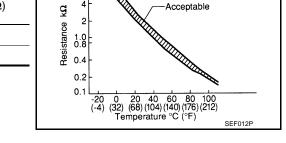
The intake air temperature (IAT) sensor is built-into the mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the rise in temperature.

<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
25 (77)	3.3	1.94 - 2.06
80 (176)	1.2	0.293 - 0.349

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



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Power Steering Pressure (PSP) Sensor

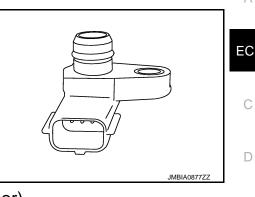
Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load.

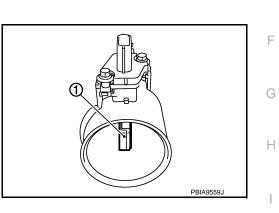
This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.

EC-31

[VK56VD]

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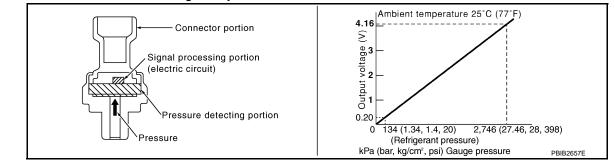
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< SYSTEM DESCRIPTION >

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Refrigerant Pressure Sensor

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.



VVEL Actuator Motor

The VVEL actuator motor rotates the control shaft according to the control signal from the VVEL control module. The VVEL control module judges whether the VVEL actuator motor controls the angle properly by the VVEL control shaft position sensor signal.

VVEL Actuator Motor Relay

Power supply for the VVEL actuator motor is provided to the VVEL control module via VVEL actuator motor relay. VVEL actuator motor relay is ON/OFF controlled by the VVEL control module. In addition, when the VVEL actuator motor relay cannot be controlled by the VVEL control module for some reason, it ON/OFF controlled by ECM.

VVEL Control Module

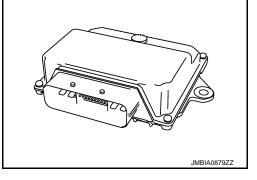
The VVEL control module consists of a microcomputer and connectors for signal input and output and for power supply. The VVEL control module controls VVEL system.

VVEL Control Shaft Position Sensor

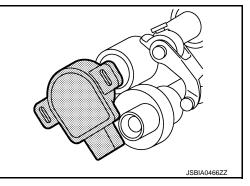
VVEL control shaft position sensor detects the control shaft position angle.

A magnet is installed to the tip of the control shaft.

The magnetic field changes as the control shaft rotates. This changes output voltage of the VVEL control shaft position sensor. VVEL control module detects the actual position angle through the voltage change and sends the signal to ECM.



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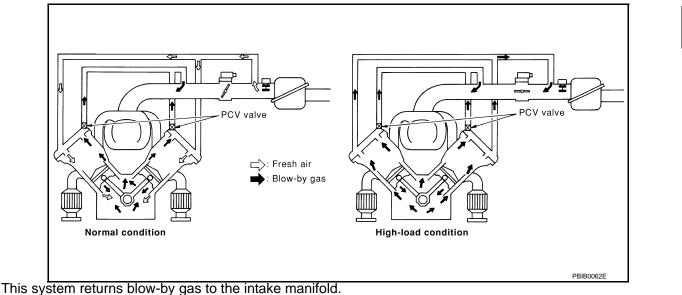
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STRUCTURE AND OPERATION

< SYSTEM DESCRIPTION >

STRUCTURE AND OPERATION

Positive Crankcase Ventilation



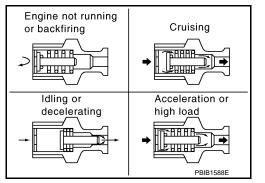
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.

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

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

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.



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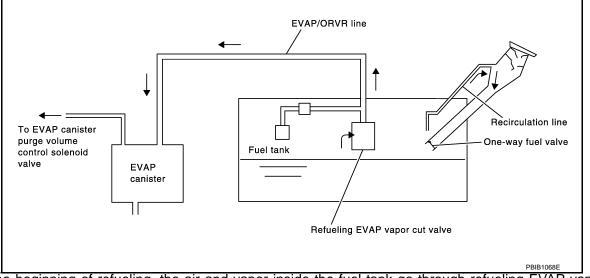
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STRUCTURE AND OPERATION

< SYSTEM DESCRIPTION >

On Board Refueling Vapor Recovery (ORVR)



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:

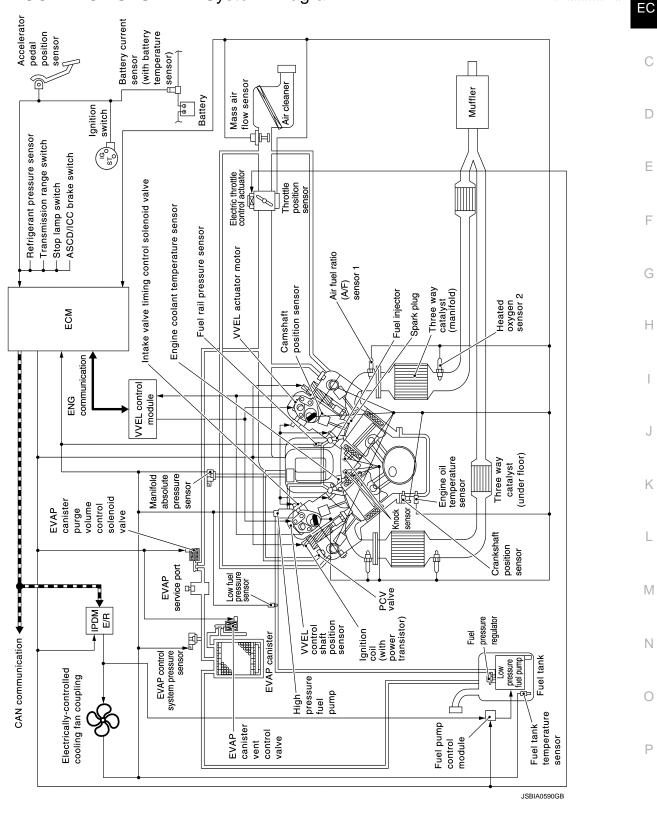
- Put a "CAUTION: FLAMMABLE" sign in workshop.
- Never smoke while servicing fuel system. Keep open flames and sparks away from work area.
- Always furnish the workshop with a CO₂ fire extinguisher.

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-153, "Work Procedure".
- Disconnect battery ground cable.
- Always replace O-ring when the fuel gauge retainer is removed.
- Never kink or twist hose and tube when they are installed.
- Never tighten hose and clamps excessively to avoid damaging hoses.
- After installation, run engine and check for fuel leaks at connections.
- Never attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.

SYSTEM **ENGINE CONTROL SYSTEM**

ENGINE CONTROL SYSTEM : System Diagram



ENGINE CONTROL SYSTEM : System Description

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ECM controls the engine by various functions.

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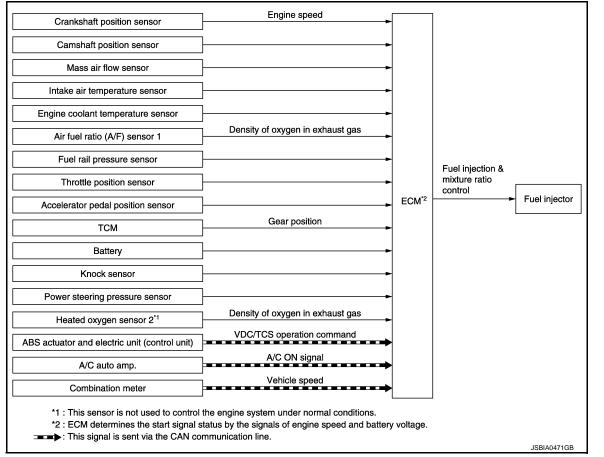
< SYSTEM DESCRIPTION >

Function	Reference
Fuel injection control	EC-36, "DIRECT INJECTION GASOLINE SYSTEM : System De- scription"
Fuel pressure control	EC-39, "FUEL PRESSURE CONTROL : System Description"
Cooling fan control	EC-41, "COOLING FAN CONTROL : System Description"
Electric ignition control	EC-42, "ELECTRIC IGNITION SYSTEM : System Description"
Intake valve timing control	EC-43, "INTAKE VALVE TIMING CONTROL : System Description"
VVEL (Variable Valve Event & Lift)	EC-44, "VVEL SYSTEM : System Description"
Evaporative emission	EC-45, "EVAPORATIVE EMISSION SYSTEM : System Descrip- tion"
Air conditioning cut control	EC-47, "AIR CONDITIONING CUT CONTROL : System Descrip- tion"
ASCD (Auto speed control device)	EC-48, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : Sys- tem Description"
Power generation voltage variable control	CHG-7, "POWER GENERATION VOLTAGE VARIABLE CON- TROL SYSTEM : System Description"

DIRECT INJECTION GASOLINE SYSTEM

DIRECT INJECTION GASOLINE SYSTEM : System Diagram

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DIRECT INJECTION GASOLINE SYSTEM : System Description

INFOID:000000006217700

INPUT/OUTPUT SIGNAL CHART

< SYSTEM DESCRIPTION >

Sensor	Input signal to ECM	ECM function	Actuator	А
Crankshaft position sensor	Engine speed*2			
Camshaft position sensor	Camshaft position			
Mass air flow sensor	Amount of intake air Intake air temperature Engine coolant temperature Density of oxygen in exhaust gas			EC
Intake air temperature sensor				
Engine coolant temperature sensor				С
Air fuel ratio (A/F) sensor 1				
Fuel rail pressure sensor	Fuel rail pressure			_
Throttle position sensor	Throttle position	Fuel injection		D
Accelerator pedal position sensor	Accelerator pedal position	& mixture ratio	Fuel injector	
ТСМ	Gear position	control		E
Battery	Battery voltage*2			
Knock sensor	Engine knocking condition			_
Power steering pressure sensor	Power steering operation	_		F
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas			
ABS actuator and electric unit (control unit)	VDC/TCS operation command			G
A/C auto amp.	A/C ON signal			
Combination meter	Vehicle speed			

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

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

SYSTEM DESCRIPTION

The adoption of the direct fuel injection method enables more accurate adjustment of fuel injection quantity by injecting atomized high-pressure fuel directly into the cylinder. This method allows high-powered engine, low fuel consumption, and emissions-reduction.

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air and fuel rail pressure) from the crankshaft position sensor, mass air flow sensor and the fuel rail pressure 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 </fuel>	Μ
 During acceleration Hot-engine operation When selector lever position is changed from N to D High-load, high-speed operation 	Ν
<fuel decrease=""> During deceleration During high engine speed operation </fuel>	0
FUEL INJECTION CONTROL	Ρ
Stratified-charge Combustion	

Stratified-charge combustion is a combustion method which enables extremely lean combustion by injecting fuel in the latter half of a compression process, collecting combustible air-fuel around the spark plug, and forming fuel-free airspace around the mixture.

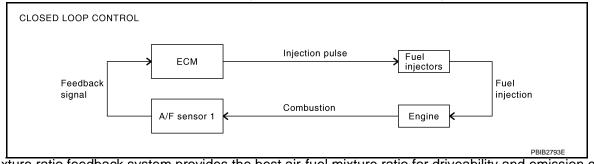
Right after a start with the engine cold, the catalyst warm-up is accelerated by stratified-charge combustion.

Homogeneous Combustion

< SYSTEM DESCRIPTION >

Homogeneous combustion is a combustion method that fuel is injected during intake process so that combustion occurs in the entire combustion chamber, as is common with conventional methods. As for a start except for starts with the engine cold, homogeneous combustion occurs.

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can 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 <u>EC-21</u>. "Air Fuel Ratio (A/F) Sensor 1". This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).

This stage is referred to as the closed loop control condition.

Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of A/F sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

Open Loop Control

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

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

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from A/F sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., fuel injector clogging) directly affect mixture ratio.

Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

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

"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from A/F sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

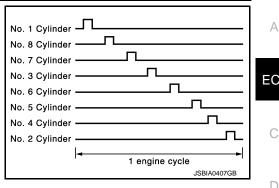
"Long-term fuel trim" is overall fuel compensation carried out over time to compensate for continual deviation of the "short-term fuel trim" from the central value. Continual deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING

Sequential Direct Injection Gasoline System

< SYSTEM DESCRIPTION >

Fuel is injected into each cylinder during each engine cycle according to the ignition order.



STRATIFIED-CHARGE START CONTROL

The use of the stratified-charge combustion method enables emissions-reduction when starting the engine with engine coolant temperature between 5°C (41°F) and 40°C (104°F).

FUEL SHUT-OFF

Fuel to each cylinder is shut-off during deceleration, operation of the engine at excessively high speed or operation of the vehicle at excessively high speed.

FUEL PRESSURE CONTROL

FUEL PRESSURE CONTROL : System Diagram

Crankshaft position sensor	Engine speed				
Camshaft position sensor					
Fuel rail pressure sensor					
Low fuel pressure sensor		ECM [*]	Fuel rail pressure control	High pressure	
Engine coolant temperature sensor		ECM		fuel pump	
Throttle position sensor					
Accelerator pedal position sensor					
Battery					
*: ECM determines the start signal s	status by the engine speed signal a	and battery	voltage.		
				JSBIA0315GB	

FUEL PRESSURE CONTROL : System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed		
Camshaft position sensor	Camshaft position		
Fuel rail pressure sensor	Fuel rail pressure		
Low fuel pressure sensor	Low fuel pressure	Fuel injection & mixture ratio	High pressure fuel pump
Engine coolant temperature sensor	Engine coolant temperature	control	
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage		

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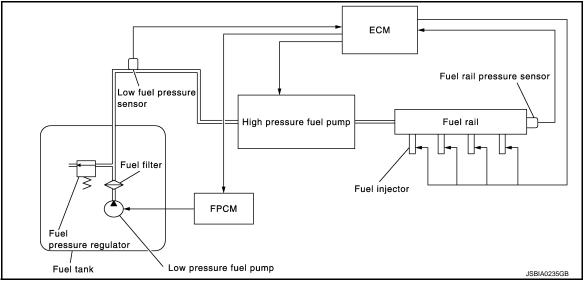
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SYSTEM DESCRIPTION



Low fuel pressure control

• The low fuel pressure pump is controlled by the fuel pump control module (FPCM) and pumps fuel according to a driving condition. The pumped fuel passes through the fuel filter and is sent to the high pressure fuel pump. FPCM controls the low pressure fuel pump, according to a signal from ECM as shown in the table below.

Conditions	Amount of fuel flow	Supplied voltage
After a laps of 1 second after ignition ON	OFF	0 V
For 1 second after turning ignition switch ONEngine is running under low load and low speed conditions	Low	Approximately 8.5 V
 Engine cranking Engine coolant temperature is below 10°C (50°F) Engine is running under high load and high speed conditions 	High	Battery voltage (11 – 14 V)
Except the above	Mid	Approximately 10 V

• Low fuel pressure is adjusted by the fuel pressure regulator.

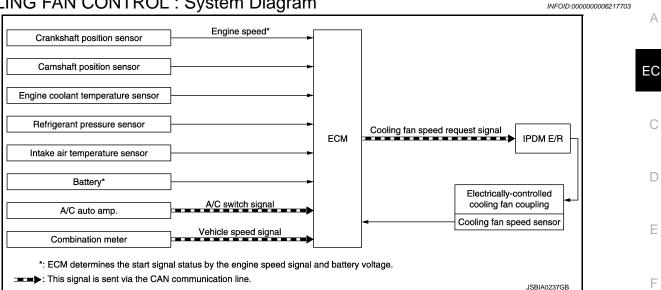
High fuel pressure control

• The high pressure fuel pump raises the pressure of the fuel sent from the low pressure fuel pump. Actuated by the camshaft, the high pressure fuel pump activates the high pressure fuel pump solenoid based on a signal received from ECM, and adjusts the amount of discharge by changing the timing of closing the inlet check valve to control fuel rail pressure.

COOLING FAN CONTROL

< SYSTEM DESCRIPTION >

COOLING FAN CONTROL : System Diagram



COOLING FAN CONTROL : System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	•
Crankshaft position sensor	Engine speed ^{*1}			-
Camshaft position sensor	Camshaft position			
Engine coolant temperature sensor	Engine coolant temperature			
Refrigerant pressure sensor	Refrigerant pressure		IPDM E/R	
Intake air temperature sensor	Intake air temperature	Cooling fan speed request signal* ²	↓ Electrically-controlled cooling fan	
Battery	Battery voltage	Signal	coupling	
Combination meter	Vehicle speed signal*2			ŀ
BCM	A/C switch signal* ²			
Cooling fan speed sensor	Cooling fan speed			- 1

*1: The ECM determines the engine speed by the signals of crankshaft position and camshaft position.

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

SYSTEM DESCRIPTION

- · Based on a signal transmitted from each sensor, ECM calculates a target fan speed responsive to a driving condition. In addition, ECM calculates a fan pulley speed according to an engine speed and transmits a cooling fan request signal to IPDM E/R via the CAN communication line to satisfy the target fan speed. Then, Ν IPDM E/R transmits ON/OFF pulse duty signal to electrically-controlled cooling fan coupling. The cooling fan speed sensor detects a cooling fan speed and transmits the detection result to ECM.
- ECM judges the start signal state from the engine speed signal and battery voltage.

ELECTRIC IGNITION SYSTEM

Ρ

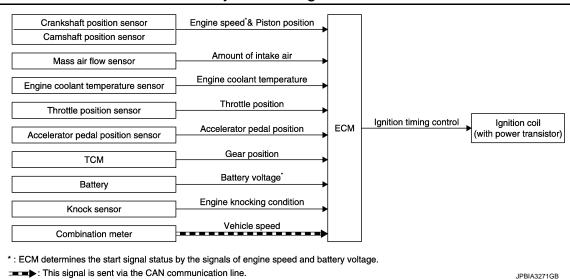
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[VK56VD]

INFOID:000000006217704

< SYSTEM DESCRIPTION >

ELECTRIC IGNITION SYSTEM : System Diagram



ELECTRIC IGNITION SYSTEM : System Description

INFOID:000000006217706

[VK56VD]

INFOID:000000006217705

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed*1	Engine speed*1	
Camshaft position sensor	Piston position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position	Ignition timing	Ignition coil
Accelerator pedal position sensor	Accelerator pedal position	control	(with power transistor)
ТСМ	Gear position		
Battery	Battery voltage*1		
Knock sensor	Engine knocking condition		
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 via the CAN communication line.

SYSTEM DESCRIPTION

Ignition order: 1 - 8 - 7 - 3 - 6 - 5 - 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

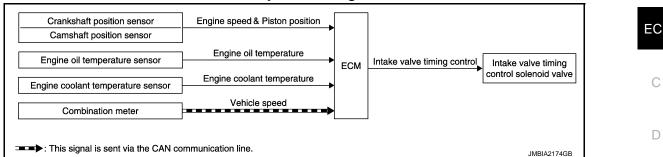
The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors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

EC-42

< SYSTEM DESCRIPTION >

INTAKE VALVE TIMING CONTROL

INTAKE VALVE TIMING CONTROL : System Diagram



INTAKE VALVE TIMING CONTROL : System Description

INFOID:000000006217708

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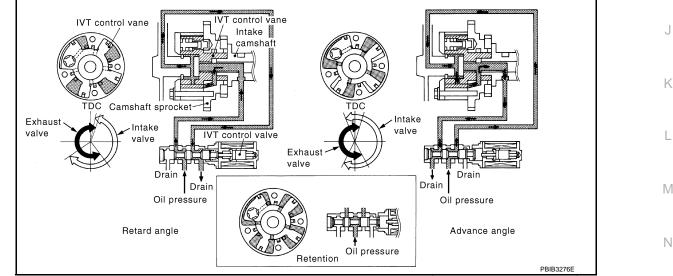
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INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor	Engine anead and pieton position			
Camshaft position sensor	 Engine speed and piston position 			
Engine oil temperature sensor	Engine oil temperature	Intake valve timing control	Intake valve timing control solenoid valve	
Engine coolant temperature sensor	Engine coolant temperature			
Combination meter	Vehicle speed*			

*: This signal is sent to the ECM via the 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, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing 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. VVEL SYSTEM

[VK56VD]

INFOID:000000006217707

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< SYSTEM DESCRIPTION >

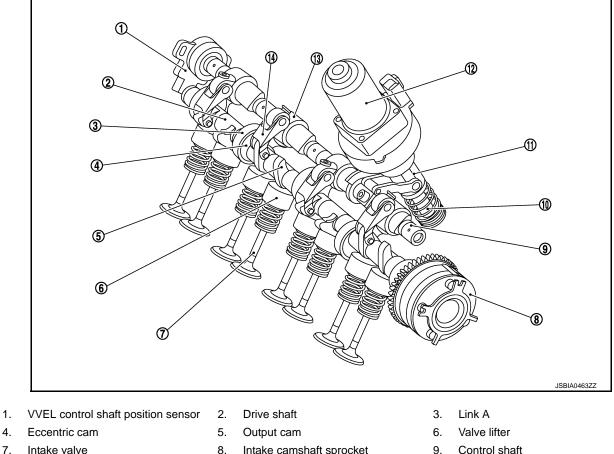
VVEL SYSTEM : System Diagram INFOID:000000006217709 Crankshaft position sensor Engine speed & Piston position Camshaft position sensor VVEL control VVEL control Accelerator pedal position ECM Accelerator pedal position sensor module Control shaft actual angle VVEL control VVEL control shaft position sensor VVEL actuator module motor assembly : This signal is sent via the ENG communication line. JSBIA0539GB

VVEL SYSTEM : System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Camshaft position sensor Crankshaft position sensor	Engine speed and piston position	VVEL control	VVEL control module
Accelerator pedal position sensor	Accelerator pedal position		\downarrow
VVEL control shaft position sensor ↓ VVEL control module	Control shaft actual angle		VVEL actuator motor assem- bly

SYSTEM DESCRIPTION



- 10. Ball screw shaft
- 13. Rocker arm

4.

7.

- 8. Intake camshaft sprocket
- 11. Ball screw nut
- 14. Link B

- Control shaft 9.
- 12. VVEL actuator motor assembly

EC-44

[VK56VD]

INFOID:000000006217710

< SYSTEM DESCRIPTION >

VVEL (Variable Valve Event & Lift) is a system that controls valve event and valve lift continuously. ECM decides the target valve lift according to the driving condition and sends the command signal to the А VVEL control module via ENG communication line.

VALVE LIFT OPERATION

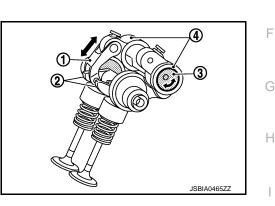
Rotational movement of the drive shaft equipped with eccentric cam is transmitted to output cam via the rocker arm and two kinds of links to depress the intake valve.

- 1. Link B
- 2. Output cam
- Eccentric cam 3.
- 4. Drive shaft
- 5. Link A
- Rocker arm 6.

VARIABLE OPERATION

VVEL control module controls the rotation of the control shaft using the VVEL actuator motor assembly and changes the movement of the output cam by shifting the link supporting point. As a result, valve lift changes continuously to improve engine output and response.

- Link B 1.
- 2. Output cam
- 3. Control shaft
- 4. Rocker arm



EVAPORATIVE EMISSION SYSTEM

EVAPORATIVE EMISSION SYSTEM : System Diagram

Crankshaft position sensor	Engine speed & Piston position				
Camshaft position sensor					
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	•			
Throttle position sensor	Throttle position	•	EVAP canister purge flow control	EVAP canister purge volume	
	Accelerator pedal position	ECM	•	control solenoid	
Accelerator pedal position sensor	Battery voltage*	-		Valvo	
Battery	Fuel temperature in fuel tank	•			
Fuel tank temperature sensor	·	•			
EVAP control system pressure sensor	Pressure in purge line	•			
Combination meter	Vehicle speed	▶			
* : ECM determines the start signal status by	the signals of engine speed and battery volta	age.	-		
	nunication line.			JSBIA0371GB	

EVAPORATIVE EMISSION SYSTEM : System Description

INFOID:000000006256912 P

INPUT/OUTPUT SIGNAL CHART



6

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INFOID:000000006256911

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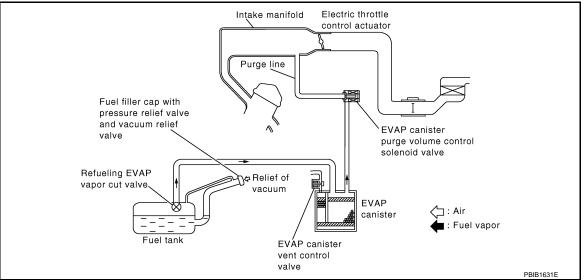
< SYSTEM DESCRIPTION >

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor Camshaft position sensor	 Engine speed^{*1} Piston position 	EVAP canister	
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*1		
Throttle position sensor	Throttle position		EVAP canister purge volume
Accelerator pedal position sensor	Accelerator pedal position	purge flow control	control solenoid valve
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	-	
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 via the 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.

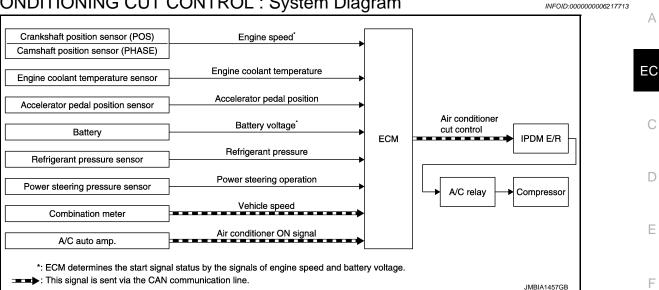
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid 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 and idling.

AIR CONDITIONING CUT CONTROL

< SYSTEM DESCRIPTION >

AIR CONDITIONING CUT CONTROL : System Diagram



AIR CONDITIONING CUT CONTROL : System Description

INPUT/OUTPUT SIGNAL CHART

Engine speed* ²			
Engine coolant temperature			
Accelerator pedal position	- Air conditioner cut control		
Battery voltage*2			
Refrigerant pressure		IPDM E/R ↓	
Power steering operation		A/C relay	
A/C ON signal*1		↓ Compressor	l
A/C evaporator temperature*1	_		
Target A/C evaporator temperature*1	_		
Blower fan ON signal	_		
Vehicle speed*1			ſ
	Engine coolant temperature Accelerator pedal position Battery voltage* ² Refrigerant pressure Power steering operation A/C ON signal* ¹ A/C evaporator temperature* ¹ Target A/C evaporator temperature* ¹ Blower fan ON signal	Engine coolant temperature Accelerator pedal position Battery voltage*2 Refrigerant pressure Power steering operation A/C ON signal*1 A/C evaporator temperature*1 Target A/C evaporator temperature*1 Blower fan ON signal	Engine coolant temperature Accelerator pedal position Battery voltage*2 Refrigerant pressure Power steering operation A/C ON signal*1 A/C evaporator temperature*1 Target A/C evaporator temperature*1 Blower fan ON signal

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

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.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

INFOID:000000006217714

[VK56VD]

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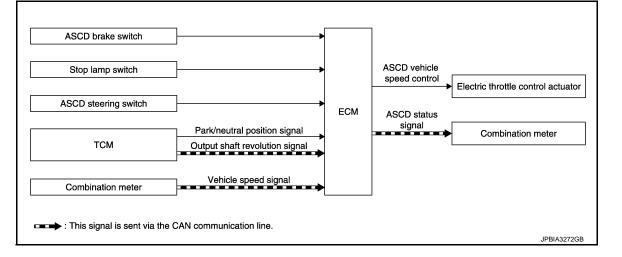
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< SYSTEM DESCRIPTION >

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Diagram



AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator		
ASCD steering switch	ASCD steering switch operation				
ASCD brake switch					
Stop lamp switch	Brake pedal operation	ACCD vahiala analysis	 Electric throttle control ac- tuator Combination meter 		
TOM	Park/neutral position signal	ASCD vehicle speed control			
ТСМ	Output shaft revolution signal*				
Combination meter	Vehicle speed 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 <u>EC-49, "AUTMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function"</u> for ASCD operating instructions.

CAUTION:

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

CAN COMMUNICATION : System Description

INFOID:000000006217718

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 <u>LAN-28, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart"</u>, about CAN communication for detail.

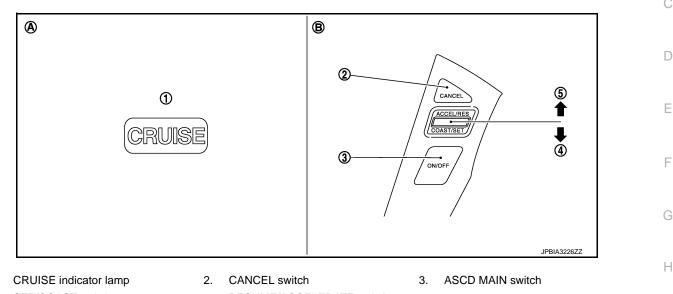
< SYSTEM DESCRIPTION >

OPERATION

AUTMATIC SPEED CONTROL DEVICE (ASCD)

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

SWITCHES AND INDICATORS



- 4. SET/COAST switch
- 5. RESUME/ACCELERATE switch
- A. On the combination meter

B. On the steering wheel

SET SPEED RANGE

1.

ASCD system can be set the following vehicle speed.

Minimum speed (Approx.)	Maximum speed (Approx.)					
40 km/h (25 MPH)	143 km/h (88 MPH)					

SWITCH OPERATION

Item	Function	L
CANCEL switch	Cancels the cruise control driving.	
RESUME/ACCELERATE switch	Resumes the set speed.Increases speed incrementally during cruise control driving.	M
SET/COAST switch	Sets desired cruise speed.Decreases speed incrementally during cruise control driving.	
ASCD MAIN switch	Master switch to activate the ASCD system. (CRUISE indicator lamp is turned ON when ASCD system is ON.)	Ν

CANCEL CONDITION

- When any of following conditions exist, the cruise operation is canceled.
- CANCEL switch is pressed
- ASCD MAIN switch pressed (Set speed is cleared)
- More than two switches at ASCD steering switch are pressed at the same time (Set speed is cleared)
- Brake pedal is depressed
- Selector lever position is changed to N, P or R
- 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 cancels the cruise operation and informs the driver by blinking CRUISE indicator lamp.

EC-49

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[VK56VD]



OPERATION

< SYSTEM DESCRIPTION >

- Engine coolant temperature is slightly higher than the normal operating temperature. Then CRUISE indicator lamp is blinked slowly.

NOTE:

Engine coolant temperature decreases to the normal operating temperature, CRUISE indicator lamp stop blinking and the cruise operation is able to work.

- Malfunction for some self-diagnoses regarding ASCD system. CRUISE indicator lamp is blinked quickly.
- When ASCD MAIN switch is turned to OFF during the cruise control driving, all of ASCD operations is canceled and vehicle speed memory is erased.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SYSTEM DESCRIPTION >

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

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)

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 <u>GI-48, "Descrip-</u><u>tion"</u>.

NOTE:

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

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< SYSTEM DESCRIPTION >

DIAGNOSIS SYSTEM (ECM) DIAGNOSIS DESCRIPTION

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

INFOID:000000006217722

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

		М	IL		D	ТС	1st trip DTC		
Items	1s	t trip	2no	d trip	1st trip	2nd trip	1st trip	2nd trip	
	Blinking	Illuminate	Blinking	Illuminate	displaying	displaying	displaying	displaying	
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 (Re- fer to <u>EC-98, "DTC Index"</u> .)	_	×	_	—	×	_	—	_	
Except above	_	_		×	_	×	×	_	

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

INFOID:000000006217723

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 $\underline{\text{EC-98}}$, "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-III.

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 <u>EC-135</u>, "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-III or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-III screen.

< SYSTEM DESCRIPTION >

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

Priority		Items	
1	Freeze frame data	Misfire — DTC: P0300 - 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 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

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 CON-SULT-III 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

			•	IVI
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)	Ν
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)	0

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 "MIS-FIRE <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"

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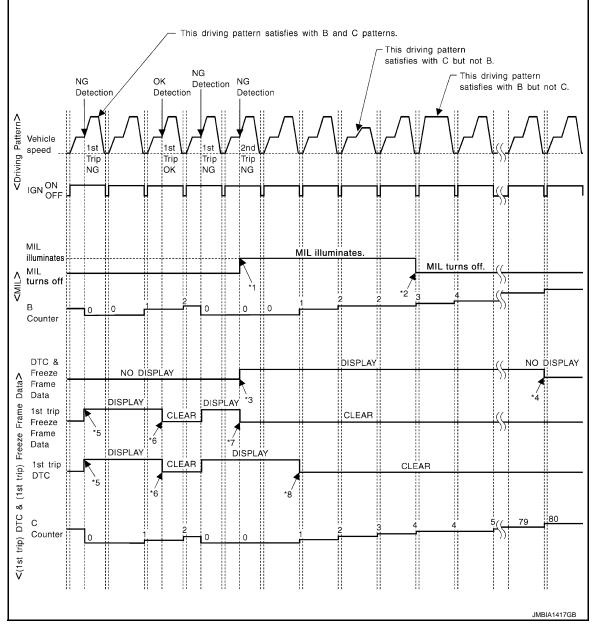
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< SYSTEM DESCRIPTION >



- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *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.)
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

- *2: MIL will turn OFF after vehicle is driv- *3: When the same malfunction is deen 3 times (pattern B) without any malfunctions.
- *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.
- *8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.
- tected in two consecutive trips, the DTC and the 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.

Explanation for Driving Patterns for "Misfire < Exhaust Quality Deterioration>", "Fuel Injection System" <Driving Pattern B>

Driving pattern B means the vehicle operation as per the following:

All components and systems should be monitored at least once by the OBD system.

EC-54

< SYSTEM DESCRIPTION >

 The B counter will be cleared when the malfunction is detected once regardless of the driving pattern. The B counter will be counted up when driving pattern B is satisfied without any malfunction. The MIL will turn OFF when the B counter reaches 3. (*2 in "OBD SYSTEM OPERATION CHART") 	А
<driving c="" pattern=""></driving>	
Driving pattern C means operating vehicle as per the following:	EC
The following conditions should be satisfied at the same time:	LC
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 (T) condition:	С
 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).	D
Example:	D
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:	E
Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C	
(158°F)	
 The C counter will be cleared when the malfunction is detected regardless of vehicle conditions above. The C counter will be counted up when vehicle conditions above are satisfied without the same malfunction. The DTC will not be displayed after C counter reaches 80. 	F
 The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM. 	G
Relationship Between MIL, DTC, 1st Trip DTC and Driving Patterns Except For "Misfire < Exhaust	
Quality Deterioration>", "Fuel Injection System"	Н
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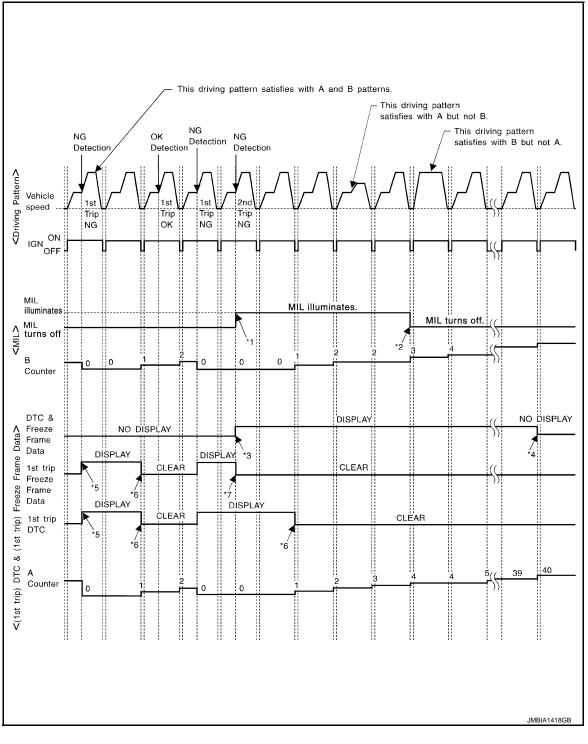
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- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *2: MIL will turn OFF after vehicle is driv- *3: When the same malfunction is deen 3 times (pattern B) without any malfunctions.
- tected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

< SYSTEM DESCRIPTION >

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

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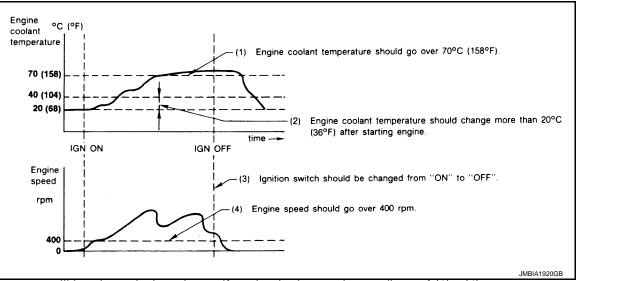
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Explanation for Driving Patterns Except for "Misfire <Exhaust Quality Deterioration>", "Fuel Injection System"

<Driving Pattern A>



- The A counter will be cleared when the malfunction is detected regardless of (1) (4).
- The A counter will be counted up when (1) (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

<Driving Pattern B>

Driving pattern B means operating vehicle operation as per the following:

- All components and systems should be monitored at least once by the OBD system.
- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MIL will turn OFF when the B counter reaches 3 (*2 in OBD SYSTEM OPERATION CHART).

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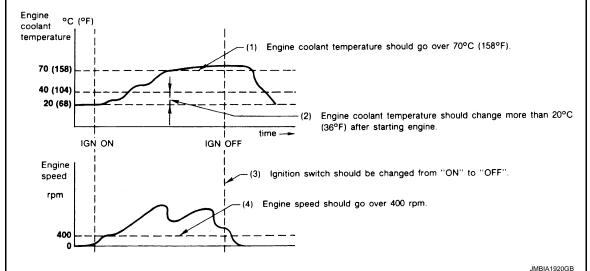
< SYSTEM DESCRIPTION >

DIAGNOSIS DESCRIPTION : Driving Pattern

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DRIVING PATTERN A



- The A counter will be cleared when the malfunction is detected regardless of (1) (4).
- The A counter will be counted up when (1) (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

DRIVING PATTERN B

Driving pattern B means operating vehicle operation as per the following:

- All components and systems should be monitored at least once by the OBD system.
- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MIL will turn OFF when the B counter reaches 3.

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 (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 C counter will be cleared when the malfunction is detected regardless of vehicle conditions above.
- The C counter will be counted up when vehicle conditions above are satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.
- DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code

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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:**

< SYSTEM DESCRIPTION >

The SRT will also indicate "INCMP" if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.

If, during the state emissions inspection, the SRT indicates "CMPLT" for all test items, the inspector will continue with the emissions test. However, if the SRT indicates "INCMP" for one or more of the SRT items the vehicle is returned to the customer untested.

NOTE:

If MIL is ON during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates "CMPLT" for all test items. Therefore, it is important to check SRT ("CMPLT") and DTC (No DTCs) before the inspection.

SRT SET TIMING

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

				Example				
Self-diagnosis result		Diagnosis	$\begin{array}{c} \mbox{Ignition cycle} \\ \leftarrow \mbox{ON} \rightarrow \mbox{OFF} \ \leftarrow \mbox{ON} \rightarrow \mbox{OFF} \ \leftarrow \mbox{ON} \rightarrow \mbox{OF} \end{array}$					
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". \rightarrow 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. \rightarrow Case 2 above

If one or more SRT related self-diagnoses show NG results in 2 consecutive cycles, the SRT will also indicate \mathbb{N} "CMPLT". \rightarrow 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".

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DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)

DESCRIPTION

The MIL is located on the instrument panel.

- The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check. If the MIL does not light up, refer to <u>EC-515, "Component Function Check"</u>.
- 2. When the engine is started, the MIL should go off. If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.

On Board Diagnosis Function

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 po- sition learning	ECM can learn the accelerator pedal released position. Refer to EC-146, "Description".
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to EC-147, "Description".
Idle air volume learning	ECM can learn the idle air volume. Refer to EC-148. "Description".
VVEL control shaft position sensor adjustment	The initial position of the VVEL control shaft position sensor can be adjusted. Refer to <u>EC-150, "De-scription"</u> .

BLUB CHECK MODE

Description

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

Operation Procedure

- 1. Turn ignition switch ON.
- The MIL on the instrument panel should stay ON. If it remains OFF, check MIL circuit. Refer to <u>EC-515, "Diagnosis Procedure"</u>.

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 <u>EC-58</u>, "<u>DIAGNOSIS DESCRIPTION</u> : <u>System Readiness Test (SRT) Code</u>".

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.



SERVICE

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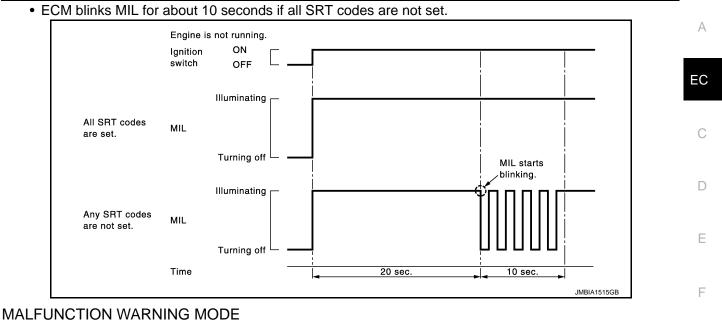
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Description

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-515, "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 twi

- 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 mal-function.
- 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.

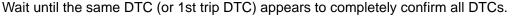
NOTE:

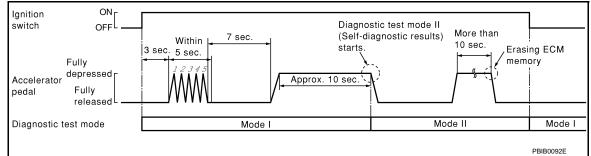
Do not release the accelerator pedal for 10 seconds if MIL starts blinking during this period. This blinking is displaying SRT status and is continued for another 10 seconds.

4. Fully release the accelerator pedal. ECM has entered to Self-diagnostic results mode.

< SYSTEM DESCRIPTION >

NOTE:

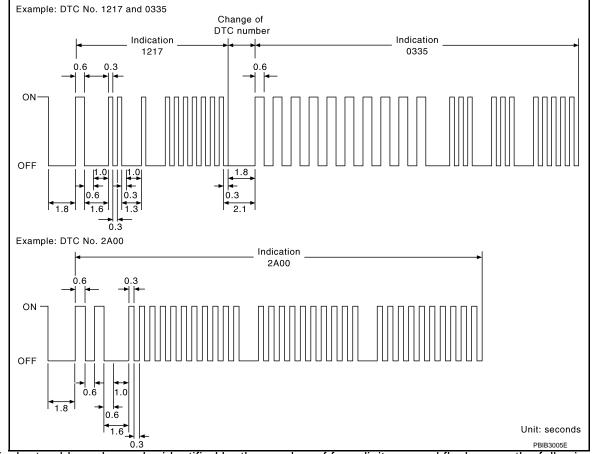




How to Read Self-diagnostic Results

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-III 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	А	В	С	D	Е	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.

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In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. Refer to <u>EC-98, "DTC Index"</u>.

How to Erase Self-diagnostic Results

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By performing this procedure, I	ECM memory is erased	and the following	diagnostic information	tion is erased	as
well.					EC
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- 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.
- 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-III Function

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the in- dications on the CONSULT-III unit.
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.
Active test	Diagnostic Test Mode in which CONSULT-III drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/results can be confirmed.
Function test	This mode is used to inform customers when the vehicle requires periodic maintenance.
ECU identification	ECM part number can be read.

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

WORK SUPPORT MODE

Work Item

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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. IGN SW ON ENGINE NOT RUNNING AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). NO VACUUM AND NO HIGH PRESSURE IN EVAP SYS- TEM FUEL TANK TEMP. IS MORE THAN 0°C (32°F). WITHIN 10 MINUTES AFTER STARTING "EVAP SYS- TEM CLOSE" WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITION EXCEPT ABOVE, CONSULT- III WILL DISCONTINUE IT AND DISPLAY APPROPRI- ATE INSTRUCTION. NOTE: WHEN STARTING ENGINE, CONSULT-III MAY DIS- PLAY "BATTERY VOLTAGE IS LOW. CHARGE BAT- TERY", EVEN WHEN USING A CHARGED BATTERY. 	When detecting EVAP vapor leak in the EVAP system
FUEL PRESSURE RELEASE	FUEL PUMP WILL STOP BY TOUCHING "START" DUR- ING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
SELF-LEARNING CONT	• THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEF- FICIENT.	When clearing mixture ratio self- learning value
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
TARGET IGN TIM ADJ*	IDLE CONDITION	When adjusting target ignition tim- ing
CLSD THL POS LEARN	IGNITION ON AND ENGINE STOPPED.	When learning the throttle valve closed position
VVEL POS SEN ADJ PREP	 USE THIS ITEM ONLY WHEN REPLACING VVEL ACTU- ATOR SUB ASSEMBLY. IGNITION ON AND ENGINE STOPPED. 	When adjusting VVEL control shaft position sensor

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

SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-98. "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.

How to Erase DTC and 1st Trip DTC

NOTE:

- If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
- If the DTC is not for A/T related items (see EC-98. "DTC Index"), skip step 1.
- 1. Erase DTC in TCM. Refer to <u>TM-60, "Diagnosis Description"</u>.
- 2. Select "ENGINE" with CONSULT-III.
- 3. Select "SELF-DIAG RESULTS".
- 4. Touch "ERASE". (DTC in ECM will be erased.)

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[VK56VD]

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description	
DIAG TROUBLE CODE [PXXXX]	 The engine control component part/control system has a trouble code the is displayed as PXXXX. (Refer to <u>EC-98, "DTC Index"</u>.) 	
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.	
L-FUEL TRM-B2 [%]	• The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.	
S-FUEL TRM-B1 [%]	"Short-term fuel trim" at the moment a malfunction is detected is displayed.	
S-FUEL TRM-B2 [%]	 The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel sched- ule. 	
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.	
INT MANI PRES [kPa]	These items are displayed but are not applicable to this model.	
ABSOL TH·P/S [%]	The throttle valve opening angle at the moment a malfunction is detected is displayed.	
B/FUEL SCHDL [msec]	The base fuel schedule at the moment a malfunction is detected is displayed.	
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed.	
FUEL SYS-B1	• "Fuel injection system status" at the moment a malfunction is detected is displayed.	
FUEL SYS-B2	 One of the following mode is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration 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 	
COMBUST CONDI- TION	These items are displayed but are not applicable to this model.	

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

DATA MONITOR MODE

Monitored Item

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×: Applicable

Monitored item	Unit	Description	Remarks
ENG SPEED	rpm	 Indicates the engine speed computed from the sig- nal of the crankshaft position sensor and camshaft position sensor. 	 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.
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 indicat- ed 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".

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[VK56VD]

Monitored item	Unit	Description	Remarks
A/F ALPHA-B1 A/F ALPHA-B2	%	 The mean value of the air-fuel ratio feedback cor- rection factor per cycle is indicated. 	 When the engine is stopped, a certain value is indicated. This data also includes the data for the air-fuel ratio learning control. When engine is running, specification range is indicat- ed in "SPEC".
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 en- ters fail-safe mode. The en- gine coolant temperature determined by the ECM is displayed.
A/F SEN1 (B1)	V	• The A/F signal computed from the input signal of	
A/F SEN1 (B2)	v	the air fuel ratio (A/F) sensor 1 is displayed.	
HO2S2 (B1)	V	• The signal voltage of the heated oxygen sensor 2	
HO2S2 (B2)	v	is displayed.	
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	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 	 When the engine is stopped, a certain value is indicated.
VHCL SPEED SE	km/h or mph	 way catalyst is relatively large. 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 ACCEL SEN 2	V	 The accelerator pedal position sensor signal volt- age is displayed. 	 ACCEL SEN 2 signal is converted by ECM internally. Thus, they differs from ECM terminal voltage signal.
TP SEN 1-B1 TP SEN 2-B1	V	 The throttle position sensor signal voltage is dis- played. 	 TP SEN 2-B1 signal is con- verted by ECM internally. Thus, they differs from ECM terminal voltage signal.
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 pres- sure sensor is displayed.	
FUEL LEVEL SE	V	 The signal voltage of the fuel level sensor is dis- played. 	
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 regard- less 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 voltage of the power steering pressure sensor signal) is indicated.	

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Monitored item	Unit	Description	Remarks
LOAD SIGNAL	ON/OFF	 Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and light- ing 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 blower fan ON signal.	
BRAKE SW	ON/OFF	Indicates [ON/OFF] condition from the stop lamp switch signal.	
IGN TIMING	BTDC	Indicates the ignition timing computed by ECM ac- cording to the input signals.	• When the engine is stopped, a certain value is indicated.
COMBUSTION	_	• These items are displayed but are not applicable to this model.	
CAL/LD VALUE	%	"Calculated load value" indicates the value of the current air flow divided by peak air flow.	
MASS AIRFLOW	g/s	 Indicates the mass air flow computed by ECM ac- cording 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 SOL (B1) INT/V SOL (B2)	%	 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 (deter- mined by ECM according to the input signals) is in- dicated.	
VENT CONT/V	ON/OFF	The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated. ON: Closed OFF: Open	
THRTL RELAY	ON/OFF	 Indicates the throttle control motor relay control condition determined by the ECM according to the input signals. 	
A/F S1 HTR (B1)		• Air fuel ratio (A/F) sensor 1 heater control value	
A/F S1 HTR (B2)	%	computed by ECM according to the input signals.The current flow to the heater becomes larger as the value increases.	
HO2S2 HTR (B1)		Indicates [ON/OFF] condition of heated oxygen	
HO2S2 HTR (B2)	ON/OFF	sensor 2 heater determined by ECM according to the input signals.	
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 in- put speed sensor signal.	

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< SYSTEM DESCRIPTION >

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Monitored item	Unit	Description	Remarks
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 per- formed yet. CMPLT: Idle air volume learning has already been performed successfully. 	
TRVL AFTER MIL	km or mile	Distance traveled while MIL is activated.	
SNOW MODE SW	ON/OFF	 Indicates [ON/OFF] condition from the snow mode switch signal. 	
ENG OIL TEMP	°C or °F	• The engine oil temperature (determined by the sig- nal voltage of the engine oil temperature sensor) is displayed.	
MAIN SW	ON/OFF	 Indicates [ON/OFF] condition from MAIN switch signal. 	
CANCEL SW	ON/OFF	 Indicates [ON/OFF] condition from CANCEL switch signal. 	
RESUME/ACC SW	ON/OFF	Indicates [ON/OFF] condition from RESUME/AC- CELERATE switch signal.	
SET SW	ON/OFF	 Indicates [ON/OFF] condition from SET/COAST 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. 	
DIST SW	ON/OFF	 Indicates [ON/OFF] condition from DISTANCE switch signal. 	
CRUISE LAMP	ON/OFF	 Indicates [ON/OFF] condition of CRUISE indicator determined by the ECM according to the input sig- nals. 	
AC EVA TEMP	°C or °F	 Indicates A/C evaporator temperature sent from A/ C auto amp. 	
AC EVA TARGET	°C or °F	• Indicates target A/C evaporator temperature sent from A/C auto amp.	
FAN DUTY	%	• Indicates a command value for cooling fan. The value is calculated by ECM based on 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 dis- played. 	
A/F ADJ-B1		 Indicates the correction of a factor stored in ECM. The factor is calculated from the difference be- 	
A/F ADJ-B2		tween the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 sig- nal.	
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 sig- nal voltage of the intake air temperature sensor) is indicated.	
AC PRESS SEN	V	• The signal voltage from the refrigerant pressure sensor is displayed.	
FUEL PRES SEN	MPa	Indicates the fuel rail pressure computed by ECM according to the input signals	

< SYSTEM DESCRIPTION >

[VK56VD]

Monitored item	Unit	Description	Remarks	٨
FUEL INJ B1	msec	• ECM-calculated injection pulse width of the fuel in- jector on the Bank 1 side.		A
FUEL INJ B2	msec	• ECM-calculated injection pulse width of the fuel in- jector on the Bank 2 side.		EC
INT/V TIM (B1)	°CA	Indicates [°CA] of intake camshaft advance angle.		
INT/V TIM (B2)				С
MAP SENSOR	V	 The signal voltage from the manifold absolute pressure (MAP) sensor is displayed. 		0
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. 		D
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. 		F
VVEL LEARN	YET/DONE	 Display the condition of VVEL learning YET: VVEL learning has not been performed yet. DONE: VVEL learning has already been per- formed successfully. 		G
VVEL SEN LEARN-B1	V	 Indicates the VVEL learning value. 		
VVEL SEN LEARN-B2	V	· indicates the vvill learning value.		Н
VVEL POSITION SEN-B1	V	• The VVEL control shaft position sensor signal volt-		
VVEL POSITION SEN-B2		age is displayed.		I
VVEL TIM-B1	deg	 Indicates [deg] of VVEL control shaft angle. 		
VVEL TIM-B2				1
FPCM	HI/MID/LOW/ OFF	 The control condition of the fuel pump control mod- ule (FPCM) (determined by ECM according to the input signals) is indicated. 		J
BAT TEMP SEN	V	The signal voltage from the battery temperature sensor is displayed.		К
COOLING FAN SPD	rpm	• Displays a cooling fan speed from a signal of elec- trically-controlled cooling fan coupling.		L
THRTL STK CNT B1*	_	—		
HO2 S2 DIAG2(B1)*	INCMP/CM- PLT	 Indicates DTC P0139 self-diagnosis (slow re- sponse) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 		Μ
HO2 S2 DIAG2(B2)*	INCMP/CM- PLT	 Indicates DTC P0159 self-diagnosis (slow re- sponse) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 		Ν
FUEL INJ TIMG	deg	 Indicates the fuel injection timing computed by ECM according to the input signals. 		0
H/P FUEL PUMP DEG	deg	Displays ECM-calculated fuel discharge position of the high pressure fuel pump.		Ρ
FUEL PRES SEN V	mV	• The signal voltage of FRP sensor is displayed.		
L/FUEL PRES SEN	MPa	• Displays a pressure value calculated from a low fuel pressure sensor voltage.		
L/FUEL PRES SEN V	mV	The signal voltage of low fuel pressure sensor is displayed.		

< SYSTEM DESCRIPTION >

Monitored item	Unit	Description	Remarks
ECM TEMP 1	°C or °F	Displays a temperature calculated from a signal of ECM temperature sensor 1.	
ECM TEMP 2	°C or °F	Displays a temperature calculated from a signal of ECM temperature sensor 2.	
FUEL PUMP DUTY	%	• The control condition of the fuel pump control mod- ule (FPCM) (determined by ECM according to the input signals) is indicated.	

*: 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.

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
VENT CON- TROL/V	 Ignition switch: ON (Engine stopped) Turn solenoid valve ON and OFF with the CONSULT-III and listen to operating sound. 	Solenoid valve makes an operating sound.	Harness and connectorsSolenoid valve
ENG COOLANT TEMP	 Engine: Return to the original non-standard condition Change the engine coolant tem- perature using CONSULT-III. 	If malfunctioning symptom disappears, see CHECK ITEM.	 Harness and connectors Engine coolant temperature sensor Fuel injector
FUEL INJEC- TION	 Engine: Return to the original non-standard condition Change the amount of fuel injec- tion using CONSULT-III. 	If malfunctioning symptom disap- pears, see CHECK ITEM.	 Harness and connectors Fuel injector Air fuel ratio (A/F) sensor 1
FUEL/T TEMP SEN	Change the fuel tank temperature	using CONSULT-III.	
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 CON-SULT-III. 	Engine speed changes according to the opening percent.	Harness and connectorsSolenoid valve
FAN DUTY CON- TROL*	 Ignition switch: ON Change duty ratio using CON- SULT-III. 	Cooling fan speed changes.	 Harness and connectors Cooling fan motor Cooling fan relay Cooling fan control module IPDM E/R
ALTERNATOR DUTY	 Engine: Idle Change duty ratio using CON- SULT-III. 	Battery voltage changes.	 Harness and connectors IPDM E/R Alternator
POWER BAL- ANCE	 Engine: After warming up, idle the engine. A/C switch OFF Selector lever: P or N Cut off each injector signal one at a time using CONSULT-III. 	Engine runs rough or stops.	 Harness and connectors Compression Fuel injector Power transistor Spark plug Ignition coil
IGNITION TIM- ING	 Engine: Return to the original non-standard condition Timing light: Set Retard the ignition timing using CONSULT-III. 	If malfunctioning symptom disap- pears, see CHECK ITEM.	Perform Idle Air Volume Learning.

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TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)	^
V/T ASSIGN AN- GLE	 Engine: Return to the original non-standard condition Change intake valve timing using 	If malfunctioning symptom disap- pears, see CHECK ITEM.	 Harness and connectors Intake valve timing control solenoid valve 	A
	CONSULT-III. Engine: Return to the original			EC
FPCM	 Select "LOW", "MID" and "HI" with CONSULT-III. 	Fuel pump speed changes or stops.	Harness and connectorsFuel pump control module (FPCM)	С

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

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

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

SRT WORK SUPPORT Mode

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

DTC WORK SUPPORT Mode

Test mode	Test item	Corresponding DTC No.	Reference page
	HO2S2 (B1) P1146	P0138	<u>EC-249</u>
	HO2S2 (B1) P1147	P0137	<u>EC-243</u>
HO2S2	HO2S2 (B1) P0139	P0139	<u>EC-257</u>
n0232	HO2S2 (B2) P1166	P0158	<u>EC-249</u>
	HO2S2 (B2) P1167	P0157	<u>EC-243</u>
-	HO2S2 (B2) P0159	P0159	<u>EC-257</u>
	A/F SEN1 (B1) P1278/P1279	P0133	<u>EC-238</u>
A/F SEN1	A/F SEN1 (B1) P1276	P0130	<u>EC-228</u>
A/F SEINT	A/F SEN1 (B2) P1288/P1289	P0153	<u>EC-238</u>
	A/F SEN1 (B2) P1286	P0150	<u>EC-228</u>
	EVP V/S LEAK P0456/P1456*	P0456	EC-346, "DTC Logic"
EVAPORATIVE SYSTEM	PURG VOL CN/V P1444	P0443	EC-317, "DTC Logic"
	PURG FLOW P0441	P0441	EC-312, "DTC Logic"

*: DTC P1456 does not apply but appears in DTC Work Support Mode screens.

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[VK56VD]

ECU DIAGNOSIS INFORMATION ECM

Reference Value

INFOID:000000006217730

[VK56VD]

VALUES ON THE DIAGNOSIS TOOL

NOTE:

• Specification data are reference values.

• Specification data are output/input values which are detected or supplied by the ECM at the connector. * Specification data may not be directly related to their components signals/values/operations.

i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIM-ING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

CONSULT-III MONITOR ITEM

Monitor Item	Condition		Values/Status
ENG SPEED	• Run engine and compare CONSULT-III value with the tachometer indication.		Almost the same speed as the tachometer indication
MAS A/F SE-B1	See EC-161, "Description".		
B/FUEL SCHDL	See EC-161, "Description".		
A/F ALPHA-B1	See EC-161, "Description".		
A/F ALPHA-B2	See EC-161, "Description".		
COOLAN TEMP/S	Ignition switch: ON		Indicates engine coolant temperature
A/F SEN1 (B1)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5 V
A/F SEN1 (B2)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5 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 (B2)	 Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. Engine: After warming up After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 		0 - 0.3 V ⇔ Approx. 0.6 - 1.0 V
HO2S2 MNTR (B1)	 Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. Engine: After warming up After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 		LEAN ⇔ RICH
HO2S2 MNTR (B2)	 Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. Engine: After warming up After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 		LEAN ⇔ RICH
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer in- dication.		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	0.65 - 0.87 V
		Accelerator pedal: Fully depressed	4.3 - 4.8 V
ACCEL SEN 2*1	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.56 - 0.96 V
		Accelerator pedal: Fully depressed	4.0 - 4.8 V

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Monitor Item	(Condition	Values/Status
	Ignition switch: ON (Engine stand)	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 1-B1	(Engine stopped)Selector lever: D position	Accelerator pedal: Fully depressed	Less than 4.75 V
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 2-B1* ¹	(Engine stopped)Selector lever: D position	Accelerator pedal: Fully depressed	Less than 4.75 V
FUEL T/TMP SE	Ignition switch: ON		Indicates fuel tank tempera- ture
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: $ON \rightarrow START \rightarrow$	ON	$OFF\toON\toOFF$
	Ignition switch: ON	Accelerator pedal: Fully released	ON
CLSD THL POS	(Engine stopped)	Accelerator pedal: Slightly depressed	OFF
		Air conditioner switch: OFF	OFF
AIR COND SIG	Engine: After warming up, idle the engine	Air conditioner switch: ON (Compressor operates.)	ON
	Engine: After warming up, idle	Steering wheel: Not being turned	OFF
PW/ST SIGNAL	the engine	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: $ON \rightarrow OFF \rightarrow O$	N	$ON \rightarrow OFF \rightarrow ON$
	Engine: After warming up, idle	Heater fan switch: ON	ON
HEATER FAN SW	the engine	Heater fan switch: OFF	OFF
		Brake pedal: Fully released	OFF
BRAKE SW	Ignition switch: ON	Brake pedal: Slightly depressed	ON
	Engine: After warming up	Idle	1 - 4°BTDC
IGN TIMING	 Selector lever: P or N position A/C switch: OFF No load 	2,000 rpm	25 - 45°BTDC
COMBUSTION		_	These items are displayed but are not applicable to this model.
	Engine: After warming up	Idle	5 - 35%
CAL/LD VALUE	 Selector lever: P or N position A/C switch: OFF No load 	2,500 rpm	5 - 35%
	Engine: After warming up	Idle	2.0 - 6.0 g/s
MASS AIRFLOW	 Selector lever: P or N position 		
	 A/C switch: OFF No load	2,500 rpm	7.0 - 20.0 g/s
PURG VOL C/V	 Engine: After warming up Selector lever: P or N position A/C switch: OFF 	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%
	No load	2,000 rpm	5%
INT/V SOL (B1)	Engine: After warming up Selector lever: P or N position	Idle	0 - 2%
	 A/C switch: OFF No load	2,000 rpm	Approx. 0 - 50%

< ECU DIAGNOSIS INFORMATION >

Monitor Item		Condition	Values/Status
	Engine: After warming up	Idle	0 - 2%
INT/V SOL (B2)	 Selector lever: P or N position A/C switch: OFF No load 	2,000 rpm	Approx. 0 - 50%
	Engine: After warming up, idle	A/C switch: OFF	OFF
AIR COND RLY	Engine: After warming up, idle the engine	A/C switch: ON (Compressor operates)	ON
VENT CONT/V	Ignition switch: ON		OFF
THRTL RELAY	Ignition switch: ON		ON
A/F S1 HTR (B1)	Engine: After warming up, idle th (More than 140 seconds after sta		4 - 100%
A/F S1 HTR (B2)	Engine: After warming up, idle th (More than 140 seconds after sta		4 - 100%
HO2S2 HTR (B1)	- Engine: After warming up	after the following conditions are met. en 3,500 and 4,000 rpm for 1 minute and at	ON
	Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B2)	 Engine speed: Below 3,600 rpm Engine: After warming up Keeping the engine speed betwee idle for 1 minute under no load 	ON	
	• Engine speed: Above 3,600 rpm	OFF	
	Power generation voltage variab	ON	
ALT DUTY SIG	Power generation voltage variab	le control: Not operating	OFF
I/P PULLY SPD	Vehicle speed: More than 20 km	Almost the same speed as the tachometer indication	
VEHICLE SPEED	• Turn drive wheels and compare C dication.	CONSULT-III value with the speedometer in-	Almost the same speed as the speedometer indication
IDL A/V LEARN	Engine: Running	Idle air volume learning has not been per- formed yet.	YET
	Engine: Running	Idle air volume learning has already been performed successfully.	CMPLT
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has illuminated.	0 - 65,535 km (0 - 40,723 miles)
SNOW MODE SW	 Ignition switch: ON 	Snow mode switch: ON	ON
	ignition switch. ON	Snow mode switch: OFF	OFF
ENG OIL TEMP	Engine: After warming up		More than 70°C (158°F)
MAIN SW	 Ignition switch: ON 	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	 Ignition switch: ON 	CANCEL switch: Pressed	ON
	.g	CANCEL switch: Released	OFF
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Re- leased	OFF
SET SW	Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
BRAKE SW1		Brake pedal: Fully released	ON
(ASCD/ICC brake switch)	Ignition switch: ON	Brake pedal: Slightly depressed	OFF

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Monitor Item		Condition	Values/Status
BRAKE SW2	Ignition switch: ON	Brake pedal: Fully released	OFF
(Stop lamp switch)		Brake pedal: Slightly depressed	ON
DIST SW	 Ignition switch: ON 	DISTANCE switch: Pressed	ON
300 300	Ignition switch: ON	DISTANCE switch: Released	OFF
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time \rightarrow at the 2nd time	$ON \rightarrow OFF$
AC EVA TEMP	Engine: Running		Indicates A/C evaporator temperature sent from"uni-fied meter and A/C amp.".
AC EVA TARGET	Engine: Running		Indicates target A/C evapo- rator temperature sentfrom "unified meter and A/C amp.".
FAN DUTY	Engine: Running		0 - 100%
ALT DUTY	Engine: Idle		0 - 80%
BAT CUR SEN	 Engine speed: Idle Battery: Fully charged*² Selector lever: P or N position A/C switch: OFF No load 	Approx. 2,600 - 3,500 mV	
A/F ADJ-B1	Engine: Running		-0.330 - 0.330
A/F ADJ-B2	Engine: Running		-0.330 - 0.330
P/N POSI SW	a Ignition outtable ON	Selector lever: P or N	ON
P/IN POSI 500	Ignition switch: ON	Selector lever: Except above position	OFF
NT/A TEMP SE	Ignition switch: ON		Indicates intake air temper- ature
AC PRESS SEN	Engine: Idle Both A/C switch and blower fan	1.0 - 4.0 V	
	Engine: After warming up	Idle	Approx. 2.74 Mpa
FUEL PRES SEN	 Selector lever: P or N position A/C switch: OFF No load 	2,000 rpm	Approx. 3.0 Mpa
	Engine: After warming up	Idle	Approx. 1.4 msec
FUEL INJ B1	 Selector lever: P or N position A/C switch: OFF No load 	2,000 rpm	Approx. 1.0 msec
	Engine: After warming up	Idle	Approx. 1.4 msec
FUEL INJ B2	 Selector lever: P or N position A/C switch: OFF No load 	2,000 rpm	Approx. 1.0 msec
	Engine: After warming up Selector lever: P or N position	Idle	–5 - 5°CA
INT/V TIM (B1)	 A/C switch: OFF No load	2,000 rpm	Approx. 0 - 30°CA
	Engine: After warming up	Idle	–5 - 5°CA
INT/V TIM (B2)	 Selector lever: P or N position A/C switch: OFF No load 	2,000 rpm	Approx. 0 - 30°CA
	Engine: After warming up	Idle	Approx. 1.0 V
MAP SENSOR	 Selector lever: P or N position A/C switch: OFF No load 	2,000 rpm	Approx. 1.35 V
EVAP LEAK DIAG	Ignition switch: ON		Indicates the condition of EVAP leak diagnosis.

< ECU DIAGNOSIS INFORMATION >

Monitor Item	(Values/Status	
EVAP DIAG READY	Ignition switch: ON		Indicates the ready condi- tion of EVAP leak diagnosis.
	• Ignition switch: OFF \rightarrow ON	VVEL learning has not been performed yet.	YET
VVEL LEARN	(After warming up)	VVEL learning has already been per- formed successfully.	DONE
VVEL SEN LEARN-B1	VVEL learning has already been	performed successfully	Approx. 0.30 - 0.80 V
VVEL SEN LEARN-B2	VVEL learning has already been	performed successfully	Approx. 0.30 - 0.80 V
	Engine: After warming up	Idle	Approx. 0.25 - 1.50 V
VVEL POSITION SEN- B1	 Selector lever: P or N position A/C switch: OFF No load 	When revving engine up to 2,000 rpm quickly	Approx. 0.25 - 4.75 V
	Engine: After warming up	Idle	Approx. 0.25 - 1.50 V
VVEL POSITION SEN- B2	Selector lever: P or N positionAir conditioner switch: OFFNo load	When revving engine up to 2,000 rpm quickly	Approx. 0.25 - 4.75 V
	Engine: After warming up	Idle	Approx. 0 - 23 deg
VVEL TIM-B1	 Selector lever: P or N position A/C switch: OFF No load 	When revving engine up to 2,000 rpm quickly	Approx. 0 - 90 deg
	Engine: After warming up	Idle	Approx. 0 - 23 deg
VVEL TIM-B2	 Selector lever: P or N position A/C switch: OFF No load 	When revving engine up to 2,000 rpm quickly	Approx. 0 - 90 deg
		Engine: Cranking	Н
FPCM	 Engine: After warming up Selector lever: P or N position 	Revving engine from idle to 4,000 rpm quickly	MID
	 A/C switch: OFF No load	 Engine: Idle Engine coolant temperature: More than 10°C (50°F) 	LOW
BAT TEMP SEN	 Engine: After warming up Selector lever: P or N position A/C switch: OFF No load 	ldle	Indicates the temperature around the battery.
	Engine speed: Idle	Water temp: Less than 98°C	Approx. 100 – 200 rpm
COOLING FAN SPD	 Engine: After warming up Selector lever: P or N position A/C switch: OFF No load 	Water temp: More than 98°C	Approx. 600 – 700 rpm
THRTL STK CNT B1	NOTE: The item is indicated, but not used.		_
HO2 S2 DIAG2(B1)	NOTE: The item is indicated, but not used.	_	
HO2 S2 DIAG2(B2)	NOTE: The item is indicated, but not used.	-	
	Engine: After warming up	Idle	Approx. 16 deg
FUEL INJ TIMG	 Selector lever: P or N position A/C switch: OFF No load 	2,000 rpm	Approx. –170 deg
	Engine: After warming up	Idle	Approx. 211.0 deg
H/P FUEL PUMP DEG	Selector lever: P or N positionA/C switch: OFFNo load	2,000 rpm	Approx. 206.0 deg

< ECU DIAGNOSIS INFORMATION >

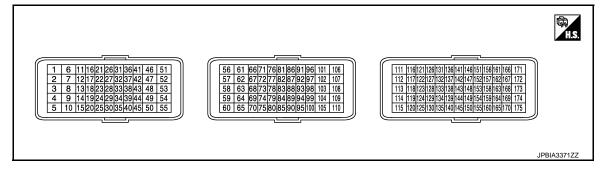
[VK56VD]

Monitor Item	Condition		Values/Status
	 Engine: After warming up Selector lever: P or N position 	Idle	Approx. 1150 mV
FUEL PRES SEN V	A/C switch: OFF No load	2,000 rpm	Approx. 1200 mV
	Engine: After warming up	Idle	Approx. 0.45 MPa
L/FUEL PRES SEN	Selector lever: P or N positionA/C switch: OFFNo load	2,000 rpm	Approx. 0.45 MPa
	Engine: After warming up	Idle	Approx. 3250 mV
L/FUEL PRES SEN V	Selector lever: P or N positionA/C switch: OFFNo load	3,000 rpm	Approx. 3100 mV
ECM TEMP 1	 Engine: After warming up Selector lever: P or N position A/C switch: OFF No load 	ldle	Indicates the temperature of ECM internal circuit 1.
ECM TEMP 2	 Engine: After warming up Selector lever: P or N position A/C switch: OFF No load 	ldle	Indicates the temperature of ECM internal circuit 2.
FUEL PUMP DUTY	 Engine: After warming up Shift lever: P or N Air conditioner switch: OFF No load 	Engine speed: Idle	30 - 40%

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

*2: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-159, "How to Handle Battery".

TERMINAL LAYOUT



PHYSICAL VALUES

NOTE:

- Specification data are reference values and are measured between each terminals.
- Pulse signal is measured by CONSULT-III.

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< ECU DIAGNOSIS INFORMATION >

	nal No. color)	Description		Condition	Value
+	-	Signal name	Input/ Output	Condition	(Approx.)
1 (R) 175 2 (B) (R)	175	, , ,	Output	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	BATTERY VOLTAGE (11 - 14 V)★ 100mSec/div 20V/div
	(B)			[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V)★ 100mSec/div
3 (G)	175	Fuel injector No. 3 (LO)	laput	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div € € 2V/div JPBIA3355ZZ
(G) 4 (G)	(B)	Fuel injector No. 2 (LO)	Input	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div € 2V/div JPBIA3356ZZ
5 (B/R)	_	ECM ground	_	_	

< ECU DIAGNOSIS INFORMATION >

[VK56VD]

	nal No. color)	Description		Condition	Value	А
+	_	Signal name	Input/ Output	Condition	(Approx.)	
6 (R)	175	Fuel injector No. 3 (HI)	Output	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	BATTERY VOLTAGE (11 - 14 V)★ 100mSec/div 20V/div JPBIA3345ZZ	C D
7 (R)	(B)	Fuel injector No. 2 (HI)		[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V)★ 100mSec/div	F
8 (G)	175	Fuel injector No. 8 (LO)	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	20V/div JPBIA3347ZZ BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div ↓ ↓ 2V/div JPBIA3355ZZ	G H I
9 (G)	(B)	Fuel injector No. 5 (LO)	input	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	K
10 (B)	—	ECM ground	_	_	_	Μ
11 (BR)	175 (B)	PNP switch	Input	 [Ignition switch: ON] Selector lever: P or N position [Ignition switch: ON] Selector lever: Except above position 	BATTERY VOLTAGE (11 - 14 V) 0 V	N

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< ECU DIAGNOSIS INFORMATION >

Terminal No. (Wire color) Descri		Description		Condition	Value
+	_	Signal name	Input/ Output		(Approx.)
12 (Y) 13 (L/B) 14	175	Ignition signal No. 1 175 Ignition signal No. 2 (B) Ignition signal No. 3 Ignition signal No. 4	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	0 - 0.2 V★ 50mSec/div
(BR/ Y) 15 (LG/ R)	(B)			[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	0.1 - 0.4 V★ 50mSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓
17 (P/L) 18 (Y/R) 19 (G/Y) 20 (O)	175	Ignition signal No. 5 Ignition signal No. 6 Ignition signal No. 7 Ignition signal No. 8	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	0 - 0.2 V 50mSec/div 50mSec/div 2V/div
	(B)			[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	0.1 - 0.4 V★ 50mSec/div
21 (G/O)	25 (LG)	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.
22 (BR/	25 (I_C)		Input	[Engine is running] • Warm-up condition • Idle speed	0.9 - 1.1 V
W)	(LG)			[Engine is running]Warm-up conditionEngine speed: 2,500 rpm	1.4 - 1.9 V

< ECU DIAGNOSIS INFORMATION >

[VK56VD]

	nal No. color)	Description		Condition	Value
+	_	Signal name	Input/ Output	Condition	(Approx.)
23	45	Low fuel pressure sensor	laput	[Engine is running] • Warm-up condition • Idle speed	2.4 - 3.6 V 50mSec/div 2V/div JPBIA3357ZZ
(V)	(L/O)	Low ruer pressure sensor	Input -	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	2.4 - 3.6 V 50mSec/div 4 4 50mSec/div 4 50mSec/div 4 50mSec/div 4 50mSec/div 4 50mSec/div 4 50mSec/div 50mSec/div 4 50mSec/div 50mSe
25 (LG)		Sensor ground [Mass air flow sensor/ Intake air temperature sensor]	_		_
27 (P)	45 (L/O)	Sensor power supply (Power steering pressure sen- sor/ Low fuel pressure sensor/ Electrically-controlled cooling fan coupling)		[Ignition switch: ON]	5 V
28 (SB)	40 (W/L)	Sensor power supply (Fuel rail pressure sensor/En- gine oil pressure sensor)	_	[Ignition switch: ON]	5 V
29 (W)	35 (—)	Knock sensor (bank 1)	Input	[Engine is running] • Idle speed	2.0 V*1
31	40			[Engine is running]Warm-up conditionIdle speed	0.98 - 1.2 V
	40 (W/L)	Fuol rail proceuro concor	Input	[Engine is running]Warm-up conditionRevving engine from idle to 4,000 rpm quickly	1.1 - 2.9 V
32 (R)	40 (W/L)	Engine coolant temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.
33 (W)	35 (—)	Knock sensor (bank 2)	Input	[Engine is running] • Idle speed	2.0 V*1
35 (—)	_	Sensor ground (Knock sensor)	_	_	_

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< ECU DIAGNOSIS INFORMATION >

	nal No. color)	Description		Condition	Value
+	-	Signal name	Input/ Output	Condition	(Approx.)
				[Ignition switch: ON] • Engine stopped	5 V
37 (V)	175 (B)	Cooling fan speed	Input	[Engine is running] • Idle speed • After warm-up condition	BATTERY VOLTAGE (11 - 14 V)★ 100mSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓
				[Engine is running]Idle speedBefore warm-up condition	BATTERY VOLTAGE (11 - 14 V)★ 100mSec/div
39 (P/B)	45 (L/O)	Power steering pressure sensor	Input	 [Engine is running] Steering wheel: Being turned [Engine is running] Steering wheel: Not being turned 	0.5 - 4.5 V 0.4 - 0.8 V
40 (W/L)		Sensor ground (Fuel rail pressure sensor/En- gine coolant temperature sen- sor/Engine oil temperature sensor)	_		
42 (L/Y)	40 (W/L)	Engine oil temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine oil temperature.
45 (L/O)	_	Sensor ground (Power steering pressure sen- sor/ Low fuel pressure sensor/ Electrically-controlled cooling fan coupling)	_	_	_
46 (SB)	175 (B)	Fuel injector driver power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
((-)			[Ignition switch: OFF]	1.5 V
47 (G)	175 (B)	Heated oxygen sensor 2 heater (bank 1)	Input	 [Engine is running] Engine speed: Below 3,600 rpm after the following conditions are met Engine: after warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	10 V★ 50mSec/div 50mSec/div 50mSec/div 50mSec/div JMBIA0037GB
				[Ignition switch: ON] • Engine: Stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)

< ECU DIAGNOSIS INFORMATION >

[VK56VD]

	nal No. color)	Description		Condition	Value	А
+	_	Signal name	Input/ Output	Condition	(Approx.)	
48 (L/W)	175 (B)	A/F sensor 1 heater (bank 1)	Input	 [Engine is running] Warm-up condition Idle speed (More than 140 seconds after start- ing engine) 	2.9 - 8.8 V★ 5mSec/div 5V/div	C D
				[Engine is running]Warm-up conditionIdle speed	BATTERY VOLTAGE (11 - 14 V)	Е
49 (LG/ B)	175 (B)	Intake valve timing control sole- noid valve (bank 1)	Output	[Engine is running]Warm-up conditionEngine speed: 2,000rpm	7 - 12 V★	F
51 (R)	175 (B)	Fuel injector driver power supply	Output	[Engine is running] • Warm-up condition • Idle speed [Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)	Н
52 (L/R)	175 (B)	Heated oxygen sensor 2 heater (bank 2)	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 [Ignition switch: ON] Engine: Stopped 	10 V★ 50mSec/div € 50mSec/div 50mSec/div JMBIA0037GB BATTERY VOLTAGE	I J K
				[Engine is running] • Engine speed: Above 3,600 rpm	(11 - 14 V) 2.9 - 8.8 V★	M
53 (SB)	175 (B)	A/F sensor 1 heater (bank 2)	Output	 [Engine is running] Warm-up condition Idle speed (More than 140 seconds after start- ing engine) 	5mSec/div	N

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< ECU DIAGNOSIS INFORMATION >

Terminal No. (Wire color)		Description		Condition	Value
+	_	Signal name	Input/ Output		(Approx.)
				[Engine is running]Warm-up conditionIdle speed	BATTERY VOLTAGE (11 - 14 V)
54 (G/R)	175 (B)	Intake valve timing control sole- noid valve (bank 2)	Output	[Engine is running]Warm-up conditionEngine speed: 2,000rpm	7 - 12 V★
57	175	Throttle control motor (Open)	Output	 [Ignition switch: ON] Engine: Stopped Selector lever: D Accelerator pedal: Fully depressed 	0 - 14 V★ 500µSec/div 500µSec/div 500µSec/div 500µSec/div 500µSec/div JMBIA0031GB
(W)	(B)			[Ignition switch: ON]Engine: StoppedSelector lever: D positionAccelerator pedal: Fully released	0 - 14 V★ 500µSec/div
60 (B)		Shield	_	_	_
63 (R)	175 (B)	Throttle control motor (Close)	Output	 [Ignition switch: ON] Engine: Stopped Selector lever: D position Accelerator pedal: In the middle of releasing operation 	0 - 14 V★ 500µSec/div 500µSec/div 500µSec/div 500µSec/div 500µSec/div JMBIA0031GB

< ECU DIAGNOSIS INFORMATION >

Termir (Wire		Description		Condition	Value	А
+	-	Signal name	Input/ Output	Condition	(Approx.)	
64	175	EVAP canister purge volume	Output	[Engine is running]Idle speedAccelerator pedal: Not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div € 10V/div JMBIA0039GB	C D
(V/W)	(B)	control solenoid valve	Cutput	 [Engine is running] Engine speed: About 2,000 rpm (More than 100 seconds after start- ing engine) 	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div 50mSec/div 10V/div JMBIA0040GB	E F G
67 (V)	175 (B)	Manifold absolute pressure sen- sor	Input	[Engine is running] • Warm-up condition • Idle speed [Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	1.2 V 1.5 V	Н
68 (BR/ W)	_	Sensor ground [Camshaft position sensor (bank 1)]				J
70 (W/L)		Sensor ground (Manifold absolute pressure sensor)	_	_	_	K
73	99 (LG/	Camshaft position sensor (bank	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	3.0 - 5.0 V★ 20mSec/div € 2V/div JMBIA0045GB	L
(P)	B)	2)	input	[Engine is running] • Engine speed: 2,000 rpm	3.0 - 5.0 V★ 20mSec/div = 	N O
74 (L)	175 (B)	A/F sensor 1 (bank 2)	Input	[Ignition switch: ON]	2.5 V	Ρ
76 (W/ G)	98 (G/ W)	Sensor power supply (Crankshaft position sensor)	_	[Ignition switch: ON]	5 V	
77 (Y/R)	68 (BR/ W)	Sensor power supply [Camshaft position sensor (bank 1)]		[Ignition switch: ON]	5 V	

< ECU DIAGNOSIS INFORMATION >

	Terminal No. (Wire color)		Oradition	Value						
+	_	Signal name	Input/ Output	Condition	(Approx.)					
78 (L/R)	175 (B)	A/F sensor 1 (bank 2)	Input	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	2.2 - 2.8V Output voltage varies with air fuel ratio.					
79	97	Throttle position concer 2	logut	[Ignition switch: ON] • Engine: Stopped • Selector lever: D position • Accelerator pedal: Fully released	Less than 4.75 V					
(B)	(W)	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine: Stopped • Selector lever: D position • Accelerator pedal: Fully depressed	More than 0.36 V					
80 (L/W)	175 (B)	A/F sensor 1 (bank 2)	Input	[Ignition switch: ON]	3.0 V					
81 (G)	97 (W)	Sensor power supply [Throttle position sensor (bank 1)]	_	[Ignition switch: ON]	5 V					
83 (LG/ R)	99 (LG/ B)	Sensor power supply [Camshaft position sensor (bank 2)]	_	[Ignition switch: ON]	5 V					
85 (GR/ R)	70 (W/L)	Sensor power supply (Manifold absolute pressure sensor)	_	[Ignition switch: ON]	5 V					
86 (R/	98	-			-			loout	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	4.0 - 5.0 V★ 1mSec/div 2V/div JMBIA0041GB
W)	(G) W)		Input	[Engine is running] • Engine speed: 2,000 rpm	4.0 - 5.0 V★ 1mSec/div					
87 (L/W)	100 (R)	Heated oxygen sensor 2 (bank 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					
88 (B)	175 (B)	A/F sensor 1 (bank 1)	Input	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	2.2 - 2.8 V Output voltage varies with air fuel ratio.					
90 (W)	175 (B)	A/F sensor 1 (bank 1)	Input	[Ignition switch: ON]	3.0 V					

< ECU DIAGNOSIS INFORMATION >

Terminal No. (Wire color)		Description			Value
+	_	Signal name	Input/ Output	Condition	(Approx.)
91 (R)	97 (W)	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine: Stopped • Selector lever: D position • Accelerator pedal: Fully released [Ignition switch: ON] • Engine: Stopped	More than 0.36 V
				 Selector lever: D position Accelerator pedal: Fully depressed 	Less than 4.75 V
94 (R)	175 (B)	A/F sensor 1 (bank 1)	Input	[Ignition switch: ON]	2.0 V
95	68 (BR/	Camshaft position sensor (bank	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	3.0 - 5.0 V★ 20mSec/div 20mSec/div 20V/div JMBIA0045GB
L/R) (BR/ 1)		[Engine is running] • Engine speed: 2,000 rpm	3.0 - 5.0 V★ 20mSec/div 20mSec/div 20mSec/div		
96 (W/ R)	100 (R)	Heated oxygen sensor 2 (bank 1)	Input	 [Engine is running] Revving engine from idle to 3,000 rpm quickly after the following conditions are met Engine: after warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	0 - 1.0 V
97 (W)	_	Sensor ground [Throttle position sensor (bank 1)]	_	_	_
98 (G/ W)	_	Sensor ground (Crankshaft position sensor)			
99 (LG/ B)	_	Sensor ground [Camshaft position sensor (bank 2)]	_		_
100 (R)	_	Sensor ground (Heated oxygen sensor 2)	_	_	_

< ECU DIAGNOSIS INFORMATION >

Terminal No. (Wire color)		Description		Condition	Value	
+	_	Signal name	Input/ Output	Condition	(Approx.)	
		Fuel injector No. 1 (HI)	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	BATTERY VOLTAGE (11 - 14 V)★ 100mSec/div 00mSec/div 00mSec/div 00mSec/div 00mSec/div 00mSec/div 00mSec/div 00mSec/div 00mSec/div 00mSec/div	
102 (R)	(B)	Fuel injector No. 6 (HI)	input	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V)★ 100mSec/div	
103 (G)	175	Fuel injector No. 7 (LO) Fuel injector No. 4 (LO)	Output	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	
104 (G)	(B)			[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div 50mSec/div 2V/div JPBIA3356ZZ	
105 (L/W)	175 (B)	High pressure fuel pump (HI)	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	BATTERY VOLTAGE (11 - 14 V)★ 20mSec/div 20mSec/div 10V/div JPBIA3340ZZ BATTERY VOLTAGE	
				[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	(11 - 14 V)★ 20mSec/div 20mSec/div 10V/div JPBIA3341ZZ	

< ECU DIAGNOSIS INFORMATION >

	nal No. color)	Description		Condition	Value	А
+	_	Signal name	Input/ Output	Condition	(Approx.)	
106 (R)	175	Fuel injector No. 7 (HI)	0.444	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	BATTERY VOLTAGE (11 - 14 V)★ 100mSec/div	C D
107 (R)	(B)	Fuel injector No. 4 (HI)	Output	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V)★ 100mSec/div 	E F
108 (G) 109	175 (B)	Fuel injector No. 1 (LO) Fuel injector No. 6 (LO)	Output	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div ↓ ↓ 2V/div JPBIA3355ZZ BATTERY VOLTAGE	H I J
(G)				[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	(11 - 14 V)★ 50mSec/div	K
110 (L/B)	175 (B)	High pressure fuel pump (LO)	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	BATTERY VOLTAGE (11 - 14 V)★ 20mSec/div 20mSec/div 5V/div JPBIA3342ZZ BATTERY VOLTAGE	M N O
				[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	(11 - 14 V)★ 20mSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	Ρ

< ECU DIAGNOSIS INFORMATION >

Terminal No. (Wire color)		Description		Condition	Value	
+	_	Signal name	Input/ Output	Condition	(Approx.)	
111 (R)	175 (B)	Fuel injector driver power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	
112 (SB)	175 (B)	Fuel injector driver power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	
114 (B)	_	ECM ground	—	_	_	
115 (B)	_	ECM ground	_	_	_	
120 (Y)	175 (B)	EVAP canister vent control valve	Output	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	
122 (BR/ W)	175 (B)	VVEL actuator motor relay abort signal (VVEL control module)	Input	[Ignition switch: ON]	0 V	
123 (V/R)	175 (В)	Throttle control motor relay	Output	[Ignition switch: $ON \rightarrow OFF$]	0 - 1.0 V ↓ BATTERY VOLTAGE (11 - 14 V) ↓ 0 V	
				[Ignition switch: ON]	0 - 1.0 V	
				[When cranking engine]	0 - 0.5 V	
125 (GR)	175 (B)	Fuel pump control module (FPCM)	Output	[Engine is running] • Warm-up condition	0 - 4.0 V★ 5mSec/div € 2V/div JPBIA3344ZZ	
126	129	Accelerator pedal position sen-	Input	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.28 - 0.48 V	
(O)	(P/L)	sor 2		[Ignition switch: ON]Engine: StoppedAccelerator pedal: Fully depressed	2.0 - 2.5 V	
				[Ignition switch: ON] • ASCD steering switch: OFF	4 V	
				[Ignition switch: ON] • MAIN switch: Pressed	0 V	
128 (Y)	130 (R)	ASCD steering switch	Input	[Ignition switch: ON] • CANCEL switch: Pressed	1 V	
(-)	(/)		[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3 V	
				[Ignition switch: ON] • SET/COAST switch: Pressed	2 V	

< ECU DIAGNOSIS INFORMATION >

	nal No. color)	Description		Condition	Value	А
+	-	Signal name	Input/ Output	Condition	(Approx.)	
				[Ignition switch: ON] • ICC steering switch: OFF	4.2 V	EC
				[Ignition switch: ON] • MAIN switch: Pressed	0 V	С
				[Ignition switch: ON] • CANCEL switch: Pressed	1.9 V	_
128 (Y)	175 (B)	ICC steering switch	Input	[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3.7 V	D
				[Ignition switch: ON] SET/COAST switch: Pressed 	3.2 V	E
				[Ignition switch: ON] • DISTANCE switch: Pressed	2.6 V	F
				[Ignition switch: ON]DYNAMIC DRIVER ASSISTANCE switch: Pressed	1.0 V	- G
129 (P/L)	_	Sensor ground (Accelerator pedal position sen- sor 2)	_	_	_	G
130 (R)	_	Sensor ground (ASCD steering switch/ICC steering switch)	_		_	- H
131 (L/W)	129 (P/L)	Sensor power supply (Accelerator pedal position sen- sor 2)	_	[Ignition switch: ON]	5 V	
133 (SB)	150 (R)	Sensor power supply (Refrigerant pressure sensor/ Battery current sensor/EVAP control system pressure sensor)	_	[Ignition switch: ON]	5 V	J
134 (V/W)	175 (B)	Fuel temperature sensor	Input	[Engine is running] • Warm-up condition	2.8 V	- K
136 (W/	140	Accelerator pedal position sen-	Input	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.65 - 0.87 V	L
(W/ R)	(R/Y)	sor 1	input	[Ignition switch: ON]Engine: StoppedAccelerator pedal: Fully depressed	4.3 - 4.8 V	Μ
137 (W/ G)	140 (R/Y)	Sensor power supply (Accelerator pedal position sen- sor 1)	_	[Ignition switch: ON]	5 V	Ν
138 (V)	150 (R)	Battery current sensor	Input	[Engine is running] • Battery: Fully charged ^{*2} • Idle speed	2.6 - 3.5 V	0
139 (G)	175 (B)	Battery temperature sensor	Input	[Engine is running] • Battery temperature: 25°C • Idle speed	3.3 V	P
140 (R/Y)	_	Sensor ground (Accelerator pedal position sen- sor 1)	_		_	_
141	175	Ignition switch	Input	[Ignition switch: OFF]		_
(SB)	(B)	·	put	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	_

< ECU DIAGNOSIS INFORMATION >

	nal No. color)	Description		Condition	Value
+	-	Signal name	Input/ Output	Condition	(Approx.)
142 (R/ W)	175 (B)	Fuel pump control module (FPCM) check	Input	[When cranking engine] [Engine is running] • Warm-up condition • Idle speed	0 V 9 V
143 (L/Y)	150 (R)	EVAP control system pressure sensor	Input	[Ignition switch: ON]	1.8 - 4.8 V
144 (O/B)	150 (R)	Refrigerant pressure sensor	Input	 [Engine is running] Warm-up condition Both A/C switch and blower fan motor switch: ON (Compressor operates) 	1.0 - 4.0 V
146 (L)		CAN communication line	_	_	_
147	175	ASCD/ICC brake switch	Input	[Ignition switch: ON] • Brake pedal: Slightly depressed	0 V
(G/Y)	(B)	ASCD/ICC DIake Switch	mput	[Ignition switch: ON] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)
150 (R)	_	Sensor ground (Refrigerant pressure sensor/ Battery current sensor/EVAP control system pressure sensor)		_	_
151 (P)		CAN communication line		_	_
156 (L)	175 (B)	Power supply for ECM (Back- up)	Input	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
158 (W/B)	175 (B)	Stop lamp switch	Input	 [Ignition switch: OFF] Brake pedal: Fully released [Ignition switch: OFF] Brake pedal: Slightly depressed 	0 V BATTERY VOLTAGE (11 - 14 V)
161 (R/ W)		ENG communication line			_
163 (L/G)	175 (B)	ECM relay (Self shut-off)	Output	[Engine is running][Ignition switch: OFF]A few seconds after turning ignition switch OFF	0 - 1.5 V
. /				[Ignition switch: OFF]More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
165 (GR/ R)	_	NOTE: Not used	_	_	_
166 (W)		ENG communication line	—	_	_

< ECU DIAGNOSIS INFORMATION >

[VK56VD]

	nal No. color)	Description		Condition	Value	А
+	_	Signal name	Input/ Output	Condition	(Approx.)	
169	175	Engine speed signal output	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	0 - 7.0 V★ 10mSec/div	C D
(G/B)	(B)	Engine speed signal output	Input	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	0 - 7.0 V★ 10mSec/div	E
171 (W)	175 (B)	Power supply for ECM	Input	[Ignition switch: ON]	ZV/div JPBIA3354ZZ BATTERY VOLTAGE (11 - 14 V)	G
172 (W)	175 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	Н
173 (O)	175 (B)	Throttle control motor power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	
174 (B)	_	ECM ground	-	_	_	I
175 (B)	_	ECM ground	—	_	_	J

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

*1: This may vary depending on internal resistance of the tester.

*2: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-159. "How to Handle Battery".

Fail-safe

INFOID:000000006217731

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NON DTC RELATED ITEM

Detected items	Engine operating condition in fail-safe mode	Remarks	Reference page	N
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 illuminating 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 the fail-safe function. The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunc- tion.	<u>EC-515</u>	C

DTC RELATED ITEM

< ECU DIAGNOSIS INFORMATION >

DTC No.	Detected items	Engine operating condition in fail-safe mode				
U0113 U1003 U1024	Can communication circuit	VVEL actuator motor relay is turned off, and VVEL value is become at a minimum angle Engine speed will not rise more than 3,500 rpm due to the fuel cut.				
P0011 P0021	Intake valve timing control	The signal is not energized to the intake valve timing control solenoid valve and the valve control does not function.				
P0087	FRP control system	Engine torque is limited.VVEL value is maintained at a fixe	ed angle.			
P0088		Engine speed is limited.				
P008A	Low fuel pressure control system	Engine torque is limited.				
P0090	FRP control system	Engine torque is limited.VVEL value is maintained at a fixe	ed angle.			
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than	n 2,400 rpm due to the fuel cut.			
	Engine coolant tempera- ture sensor circuit	Engine coolant temperature will be c CONSULT-III displays the engine co	letermined by ECM based on the following condition polant temperature decided by ECM.			
		Condition	Engine coolant temperature decided (CONSULT-III display)			
P0117		Just as ignition switch is turned ON or START	40°C (104°F)			
P0118		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.				
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the norma condition. Therefore, the acceleration will be poor.				
P0190	FRP sensor	Engine speed is limited.High pressure fuel pump is activation	ted at maximum discharge pressure.			
P0201 P0202 P0203 P0204 P0205 P0206 P0207 P0208	Injector	 High pressure fuel pump is activated at maximum discharge pressure. Engine torque is limited. Fuel injection shut-off of malfunction cylinder. Mixture ratio feedback control does not function. Idle engine speed is increased. 				
P0500	Vehicle speed sensor	The cooling fan operates (Highest)	while engine is running.			
P0524	Engine oil pressure	The signal is not energized to the intake valve timing control solenoid valve and the valve control does not function. Engine speed will not rise more than 2,400 rpm due to the fuel cut.				
P0605	ECM	(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. ECM deactivates ASCD operation.				
P0607	ECM	VVEL actuator motor relay is turned Engine speed will not rise more thar	off, and VVEL value is become at a minimum angl n 3,500 rpm due to the fuel cut.			

< ECU DIAGNOSIS INFORMATION >

DTC No.	Detected items	Engine opera	ating condition in fail-safe mode			
	ECM	Type1 Engine torque is limited. Idle engine speed is increased. Fuel injector power supply shut-operative statements. 	off			
P062B		 High fuel pressure limitation. Type2 Engine torque is limited. Fuel injection shut-off of malfunct Mixture ratio feedback control do Idle engine speed is increased. 	tion cylinder.			
P0643	Sensor power supply		trol actuator control, throttle valve is maintained at a by the return spring.			
P1087 P1088	VVEL control function	VVEL of normal bank is controlled Engine speed will not rise more that				
P1089 P1092	VVEL control shaft position sensor	VVEL value is maintained at a fixed Engine speed will not rise more that	5			
P1197	Out of gas	Engine torque is limited.VVEL value is maintained at a fix	ked angle.			
P1608	VVEL control shaft position sensor	VVEL actuator motor relay is turned Engine speed will not rise more that	d off, and VVEL value is become at a minimum angle. an 3,500 rpm due to the fuel cut.			
P1090	VVEL actuator motor	VVEL of normal bank is controlled Engine speed will not rise more that				
P1093		VVEL actuator motor relay is turned Engine speed will not rise more that	d off, and VVEL value is become at a minimum angle. an 3,500 rpm due to the fuel cut.			
P1091	VVEL actuator motor relay	/VEL actuator motor relay is turned off, and VVEL value is become at a minimum angle. Engine speed will not rise more than 3,500 rpm due to the fuel cut.				
P1197	Out of gas	Engine torque is limited.VVEL value is maintained at a fix	ked angle.			
P2101	Electric throttle control function	ECM stops the electric throttle cont fixed opening (approx. 5 degrees) b	trol actuator control, throttle valve is maintained at a by the return spring.			
P2118	Throttle control motor	ECM stops the electric throttle cont fixed opening (approx. 5 degrees) b	trol actuator control, throttle valve is maintained at a by the return spring.			
	Electric throttle control ac- tuator	malfunction:)	ator does not function properly due to the return spring ctuator by regulating the throttle opening around the I not rise more than 2,000 rpm.			
P2119		ECM controls the electric throttle co ing to 20 degrees or less.	in fail-safe mode is not in specified range:) ontrol actuator because of regulating the throttle open-			
		stops, the engine stalls.	lve is stuck open:) slows down gradually by fuel cut. After the vehicle position, and engine speed will not exceed 1,000 rpm			
P1290 P2100 P2103	Throttle control motor relay	ECM stops the electric throttle cont fixed opening (approx. 5 degrees) b	trol actuator control, throttle valve is maintained at a by the return spring.			
P1606	VVEL control module	VVEL actuator motor relay is turned Engine speed will not rise more that	d off, and VVEL value is become at a minimum angle. an 3,500 rpm due to the fuel cut.			
	Brake switch	ECM controls the electric throttle co small range. Therefore, acceleration will be poor	ontrol actuator by regulating the throttle opening to a r.			
P1805		Vehicle condition	Driving condition			
		When engine is idling	Normal			
		When accelerating	Poor acceleration			

< ECU DIAGNOSIS INFORMATION >

DTC No.	Detected items	Engine operating condition in fail-safe mode
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. Therefore, the acceleration will be poor.
P2539	Low fuel pressure sensor	Engine torque is limited.

DTC Inspection Priority Chart

INFOID:000000006217732

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

< ECU DIAGNOSIS INFORMATION >

Priority	Detected items (DTC)	A
1	U0101 CAN communication line	
	U0113 U1003 CAN communication line	
	U1001 CAN communication line	EC
	U1024 VVEL CAN communication line	LO
	 P006A P0101 P0102 P0103 Mass air flow sensor 	
	 P010A Manifold absolute pressure sensor 	
	P0112 P0113 P0127 Intake air temperature sensor	С
	 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 	D
	 P0196 P0197 P0198 Engine oil temperature sensor 	
	 P0327 P0328 P0332 P0333 Knock sensor 	
	P0335 Crankshaft position sensor	_
	P0340 P0345 Camshaft position sensor	E
	 P0460 P0461 P0462 P0463 Fuel level sensor 	
	P0500 Vehicle speed sensor	
	 P0527 Cooling fan speed sensor 	F
	• P0605 P0607 P0611 P062B ECM	I
	P0643 Sensor power supply	
	• P0700 TCM	
	P0705 P0850 Transmission range switch	G
	P1089 P1092 P1608 VVEL control shaft position sensor	
	P1197 Out of gas*	
	P1220 Fuel pump control module (FPCM)	
	P1421 P1423 P1424 Cold start control	Н
	P1550 P1551 P1552 P1553 P1554 Battery current sensor	
	P1556 P1557 Battery temperature sensor	
	P1606 P1607 VVEL control module	
	• P1610 - P1615 NATS	
	P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor	
	P2539 P2541 P2542 Low fuel pressure sensor	_
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< ECU DIAGNOSIS INFORMATION >

Priority	Detected items (DTC)
2	 P0031 P0032 P0051 P0052 Air fuel ratio (A/F) sensor 1 heater P0037 P0038 P0057 P0058 Heated oxygen sensor 2 heater P0075 P0081 Intake valve timing control solenoid valve P0130 P0131 P0132 P0133 P0150 P0151 P0152 P0153 P2A00 P2A03 Air fuel ratio (A/F) sensor 1 P0138 P0139 P0157 P0158 P0159 Heated oxygen sensor 2 P0190 - P0193 FRP sensor 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 P0603 ECM power supply P0710 P0717 P0720 P0729 P0730 P0731 P0732 P0733 P0734 P0735 P0740 P0744 P0745 P0750 P0775 P0780 P0795 P1730 P1734 P2713 P2722 P2731 P2807 A/T related sensors, solenoid valves and switches P1087 P1088 VVEL system P1090 P1093 VVEL actuator motor P1091 VVEL actuator motor relay P1217 Engine over temperature (OVERHEAT) P1650 Starter motor relay P2101 Electric throttle control function P2118 Throttle control function P2108 Evake switch P2100 P2103 Throttle control function P2101 Electric throttle control function
3	 P0011 P0021 Intake valve timing control P0087, P0088, P0090 FRP control system P0088 Low fuel pressure control system P0088 Low fuel pressure control system P0171 P0172 P0174 P0175 Fuel injection system function P0201 - P0208 Injector P0300 - P0308 Misfire P0420 P0430 Three way catalyst function P0426 EVAP control system (VERY SMALL LEAK) P0506 P0507 Idle speed control system P050E Cold start control P0524 Engine oil pressure P1148 P1168 Closed loop control P1212 TCS communication line P1421 Cold start control P1564 ASCD steering switch / ICC steering switch P1572 ASCD brake switch / ICC brake switch P1574 ASCD vehicle speed sensor / ICC vehicle speed sensor

NOTE:

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

DTC Index

INFOID:000000006217733

×:Applicable —: Not applicable

DTC* ¹		ltems				Reference
CONSULT-III GST* ²	ECM* ³	(CONSULT-III screen terms)	SRT code	Trip	MIL	page
U0101	0101	LOST COMM (TCM)	—	1	×	<u>EC-171</u>
U0113	0113	CAN COMM CIRCUIT	—	1	×	<u>EC-173</u>
U1001	1001* ⁴	CAN COMM CIRCUIT	—	1 or 2	—	<u>EC-172</u>
U1003	1003	CAN COMM CIRCUIT	—	2	—	<u>EC-173</u>



< ECU DIAGNOSIS INFORMATION >

DTC	;* ¹	Harris				D.(Λ
CONSULT-III GST* ²	ECM* ³	Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page	A
U1024	1024	VVEL CAN COMM CIRCUIT	_	1	×	<u>EC-175</u>	EC
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	_	_	Blinking* ⁶	_	C
P0011	0011	INT/V TIM CONT-B1	×	2	×	FC 477	0
P0021	0021	INT/V TIM CONT-B2	×	2	×	<u>EC-177</u>	
P0031	0031	A/F SEN1 HTR (B1)		2	×	50 404	D
P0032	0032	A/F SEN1 HTR (B1)		2	×	<u>EC-181</u>	
P0037	0037	HO2S2 HTR (B1)		2	×	FC 494	_
P0038	0038	HO2S2 HTR (B1)	—	2	×	<u>EC-184</u>	E
P0051	0051	A/F SEN1 HTR (B2)	—	2	×	EC 494	-
P0052	0052	A/F SEN1 HTR (B2)		2	×	<u>EC-181</u>	F
P0057	0057	HO2S2 HTR (B2)		2	×	FC 494	-
P0058	0058	HO2S2 HTR (B2)	—	2	×	<u>EC-184</u>	
P006A	006A	MAP-MAF CORELTION-B1		2	×	<u>EC-187</u>	G
P0075	0075	INT/V TIM V/CIR-B1		2	×	FO 400	-
P0081	0081	INT/V TIM V/CIR-B2		2	×	<u>EC-193</u>	Н
P0087	0087	LOW FUEL PRES		2	×	E0 405	-
P0088	0088	HIGH FUEL PRES		2	×	<u>EC-195</u>	
P008A	008A	LOW FUEL PRES SYS		2	×	<u>EC-198</u>	
P008B	008B	LOW FUEL PRES SYS		2	×	<u>EC-200</u>	-
P0090	0090	FUEL PUMP		2	×	<u>EC-195</u>	-
P0101	0101	MAF SEN/CIRCUIT-B1		2	×	<u>EC-187</u>	0
P0102	0102	MAF SEN/CIRCUIT-B1		1	×	50.004	-
P0103	0103	MAF SEN/CIRCUIT-B1		1	×	<u>EC-201</u>	Κ
P0106	0106	ABSL PRES SEN/CIRC		2	×	<u>EC-206</u>	-
P010A	010A	ABSL PRES SEN/CIRC		2	×	<u>EC-210</u>	-
P0112	0112	IAT SEN/CIRCUIT-B1		2	×	FC 040	- L
P0113	0113	IAT SEN/CIRCUIT-B1	—	1 or 2	×	<u>EC-213</u>	
P0116	0116	ECT SEN/CIRC	—	2	×	<u>EC-215</u>	M
P0117	0117	ECT SEN/CIRC	—	1	×	EC 217	-
P0118	0118	ECT SEN/CIRC	—	1	×	<u>EC-217</u>	
P0122	0122	TP SEN 2/CIRC-B1	—	1	×	EC 210	N
P0123	0123	TP SEN 2/CIRC-B1	—	1	×	<u>EC-219</u>	
P0125	0125	ECT SENSOR	—	2	×	EC-222	0
P0127	0127	IAT SENSOR-B1	—	2	×	<u>EC-224</u>	-
P0128	0128	THERMSTAT FNCTN	—	2	×	<u>EC-226</u>	-
P0130	0130	A/F SENSOR1 (B1)	×	2	×	<u>EC-228</u>	Ρ
P0131	0131	A/F SENSOR1 (B1)	—	2	×	EC-232	-
P0132	0132	A/F SENSOR1 (B1)	—	2	×	<u>EC-235</u>	-
P0133	0133	A/F SENSOR1 (B1)	×	2	×	<u>EC-238</u>	-
P0137	0137	HO2S2 (B1)	×	2	×	<u>EC-243</u>	-
P0138	0138	HO2S2 (B1)	×	2	×	<u>EC-249</u>	-

< ECU DIAGNOSIS INFORMATION >

DTC* ¹		lteree				Reference
CONSULT-III GST* ²	ECM* ³	ltems (CONSULT-III screen terms)	SRT code	Trip	MIL	page
P0139	0139	HO2S2 (B1)	×	2	×	EC-257
P0150	0150	A/F SENSOR1 (B2)	×	2	×	EC-228
P0151	0151	A/F SENSOR1 (B2)	—	2	×	EC-232
P0152	0152	A/F SENSOR1 (B2)	—	2	×	EC-235
P0153	0153	A/F SENSOR1 (B2)	×	2	×	EC-238
P0157	0157	HO2S2 (B2)	×	2	×	EC-243
P0158	0158	HO2S2 (B2)	×	2	×	EC-249
P0159	0159	HO2S2 (B2)	×	2	×	EC-257
P0171	0171	FUEL SYS-LEAN-B1		2	×	EC-263
P0172	0172	FUEL SYS-RICH-B1		2	×	EC-267
P0174	0174	FUEL SYS-LEAN-B2		2	×	EC-263
P0175	0175	FUEL SYS-RICH-B2		2	×	EC-267
P0181	0181	FTT SENSOR		2	×	EC-271
P0182	0182	FTT SEN/CIRCUIT		2	×	EC-274
P0183	0183	FTT SEN/CIRCUIT		2	×	EC-274
P0190	0190	FUEL PRES SEN/CIRC		1	×	EC-276
P0191	0191	FRP SENSOR A		2	×	EC-279
P0192	0192	FRP SEN/CIRC		2	×	EC-276
P0193	0193	FRP SEN/CIRC		2	×	EC-276
P0196	0196	EOT SENSOR	_	2	×	EC-283
P0197	0197	EOT SEN/CIRC		2	×	
P0198	0198	EOT SEN/CIRC		2	×	<u>EC-285</u>
P0201	0201	INJECTOR CIRC-CYL1		2	×	
P0202	0202	INJECTOR CIRC-CYL2		2	×	-
P0203	0203	INJECTOR CIRC-CYL3		2	×	_
P0204	0204	INJECTOR CIRC-CYL4		2	×	-
P0205	0205	INJECTOR CIRC-CYL5		2	×	<u>EC-287</u>
P0206	0206	INJECTOR CIRC-CYL6		2	×	_
P0207	0207	INJECTOR CIRC-CYL7		2	_	_
P0208	0208	INJECTOR CIRC-CYL8		2	_	_
P0222	0222	TP SEN 1/CIRC-B1		1	×	FO 000
P0223	0223	TP SEN 1/CIRC-B1	—	1	×	<u>EC-288</u>
P0300	0300	MULTI CYL MISFIRE		1 or 2	×	
P0301	0301	CYL 1 MISFIRE		1 or 2	×	_
P0302	0302	CYL 2 MISFIRE	_	1 or 2	×	-
P0303	0303	CYL 3 MISFIRE		1 or 2	×	
P0304	0304	CYL 4 MISFIRE	_	1 or 2	×	EC-291
P0305	0305	CYL 5 MISFIRE		1 or 2	×	
P0306	0306	CYL 6 MISFIRE		1 or 2	×	
P0307	0307	CYL 7 MISFIRE	—	1 or 2	×	1
P0308	0308	CYL 8 MISFIRE		1 or 2	×	

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		Items				Reference	А
CONSULT-III GST* ²	ECM* ³	(CONSULT-III screen terms)	SRT code	Trip	MIL	page	~
P0327	0327	KNOCK SEN/CIRC-B1		2			EC
P0328	0328	KNOCK SEN/CIRC-B1		2	—	FC 007	
P0332	0332	KNOCK SEN/CIRC-B2		2	—	<u>EC-297</u>	
P0333	0333	KNOCK SEN/CIRC-B2	—	2	—	-	С
P0335	0335	CKP SEN/CIRCUIT	—	2	×	<u>EC-299</u>	-
P0340	0340	CMP SEN/CIRC-B1	—	2	×	EC 202	D
P0345	0345	CMP SEN/CIRC-B2		2	×	- <u>EC-303</u>	D
P0420	0420	TW CATALYST SYS-B1	×	2	×	FO 207	-
P0430	0430	TW CATALYST SYS-B2	×	2	×	<u>EC-307</u>	Е
P0441	0441	EVAP PURG FLOW/MON	×	2	×	EC-312	_
P0443	0443	PURG VOLUME CONT/V		2	×	<u>EC-317</u>	_
P0444	0444	PURG VOLUME CONT/V		2	×	FO 000	- F
P0445	0445	PURG VOLUME CONT/V		2	×	<u>EC-322</u>	
P0447	0447	VENT CONTROL VALVE		2	×	EC-325	G
P0448	0448	VENT CONTROL VALVE		2	×	EC-329	_
P0451	0451	EVAP SYS PRES SEN		2	×	EC-333	-
P0452	0452	EVAP SYS PRES SEN		2	×	EC-336	- H
P0453	0453	EVAP SYS PRES SEN		2	×	EC-341	-
P0456	0456	EVAP VERY SML LEAK	×* ⁸	2	×	<u>EC-346</u>	-
P0460	0460	FUEL LEV SEN SLOSH		2	×	EC-352	_
P0461	0461	FUEL LEVEL SENSOR		2	×	EC-353	-
P0462	0462	FUEL LEVL SEN/CIRC		2	×	EC-355	- J
P0463	0463	FUEL LEVL SEN/CIRC		2	×	<u>EC-355</u>	-
P0500	0500	VEH SPEED SEN/CIRC*5		2	×	<u>EC-356</u>	K
P0506	0506	ISC SYSTEM		2	×	EC-358	_
P0507	0507	ISC SYSTEM		2	×	EC-360	-
P050E	050E	COLD START CONTROL		2	×	EC-362	- L
P0524	0524	ENGINE OIL PRESSURE		2	×	EC-364	-
P0527	0527	COOLING FAN SPD SEN		2		<u>EC-367</u>	M
P0550	0550	PW ST P SEN/CIRC		2		EC-371	_
P0603	0603	ECM BACK UP/CIRCUIT		2	×	EC-374	-
P0605	0605	ECM		1 or 2	× or —	<u>EC-376</u>	N
P0607	0607	ECM		1	×	<u>EC-378</u>	-
P0611	0611	FIC MODULE		2	×	<u>EC-379</u>	0
P062B	062B	ECM		2	× or —	EC-380	
P0643	0643	SENSOR POWER/CIRC		1	×	EC-381	-
P0705	0705	T/M RANGE SENSOR A		2	×	<u>TM-106</u>	Ρ
P0710	0710	FLUID TEMP SENSOR*7		2	×	<u>TM-107</u>	-
P0717	0717	INPUT SPEED SENSOR A		2	×	<u>TM-109</u>	_
P0720	0720	OUTPUT SPEED SENSOR*5		2	×	<u>TM-110</u>	-
P0729	0729	6GR INCORRECT RATIO* ⁷		2	×	<u>TM-114</u>	_
P0730	0730	INCORRECT GR RATIO		2	×	<u>TM-116</u>	-

ECM

< ECU DIAGNOSIS INFORMATION >

DTC*1

< ECU DIAGNOSIS INFORMATION >

DTC	C* ¹	lterre				Deference
CONSULT-III GST* ²	ECM* ³	Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page
P0731	0731	1GR INCORRECT RATIO*7	_	2	×	<u>TM-118</u>
P0732	0732	2GR INCORRECT RATIO*7	_	2	×	<u>TM-120</u>
P0733	0733	3GR INCORRECT RATIO*7		2	×	<u>TM-122</u>
P0734	0734	4GR INCORRECT RATIO*7		2	×	TM-124
P0735	0735	5GR INCORRECT RATIO*7		2	×	TM-126
P0740	0740	TORQUE CONVERTER		2	×	<u>TM-128</u>
P0744	0744			2	×	TM-129
P0745	0745	PC SOLENOID A		2	×	TM-131
P0750	0750	SHIFT SOLENOID A		2	×	<u>TM-132</u>
P0775	0775	PC SOLENOID B		2	×	TM-133
P0780	0780	SHIFT		1	×	TM-134
P0795	0795	PC SOLENOID C		2	×	TM-136
P0850	0850	P-N POS SW/CIRCUIT		2	×	<u>EC-383</u>
P1087	1087	VVEL SYSTEM-B1		1	×	EC-386
P1088	1088	VVEL SYSTEM-B2		1	×	EC-386
P1089	1089	VVEL POS SEN/CIRC-B1		1	×	<u>EC-387</u>
P1090	1090	VVEL ACTR MOT-B1		1	×	EC-390
P1091	1091	VVEL ACTR MOT PWR		1	×	EC-393
P1092	1092	VVEL POS SEN/CIRC-B2		1	×	EC-387
P1093	1093	VVEL ACTR MOT-B2		1	×	EC-390
P1148	1148	CLOSED LOOP-B1		1	×	EC-396
P1168	1168	CLOSED LOOP-B2		1	×	<u>EC-396</u>
P1197	1197	FUEL RUN OUT		2		EC-397
P1212	1212	TCS/CIRC		2	_	EC-399
P1217	1217	ENG OVER TEMP		1	×	<u>EC-400</u>
P1220	1220	FPCM		1		EC-403
P1225	1225	CTP LEARNING-B1		2		EC-406
P1226	1226	CTP LEARNING-B1		2		EC-407
P1421	1421	COLD START CONTROL		2	×	<u>EC-408</u>
P1423	1423	COLD START CONTROL	_	2	×	<u>EC-410</u>
P1424	1424	COLD START CONTROL		2	×	<u>EC-410</u>
P1550	1550	BAT CURRENT SENSOR		2		EC-412
P1551	1551	BAT CURRENT SENSOR		2		<u>EC-416</u>
P1552	1552	BAT CURRENT SENSOR		2	_	<u>EC-416</u>
P1553	1553	BAT CURRENT SENSOR	_	2	_	<u>EC-420</u>
P1554	1554	BAT CURRENT SENSOR	_	2		<u>EC-424</u>
P1556	1556	BAT TMP SEN/CIRC	_	2		<u>EC-428</u>
P1557	1557	BAT TMP SEN/CIRC		2		<u>EC-428</u>
P1564	1564	ASCD SW	_	1	_	<u>EC-431</u> (with ASCD) <u>EC-434</u> (with ICC)
P1568	1568	ICC COMMAND VALUE		1		<u>EC-437</u>

< ECU DIAGNOSIS INFORMATION >

[VK56VD]

DTC	;*1	ltomo				Deference	A
CONSULT-III GST* ²	ECM* ³	Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page	~
P1572	1572	ASCD BRAKE SW	_	1	_	<u>EC-438</u> (with ASCD) <u>EC-443</u> (with ICC)	EC
P1574	1574	ASCD VHL SPD SEN	_	1		<u>EC-447</u> (with ASCD) <u>EC-449</u> (with ICC)	C
P1606	1606	VVEL CONTROL MODULE		1 or 2	\times or —	<u>EC-451</u>	_
P1607	1607	VVEL CONTROL MODULE		1	×	<u>EC-452</u>	-
P1608	1608	VVEL SENSOR POWER/CIRC		1	×	<u>EC-453</u>	E
P1610	1610	LOCK MODE	_	2	—	<u>SEC-53</u>	-
P1611	1611	ID DISCORD IMMU-ECM	_	2	—	<u>SEC-54</u>	F
P1612	1612	CHAIN OF ECM-IMMU	_	2	—	<u>SEC-55</u>	
P1613	1613	ECM INT CIRC-IMMU	—	2	—	<u>SEC-48</u>	-
P1614	1614	CHAIN OF IMMU-KEY	_	2	—	<u>SEC-56</u>	G
P1615	1615	DIFFERENCE OF KEY	—	2	—	<u>SEC-48</u>	-
P1650	1650	STR MTR RELAY 2	—	2	×	<u>SEC-48</u>	H
P1651	1651	STR MTR RELAY	_	2	×	<u>SEC-48</u>	
P1652	1652	STR MTR SYS COMM	—	1	×	<u>SEC-48</u>	-
P1730	1730	INTERLOCK	—	2	×	<u>TM-140</u>	
P1734	1734	7GR INCORRECT RATIO*7		2	×	<u>TM-142</u>	-
P1805	1805	BRAKE SW/CIRCUIT		2		<u>EC-455</u>	
P2100	2100	ETC MOT PWR-B1		2	×	<u>EC-458</u>	J
P2101	2101	ETC FNCTN/CIRC-B1		1	×	<u>EC-460</u>	-
P2103	2103	ETC MOT PWR		1	×	<u>EC-458</u>	K
P2118	2118	ETC MOT-B1	_	1	×	EC-464	-
P2119	2119	ETC ACTR-B1		1	×	EC-466	-
P2122	2122	APP SEN 1/CIRC		1	×	<u>EC-468</u>	- L
P2123	2123	APP SEN 1/CIRC		1	×	EC-468	-
P2127	2127	APP SEN 2/CIRC		1	×	<u>EC-471</u>	M
P2128	2128	APP SEN 2/CIRC		1	×	EC-471	
P2135	2135	TP SENSOR-B1		1	×	<u>EC-475</u>	-
P2138	2138	APP SENSOR		1	×	EC-478	N
P2539	2539	LOW FUEL PRES SEN		2	×	<u>EC-483</u>	-
P2541	2541	LOW FUEL PRES SEN		2	×	<u>EC-483</u>	0
P2542	2542	LOW FUEL PRES SEN		2	×	<u>EC-483</u>	0
P2713	2713	PRESS CONTROL SOL D	_	2	×	<u>TM-147</u>	-
P2722	2722	PRESS CONTROL SOL E		2	×	<u>TM-148</u>	Ρ
P2731	2731	PRESS CONTROL SOL F	_	2	×	<u>TM-149</u>	-
P2807	2807	PRESS CONTROL SOL G	_	2	×	<u>TM-150</u>	-
P2A00	2A00	A/F SENSOR1 (B1)	_	2	×	<u>EC-487</u>	-
P2A03	2A03	A/F SENSOR1 (B2)		2	×	EC-487	-

*1: 1st trip DTC No. is the same as DTC No.

< ECU DIAGNOSIS INFORMATION >

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

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: The troubleshooting for this DTC needs CONSULT-III.

*5: When the fail safe operations for both self-diagnoses occur, the MIL illuminates.

*6: When the ECM is in the mode that displays SRT status, MIL may blink. For the details, refer to "How to Display SRT Status".

*7: When erasing this DTC, always use CONSULT-III or GST.

*8: SRT code will not be set if the self-diagnostic result is NG.

Test Value and Test Limit

The following is the information specified in Service \$06 of 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)

ltem	OBD-	Self-diagnostic test item	DTC	li	e and Test mit display)	Description
nem	MID	Sell-diagnostic test item	DIC	TID	Unitand Scaling ID	Description
			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
		Air fuel ratio (A/F) sensor 1	P0130	86H	0BH	Maximum sensor output voltage for test cycle
	01H	(Bank 1)	P0133	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0133	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A00	89H	84H	The amount of shift in air fuel ratio
			P2A00	8AH	84H	The amount of shift in air fuel ratio
HO2S			P0130	8BH	0BH	Difference in sensor output voltage
			P0133	8CH	83H	Response gain at the limited frequency
		Heated oxygen sensor 2 (Bank 1)	P0138	07H	0CH	Minimum sensor output voltage for test cycle
	02H		P0137	08H	0CH	Maximum sensor output voltage for test cycle
			P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
			P0143	07H	0CH	Minimum sensor output voltage for test cycle
	03H	Heated oxygen sensor 3 (Bank 1)	P0144	08H	0CH	Maximum sensor output voltage for test cycle
			P0146	80H	0CH	Sensor output voltage
			P0145	81H	0CH	Difference in sensor output voltage

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< ECU DIAGNOSIS INFORMATION >

	OBD-		570	li	e and Test mit display)		A
Item	MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description	EC
			P0151	83H	0BH	Minimum sensor output voltage for test cycle	С
			P0151	84H	0BH	Maximum sensor output voltage for test cycle	
			P0150	85H	0BH	Minimum sensor output voltage for test cycle	D
		Air fuel ratio (A/F) sensor 1	P0150	86H	0BH	Maximum sensor output voltage for test cycle	E
	05H	(Bank 2)	P0153	87H	04H	Response rate: Response ratio (Lean to Rich)	
			P0153	88H	04H	Response rate: Response ratio (Rich to Lean)	F
			P2A03	89H	84H	The amount of shift in air fuel ratio	
			P2A03	8AH	84H	The amount of shift in air fuel ratio	G
HO2S			P0150	8BH	0BH	Difference in sensor output voltage	
			P0153	8CH	83H	Response gain at the limited frequency	
		Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for test cycle	H
	06H		P0157	08H	0CH	Maximum sensor output voltage for test cycle	
			P0158	80H	0CH	Sensor output voltage	
			P0159	81H	0CH	Difference in sensor output voltage	
			P0163	07H	0CH	Minimum sensor output voltage for test cycle	<u> </u>
	07H	Heated oxygen sensor 3 (Bank2)	P0164	08H	0CH	Maximum sensor output voltage for test cycle	K
			P0166	80H	0CH	Sensor output voltage	
			P0165	81H	0CH	Difference in sensor output voltage	
			P0420	80H	01H	O2 storage index	
		Three way catalyst function	P0420	82H	01H	Switching time lag engine exhaust index value	M
	21H	(Bank1)	P2423	83H	0CH	Difference in 3rd O2 sensor output volt- age	
CATA-			P2423	84H	84H	O2 storage index in HC trap catalyst	N
LYST			P0430	80H	01H	O2 storage index	
	0011	Three way catalyst function	P0430	82H	01H	Switching time lag engine exhaust index value	0
	22H	(Bank2)	P2424	83H	0CH	Difference in 3rd O2 sensor output volt- age	
			P2424	84H	84H	O2 storage index in HC trap catalyst	P

< ECU DIAGNOSIS INFORMATION >

ltem	OBD- MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		
				TID	Unitand Scaling ID	Description
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
	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)
	5511		P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
VVT			P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
SYSTEM		VVT Monitor (Bank2)	P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
	36H		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)
	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)
EVAP SYSTEM	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
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control valve close
	41H	A/F sensor 1 heater (Bank 1)	Low Input:P0031 High Input:P0032	81H	0BH	Converted value of Heater electric cur- rent to voltage
O2 SEN- SOR HEATER	42H	Heated oxygen sensor 2 heat- er (Bank 1)	Low Input:P0037 High Input:P0038	80H	0CH	Converted value of Heater electric cur- rent to voltage
	43H	Heated oxygen sensor 3 heat- er (Bank 1)	P0043	80H	0CH	Converted value of Heater electric cur- rent to voltage
	45H	A/F sensor 1 heater (Bank 2)	Low Input:P0051 High Input:P0052	81H	0BH	Converted value of Heater electric cur- rent to voltage
	46H	Heated oxygen sensor 2 heat- er (Bank 2)	Low Input:P0057 High Input:P0058	80H	0CH	Converted value of Heater electric cur- rent to voltage
	47H	Heated oxygen sensor 3 heat- er (Bank 2)	P0063	80H	0CH	Converted value of Heater electric cur- rent to voltage

< ECU DIAGNOSIS INFORMATION >

[VK56VD]

Item	OBD- MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description	А
				TID	Unitand Scaling ID	Description	EC
SEC- OND- ARY AIR	71H	Secondary Air system	P0411	80H	01H	Secondary Air Injection System Incor- rect Flow Detected	С
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary Air Injection System Insufficient Flow	
			P2445	82H	01H	Secondary Air Injection System Pump Stuck Off	D
			P2448	83H	01H	Secondary Air Injection System High Airflow	E
			Bank1: P2440 Bank2: P2442	84H	01H	Secondary Air Injection System Switch- ing Valve Stuck Open	
			P2440	85H	01H	Secondary Air Injection System Switch- ing Valve Stuck Open	F
			P2444	86H	01H	Secondary Air Injection System Pump Stuck On	0
FUEL SYSTEM	81H	Fuel injection system function (Bank 1)	P0171 or P0172	80H	2FH	Long term fuel trim	G
			P0171 or P0172	81H	24H	The number of lambda control clamped	
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	80H	2FH	Long term fuel trim	Н
			P0174 or P0175	81H	24H	The number of lambda control clamped	

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< ECU DIAGNOSIS INFORMATION >

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

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< ECU DIAGNOSIS INFORMATION >

[VK56VD]

	OBD-	Self-diagnostic test item		Test value and Test limit (GST display)			А
Item	MID		DTC	TID	Unit and Scaling ID	Description	EC
Item	A2H	No. 1 Cylinder Misfire	P0301	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	С
			P0301	0CH	24H	Misfire counts for last/current driving cy- cles	
	АЗН	No. 2 Cylinder Misfire	P0302	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	D
			P0302	0CH	24H	Misfire counts for last/current driving cy- cles	E
	A4H	No. 3 Cylinder Misfire	P0303	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	F
			P0303	0CH	24H	Misfire counts for last/current driving cy- cles	G
MISFIRE	A5H	No. 4 Cylinder Misfire	P0304	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	Н
			P0304	0CH	24H	Misfire counts for last/current driving cy- cles	
	A6H	No. 5 Cylinder Misfire	P0305	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	I
			P0305	0CH	24H	Misfire counts for last/current driving cy- cles	J
	A7H	No. 6 Cylinder Misfire	P0306	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	K
			P0306	0CH	24H	Misfire counts for last/current driving cy- cles	
	A8H	No. 7 Cylinder Misfire	P0307	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	L
			P0307	0CH	24H	Misfire counts for last/current driving cy- cles	M
	A9H	No. 8 Cylinder Misfire	P0308	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	Ν
			P0308	0CH	24H	Misfire counts for last/current driving cy- cles	0

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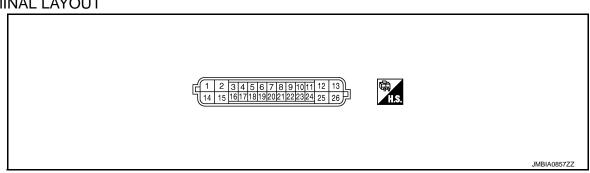
< ECU DIAGNOSIS INFORMATION >

VVEL CONTROL MODULE

Reference Value

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TERMINAL LAYOUT



PHYSICAL VALUES

NOTE:

- VVEL control module is located under the battery. Temporarily remove the battery to check voltage of the terminals.
- Specification data are reference values and are measured between each terminals.
- Pulse signal is measured by CONSULT-III.

Termi	nal No.	Description			Value	
+	_	Signal name	Input/ Output	Condition	(Approx.)	
1 (R)	14 (B)	VVEL actuator motor power supply (bank 2)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)	
2 14 (L/W) (B)		VVEL actuator motor	Output	[Engine is running] • Warm-up condition • Idle speed	0 - 14 V★ 100µSec/div 5V/div JMBIA0854ZZ	
	(B)	(High lift) (bank 2)		[Engine is running]Warm-up conditionWhen revving engine up to 2,000 rpm quickly	0 - 14 V★ 100µSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	
3	6	6 VVEL control shaft position (R) sensor 1 (bank 1)		[Engine is running] • Warm-up condition • Idle speed	0.25 - 1.40 V	
(W)			Input	[Engine is running]Warm-up conditionWhen revving engine up to 3,000 rpm quickly	0.25 - 4.75 V	
4 (L/W)		Sensor ground [VVEL control shaft position sensor 1 (bank 2)]		_	_	

VVEL CONTROL MODULE

< ECU DIAGNOSIS INFORMATION >

[VK56VD]

Termi	inal No.	Description			Value	
+	-	Signal name	Input/ Output	Condition	(Approx.)	A
5	4	VVEL control shaft position		[Engine is running]Warm-up conditionIdle speed	0.25 - 1.40 V	EC
(L/R)	(L/W)	sensor 1 (bank 2)	Input	[Engine is running]Warm-up conditionWhen revving engine up to 3,000 rpm quickly	0.25 - 4.75 V	С
6 (R)		Sensor ground [VVEL control shaft position sensor 1 (bank 1)]	_	_	_	D
7 (B)	6 (R)	Sensor power supply [VVEL control shaft position sensor 1 (bank 1)]	_	[Ignition switch: ON]	5 V	E
8 (W/L)	14 (B)	Power supply for VVEL con- trol module		[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	F
9 (L)	4 (L/W)	Sensor power supply [VVEL position sensor 1 (bank 2)]	_	[Ignition switch: ON]	5 V	G
11 (W)	_	ENG communication line	Input/ Output	_	_	
12 (L/W)	14 (B)	VVEL actuator motor (High lift) (bank 1)	Output	[Engine is running] • Warm-up condition • Idle speed	0 - 14 V★ 100µSec/div 5V/div JMBIA0854ZZ	H
(L/VV)	(В)	(rigit iiit) (Dank T)		[Engine is running]Warm-up conditionWhen revving engine up to 3,000 rpm quickly	0 - 14 V★ 100µSec/div	K
13 (R)	14 (B)	VVEL actuator motor power supply (bank 1)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	M
14 (B)	_	VVEL control module ground		_	_	N

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VVEL CONTROL MODULE

< ECU DIAGNOSIS INFORMATION >

[VK56VD]

Termi	nal No.	Description			Value
+	_	Signal name	Input/ Output	Condition	Value (Approx.)
15	14	VVEL actuator motor	Output	[Engine is running]Warm-up conditionIdle speed	0 - 14 V★ 100µSec/div € 5V/div JMBIA0854ZZ
(L/B)	(B)	(Low lift) (bank 2)	Culput	[Engine is running]Warm-up conditionWhen revving engine up to 3,000 rpm quickly	0 - 14 V★ 100µSec/div 5V/div JMBIA0855ZZ
16	19	19 VVEL control shaft position		[Engine is running]Warm-up conditionIdle speed	3.50 - 4.75 V
(L/R)		Input	[Engine is running]Warm-up conditionWhen revving engine up to 3,000 rpm quickly	0.25 - 4.75 V	
17 (O)	_	Sensor ground [VVEL control shaft position sensor 2 (bank 2)]	_	_	_
18 (W/L)	17 (O)	VVEL control shaft position sensor 2 (bank 2)	Input	 [Engine is running] Warm-up condition Idle speed [Engine is running] Warm-up condition When revving engine up to 3,000 rpm quickly 	3.50 - 4.75 ∨ 0.25 - 4.75 ∨
19 (L)	_	Sensor ground [VVEL control shaft position sensor 2 (bank 1)]	_	_	_
20 (L/W)	19 (L)	Sensor power supply [VVEL control shaft position sensor 2 (bank 1)]	_	[Ignition switch: ON]	5 V
21 (BR/ W)	14 (B)	VVEL actuator motor relay abort signal (ECM)	Input	[Engine is running]Warm-up conditionIdle speed	0 V
22 (W)	17 (O)	Sensor power supply [VVEL control shaft position sensor 2 (bank 2)]	_	[Ignition switch: ON]	5 V
23 (BR/ Y)	14 (B)	VVEL control motor relay	Output	[Ignition switch: OFF] [Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V) 0 - 1.0 V
24 (R/W)	_	ENG communication line	Input/ Output		

VVEL CONTROL MODULE

< ECU DIAGNOSIS INFORMATION >

[VK56VD]

Terminal No.		Description			Value	0
+	-	Signal name	Input/ Output	Condition	(Approx.)	A
			Output	[Engine is running] • Warm-up condition • Idle speed	0 - 14 V★ 100µSec/div	EC
	14 (B)	VVEL control motor (Low lift) (bank 1)				С
25 (L/B)					5V/div JMBIA0854ZZ 0 - 14 V★	D
				[Engine is running]Warm-up conditionWhen revving engine up to 3,000	100µSec/div	Е
				rpm quickly	5V/div JMBIA0855ZZ	F
★: Avera	age volta	ge for pulse signal (Actual puls	e signal ca	n be confirmed by oscilloscope.)		G

J

Κ

L

Μ

Ν

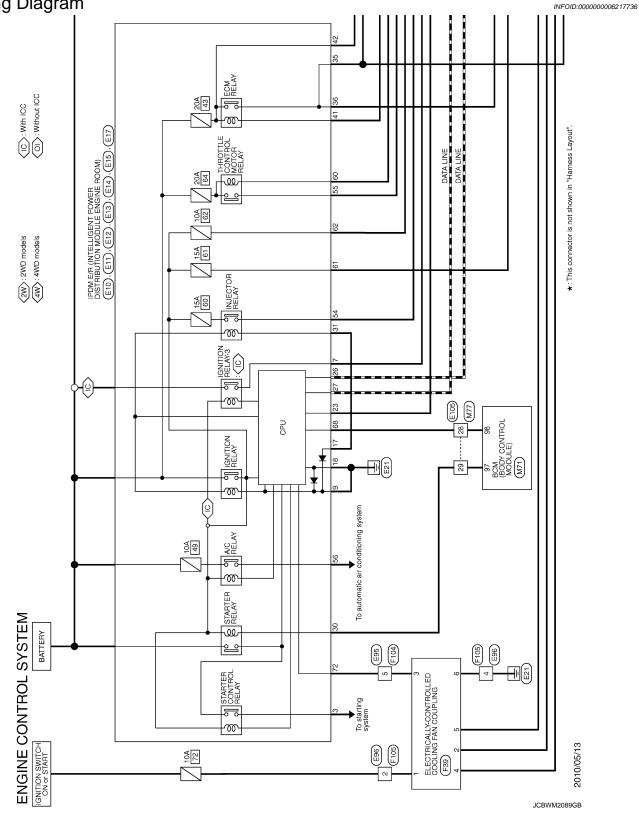
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[VK56VD]

WIRING DIAGRAM ENGINE CONTROL SYSTEM

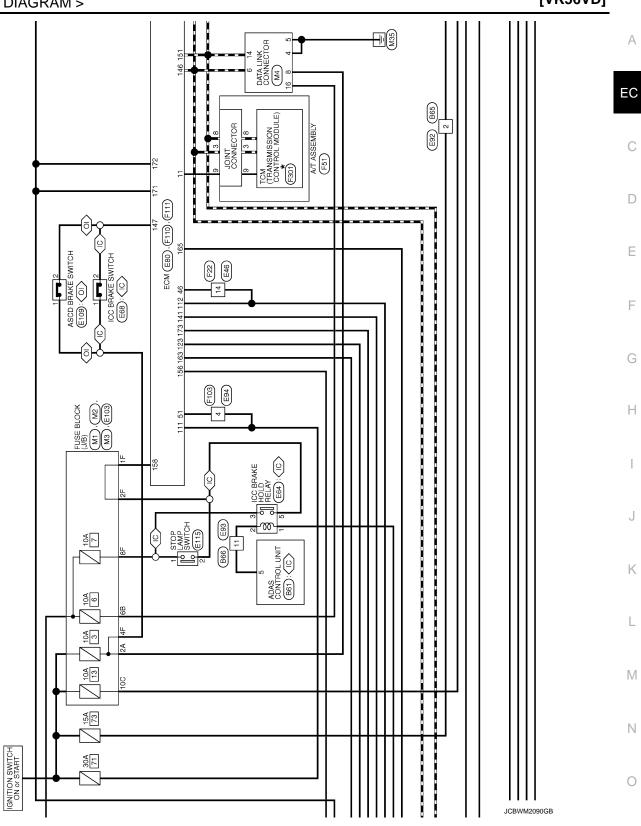
Wiring Diagram



ENGINE CONTROL SYSTEM

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[VK56VD]

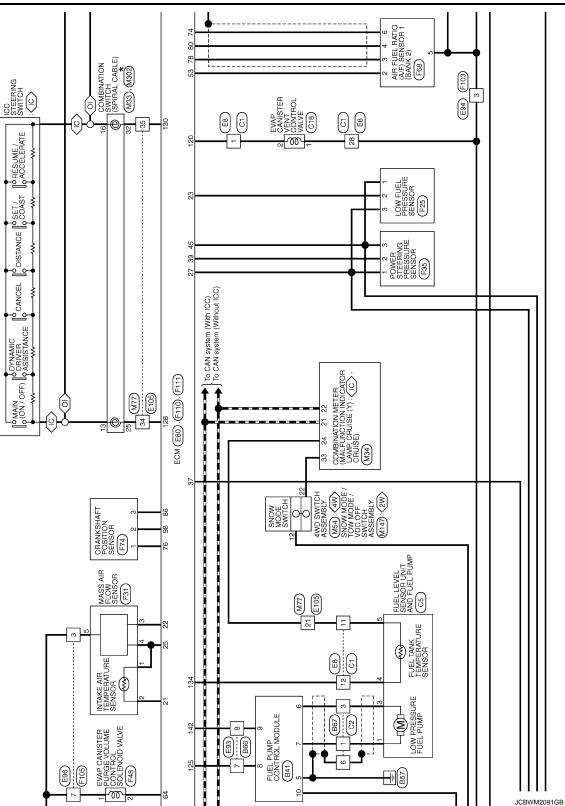


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ENGINE CONTROL SYSTEM

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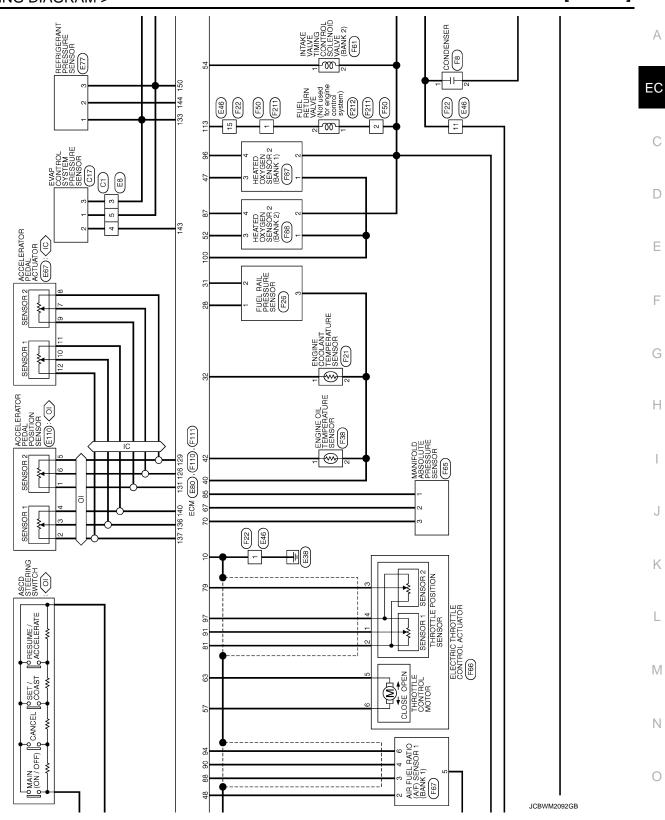
[VK56VD]



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ENGINE CONTROL SYSTEM

[VK56VD]

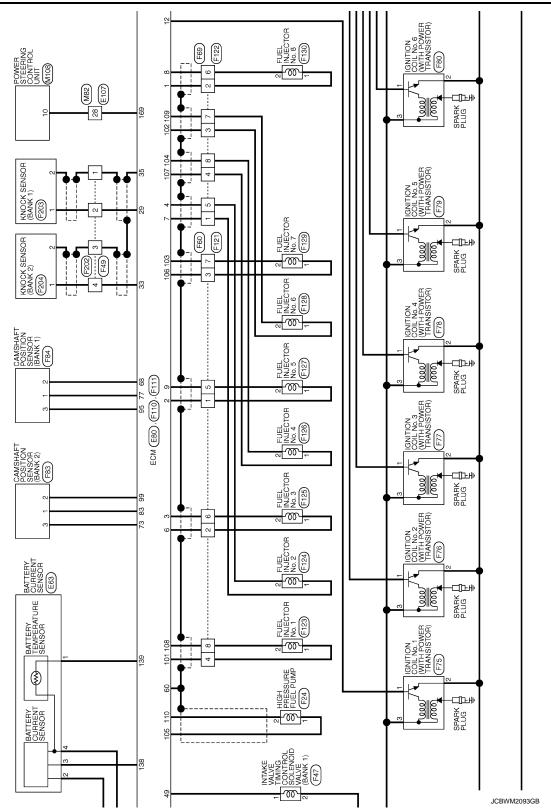


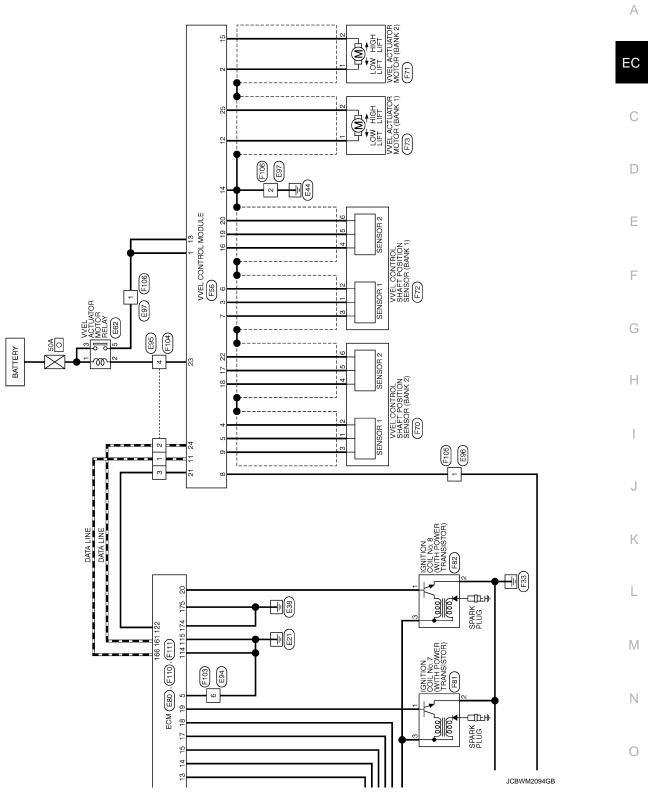
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ENGINE CONTROL SYSTEM

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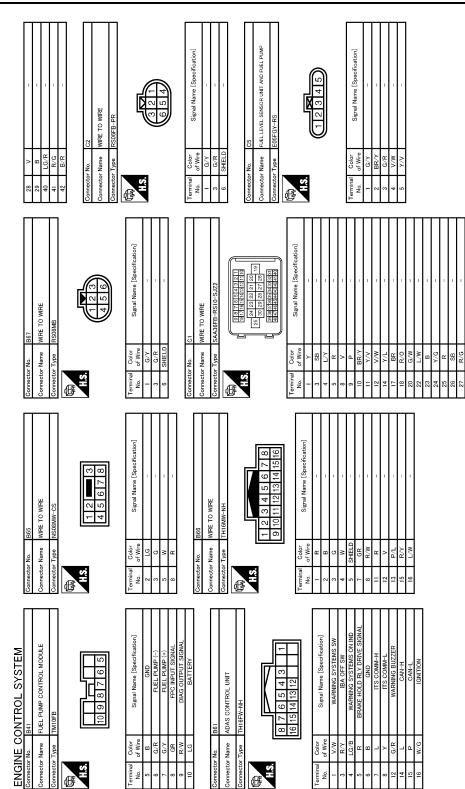
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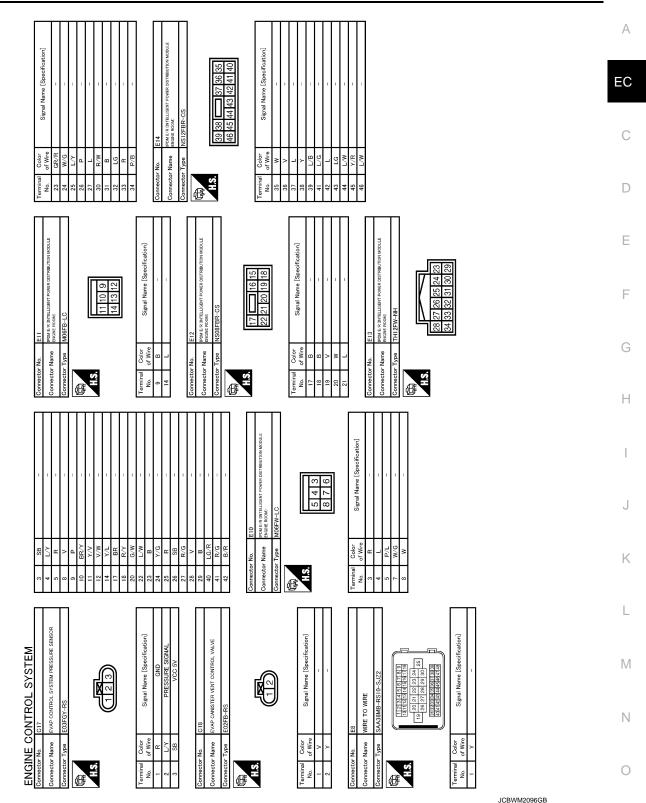
[VK56VD]



JCBWM2095GB

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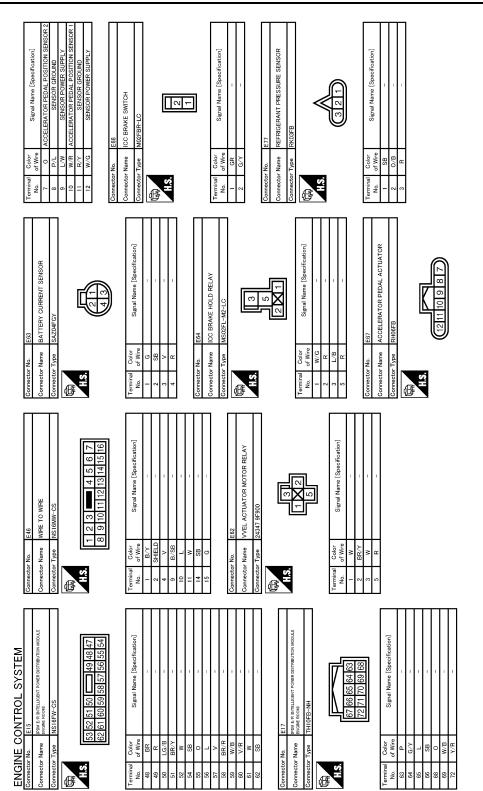
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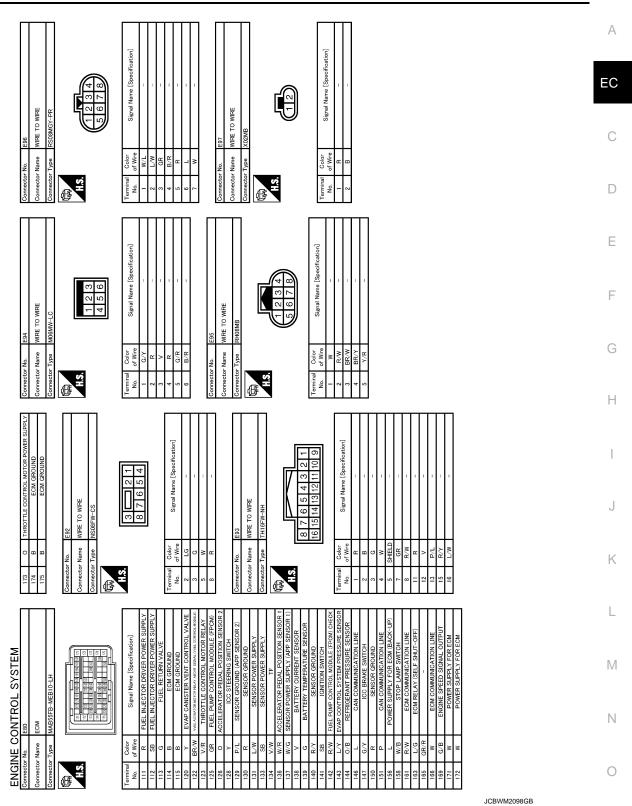
ENGINE CONTROL SYSTEM

[VK56VD]



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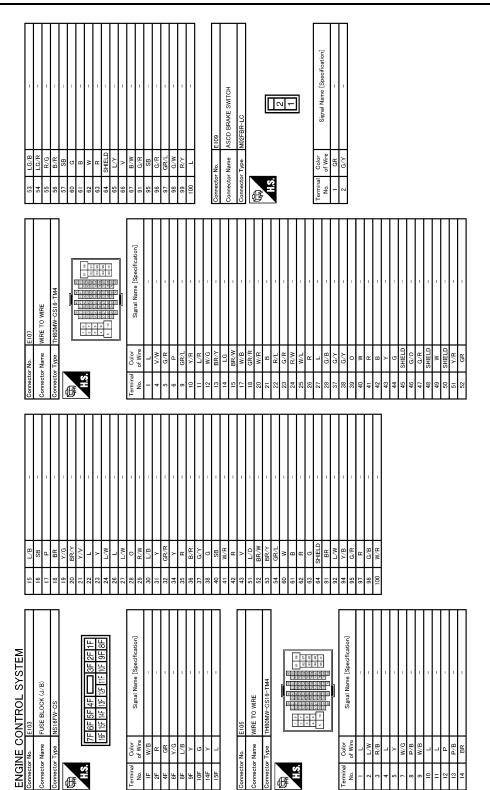
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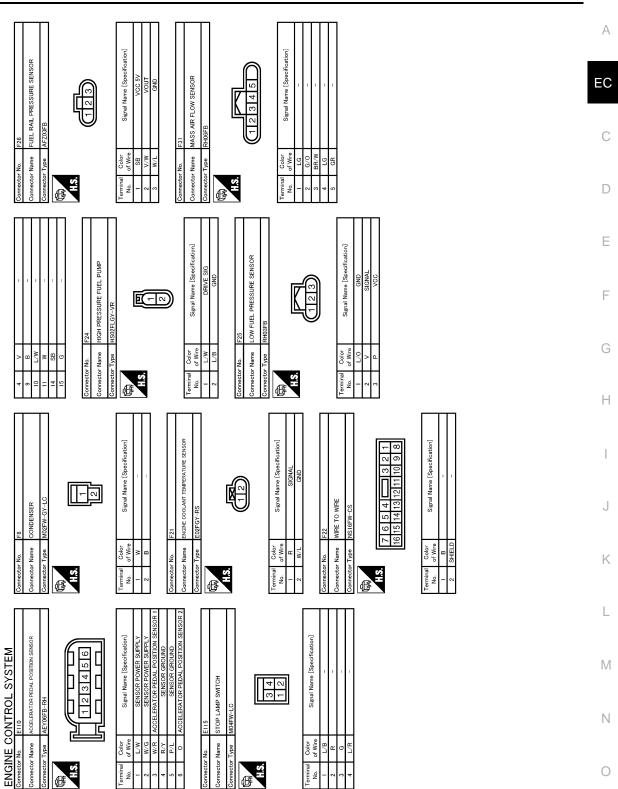
[VK56VD]

[VK56VD]



JCBWM2099GB

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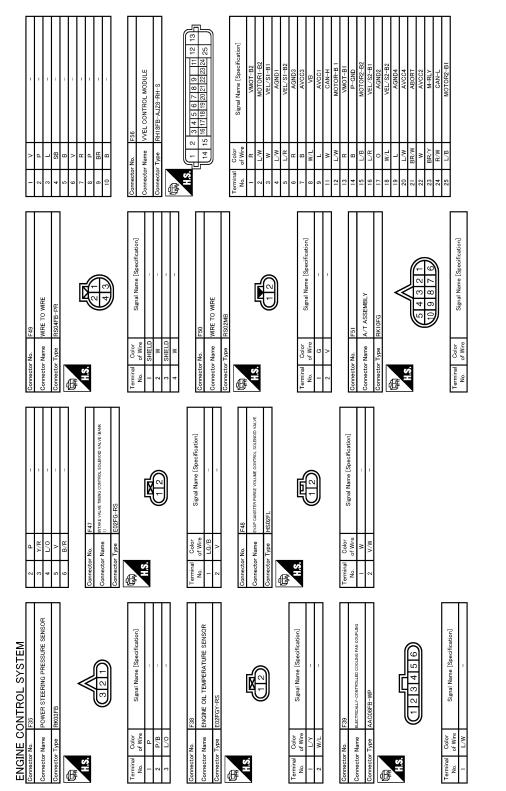
JCBWM2100GB

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[VK56VD]

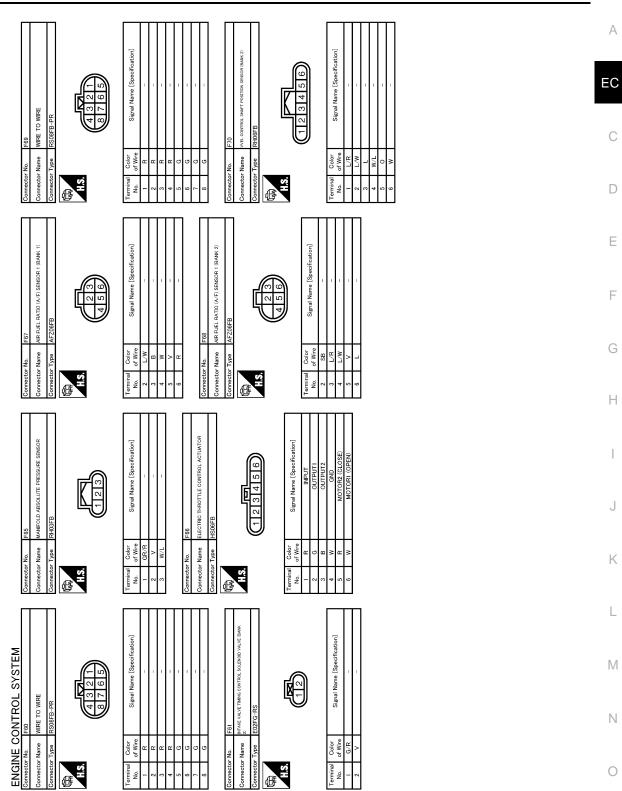
ENGINE CONTROL SYSTEM

[VK56VD]



JCBWM2101GB

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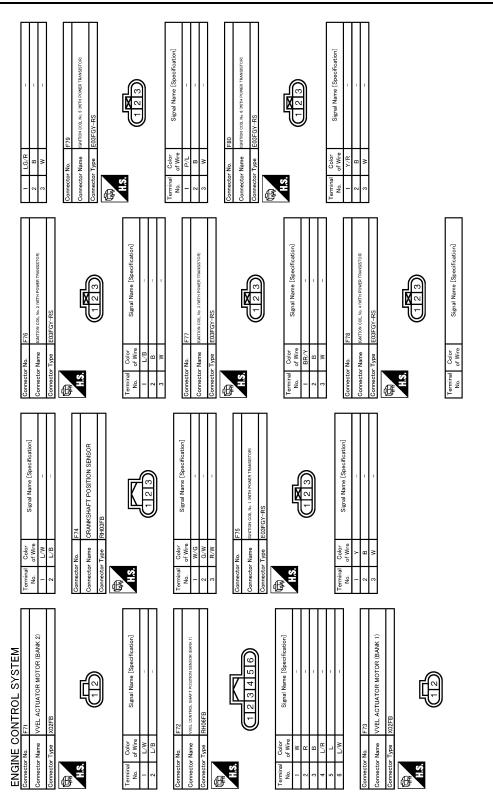
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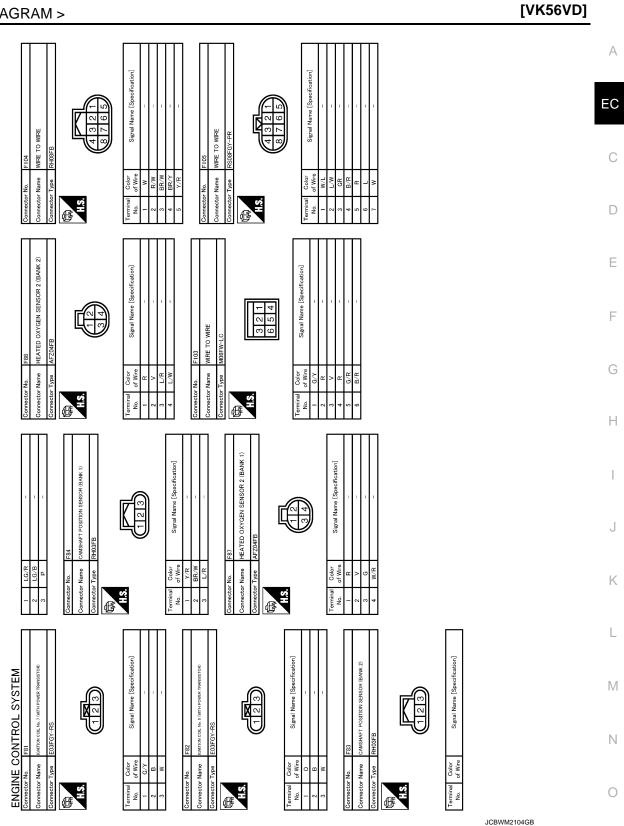
[VK56VD]

ENGINE CONTROL SYSTEM

[VK56VD]

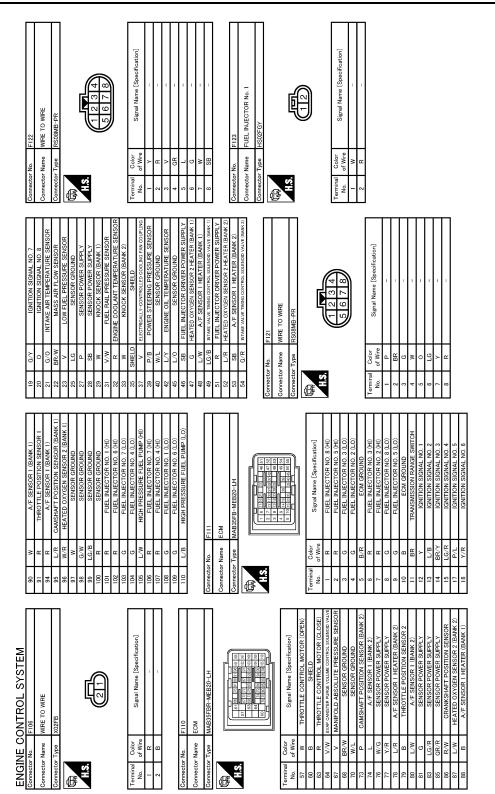


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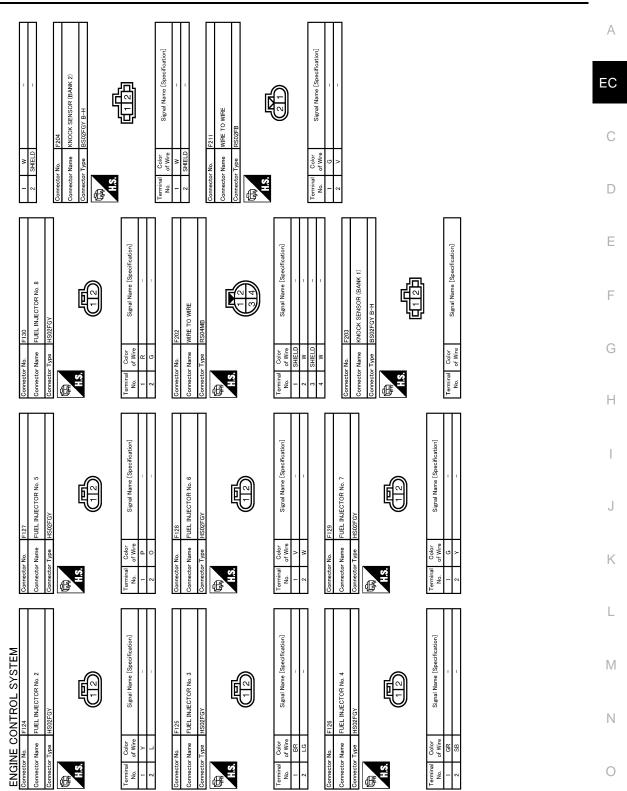
WM2104GB

[VK56VD]



JCBWM2105GB

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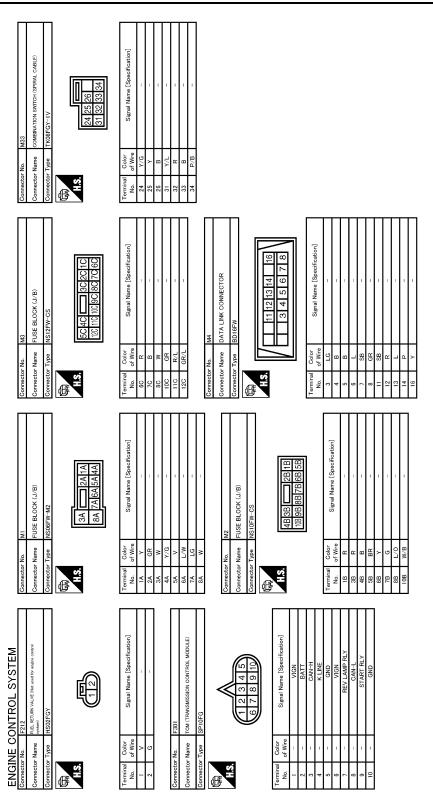


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Р

[VK56VD]

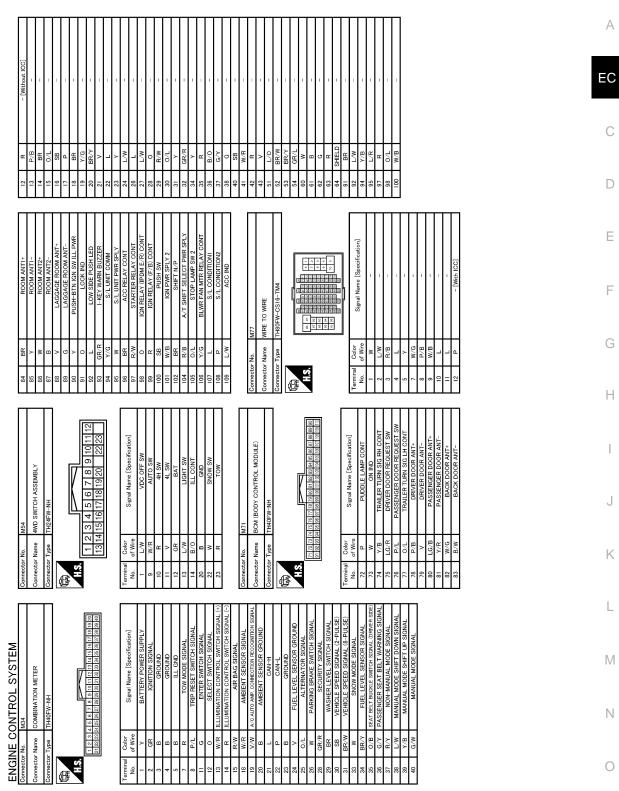
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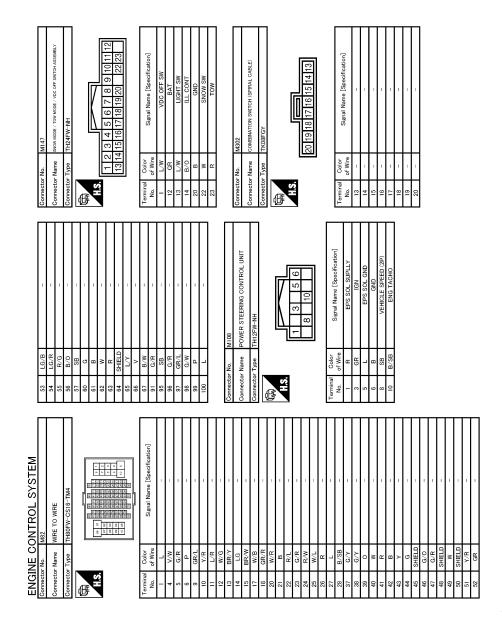
JCBWM2107GB

ENGINE CONTROL SYSTEM

[VK56VD]



JCBWM2108GB



JCBWM2109GB

< BASIC INSPECTION >

BASIC INSPECTION DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

А

[VK56VD]

INFOID:000000006217737 EC **OVERALL SEQUENCE** Inspection start D 1. Get information for symptom Get the detailed information about symptom from the customer. Е 2. Check DTC*1 Check DTC*1 Print out DTC*1 and freeze frame data*2 (or, write it down). Check related service bulletins. Symptom is described. Symptom is not described. Symptom is described. DTC*1 is detected. DTC*1 is detected. DTC*1 is not detected. 3. Confirm the symptom 4. Confirm the symptom Try to confirm the symptom described by the Try to confirm the symptom described by the Н customer. customer. Also study the normal operation and fail-safe Also study the normal operation and fail-safe related to the symptom. related to the symptom. 5. Perform DTC CONFIRMATION PROCEDURE 6. Perform BASIC INSPECTION With CONSULT-III Without CONSULT-III 9. Detect malfunctioning 7. Perform "SPEC" in system by Symptom Within the "DATA MONITOR" mode Κ SP value Table Out of the SP value 8. Detect malfunctioning part by **TROUBLE DIAGNOSIS** Malfunctioning part - SPECIFICATION VALUE is not detected. Malfunctioning part 10. Detect malfunctioning part by is detected M **Diagnosis Procedure** Ν 11. Repair or replace the malfunctioning part 12. Final check DTC*1 is detected. Symptom remains. Check that the symptom is not detected. Perform DTC Confirmation Procedure again, and then check that the malfunction is repaired. Ρ DTC*1 is not detected. Symptom does not remain. **INSPECTION END**

*1: Include 1st trip DTC.

*2: Include 1st trip freeze frame data.

DETAILED FLOW

JMBIA1416GB

< BASIC INSPECTION >

1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the "Diagnostic Work Sheet". (Refer to <u>EC-138</u>, "<u>Diagnostic Work</u> <u>Sheet</u>".)

>> GO TO 2.

2.CHECK DTC

- 1. Check DTC.
- 2. Perform the following procedure if DTC is displayed.
- Record DTC and freeze frame data. (Print them out with CONSULT-III or GST.)
- Erase DTC. (Refer to "How to Erase DTC and 1st Trip DTC" in <u>EC-63</u>, <u>"CONSULT-III Function"</u> or <u>EC-60</u>, <u>"On Board Diagnosis Function"</u>.)
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Matrix Chart is useful. Refer to <u>EC-524</u>, "Symptom Table".)
- 3. Check related service bulletins for information.

Are any symptoms described and any DTCs detected?

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

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON). Also study the normal operation and fail-safe related to the symptom. Refer to <u>EC-529</u>, "<u>Description</u>" and <u>EC-93</u>, "Fail-safe".

Diagnosis Work Sheet is useful to verify the incident.

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

>> GO TO 5.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.

Also study the normal operation and fail-safe related to the symptom. Refer to <u>EC-529</u>, "<u>Description</u>" and <u>EC-93</u>, "Fail-safe".

Diagnosis Work Sheet is useful to verify the incident.

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

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

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

If two or more DTCs are detected, refer to EC-96. "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 CONFIR-MATION PROCEDURE.

Is DTC detected?

YES >> GO TO 10.

NO >> Check according to <u>GI-40, "Intermittent Incident"</u>.

Ó.PERFORM BASIC INSPECTION

Perform EC-139, "Work Procedure".

DIAGNOSIS AND REPAIR WORKFLOW

DIAGNOSIS AND REPAIR WORKFLOW	
< BASIC INSPECTION > [VK56VD]	
Will CONSULT-III be used?	
YES >> GO TO 7. NO >> GO TO 9.	А
7.PERFORM SPEC IN DATA MONITOR MODE	EC
WITH CONSULT-III Check that "MAS A/F SE-B1", "B/FUEL SCHDL", "A/F ALPHA-B1" and "A/F ALPHA-B2" are within the SP value using "SPEC" in "DATA MONITOR" mode with CONSULT-III. Refer to <u>EC-161, "Component Function Check"</u> . <u>Is the measurement value within the SP value?</u>	С
YES >> GO TO 9.	D
NO $>>$ GO TO 8. 8.DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE	D
Detect malfunctioning part according to <u>EC-162, "Diagnosis Procedure"</u> .	Е
Is a malfunctioning part detected?	
YES >> GO TO 11. NO >> GO TO 9.	F
9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE	
Detect malfunctioning system according to <u>EC-524, "Symptom Table"</u> based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptoms.	G
>> GO TO 10. 10. Detect malfunctioning part by diagnosis procedure	Н
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 <u>GI-43</u> , " <u>Circuit Inspec-</u> tion"	I
tion". Is a malfunctioning part detected?	J
 YES >> GO TO 11. NO >> Monitor input data from related sensors or check voltage of related ECM terminals using CON- SULT-III. Refer to <u>EC-72, "Reference Value"</u>. 	Κ
11. REPAIR OR REPLACE THE MALFUNCTIONING PART	
 Repair or replace the malfunctioning part. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement. 	L
3. Check DTC. If DTC is displayed, erase it. Refer to "How to Erase DTC and 1st Trip DTC" in <u>■EC-63,</u> <u>"CONSULT-III Function"</u> or <u>■EC-60, "On Board Diagnosis Function"</u> .	Μ
>> GO TO 12.	Ν
12.FINAL CHECK	
When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then check that the malfunction have been completely repaired. When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and check that the symptom is not detected.	0
Is DTC detected and does symptom remain?	Ρ
YES-1 >> DTC is detected: GO TO 10.	
YES-2 >> Symptom remains: GO TO 6. NO >> Before returning the vehicle to the customer, always erase unnecessary DTC in ECM and TCM	
(Transmission Control Module). (Refer to "How to Erase DTC and 1st Trip DTC" in DEC-63.	

(Transmission Control Module). (Refer to "How to Erase DTC and 1st Trip DTC" in <u>EC-63.</u> <u>"CONSULT-III Function"</u> or <u>EC-60.</u> "On Board Diagnosis Function".) If the completion of SRT is

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

needed, drive vehicle under the specific driving pattern. Refer to <u>EC-157, "SRT Set Driving Pat-</u> tern".

Diagnostic Work Sheet

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.

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. 			
	Startability	Impossible to start No combust Partial combustion affected by th Partial combustion NOT affected Possible but hard to start Other	nrottle position I by throttle position		
Symptoms	🗌 Idling	☐ No fast idle ☐ Unstable ☐ H ☐ Others [High idle ☐ Low idle]		
5 1	Driveability	Stumble Surge Knock Intake backfire Exhaust backfi Others [Lack of power re]		
	Engine stall	At the time of start While idling While accelerating While dece Just after stopping While loadi	lerating		
Incident occur	rrence	☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime			
Frequency		All the time Under certain cond	ditions 🗌 Sometimes		
Weather cond	litions	Not affected			
	Weather	Fine Raining Snowing	Others []		
	Temperature	🗌 Hot 🗌 Warm 🗌 Cool 🗌] Cold 🔲 Humid °F		
		Cold During warm-up	After warm-up		
Engine conditions		Engine speed0 2,000			
Road conditions		🗌 In town 🗌 In suburbs 🗌 Hig	hway 🗌 Off road (up/down)		
Driving conditions		While accelerating While cruis While decelerating While turning	0		
		Vehicle speed 0 10 20	<u>, , , , </u> 30 40 50 60 MPH		
Malfunction indicator lamp		🗌 Turned on 🛛 🗌 Not turned on			

KEY POINTS

WHAT.....Vehicle & engine modelWHEN.....Date, FrequenciesWHERERoad conditionsHOW.....Operating conditions,
Weather conditions,
Symptoms

SEF907L



MTBL0017

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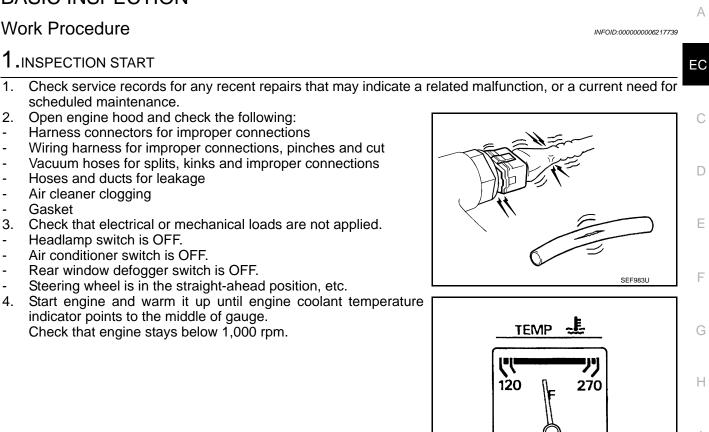
< BASIC INSPECTION >

BASIC INSPECTION

Work Procedure

Gasket

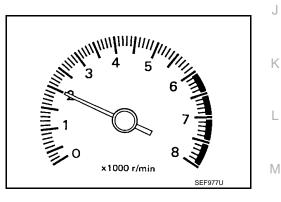
1.



- 5. Run engine at approximately 2,000 rpm for approximately 2 minutes under no load.
- 6. Check that no DTC is displayed with CONSULT-III or GST.

<u>Are any</u>	DTCs detected?
VES	

160	>> GO TO Z.
NO	>> GO TO 3.



SEF976U

2.repair or replace

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

>> GO TO 3

3.CHECK IDLE SPEED

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

Ρ

Ν

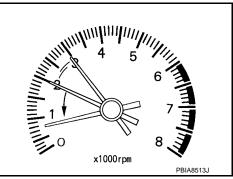
BASIC INSPECTION

< BASIC INSPECTION >

- 2. Rev engine between 2,000 and 3,000 rpm 2 or 3 times under no load, then run engine at idle speed for approximately 1 minute.
- Check idle speed.
 For procedure, refer to <u>EC-530, "Inspection"</u>.
 For specification, refer to <u>EC-538, "Idle Speed"</u>.

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-146, "Work Procedure".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-147, "Work Procedure".

>> GO TO 6.

6.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-148, "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 IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.

Check idle speed.
 For procedure, refer to <u>EC-530, "Inspection"</u>.
 For specification, refer to <u>EC-538, "Idle Speed"</u>.

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the Following.

- Check camshaft position sensor and circuit. Refer to EC-303, "DTC Logic".
- Check crankshaft position sensor and circuit. Refer to <u>EC-299, "DTC Logic"</u>.

Is the inspection result normal?

YES >> GO TO 9.

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

9.CHECK ECM FUNCTION

- 1. Substitute with a non-malfunctioning ECM to check ECM function. (ECM may be the cause of the incident, although this is rare.)
- Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to <u>SEC-51, "ECM : Work Procedure"</u>.

>> GO TO 4.

10.CHECK IGNITION TIMING

- 1. Run engine at idle.
- Check ignition timing with a timing light. For procedure, refer to <u>EC-531. "Inspection"</u>.

BASIC INSPECTION

< BASIC INSPECTION >	[VK56VD]
For specification, refer to EC-538. "Ignition Timing".	
Is the inspection result normal?	A
YES >> GO TO 19. NO >> GO TO 11.	_
11.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING	EC
 Stop engine. Perform <u>EC-146, "Work Procedure"</u>. 	
	C
>> GO TO 12.	
12.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	D
Perform <u>EC-147, "Work Procedure"</u> .	
	E
>> GO TO 13.	
13. PERFORM IDLE AIR VOLUME LEARNING	
Perform <u>EC-148. "Work Procedure"</u> .	F
<u>Is Idle Air Volume Learning carried out successfully?</u> YES >> GO TO 14.	
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.	G
14. CHECK IDLE SPEED AGAIN	
1. Start engine and warm it up to normal operating temperature.	H
 Check idle speed. For procedure, refer to <u>EC-530, "Inspection"</u>. 	
For specification, refer to <u>EC-538, "Idle Speed"</u> .	
Is the inspection result normal?	
YES >> GO TO 15. NO >> GO TO 17.	
15. CHECK IGNITION TIMING AGAIN	J
 Run engine at idle. Check ignition timing with a timing light. 	K
For procedure, refer to EC-531, "Inspection".	
For specification, refer to <u>EC-538, "Ignition Timing"</u> . Is the inspection result normal?	
YES $>>$ GO TO 19.	L
NO >> GO TO 16.	
16. CHECK TIMING CHAIN INSTALLATION	N
Check timing chain installation. Refer to EM-62, "Removal and Installation".	
Is the inspection result normal?	Ν
YES >> GO TO 17. NO >> Repair the timing chain installation. Then GO TO 4.	
17. DETECT MALFUNCTIONING PART	
Check the following.	C
 Check camshaft position sensor and circuit. Refer to <u>EC-303, "DTC Logic"</u>. 	
• Check crankshaft position sensor and circuit. Refer to <u>EC-299, "DTC Logic"</u> .	P
Is the inspection result normal?	
YES >> GO TO 18. NO >> Repair or replace malfunctioning part. Then GO TO 4.	
18. CHECK ECM FUNCTION	

^{1.} Substitute with a non-malfunctioning ECM to check ECM function. (ECM may be the cause of the incident, although this is rare.)

BASIC INSPECTION

< BASIC INSPECTION >

 Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to <u>SEC-51, "ECM : Work Procedure"</u>.

>> GO TO 4.

19.INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, perform EC-143, "Work Procedure".

>> INSPECTION END

ADDITIONAL SERVICE WHEN REPLACING ECM

< BASIC INSPECTION > [VK56VD	[י
ADDITIONAL SERVICE WHEN REPLACING ECM	_
Description	A 740
When replacing ECM, the following procedure must be performed.	EC
Work Procedure	
1.PERFORM INITIALIZATION OF IVIS (NATS) SYSTEM AND REGISTRATION OF ALL IVIS (NATS) IGN TION KEY IDS	I- C
Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to <u>SEC 51, "ECM : Work Procedure"</u> .	<u>}</u>
>> GO TO 2. 2.PERFORM VIN REGISTRATION	Е
Perform VIN registration. Refer to EC-145, "Work Procedure".	F
>> GO TO 3.	I
3.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING	G
Perform accelerator pedal released position learning. Refer to EC-146, "Work Procedure".	
>> GO TO 4.	Н
4. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	
Perform throttle valve closed position learning. Refer to EC-147, "Work Procedure".	
>> GO TO 5.	
5. PERFORM IDLE AIR VOLUME LEARNING	J
Perform idle air volume learning. Refer to EC-148. "Work Procedure".	_
>> END	Κ
	L
	Μ
	Ν
	\sim
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	Р

ADDITIONAL SERVICE WHEN REPLACING VVEL CONTROL MODULE < BASIC INSPECTION > [VK56VD]

ADDITIONAL SERVICE WHEN REPLACING VVEL CONTROL MODULE

Description

INFOID:000000006217742

When replacing VVEL control module, the following procedure must be performed.

Work Procedure

INFOID:000000006217743

1.PERFORM IDLE AIR VOLUME LEARNING

Perform idle air volume learning. Refer to EC-148, "Work Procedure".

>> END

VIN REGISTRATION

< BASIC INSPECTION > [VK56VD]]
VIN REGISTRATION	A
Description INFOID:0000000062177	
VIN Registration is an operation to register VIN in ECM. It must be performed each time ECM is replaced.	EC
NOTE: Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M).	
Work Procedure	45 C
1.CHECK VIN	
Check the VIN of the vehicle and note it. Refer to GI-23, "Information About Identification or Model Code".	D
>> GO TO 2.	_
2.PERFORM VIN REGISTRATION	E
 WITH CONSULT-III Turn ignition switch ON with engine stopped. Select "VIN REGISTRATION" in "WORK SUPPORT" mode. Follow the instructions on the CONSULT-III display. 	F
>> END	G
	Н
	J
	K
	L
	Μ
	Ν
	0
	Р

ACCELERATOR PEDAL RELEASED POSITION LEARNING

< BASIC INSPECTION >

ACCELERATOR PEDAL RELEASED POSITION LEARNING

Description

INFOID:000000006217746

[VK56VD]

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 the harness connector of the accelerator pedal position sensor or ECM is disconnected.

Work Procedure

INFOID:000000006217747

1.START

- 1. Check 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

< BASIC INSPECTION >

THROTTLE VALVE CLOSED POSITION LEARNING

Description

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

Work Procedure

1.	START	D
0	WITH CONSULT-III	
1.	Turn ignition switch ON.	
2.	Select "CLSD THL POS LEARN" in "WORK SUPPORT" mode.	E
3.	Follow the instructions on the CONSULT-III 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.	_
(\mathbf{x})	WITHOUT CONSULT-III	F
1.	Start the engine.	
	NOTE:	
	Engine coolant temperature is 25°C (77°F) or less before engine starts.	G
2.	Warm up the engine.	
	NOTE:	
	Raise engine coolant temperature until it reaches 65°C (149°F) or more.	Н
3.	Turn ignition switch OFF and wait at least 10 seconds.	11
	Check that throttle valve moves during the above 10 seconds by confirming the operating sound.	
	>> END	
	>> LIND	
		J

Revision: 2010 May

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IDLE AIR VOLUME LEARNING

< BASIC INSPECTION >

IDLE AIR VOLUME LEARNING

Description

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

- Each time the electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of the specification.

Work Procedure

INFOID:000000006217751

1.PRECONDITIONING

Check that all of the following conditions are satisfied.

Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery voltage: More than 12.9 V (At idle)
- Engine coolant temperature: 70 105°C (158 221°F)
- Selector lever position: P or N
- Electric load switch: OFF

 (Air conditioner, headlamp, rear window defogger)
 On vehicles equipped with daytime light systems, if the parking brake is applied before the engine is started the headlamp will not illuminate.
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
- With CONSULT-III: Drive vehicle until "ATF TEMP 2" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9 V.
- Without CONSULT-III: Drive vehicle for 10 minutes.

Will CONSULT-III be used?

YES >> GO TO 2.

NO >> GO TO 3.

2. PERFORM IDLE AIR VOLUME LEARNING

WITH CONSULT-III

- 1. Perform Accelerator Pedal Released Position Learning. Refer to EC-146, "Work Procedure".
- 2. Perform Throttle Valve Closed Position Learning. EC-147, "Work Procedure".
- 3. Start engine and warm it up to normal operating temperature.
- 4. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
- 5. Touch "START" and wait 20 seconds.

Is "CMPLT" displayed on CONSULT-III screen?

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

3.PERFORM IDLE AIR VOLUME LEARNING

WITHOUT CONSULT-III

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-146. "Work Procedure".
- 2. Perform Throttle Valve Closed Position Learning. EC-147, "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 5 times within 5 seconds.
- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.
- 7. Wait 7 seconds, fully depress the accelerator pedal for approx. 20 seconds until the MIL stops blinking and turns ON.
- 8. Fully release the accelerator pedal within 3 seconds after the MIL turns ON.

EC-148

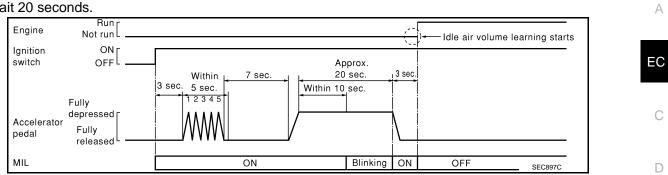
INFOID:000000006217750

IDLE AIR VOLUME LEARNING

< BASIC INSPECTION >

Start engine and let it idle. 9.

10. Wait 20 seconds.



>> GO TO 4.

4. CHECK IDLE SPEED AND IGNITION TIMING

Rev up engine two or three times and check that idle speed and ignition timing are within the specifications. For procedure, refer to <u>EC-530, "Inspection"</u> and <u>EC-531, "Inspection"</u> . For specifications, refer to <u>EC-538, "Idle Speed"</u> and <u>EC-538, "Ignition Timing"</u> .	F
Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 5.	G
5. DETECT MALFUNCTIONING PART-I	
 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. 	Η
Is the inspection result normal?	
YES >> GO TO 6. NO >> Repair or replace malfunctioning part.	J
6.DETECT MALFUNCTIONING PART-II	
 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 <u>EC-161</u>, "<u>Description</u>". If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning again: Engine stalls. Incorrect idle. 	K
>> INSPECTION END	M
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[VK56VD]

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VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT

< BASIC INSPECTION >

VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT

Description

VVEL control shaft position sensor adjustment is an operation to adjust the initial position of the VVEL control shaft position sensor.

It must be performed each time VVEL ladder assembly is replaced.

CAUTION:

- It must be performed only on the replaced bank side.
- It must not be performed except when VVEL ladder assembly is replaced. If by any chance the adjustment is performed, replace VVEL ladder assembly.

Work Procedure

1.START

Will CONSULT-III be used?

Will CONSULT-III be used?

YES >> GO TO 2.

NO >> GO TO 3.

2. PERFORM VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT

WITH CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "VVEL POS SEN ADJ PREP" in "WORK SUPPORT" mode with CONSULT-III.
- 3. Touch "Start" and wait a few seconds.
- 4. Check that "CMPLT" is displayed on CONSULT-III screen.
- Select "VVEL POSITION SEN-B1" or "VVEL POSITION SEN-B2" in "DATA MONITOR" mode with CON-SULT-III.
- Loosen the VVEL control shaft position sensor mounting bolts (1).
- Turn the VVEL control shaft position sensor (2) clockwise and counterclockwise while monitoring the output voltage of "VVEL POSITION SEN-B1" or "VVEL POSITION SEN-B2" and adjust the output voltage to be within the standard value.

Voltage: 500 ± 48 mV

8. Tighten the VVEL control shaft position sensor mounting bolts.

O. 7.0 N•m (0.71 kg-m, 62 in-lb)

9. Reconfirm that the output voltage of "VVEL POSITION SEN-B1" or "VVEL POSITION SEN-B2" is within the standard value.

Voltage: $500 \pm 48 \text{ mV}$

NOTE:

If it varies from the standard value after the mounting bolts are tightened, perform steps 6 to 8 again.

- 10. Turn ignition switch OFF and wait at least 10 seconds.
- 11. Start engine and warm it up to normal operating temperature.
- 12. Turn ignition switch OFF and wait at least 10 seconds.
- 13. Perform idle air volume learning. Refer to EC-148, "Work Procedure".

>> INSPECTION END

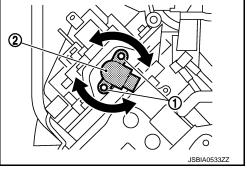
3. perform vvel control shaft position sensor adjustment

🛞 WITHOUT CONSULT-III

- 1. Disconnect VVEL control shaft position sensor harness connector.
- 2. Remove VVEL actuator motor relay.
- 3. Turn ignition switch ON, wait at least 5 seconds and then turn it OFF.

EC-150





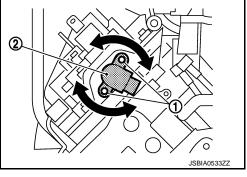
INFOID:000000006217753

INFOID:000000006217752

VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT

< BASIC INSPECTION >

- 4. Reconnect all harness connectors disconnected.
- 5. Install VVEL actuator motor relay.
- 6. Turn ignition switch ON and wait at least 5 seconds.
- Loosen the VVEL control shaft position sensor mounting bolts (1).
- Turn the VVEL control shaft position sensor (2) clockwise and counterclockwise while monitoring the output voltage between the VVEL control module terminals with a tester and adjust the output voltage to be within the standard value.



		VVEL control module		
Bank	Connector	+	_	Voltage
Dank		Terminal	Terminal	
1	F56	3	6	500 ± 48 mV
2	1.00	5	4	500 ± 40 IIIV

9. Tighten the VVEL control shaft position sensor mounting bolts.

0

7.0 N•m (0.71 kg-m, 62 in-lb)

10. Reconfirm that the output voltage of VVEL control shaft position sensor is within the standard value.

		VVEL control module			
Bank	Connector	+	_	Voltage	
Dalik	Connector	Terminal	Terminal		
1	F56	3	6	- 500 ± 48 mV	
2	130	5	4		

NOTE:

If it varies from the standard value after the mounting bolts are tightened, perform steps 7 to 9 again.

- 11. Turn ignition switch OFF and wait at least 10 seconds.
- 12. Start engine and warm it up to normal operating temperature.
- 13. Turn ignition switch OFF and wait at least 10 seconds.
- 14. Perform Idle Air Volume Learning. Refer to EC-148, "Work Procedure".

>> INSPECTION END

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MIXTURE RATIO SELF-LEARNING VALUE CLEAR

< BASIC INSPECTION >

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

Description

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

Work Procedure

1.START

WITH CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
- 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. Check DTC P0102 is detected.
- 7. Select Service \$04 with GST to erase the DTC P0102.

>> END

INFOID:000000006217754

INFOID:000000006217755

[VK56VD]

FUEL PRESSURE

< BASIC INSPECTION >

FUEL PRESSURE

		А
Work Procedure	INFOID:000000006217756	/ (
FUEL PRESSURE RELEASE		EC
 WITH CONSULT-III Turn ignition switch ON. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT-III. Start engine. 		С
 After engine stalls, crank it two or three times to release all fuel pressure. Turn ignition switch OFF. 		D
 WITHOUT CONSULT-III Remove fuel pump fuse in IPDM E/R. NOTE: 		Е
 For the fuse number, refer to <u>EC-114, "Wiring Diagram"</u>. For the fuse arrangement, refer to <u>PG-143, "Fuse, Connector and Terminal Arrangement</u>" 	<u>1</u> .	F
 Start engine. After engine stalls, crank it two or three times to release all fuel pressure. Turn ignition switch OFF. 		G
5. Reinstall fuel pump fuse after servicing fuel system. LOW FUEL PRESSURE CHECK		Н
 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 u purposes. 	used for other	I

• 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.

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

< ↓

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To quick connector

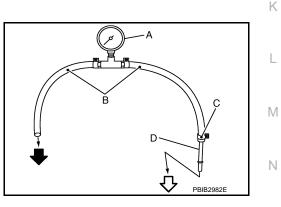
To fuel tube (engine side)

: 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.
- Disconnect fuel feed hose from fuel tube. Refer to <u>EM-43, "Exploded View"</u>. CAUTION:

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





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[VK56VD]

FUEL PRESSURE

< BASIC INSPECTION >

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

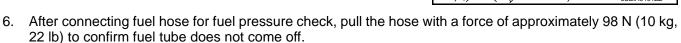
CAUTION:

- 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 : 1.0 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 inlb)

Make sure that clamp screw does not contact adjacent parts.

- 5. Connect fuel tube adapter (C) to fuel feed hose (1) in the same manner as instructed in Step 4.
 - A : Fuel pressure gauge
 - B : Fuel hose for fuel pressure check



7. Reinstall the part removed at Step 3. **NOTE:**

Install the part to allow smooth engine starts.

- 8. Turn ignition switch ON and check for fuel leakage.
- 9. Start engine and check for fuel leakage.
- 10. Read the indication of fuel pressure gauge. CAUTION:
 - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
 - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.

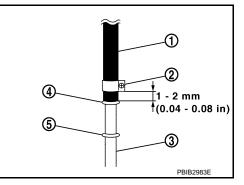
At idling : Approximately 450 kPa (4.5 bar, 4.6 kg/cm², 65 psi)

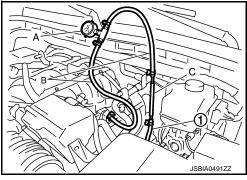
HIGH FUEL PRESSURE CHECK

NOTE:

Since the fuel pressure gauge kit cannot be connected, follow the method shown below to check high fuel pressure.

- WITH CONSULT-III
- 1. Start engine.
- 2. Check "FUEL PRES SEN V" in "DATA MONITOR" mode with CONSULT-III.





EC-154

FUEL PRESSURE

< BASIC INSPECTION >

[VK56VD]

Monitor Item	Condition	Values/Status	А
FUEL PRES SEN V	Idle	980 – 1,200 mV	
	Revving engine from idle to 4,000 rpm quickly	1,100 – 2,900 mV	50

WITHOUT CONSULT-III 1. Start the engine.

2. Check fuel rail pressure sensor signal voltage.

	+				-	
Fuel rail pr	essure sensor	-	Condition	Value (Approx.)	D	
Connector	Terminal		Conducti		(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
F26	2	Ground	Engine speed: idle	0.98 – 1.2 V	-	
F20	2 Ground	Engine speed: Revving engine from idle to 4,000 rpm quickly	1.1 – 2.9 V	E		

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HOW TO SET SRT CODE

< BASIC INSPECTION >

HOW TO SET SRT CODE

Description

INFOID:000000006265593

[VK56VD]

OUTLINE

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

SRT ITEM

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

SRT item ^{*1} (CONSULT-III indication)	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	Three way catalyst function	P0420, P0430
EVAP SYSTEM	EVAP control system purge flow monitoring	P0441
	EVAP control system	P0456
HO2S	Air fuel ratio (A/F) sensor 1	P0130, P0133, P0150, P0153
	Heated oxygen sensor 2	P0137, P0157
	Heated oxygen sensor 2	P0138, P0158
	Heated oxygen sensor 2	P0139, P0159
EGR/VVT SYSTEM	Intake value timing control function	P0011, P0021

*1: Though displayed on the CONSULT-III screen, "HO2S HTR" is not SRT item.

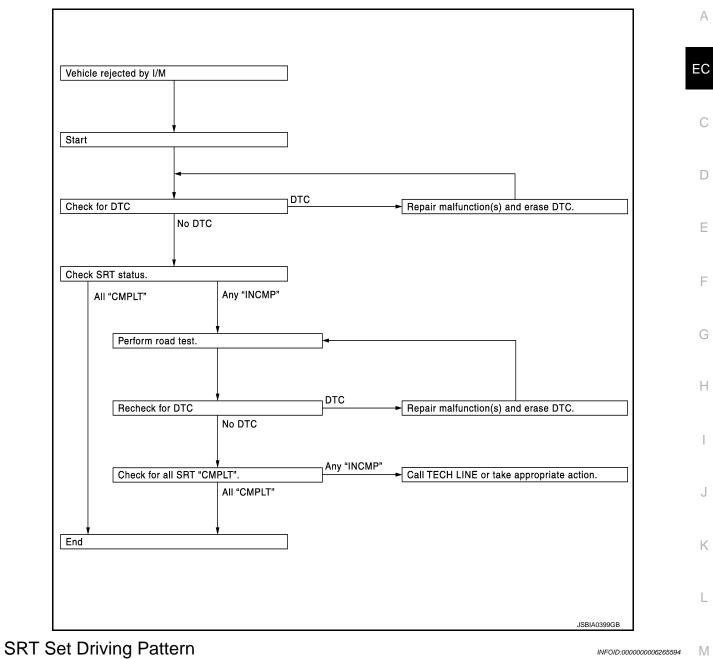
SRT SERVICE PROCEDURE

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.

HOW TO SET SRT CODE

< BASIC INSPECTION >

[VK56VD]

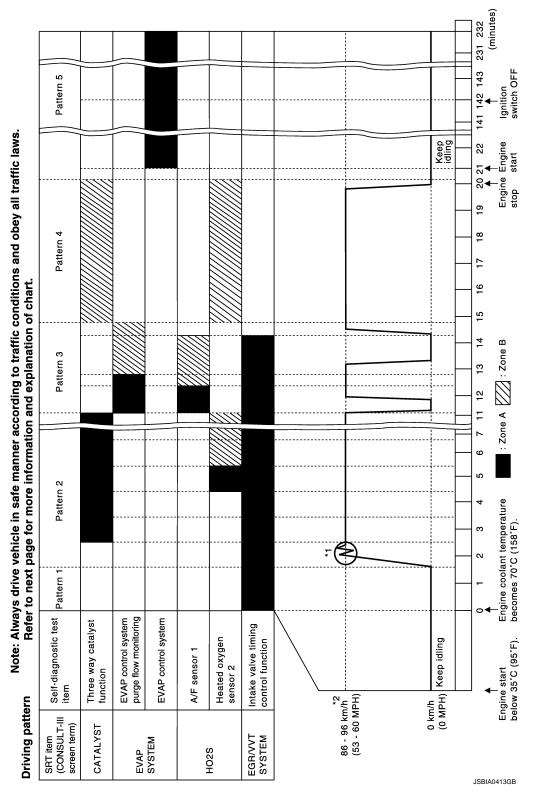


CAUTION:

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



• The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.

Zone A refers to the range where the time, required for the diagnosis under normal conditions*, is the shortest.

Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

*: Normal conditions refer to the following:

Sea level

HOW TO SET SRT CODE

< BASIC INSPECTION >	[VK56VD]
 Flat road Ambient air temperature: 20 - 30°C (68 - 86°F) Diagnosis is performed as quickly as possible under normal conditions. Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86° sis may also be performed. 	₽ F)], diagno-
Work Procedure	OID:000000006265595
1.снеск отс	C
Check DTC.	
<u>Is any DTC detected?</u> YES >> Repair malfunction(s) and erase DTC. Refer to <u>EC-98, "DTC Index"</u> . NO >> GO TO 2.	Γ
2.CHECK SRT STATUS	E
WITH CONSULT-III Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT-III. WITHOUT CONSULT-III	F
Perform "SRT status" mode with EC-60. "On Board Diagnosis Function".	Γ
WITH GST Select Service \$01 with GST. <u>Is SRT code(s) set?</u>	0
YES >> END NO-1 >> With CONSULT-III: GO TO 3. NO-2 >> Without CONSULT-III: GO TO 4.	ŀ
3. DTC CONFIRMATION PROCEDURE	
 Select "SRT WORK SUPPORT" in "DTC & SRT CONFIRMATION" mode with CONSULT-III. For SRT(s) that is not set, perform the corresponding "DTC CONFIRMATION PROCEDURE" a the "Performance Priority" in the "SRT ITEM" table. Refer to <u>EC-156, "Description"</u>. Check DTC. 	-
Is any DTC detected?	
YES >> Repair malfunction(s) and erase DTC. Refer to <u>EC-98, "DTC Index"</u> . NO >> GO TO 10.	ŀ
4.PERFORM ROAD TEST	
 Check the "Performance Priority" in the "SRT ITEM" table. Refer to <u>EC-156</u>, "<u>Description</u>". Perform the most efficient SRT set driving pattern to set the SRT properly. Refer to <u>EC-157</u>, "<u>SF ing Pattern</u>". 	<u>₹T Set Driv-</u>
In order to set all SRTs, the SRT set driving pattern must be performed at least once.	Ν
>> GO TO 5.	
5. PATTERN 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). Start the engine. 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-72, "Reference Value".	F

>> GO TO 6.

HOW TO SET SRT CODE

< BASIC INSPECTION >

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.

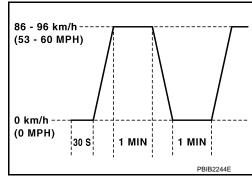
>> GO TO 7.

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

- 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 9.

9. PATTERN 5

• 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 10.

10.CHECK SRT STATUS

WITH CONSULT-III
 Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT-III.
 WITHOUT CONSULT-III
 Perform "SRT status" mode with <u>EC-60, "On Board Diagnosis Function"</u>.
 WITH GST
 Select Service \$01 with GST.
 <u>Is SRT(s) set?</u>

- YES >> END
- NO >> Call TECH LINE or take appropriate action.

Revision: 2010 May

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< DTC/CIRCUIT DIAGNOSIS >

DTC/CIRCUIT DIAGNOSIS TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

The specification (SP) value indicates the tolerance of the value that is displayed in "SPEC" in "DATA MONI- TOR" mode of CONSULT-III during normal operation of the Engine Control System. When the value in "SPEC" in "DATA MONITOR" mode is within the SP value, the Engine Control System is confirmed OK. When the value in "SPEC" in "DATA MONITOR" mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.	С
The SP value is used to detect malfunctions that may affect the Engine Control System, but will not illuminate the MIL. The SP value will be displayed for the following items:	D
 B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correc- tion) 	E
 A/F ALPHA-B1/B2 (The mean value of air-fuel ratio feedback correction factor per cycle) MAS A/F SE-B1/B2 (The signal voltage of the mass air flow sensor) IDLE FUEL PRES MAX/MIN (the signal voltage of the fuel rail pressure sensor) 	F
Component Function Check	
1.PRECONDITIONING	G
Check that all of the following conditions are satisfied. TESTING CONDITION • Vehicle driven distance: More than 5,000 km (3,107 miles)	Н
 Barometric pressure: 98.3 - 104.3 kPa (0.983 - 1.043 bar, 1.003 - 1.064 kg/cm², 14.25 - 15.12 psi) Atmospheric temperature: 20 - 30°C (68 - 86°F) Engine coolant temperature: 75 - 95°C (167 - 203°F) Transmission: Warmed-up 	I
 After the engine is warmed up to normal operating temperature, drive vehicle until "ATF TEMP 2" (A/T fluid temperature sensor signal) indicates more than 60°C (140°F). Electrical load: Not applied Rear window defogger switch, air conditioner switch and lighting switch are OFF. Steering wheel is straight 	J
 ahead. Engine speed: Idle Gear position: Neutral (or parking) 	K
>> GO TO 2.	L
2.PERFORM SPEC IN DATA MONITOR MODE	
WITH CONSULT-III NOTE:	M
Perform "SPEC" in "DATA MONITOR" mode in maximum scale display. 1. Perform <u>EC-139, "Work Procedure"</u> .	
 Select "B/FUEL SCHDL", "A/F ALPHA-B1", "A/F ALPHA-B2", "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode with CONSULT-III. 	Ν
 Check that monitor items are within the SP value. Is the measurement value within the SP value? 	0
YES >> INSPECTION END	
NO >> Proceed to <u>EC-162, "Diagnosis Procedure"</u> .	Ρ

EC-161

[VK56VD]

INFOID:000000006217760

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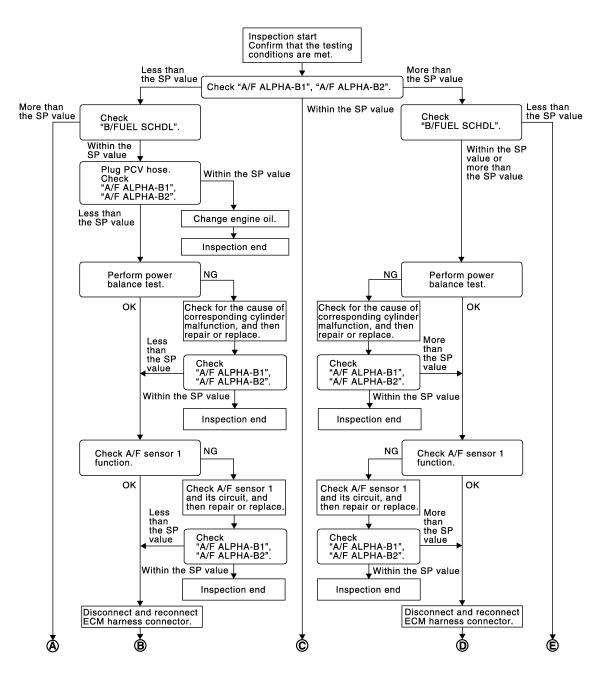
< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

INFOID:000000006217762

[VK56VD]

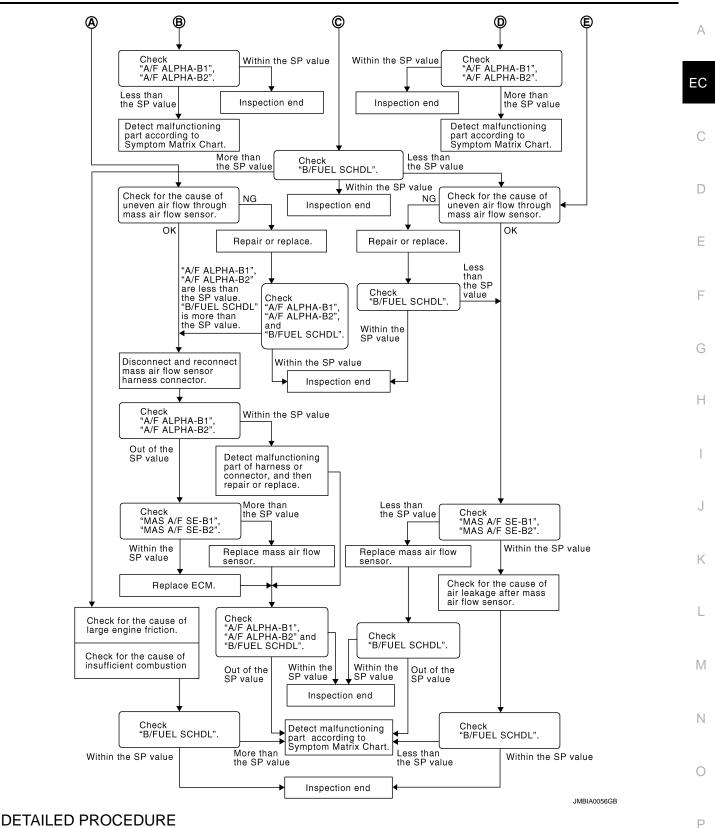
OVERALL SEQUENCE



JSBIA0519GB

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]



1.CHECK "A/F ALPHA-B1" AND "A/F ALPHA-B2"

(I) WITH CONSULT-III

- 1. Start engine.
- Check that the testing conditions are met. Refer to <u>EC-161, "Component Function Check"</u>.
- 3. Select "A/F ALPHA-B1" and "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and check that each indication is within the SP value.

EC-163

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

NOTE:

Check "A/F ALPHA-B1" and "A/F ALPHA-B2" for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little.

Is the measurement value within the SP value?

- YES >> GO TO 14.
- 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 check 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 16.

3.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and check 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 22.

4.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

- 1. Stop the engine.
- 2. Disconnect PCV hose, and then plug it.
- 3. Start engine.
- 4. Select "Ă/F ALPHA-B1" and "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and check that each 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 conditions.

>> INSPECTION END

6.PERFORM POWER BALANCE TEST

- 1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
- 2. Check that each cylinder produces a momentary engine speed drop.

Is the inspection result normal?

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

7. DETECT MALFUNCTIONING PART

Check the following below.

- Ignition coil and its circuit (Refer to <u>EC-506</u>, "Component Function Check".)
- Fuel injector and its circuit (Refer to <u>EC-498, "Component Function Check"</u>.)
- Intake air leakage
- Low compression pressure (Refer to EM-16, "Inspection".)
- Is the inspection result normal?

TROUBLE DIAGNOSIS - SPECIFICATION VALUE	
	56VD]
YES >> Replace fuel injector and then GO TO 8. NO >> Repair or replace malfunctioning part and then GO TO 8.	A
8.CHECK "A/F ALPHA-B1" AND "A/F ALPHA-B2"	
 Start engine. Select "A/F ALPHA-B1" and "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and check the indication is within the SP value. 	at each EC
Is the measurement value within the SP value?	0
YES >> INSPECTION END NO >> GO TO 9.	С
9.CHECK A/F SENSOR 1 FUNCTION	D
Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1.	
 For DTC P0130, P0150, refer to <u>EC-228, "DTC Logic"</u>. For DTC P0131, P0151, refer to <u>EC-232, "DTC Logic"</u>. 	
 For DTC P0132, P0152, refer to <u>EC-235, "DTC Logic"</u>. For DTC P0132, P0152, refer to <u>EC-235, "DTC Logic"</u>. 	E
 For DTC P0133, P0153, refer to <u>EC-238, "DTC Logic"</u>. 	
• For DTC P2A00, P2A03, refer to <u>EC-487, "DTC Logic"</u> .	F
Are any DTCs detected?	
YES >> GO TO 10. NO >> GO TO 12.	
10. CHECK A/F SENSOR 1 CIRCUIT	G
Perform Diagnosis Procedure according to corresponding DTC.	
	Н
>> GO TO 11.	
11. CHECK "A/F ALPHA-B1" AND "A/F ALPHA-B2"	
 Start engine. Select "A/F ALPHA-B1" and "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and check that indication is within the SP value. 	at each
Is the measurement value within the SP value?	J
YES >> INSPECTION END	
NO >> GO TO 12.	K
12. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR	1 %
 Stop the engine. Disconnect ECM harness connector. Check pin terminal and connector for damage, and then recon 	nect it. L
>> GO TO 13.	
13. CHECK "A/F ALPHA-B1" AND "A/F ALPHA-B2"	M
 Start engine. Select "A/F ALPHA-B1" and "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and check that indication is within the SP value. 	at each N
Is the measurement value within the SP value?	
YES >> INSPECTION END	0
NO >> Detect malfunctioning part according to <u>EC-524, "Symptom Table"</u> .	0
14.CHECK "B/FUEL SCHDL"	
Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and check that the indication is within value.	the SP P
Is the measurement value within the SP value?	
YES >> INSPECTION END	
NO-1 >> More than the SP value: GO TO 15. NO-2 >> Less than the SP value: GO TO 22.	
15. DETECT MALFUNCTIONING PART	

< DTC/CIRCUIT DIAGNOSIS >

- 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 27.

16.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 18.

NO >> Repair or replace malfunctioning part, and then GO TO 17.

17. CHECK "A/F ALPHA-B1", "A/F ALPHA-B2" AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1", "A/F ALPHA-B2" and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and check 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" and "A/F ALPHA-B2" are less than the SP value: GO TO 18.

18. disconnect and reconnect mass air flow sensor harness connector

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

>> GO TO 19.

19.CHECK "A/F ALPHA-B1" AND "A/F ALPHA-B2"

- 1. Start engine.
- 2. Select "A/F ALPHA-B1" and "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and check that each 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 <u>EC-201. "Diagno-</u> <u>sis Procedure"</u>. Then GO TO 26.
- NO >> GO TO 20.

20.CHECK "MAS A/F SE-B1"

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

Is the measurement value within the SP value?

YES >> GO TO 21.

NO >> More than the SP value: Replace malfunctioning mass air flow sensor, and then GO TO 26.

- 21.REPLACE ECM
- 1. Replace ECM.
- 2. Perform EC-143, "Work Procedure".

TROUBLE DIAGNOSIS - SPECIFICATION VALUE	
< DTC/CIRCUIT DIAGNOSIS >	[VK56VD]
>> GO TO 26.	
22.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 in air cleaner element 	
Uneven dirt in air cleaner element	_
Improper specification in intake air system	
Is the inspection result normal? YES >> GO TO 24.	
NO >> Repair or replace malfunctioning part, and then GO TO 23.	
23. CHECK "B/FUEL SCHDL"	
Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and check that the indicatio	n is within the SP
value.	
is the measurement value within the SP value?	
YES >> INSPECTION END NO >> Less than the SP value: GO TO 24.	
24.CHECK "MAS A/F SE-B1"	
Select "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode, and check that the indicatio value.	h is within the SP
Is the measurement value within the SP value?	
YES >> GO TO 25.	
NO >> Less than the SP value: Replace malfunctioning mass air flow sensor, and then	GO TO 27.
25. CHECK INTAKE SYSTEM	
Check for the cause of air leakage 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 Onen study breakers, here disconnection, or enable in POV(vielus)	
 Open stuck, breakage, hose disconnection, or cracks in PCV valve Disconnection or cracks in EVAP purge hose, stuck open EVAP canister purge volume 	control solenoid
valve	
 Malfunctioning seal in rocker cover gasket Disconnection, looseness, or cracks in hoses, such as a vacuum hose, connecting to intake 	air system narts
 Malfunctioning seal in intake air system, etc. 	, an system parts
>> GO TO 27.	
26.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2" AND "B/FUEL SCHDL"	
Select "A/F ALPHA-B1", "A/F ALPHA-B2" and "B/FUEL SCHDL" in "SPEC" of "DATA MONI check that each indication is within the SP value.	TOR" mode, and
is the measurement value within the SP value?	
 YES >> INSPECTION END NO >> Detect malfunctioning part according to <u>EC-524</u>, "Symptom Table". 	
27.CHECK "B/FUEL SCHDL"	
	diantian in within
Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and then check that the ir the SP value.	aication is within
Is the measurement value within the SP value?	
YES >> INSPECTION END	
NO >> Detect malfunctioning part according to <u>EC-524</u> , "Symptom Table".	

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

1. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

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

E	СМ	Ground	Continuity
Connector	Terminal	Cround	Continuity
F111	10		
E80	174	Ground	Existed
⊑0U	175		

3. Also check harness for short to power.

Is the inspection result normal?

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

NO *>>* GO 10 2. **N**

2. DETECT MALFUNCTIONING PART

Check the following.

· Loose or poor connection for each connector and harness

Harness for open or short between ECM and ground

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

3.CHECK ECM POWER SUPPLY CIRCUIT-I

1. Reconnect ECM harness connector.

2. Turn ignition switch ON.

3. Check the voltage between ECM harness connector terminals.

ECM			
Connector	+	-	Voltage
Connector	Terminal	Terminal	*
E80	141	175	Battery voltage

Is the inspection result normal?

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

4. DETECT MALFUNCTIONING PART

Check the following.

• 10 A fuse (No. 62)

· Loose or poor connection for each connector and harness

Harness for open or short between ECM and fuse

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

5. CHECK ECM POWER SUPPLY CIRCUIT-II

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

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

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POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

	ECM							F
0	+	_		Voltage)			
Connector	Terminal	Term	inal					E
E80	171 172	17	5 volta	turning ignition swi ge will exist for a fe to approximately 0	w seconds, then			
s the inspec	ction result	t norma	-			_		(
YES >>	GO TO 6. GO TO 8.							Γ
. CHECK I	ECM POW	/ER Sl	JPPLY CI	RCUIT-III				
	nition switc he voltage		en IPDM	E/R harness co	nnector and	ground.		 6
IPC	DM E/R				_			
Connector	Termin	al	Ground	Voltage				
E15	61		Ground	Battery voltage	_			
s the inspec	ction result	t norma	al?		_			(
YES >>	GO TO 7.							(
-	•			to <u>PCS-32, "Re</u>	moval and In	stallation".		
.CHECK I	INTERMIT	TENT	INCIDEN	Г				
efer to <u>GI-</u>	40, "Interm	nittent	Incident".					
	INSPECT							
				RCUIT-IV				
CHECK E	ECM POW	/ER Sl h OFF	JPPLY CI	at least 10 seco				 ,
CHECK E	ECM POW	/ER Sl h OFF	JPPLY CI			as per the foll	owing.	 ,
CHECK E	ECM POW hition switc he voltage	/ER Sl h OFF	JPPLY CI	at least 10 seco		as per the foll	owing.	 ,
CHECK E	ECM POW	/ER Sl h OFF	JPPLY CI	at least 10 secc narness connec		as per the foll	owing.	
CHECK E	ECM POW hition switc he voltage ECM +	/ER SU h OFF betwe	JPPLY CII	at least 10 seco		as per the foll	owing.	 I
CHECK I . Turn igr . Check t	ECM POW hition switc he voltage ECM	/ER Sl h OFF	JPPLY CII	at least 10 secc narness connec Voltage		as per the foll	owing.	
CHECK I . Turn igr . Check t Connector E80	ECM POW hition switc he voltage ECM + Terminal 163	/ER SU h OFF betwe 	JPPLY CII	at least 10 secc narness connec		as per the foll	owing.	
CHECK I . Turn ign . Check the Connector E80 s the inspec	ECM POW hition switc he voltage ECM + Terminal 163 ction result	/ER SU h OFF betwe 	JPPLY CII	at least 10 secc narness connec Voltage		as per the foll	owing.	
CHECK I Turn ign Check t Connector E80 the inspec YES >>	ECM POW nition switc he voltage ECM + Terminal 163 ction result GO TO 12	/ER SU h OFF betwe 	JPPLY CII	at least 10 secc narness connec Voltage		as per the foll	owing.	
CHECK E . Turn ign . Check t Connector E80 Sthe inspec YES >> NO >>	ECM POW nition switc he voltage ECM + Terminal 163 Ction result GO TO 12 GO TO 9.	/ER SU h OFF betwe 	JPPLY CI and wait een ECM r inal 5 al?	at least 10 seco harness connec Voltage Battery voltage		as per the foll	owing.	
CHECK E . Turn ign . Check t Connector E80 Sthe inspec YES >> NO >> .CHECK E	ECM POW nition switc he voltage ECM + Terminal 163 ction result GO TO 12 GO TO 9. ECM POW	/ER SU h OFF betwe 	JPPLY CI and wait een ECM r inal 5 al?	at least 10 seco harness connec Voltage Battery voltage		as per the foll	owing.	
CHECK I Turn ign Check the Connector E80 the inspect YES >> NO >> CHECK I Disconn	ECM POW nition switc he voltage ECM + Terminal 163 ction result GO TO 12 GO TO 12 GO TO 9. ECM POW	/ER SU h OFF betwee Term 17/ t norma 2. /ER SU narnes	JPPLY CI and wait een ECM h inal 5 al? JPPLY CI s connect	at least 10 seco harness connec Voltage Battery voltage RCUIT-V or.		as per the foll	owing.	
CHECK I Turn ign Check t Connector E80 Sthe inspec YES >> NO >> CHECK I Disconn Disconn	ECM POW nition switc he voltage ECM + Terminal 163 ction result GO TO 12 GO TO 12 GO TO 9. ECM POW nect ECM here	/ER SU h OFF betwee Term 17 t norma 2. /ER SU harnes E/R ha	JPPLY CII and wait een ECM h inal 5 al? JPPLY CII s connecte arness cor	at least 10 seconarness connectors connector.	tor terminals			
CHECK I Turn ign Check t Connector E80 Sthe inspec YES >> NO >> CHECK I Disconn Disconn	ECM POW nition switc he voltage ECM + Terminal 163 ction result GO TO 12 GO TO 12 GO TO 9. ECM POW nect ECM here	/ER SU h OFF betwee 	JPPLY CII and wait een ECM h inal 5 al? JPPLY CII s connecte arness cor	at least 10 seco harness connec Voltage Battery voltage RCUIT-V or.	tor terminals			
CONNECTOR IN CONNECTOR IN CONNECTOR IN CONNECTOR IN E80 STHE INSPECT E80 STHE INSPECT E80 STHE INSPECT E80 STHE INSPECT STHE IN STHE IN STHE IN STHE	ECM POW nition switc he voltage ECM + Terminal 163 ction result GO TO 12 GO TO 12 GO TO 9. ECM POW nect ECM here	/ER SU h OFF betwee 	JPPLY CII and wait i een ECM h inal 5 al? JPPLY CII s connecte arness cor ween ECM	at least 10 seconarness connectors connector.	tor terminals			
CONNECTOR IN CONNECTOR IN CONNECTOR IN CONNECTOR IN E80 STHE INSPECT E80 STHE INSPECT E80 STHE INSPECT E80 STHE INSPECT STHE IN STHE IN STHE IN STHE	ECM POW nition switc he voltage ECM + Terminal 163 ction result GO TO 12 GO TO 12 GO TO 9. ECM POW nect ECM hect IPDM he continu	/ER SU h OFF betwee 	JPPLY CII and wait i een ECM h inal 5 al? JPPLY CII s connecte arness cor ween ECM	at least 10 seco harness connec Voltage Battery voltage RCUIT-V or. hnector. A harness conn	tor terminals			([
CONNECTOR IN CONNECTOR IN CONNECTOR IN E80 Sthe inspect YES >> NO >> CHECK IN Disconn Check to E	ECM POW nition switc he voltage ECM + Terminal 163 ction result GO TO 12 GO TO 12 GO TO 9. ECM POW hect ECM H he continu	/ER SU h OFF betwee 	JPPLY CII and wait i een ECM h inal 5 al? JPPLY CII s connecte arness cor ween ECM	at least 10 seco harness connec Voltage Battery voltage RCUIT-V or. Innector. A harness conn	tor terminals			
CONNECTOR INCOMPOSITE CONNECTOR INTERPOSITE CONNECTOR INTERPOSITI CONTINUNTE CON POSITI	ECM POW nition switc he voltage ECM + Terminal 163 ction result GO TO 12 GO TO 12 GO TO 9. ECM POW hect ECM H he continu ECM Termin. 163	/ER SU h OFF betwee Term 17 t norma 2. /ER SU harnes E/R ha ity betwee al	JPPLY CII and wait i een ECM h inal 5 al? JPPLY CII s connector ween ECM IPI Connector E14	at least 10 seconarness connectors Voltage Battery voltage RCUIT-V or. Innector. A harness conn DM E/R Terminal 41	ector and IPE			
CONNECTOR IN CONNECTOR IN CONNECTOR IN CONNECTOR IN E80 S the inspect YES >> NO >> CHECK IS Disconne Disconne CONNECTOR IS CONNECTOR IS CONNECT	ECM POW nition switc he voltage ECM + Terminal 163 ction result GO TO 12 GO TO 12 GO TO 12 GO TO 9. ECM POW hect ECM hect ECM ECM Termin 163 ECM	/ER SU h OFF betwee Term 17/ t norma 2. /ER SU harnes E/R ha ity betweet al	JPPLY CIF and wait i een ECM h inal 5 al? JPPLY CIF s connector ween ECM IPF Connector E14 short to gro	At least 10 second harness connection Voltage Battery voltage RCUIT-V or. Innector. A harness conn DM E/R Terminal	ector and IPE			
CONNECTOR I CONNECTOR I CONNECTOR I E80 S the inspect YES >> NO >> CHECK I Disconn Disconn Disconn Check ti E80 Also che S the inspect	ECM POW nition switc he voltage ECM + Terminal 163 ction result GO TO 12 GO TO 12 GO TO 12 GO TO 9. ECM POW hect ECM hect ECM ECM Termin 163 ECM	/ER SU h OFF betwee Term 17 t norma 2. /ER SU harnes E/R ha ity bett al al	JPPLY CIF and wait i een ECM h inal 5 al? JPPLY CIF s connector ween ECM IPF Connector E14 short to gro	at least 10 seconarness connectors Voltage Battery voltage RCUIT-V or. Innector. A harness conn DM E/R Terminal 41	ector and IPE			

10. DETECT MALFUNCTIONING PART

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

Check the following.

- · Loose or poor connection for each connector and harness
- Harness for open or short between ECM and IPDM E/R

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

11.CHECK 20 A FUSE

- 1. Disconnect 20 A fuse (No. 43) from IPDM E/R.
- 2. Check 20 A fuse.

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace 15 A fuse.

12.CHECK ECM POWER SUPPLY CIRCUIT-VI

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

E	СМ	IPDN	II E/R	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E80	171	E14	35	Existed
LOU	172	L 14		LAISted

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

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

Loose or poor connection for each connector and harness

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

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

14. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-32, "Removal and Installation".

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

U0101 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

U0101 CAN COMM CIRCUIT

DTC Logic

А

EC

INFOID:000000006217764

[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (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 (emis- sion related diagnosis) with TCM for 2 sec- onds or more.	 CAN communication line betrween TCM and ECM (CAN communication line is open or shorted)
DTC CON	FIRMATION PROCEDUF	RE	
1.PERFC	ORM DTC CONFIRMATION I	PROCEDURE	
1. Turn ig	gnition switch ON and wait a	t least 3 seconds.	
	DTC.		
Is DTC de		ale and the	
	> EC-171, "Diagnosis Proce > INSPECTION END	dure".	
Diagnos	is Procedure		INFOID:00000006217765
U			
Perform th Chart".	ne trouble diagnosis for CAI	N communication system. Refer to L	AN-18, "Trouble Diagnosis Flow
<u>onarr</u> .			

- Κ
- L
- M

 - Ν
 - 0
 - Ρ

U1001 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

U1001 CAN COMM CIRCUIT

DTC Logic

INFOID:000000006217768

[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U1001	CAN COMM CIRCUIT (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 1st trip DTC.

Is 1st trip DTC detected?

- YES >> EC-172, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217769

Perform the trouble diagnosis for CAN communication system. Refer to <u>LAN-18</u>, "Trouble Diagnosis Flow <u>Chart"</u>.

U0113, U1003 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

U0113, U1003 CAN COMM CIRCUIT

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC U0113 or U1003 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-378, "DTC Logic"</u>.

DTC No.		agnosis name gnosis content)	I	DTC detecting co	ndition	Possible cause
U0113	CAN COMM C		CAN comi sion relate module fo	M is not transmitt munication signal ed diagnosis) with r 2 seconds or m	of OBD (emis- VVEL control	Harness or connectors (VVEL CAN communication line is open or aborted)
U1003	control module	ication with VVEL	When ECI CAN comr (emission	M is not transmitt nunication signal related diagnosis odule for 2 second	other than OBD) with VVEL	open or shorted)ECMVVEL control module
DTC CON	FIRMATION	PROCEDU	RE			
1.PRECO	NDITIONING					
Before per	-	following pro	ocedure, co	onfirm that ba	attery voltage	e is 10 V or more at idle.
-	SO TO 2.	FIRMATION				
 Turn ig Check 		ON and wait a	it least 3 se	conas.		
Is DTC det	ected?					
		<u>EC-173, "Diag</u>	nosis Proce	<u>edure"</u> .		
-	> INSPECTIO					
Diagnosi	s Procedu	re				INFOID:00000006412038
1. CHECK	VVEL CAN C		ION CIRC	UIT		
1. Turn io	nition switch (OFF.				
2. Discon	nect ECM hai	rness connect				
		ntrol module			VVEL contro	I module harness connector.
	· · · · · · · · · · · · · · · · · · ·					
	ECM	VVEL contro	ol module	Continuity		
Connector	Terminal	Connector	Terminal	Continuity		
E80	161	F56	24	Existed		
	166		11			
		•	ound and s	hort to power.		
	ection result n	ormal?				
	> GO TO 3. > GO TO 2.					
•			т			
			-			

Check the following.

· Harness for open or short between ECM and VVEL control module

· Loose or poor connection for each connector and harness

EC-173

INFOID:000000006412037

А

EC

С

U0113, U1003 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

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

3.CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace.

4.REPLACE VVEL CONTROL MODULE

Replace VVEL control module. Refer to EC-536. "Removal and Installation".

>> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE

B WITH CONSULT-III

- 1. Reconnect all harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Select "SELF DIAGNOSTIC RESULT" mode with CONSULT-III.
- 4. Touch "ERASE".
- 5. Perform DTC Confirmation Procedure. See <u>EC-173. "DTC Logic"</u>.

I WITH GST

- 1. Reconnect all harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Select Service \$04 with GST.
- 4. Perform DTC Confirmation Procedure. See <u>EC-173. "DTC Logic"</u>.

Is the DTC U0113 or U1003 displayed again?

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

6.REPLACE ECM

Replace ECM. Refer to EC-535, "Removal and Installation".

>> INSPECTION END

U1024 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

U1024 CAN COMM CIRCUIT

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC U1024 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-378. "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U1024	VVEL CAN COMM CIRCUIT (VVEL CAN communication)	 When VVEL control module cannot transmitting or receiving CAN communication signal with ECM for 2 seconds or more. When detecting error during the initial diagnosis of CAN controller of VVEL control module. 	 Harness or connectors (CAN communication line is open or shorted) ECM VVEL control module
DTC CON	IFIRMATION PROCEDU	RE	
1.PRECO	NDITIONING		
Before per	CONDITION: rforming the following pr > GO TO 2.	ocedure, confirm that battery voltage is	a 10 V or more at idle.
2.PERFO	RM DTC CONFIRMATION	PROCEDURE	
 Turn ig Check 	nition switch ON and wait a DTC.	at least 3 seconds.	
	<u>ected?</u> > Go to <u>EC-175, "Diagnosis</u> > INSPECTION END	s Procedure".	

Diagnosis Procedure

1. CHECK VVEL CAN COMMUNICATION CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Disconnect VVEL control module harness connector.
- 4. Check the continuity between ECM harness connector and VVEL control module harness connector.

	NN 4			1	
EC	M	VVEL control module		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
E80	161	F56	24	Existed	
EOU	166	- FDO -	11	Existed	
5. Also che	. Also check harness for short to ground and s			short to pow	
Is the inspec	tion result r	namess for short to ground and short t			
	GO TO 3.				
_	GO TO 2.				
2.DETECT	MALFUNC	TIONING PA	RT		
	U				

Check the following.

Harness for open or short between ECM and VVEL control module

Loose or poor connection for each connector and harness

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

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U1024 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

3. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace.

4.REPLACE VVEL CONTROL MODULE

1. Replace VVEL control module.

2. Perform additional service when replacing VVEL control module. Refer to EC-144, "Work Procedure".

>> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE

(I) WITH CONSULT-III

- 1. Reconnect all harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Select "SELF DIAGNOSTIC RESULT" mode with CONSULT-III.
- 4. Touch "ERASE".
- 5. Perform DTC Confirmation Procedure. See <u>EC-175, "DTC Logic"</u>.

WITH GST

- 1. Reconnect all harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Select Service \$04 with GST.
- 4. Perform DTC Confirmation Procedure. See <u>EC-175, "DTC Logic"</u>.

Is the DTC U1024 displayed again?

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

6.REPLACE ECM

- 1. Replace ECM.
- 2. Perform additional service when replacing ECM. Refer to EC-143, "Work Procedure".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

P0011, P0021 IVT CONTROL

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0011 or P0021 is displayed with DTC P0075 or P0081, first perform the trouble diagnosis for DTC P0075, P0081. Refer to <u>EC-193, "DTC Logic"</u>.

DTC No.	Trouble diagnosis (Trouble diagnosis con- tent)	Detecting condition	Possible cause
P0011	INT/V TIM CONT-B1 [Intake valve timing control performance (bank 1)]	-	 Crankshaft position sensor Camshaft position sensor Intake valve timing control solenoid valve
P0021	INT/V TIM CONT-B2 [Intake valve timing control performance (bank 2)]	There is a gap between angle of target and phase-control angle degree.	 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
	NFIRMATION PROCE	EDURE	
1.PREC	ONDITIONING		
 Turn i Turn i TESTING 	gnition switch ON. gnition switch OFF and CONDITION:	wait at least 10 seconds. wait at least 10 seconds.	
Before pe	erforming the following	g procedure, confirm that batter	ry voltage is 11 V or more at idle.
>	>> GO TO 2.		
2.PERFC	ORM DTC CONFIRMAT	ION PROCEDURE-I	
 Turn i Start of 	engine and warm it up t	select "DATA MONITOR" mode wir o the normal operating temperatur ons for at least 6 consecutive sec	re.
	the accelerator pedal as		

ENG SPEED	Less than 2,000 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	P or N position
 4. Let engine idle for 5. Check 1st trip DTC WITH GST Follow the procedure ' Is 1st trip DTC detected 	C. With CONSULT-III" above.
	178, "Diagnosis Procedure"

3.PERFORM DTC CONFIRMATION PROCEDURE-II

B WITH CONSULT-III

1. Select "DATA MONITOR" mode with CONSULT-III.

2. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,500 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 70°C (158°F)

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< DTC/CIRCUIT DIAGNOSIS >

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

Selector lever

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

YES >> Go to <u>EC-178, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1. CHECK OIL PRESSURE WARNING LAMP

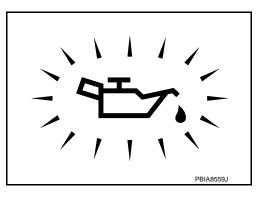
1. Start engine.

2. Check that oil pressure warning lamp is not illuminated.

Is oil pressure warning lamp illuminated?

YES >> Go to <u>LU-7, "Inspection"</u>.

NO >> GO TO 2.



2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-179, "Component Inspection (Intake Valve Timing Control Solenoid Valve)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to <u>EM-61, "Exploded</u> <u>View"</u>.

3.CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-301, "Component Inspection (Crankshaft Position Sensor)".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace crankshaft position sensor. Refer to <u>EM-106</u>, "Exploded View".

4.CHECK CAMSHAFT POSITION SENSOR

Refer to EC-306, "Component Inspection (Camshaft Position Sensor)".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning camshaft position sensor. Refer to EM-106. "Exploded View".

5.CHECK CAMSHAFT (INTAKE)

Check the following.

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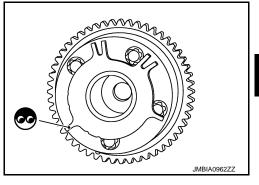
< DTC/CIRCUIT DIAGNOSIS >

· Accumulation of debris on the signal plate of camshaft front end

· Chipping signal plate of camshaft front end

Is the inspection result normal?

NO >> Remove debris and clean the signal plate of camshaft front end or replace camshaft. Refer to EM-61, "Exploded View" or EM-75, "Removal and Installation"



6. CHECK TIMING CHAIN INSTALLATION

O .CHECK HMING	G CHAIN INSTALLATION	
Check service reco	cords for any recent repairs that may cause timing chain misalignment.	_
Are there any service records that may cause timing chain misalignment?		1
YES >> Check	k timing chain installation. Refer to <u>EM-75, "Removal and Installation"</u> .	
_	ICATION CIRCUIT	
		_
=	on of Camshaft Sprocket (INT) Oil Groove". Refer to <u>EM-77, "Inspection"</u> .	
Is the inspection re		(
YES >> GO TO NO >> Clean		
•	Iubrication line.	
	RMITTENT INCIDENT	
Refer to <u>GI-40, "In</u>	ntermittent Incident".	
_		
>> INSPE	ECTION END	
Component Ins	Ispection (Intake Valve Timing Control Solenoid Valve)	774
1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I		
1. Turn ignition s		
 Disconnect intake valve timing control solenoid valve harness connector. Check resistance between intake valve timing control solenoid valve terminals as per the following. 		
5. Check lesistal	the between intake valve tinning control solehold valve terminals as per the following.	
Terminals	Resistance	
1 and 2	7.0 - 7.7 Ω [at 20°C (68°F)]	
	$\sim \Omega$	
1 or 2 and ground	(Continuity should not exist)	ľ
Is the inspection re	esult normal?	
YES >> GO TO	O 2.	
•	ace malfunctioning intake valve timing control solenoid valve. Refer to EM-61, "Explode	ed I
<u>View"</u> .		
Z.CHECK INTAK	E VALVE TIMING CONTROL SOLENOID VALVE-II	
1. Remove intak	se valve timing control solenoid valve.	_ (

1. Remove intake valve timing control solenoid valve.

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< DTC/CIRCUIT DIAGNOSIS >

Provide 12 V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check that the plunger moves as shown in the figure.
 CAUTION:

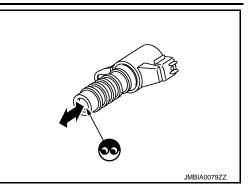
Never apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve. NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to <u>EM-61</u>, "<u>Exploded</u> <u>View</u>".



P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

DTC Logic

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DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0031	A/F SEN1 HTR (B1) [A/F sensor 1 heater (bank 1) control circuit low]	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)	 Harness or connectors (The A/F sensor 1 heater circuit is open or shorted.) A/F sensor 1 heater
P0032	A/F SEN1 HTR (B1) [A/F sensor 1 heater (bank 1) control circuit high]	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.)	 Harness or connectors (The A/F sensor 1 heater circuit is shorted.) A/F sensor 1 heater
P0051	A/F SEN1 HTR (B2) [A/F sensor 1 heater (bank 2) 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
P0052	A/F SEN1 HTR (B2) [A/F sensor 1 heater (bank 2) 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
	NFIRMATION PROCE	DURE	
.PREC	ONDITIONING		
2. Turn i 3. Turn i FESTING	gnition switch OFF and v gnition switch ON. gnition switch OFF and v CONDITION: erforming the following		is 11 V or more at idle.
-			
-	>> GO TO 2.		
∠.PERF(ORM DTC CONFIRMATIO	ON 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 <u>EC-181, "Diagnosis Procedure"</u>. NG >> INSPECTION END

Diagnosis Procedure

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

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

DTC		A/F sensor	1	Ground	Voltage
DIC	Bank	Connector	Terminal	Ground	
P0031, P0032	1	F67	5	Ground	Battery voltage
P0051, P0052	2	F68	5	Giouna	Dattery Voltage

Is the inspection result normal?

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

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P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

2. DETECT MALFUNCTIONING PART

Check the following.

- 20 A fuse (No. 43)
- Harness for open or short between A/F sensor 1 and fuse
- Loose or poor connection for each connector and harness

>> Repair or replace harness or connectors.

${f 3.}$ CHECK A/F SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

DTC	A/F sensor 1			ECM		Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0031, P0032	1	F67	2	F110	48	Existed	
P0051, P0052	2	F68	2	1110	53	LAISted	

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 A/F SENSOR 1 HEATER

Refer to EC-182, "Component Inspection (A/F Sensor 1 Heater)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.REPLACE A/F SENSOR 1

Replace malfunctioning A/F sensor 1. Refer to <u>EM-40, "Exploded View"</u>.

- 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

6.CHECK INTERMITTENT INCIDENT

Perform GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (A/F Sensor 1 Heater)

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

1. Turn ignition switch OFF.

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

Terminal	Resistance
2 and 5	2.0 - 3.2 Ω [at 25°C (77°F)]

EC-182

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P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

< DTC/CIRCUIT DI/	AGNOSIS >		
Terminal	Resistance	_	0
2 and 3, 4, 6	$\infty \Omega$	_	А
5 and 3, 4, 6	(Continuity should not exist)		
Is the inspection rest	ult normal?	_	EC
YES >> INSPEC			
2.REPLACE A/F SE	ENSOR 1		С
hard surface suchBefore installing	n as a concrete floor; use a ne new A/F sensor, clean exha rcial service tool (J-43897-18	ed from a height of more than 0.5 m (19.7 in) onto a w one. aust system threads using Oxygen Sensor Thread or J-43897-12)] and approved anti-seize lubricant	D
>> INSPEC	TION END		F
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P0037, P0038, P0057, P0058 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

P0037, P0038, P0057, P0058 HO2S2 HEATER

DTC Logic

INFOID:000000006217778

[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0037	HO2S2 HTR (B1) [Heated oxygen sensor 2 heater (bank 1) control cir- cuit 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 (The heated oxygen sensor 2 heater circuit is open or shorted.) Heated oxygen sensor 2 heater
P0038	HO2S2 HTR (B1) [Heated oxygen sensor 2 heater (bank 1) control cir- cuit 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 (The heated oxygen sensor 2 heater circuit is shorted.) Heated oxygen sensor 2 heater
P0057	HO2S2 HTR (B2) [Heated oxygen sensor 2 heater (bank 2) control cir- cuit 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 (The heated oxygen sensor 2 heater circuit is open or shorted.) Heated oxygen sensor 2 heater
P0058	HO2S2 HTR (B2) [Heated oxygen sensor 2 heater (bank 2) control cir- cuit 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 (The heated oxygen sensor 2 heater circuit is shorted.) Heated oxygen sensor 2 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start 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 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-184, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217779

1. CHECK HEATED OXYGEN SENSOR 2 (HO2S2) POWER SUPPLY CIRCUIT

- 1. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between HO2S2 harness connector and ground.

P0037, P0038, P0057, P0058 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

		HO2S2				
DTC	Bank	Connector	Terminal	Ground	Voltage	
P0037, P0038	1	F87	2			—
P0057, P0058	2	F88	2	Ground	Battery vo	Itage
Is the inspect	ion resu	It normal?				
	GO TO 3 GO TO 2					
2.DETECT N) PART			
Check the foll						
 20 A fuse (N Harness for Loose or po 	No. 43) open o					nd fuse
>> R 3. CHECK H	• •	-	•			er in harness or connectors.
1. Turn ignit						
2. Disconne	ct ECM	harness co		harness co	onnector a	nd ECM harness connector.
	HO2S2		EC	СМ		
DTC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0037, P0038	1	F87	3	F111	47	Existed
P0057, P0058	2	F88	3		52	
		ess for shor	t to ground	d and short	t to power.	
Is the inspect						
	GO TO 4		short to ar	ound or sh	ort to now	er in harness or connectors.
4.CHECK H	• •		Short to gi			
Refer to EC-1			enaction (or 2 Hoote	r)"
Is the inspect			<u>ispection (</u>			14 . .
	GO TO 6					
_NO >> G	60 TO 5					
5.REPLACE	HEATE	D OXYGE	N SENSOI	R 2		
 CAUTION: Discard an in) onto a h Before inst 	y heate hard sui talling r	ed oxygen rface such new oxyge cial servio	sensor wi as a conc en sensor,	hich has b crete floor clean ext	been drop ; use a ne haust sys	<u>, "Removal and Installation"</u> . ped from a height of more than 0.5 m (19.7 w one. tem threads using Oxygen Sensor Thread 97-12)] and approved anti-seize lubricant
•		TION END				
6. CHECK IN	ITERMI		DENT			
Refer to GI-40	0, "Inter	mittent Inci	dent".			

>> INSPECTION END

P0037, P0038, P0057, P0058 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection (HO2 Sensor 2 Heater)

INFOID:000000006217780

[VK56VD]

1.CHECK HEATED OXYGEN SENSOR 2 HEATER

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
- 3. Check resistance between HO2S2 terminals as follows.

Terminal	Resistance
2 and 3	3.4 - 4.4 Ω [at 25°C (77°F)]
1 and 2, 3, 4	$\Omega \propto$
4 and 1, 2, 3	(Continuity should not exist)

Is the inspection result normal?

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

2.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to <u>EX-5, "Removal and Installation"</u>. 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 J-43897-12)] and approved anti-seize lubricant (commercial service tool).

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

P006A, P0101 MAF SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE: If DTC P006A or P0101 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P006A	MAP-MAF CORELTION-B1 (Manifold pressure - mass air flow correlation)	A difference exceeding the specified value develops between a value transmitted from the manifold absolute pressure sensor to ECM and an estimated intake pres- sure of intake manifold calculated by ECM, based on a mass sir flow sensor signal.	 Harness or connectors (The sensor circuit is open or shorted.) Mass air flow sensor Manifold absolute pressure sensor EVAP control system pres- sure sensor Intake air leaks Intake air temperature sen- sor
P0101	MAF SEN/CIRCUIT-B1 (Mass air flow sensor circuit range/performance)	A difference exceeding the specified value develops between a signal transmitted from the mass air flow sensor to ECM.	Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch ON) instead of running engine at idle speed.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

B WITH CONSULT-III

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Accelerate the vehicle from 0 km/h (0 MPH) to 88 km/h (55 MPH) under the following conditions:

CAUTION: Always drive at a safe speed.

NOTÉ:

- Accelerate with the accelerator pedal kept constant.
- The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses

ACCEL SEN 1	1.4 – 2.0 V
Selector lever	D position

4. Check 1st trip DTC.

WITHOUT CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. With selector lever in D position, accelerate the vehicle from 0 km/h (0 MPH) to 88 km/h (55 MPH) under the following conditions:

NOTE:

- Accelerate with the accelerator pedal kept constant.
- The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.

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< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

Accelerator peda	l position sensor 1	Ground	Voltage (V)	
Connector	Terminal		voltage (v)	
E110 (Whthout ICC)	3	Ground	1.4 - 2.0	
E67 (With ICC)	10	Cround	1.4 - 2.0	

CAUTION:

Always drive at a safe speed.

3. Check 1st trip DTC. Is 1st trip DTC detected?

YES >> Proceed to EC-188, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK INTAKE SYSTEM

Check the following for connection.

Air duct

Vacuum hoses

• Intake air passage between air duct and intake manifold

Is the inspection result normal?

YES >> GO TO 2.

NO >> Reconnect the parts.

2. CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect mass air flow sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between mass air flow sensor harness connector and ground.

Mass air f	low sensor	Ground	Voltage	
Connector	Terminal	Oround		
F31	5	Ground	Battery volt- age	

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 mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and IPDM E/R
- Loose or poor connection for each connector and harness

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

4. CHECK MASS AIR FLOW SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

Mass air fle	ow sensor	EC	Continu-	
Connec- tor	Terminal	Connec- tor	Terminal	ity
F31	4	F111	25	Existed

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

INFOID:000000006288270

		P00	6A, P01	UT MAF SENSOR	
< DTC/CIRCUIT	DIAGNOSI	S >		[VK56VD]	
Is the inspection	esult normal	?			
YES >> GO					А
	•		-	short to power in harness or connectors.	
				GNAL CIRCUIT FOR OPEN AND SHORT	EC
1. Check the co	ntinuity betw	een mass	air flow se	nsor harness connector and ECM harness connector.	
Mass air flow sens	or E	СМ		-	С
Connector Term	nal Connector	Terminal	Continuity		0
F31 3	F111	22	Existed	-	
2. Also check h	arness for sh	ort to grou	nd and sh	ort to power.	D
Is the inspection	esult normal	?			
YES >> GO					Е
· ·	•		-	short to power in harness or connectors.	
6.CHECK MAN	FOLD ABSC	LUTE PRE	SSURE S	SENSOR	
Check manifold a	bsolute pres	sure senso	or. Refer to	EC-208, "Component Inspection (MAP Sensor)"	F
Is the inspection	esult normal	?			
YES >> GO					
		•		ensor. Refer to <u>EM-30, "Removal and Installation"</u> .	G
1. CHECK INTA					
	emperature	sensor. Re	efer to <u>EC-</u>	225, "Component Inspection (Intake Air Temperature Sen-	Н
<u>sor)"</u> .	a a ult narmal	n			
<u>Is the inspection</u> YES >> GO		<u> </u>			
NO >> Repl		flow sense	or (with inta	ake air temperature sensor). Refer to EM-27, "Removal and	I
8.CHECK EVAP		SYSTEM I	PRESSUR	E SENSOR	J
Refer to EC-335,	"Component	Inspection	n (EVAP C	ontrol System Pressure Sensor)".	
Is the inspection	esult normal	?			
YES-1 (Only DT					Κ
YES-2 (DTC PC NO >> Repl				O TO 10. e sensor. Refer to <u>FL-12, "Removal and Installation"</u> .	
9.CHECK MAS			in piessui		L
Refer to EC-190.				nsor)"	
Is the inspection			<u>I (IVIAI Se</u>	<u>IISOL</u> .	
YES >> GO		<u>.</u>			Μ
	ace mass air	flow sense	or.		
10.снеск ма	SS AIR FLO	W SENSO	R		Ν
Check mass air f	ow sensor. F	Refer to EC	-190. "Cor	nponent Inspection (MAF Sensor)".	
Is the inspection					
YES >> GO		_			0
				EM-27, "Removal and Installation".	
11. CHECK INT	ERMITTENT	INCIDEN	Г		Р
Refer to GI-40, "	ntermittent Ir	cident".			-

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection (MAF Sensor)

INFOID:000000006288271

[VK56VD]

1.CHECK MASS AIR FLOW SENSOR-I

WITH CONSULT-III

- 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-III and select "DATA MONITOR" mode.
- 5. Select "MAS A/F SE-B1", and check the indication.

Monitor item	Condition	Indication (V)
	Ignition switch ON (Engine stopped.)	Approx. 0.4
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9
	Idle to about 4,000 rpm	0.9 - 1.1 to Approx. 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

WITHOUT CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Check the voltage between ECM harness connector terminals under the following conditions.

ECM					
Connector	+ –		Condition	Voltage (V)	
Connector	Terminal	Terminal			
			Ignition switch ON (Engine stopped.)	Approx. 0.4	
E 111	22	25	Idle (Engine is warmed-up to normal operat- ing temperature.)	0.9 - 1.1	
F111 (MAF sens	(MAF sensor signal)	20	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9	
			Idle to about 4,000 rpm	0.9 - 1.1 to Approx. 2.4*	

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END

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.

3. CHECK MASS AIR FLOW SENSOR-II

WITH CONSULT-III

- 1. Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Connect CONSULT-III and select "DATA MONITOR" mode.
- 4. Select "MAS A/F SE-B1"", and check the indication.

EC-190

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

Monitor ite	em	Condition		Indication	(V)
	Ignition switch OI	Ignition switch ON (Engine stopped.)		Approx.	0.4
MAS A/F SE	Idle (Engine is wa	armed-up to normal op	perating temperature.)	0.9 - 1.	1
IVIAS AVE SE	2,500 rpm (Engin	e is warmed-up to nor	mal operating temperature.)	1.4 - 1.	9
	Idle to about 4,00	00 rpm		0.9 - 1.1 to App	prox. 2.4*
WITHOU 1. Repair 2. Start e	JT CONSULT-III or replace malfunct ngine and warm it u	tioning part. up to normal opera	eing increased to about 4,00 ating temperature. onnector terminals unde		conditions.
	ECM				
Connector	+	_	Condition		Voltage (V)
Connector	Terminal	Terminal			
			Ignition switch ON (Engine	stopped.)	Approx. 0.4
F111	22	25	Idle (Engine is warmed-up ting temperature.)	to normal operat-	0.9 - 1.1
	(MAF sensor signal)	nsor signal)	2,500 rpm (Engine is warm operating temperature.)	ed-up to normal	1.4 - 1.9
			Idle to about 4,000 rpm		0.9 - 1.1 to Approx. 2.4*
4.CHECK WITH Co 1. Turn ig 2. Discon 3. Start e 4. Conne	> GO TO 4. MASS AIR FLOW ONSULT-III gnition switch OFF. anect mass air flow ngine and warm it u ct CONSULT-III and "MAS A/F SE-B1",	sensor harness co up to normal opera d select "DATA MC	DNITOR" mode.	it again.	
Monitor ite	em	Condition		Indication	(V)
		N (Engine stopped.)		Approx. (
Idle (Engine is warmed-up to normal op					
		2,500 rpm (Engine is warmed-up to normal operating temperature.)		0.0 1.	1
MAS A/F SE	E-B1		U . ,	1.4 - 1.	
MAS A/F SE	E-B1	he is warmed-up to nor	U . ,		9

< DTC/CIRCUIT DIAGNOSIS >

ECM					
Connector	+ –		Condition	Voltage (V)	
Connector	Terminal	Terminal			
		²	Ignition switch ON (Engine stopped.)	Approx. 0.4	
E 111	22		Idle (Engine is warmed-up to normal operat- ing temperature.)	0.9 - 1.1	
F111 (MAF sens	(MAF sensor signal)	20	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9	
			Idle to about 4,000 rpm	0.9 - 1.1 to Approx. 2.4*	

*: 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 malfunctioning mass air flow sensor. Refer to EM-27, "Removal and Installation".

P0075, P0081 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

P0075, P0081 IVT CONTROL SOLENOID VALVE

DTC Logic

.

INFOID:000000006217781

[VK56VD]

DTC DETECTION LOGIC

		uble diagnosis ble diagnosis		D	TC detecting condition	Possible cause
P0075	[Intake va	M V/CIR-B1 alve timing cor e (bank 1) circ			er voltage is sent to the ECM ake valve timing control solenoid	Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.)
P0081	[Intake va	M V/CIR-B2 alve timing cor e (bank 2) circ		valve.		 Intake valve timing control solenoid valve
тс со	NFIRMA	TION PRO	OCEDURI	Ξ		
PREC	ONDITIC	NING				
		witch OFF	and wait a	t least 10 s	seconds.	
		witch ON.	and wait at	t least 10 s	seconds.	
	-					
_	>> GO T(
					RE	
	engine a k 1st trip	nd let it idle DTC.	for 5 seco	onds.		
s 1st trip	•					
		<u>EC-193, "D</u>		rocedure".		
		ECTION EN	D			
			D			INFOID:0000000621778
Diagno	sis Pro	cedure		NTROL SC	OLENOID VALVE POWE	
Diagno: 1. снес	SIS Proo K INTAK	Cedure E VALVE TI witch OFF.	MING CO		OLENOID VALVE POWE	R SUPPLY CIRCUIT
Diagnos 1.CHEC	K INTAK	Cedure E VALVE TI witch OFF. take valve ti	MING CO			R SUPPLY CIRCUIT
Diagnos 1.CHEC 1. Turn 2. Disco 3. Turn	Sis Proo K INTAK ignition s onnect int ignition s	Cedure E VALVE TI witch OFF. take valve ti witch ON.	MING CO ming (IVT)) control sc	OLENOID VALVE POWE	R SUPPLY CIRCUIT
Diagnos 1.CHEC 1. Turn 2. Disco 3. Turn	SIS Prod K INTAK ignition s onnect int ignition s k the volt	Cedure E VALVE TI witch OFF. take valve ti witch ON. tage betwee	MING CO ming (IVT) en IVT con) control sc	DLENOID VALVE POWE	R SUPPLY CIRCUIT
Diagnos 1.CHEC 1. Turn 2. Disco 3. Turn	SIS Prod K INTAK ignition s onnect int ignition s k the volt	Cedure E VALVE TI witch OFF. take valve ti witch ON.	MING CO ming (IVT) en IVT con) control sc	DLENOID VALVE POWE	R SUPPLY CIRCUIT
Diagnos 1.CHEC 1. Turn 2. Disco 3. Turn 4. Chec	SIS Proc K INTAKI ignition s onnect int ignition s k the volt	Cedure E VALVE TI witch OFF. take valve ti witch ON. tage betwee control solence	MING CO ming (IVT) en IVT con ^{bid valve}) control so trol soleno Ground	DLENOID VALVE POWE	R SUPPLY CIRCUIT
Diagnos 1. CHEC 1. Turn 2. Disco 3. Turn 4. Chec DTC	Sis Prod K INTAKI ignition s ponnect int ignition s k the volt	Cedure E VALVE TI witch OFF. take valve ti witch ON. tage betwee control solence Connector	MING CO ming (IVT) en IVT con bid valve Terminal) control so trol soleno	DLENOID VALVE POWE	R SUPPLY CIRCUIT
Diagnos 1. CHEC 1. Turn 2. Disco 3. Turn 4. Chec DTC P0075 P0081	Sis Prod K INTAKI ignition s ponnect int ignition s k the volt IVT Bank 1 2	Cedure E VALVE TI witch OFF. take valve ti witch ON. tage betwee control solence Connector F47	MING CO ming (IVT) en IVT con bid valve Terminal 2 2) control so trol soleno Ground	DLENOID VALVE POWE	R SUPPLY CIRCUIT
Diagnos 1.CHEC 1. Turn 2. Disco 3. Turn 4. Chec DTC P0075 P0081 s the ins YES	Sis Prod K INTAKI ignition s ponnect int ignition s k the volt IVT Bank 1 2	Cedure E VALVE TI witch OFF. take valve ti witch ON. tage betwee control solence Connector F47 F61 esult norma O 3.	MING CO ming (IVT) en IVT con bid valve Terminal 2 2) control so trol soleno Ground	DLENOID VALVE POWE	R SUPPLY CIRCUIT
Diagnos 1.CHEC 1. Turn 2. Disco 3. Turn 4. Chec DTC P0075 P0081 s the ins YES NO	K INTAK ignition s onnect int ignition s k the volt IVT Bank 1 2 Dection re >> GO TO	Cedure E VALVE TI witch OFF. take valve ti witch ON. tage betwee control solence Connector F47 F61 esult norma O 3.	MING CO ming (IVT) en IVT con bid valve Terminal 2 2 1?) control so trol soleno Ground	DLENOID VALVE POWE	R SUPPLY CIRCUIT
Diagnos 1.CHEC 1. Turn 2. Disco 3. Turn 4. Chec DTC P0075 P0081 s the ins YES NO 2.DETE Check the	K INTAK ignition s onnect int ignition s k the volt Bank 1 2 Section re >> GO TO CT MALF e followin	Cedure E VALVE TI witch OFF. take valve ti witch ON. tage betwee control solence Connector F47 F61 esult norma O 3. O 2. UNCTIONI g.	MING CO ming (IVT) en IVT con bid valve Terminal 2 2 1? NG PART) control so trol soleno - Ground - Ground	DLENOID VALVE POWE	R SUPPLY CIRCUIT

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

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

1. Turn ignition switch OFF.

EC-193

EC

P0075, P0081 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

2. Disconnect ECM harness connector.

3. Check the continuity between IVT control solenoid valve harness connector and ECM harness connector.

DTC	IVT	control solen	oid valve	EC	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0075	1	F47	1	F111	49	Existed
P0081	2	F61	1		54	LVISIGO

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 IVT CONTROL SOLENOID VALVE

Refer to EC-194. "Component Inspection (Intake Valve Timing Control Solenoid Valve)".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning IVT control solenoid valve. Refer to EM-61, "Exploded View".

5.CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Intake Valve Timing Control Solenoid Valve)

INFOID:000000006288359

[VK56VD]

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 per the following.

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

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to <u>EM-61, "Exploded</u> <u>View"</u>.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

- 1. Remove intake valve timing control solenoid valve.
- Provide 12 V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check that the plunger moves as shown in the figure.
 CAUTION:

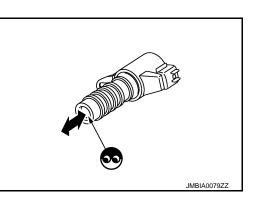
Never apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve. NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to <u>EM-61</u>, "<u>Exploded</u> <u>View</u>".



EC-194

P0087, P0088, P0090 FRP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

P0087, P0088, P0090 FRP CONTROL SYSTEM

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P0087 or P0090 is displayed with DTC P1197, first perform the trouble diagnosis for DTC P1197.
- DTC P0087 or P0090 may be displayed when running out of gas.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0087	High fuel pressure too low	The following condition continues for 5 seconds or more after engine start (regardless of water temperature): Target fuel pressure – Actual fuel pressure \geq 2.7 MPa (27 bar, 27.5 kg/cm ² , 392 psi)	
P0088	high fuel pressure too high	The following condition continues for 5 seconds or more after engine start (regardless of water temperature):Actual fuel pressure – Target fuel pressure \geq 2.7 MPa (27 bar, 27.5 kg/cm ² , 392 psi)	 Harness or connectors (The fuel pump circuit is open or shorted.) Fuel system
P0090	High pressure fuel pump per- formance	Fuel rail pressure remains at 1.5 MPa (15 bar, 15.3 kg/ cm ² , 217.5 psi) or less for 3 seconds or more during engine rev.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Check that the fuel tank is 1/8 full of fuel.
- Warm up the engine to the normal operating temperature and keep the engine speed at idle for 60 seconds.
 NOTE:

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

3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-196. "Diagnosis Procedure".
- NO >> GO TO 3.

3.perform dtc confirmation procedure-II

1. Cool the engine until the engine coolant temperature reaches 60°C (140°F) or less.

- 2. Start the engine and wait at least 60 seconds.
- 3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-196, "Diagnosis Procedure".
- NO >> INSPECTION END

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P0087, P0088, P0090 FRP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

INFOID:000000006217785

[VK56VD]

1.CHECK LOW FUEL PRESSURE

WITH CONSULT-III

1. Start the engine.

2. Check "L/FUEL PRES SEN V" in "DATA MONITOR" of "ECM" with CONSULT-III.

Data monitor item	Condition	Value (Approx.)
L/FUEL PRES SEN V	Engine speed: idle	3,000 –3,300 mV
EN OLET KEG GEN V	Engine speed: 3,000 rpm (no load)	3,000 –3,300 mv

WITHOUT CONSULT-III

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

	+				
Low fuel pressure sensor		—	Condition	Value (Approx.)	
Connector	Terminal			(· + F. 6))	
F25	2	Ground	Engine speed: idle	3.0 –3.3 V	
125	2	Gibunu	Engine speed: 3,000 rpm (no load)	5.0 - 5.5 V	

Is inspection result normal?

YES >> GO TO 2.

NO >> Check low fuel pressure system. Refer to <u>EC-512, "Diagnosis Procedure"</u>.

2. PERFORM THE HIGH PRESSURE FUEL PUMP COMPONENT INSPECTION

Perform the high pressure fuel pump component inspection. Refer to <u>EC-196. "Component Inspection"</u>. <u>Is inspection result normal?</u>

YES >> GO TO 3.

NO >> Replace the fuel pump.

3.CHECK FUEL LEAKAGE

1. Start the engine.

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

Is inspection result normal?

- YES >> Check that the fuel system has no breakage, bend, and crush.
- NO >> Repair or Replace the error-detected parts.

Component Inspection

INFOID:000000006217786

1.CHECK HIGH PRESSURE FUEL PUMP-I

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

+	_	Condition		
High pressu	re fuel pump			Resistance
Terr	ninal			
1	2	Temperature °C (°F)	20 - 30 (68 - 86)	9 - 11 Ω

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace high pressure fuel pump. Refer to <u>EM-49, "Removal and Installation"</u>.

EC-196

P0087, P0088, P0090 FRP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

2.CHECK HIGH PRESSURE FUEL PUMP-II

WITH CONSULT-III

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

Data monitor item	Condition	Voltage (Approx.)
FUEL PRES SEN V	Engine speed: idle	980 – 1,200 mV
TOLL FILLS SLIN V	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,100 – 2,900 mV

WITHOUT CONSULT-III

1. Start the engine.

2. Check fuel rail pressure sensor signal voltage.

	+		– Condition Value (Approx.)		F
Fuel rail pr	essure sensor	-			
Connector	Terminal			(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
F26	2	Ground	Engine speed: idle	0.98 – 1.2 V	G
120	2	Orbana	Engine speed: Revving engine from idle to 4,000 rpm quickly	1.1 – 2.9 V	-

YES >> INSPECTION END

NO >> Replace high pressure fuel pump. Refer to <u>EM-43</u>, "Removal and Installation".

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P008A LOW FUEL PRESSURE CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

P008A LOW FUEL PRESSURE CONTROL SYSTEM

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P008A is displayed with DTC P1197, first perform the trouble diagnosis for DTC P1197. Refer to <u>EC-397, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P008A	Low fuel pressure too low	A condition of low fuel pressure 0.23 MPa (2.3 bar, 2.346 kg/cm ² , 33.35 psi) or less continues for 5 seconds or more after warming up the engine.	 Harness or connectors (The low pressure fuel pump circuit is open or shorted.) Low pressure fuel pump Fuel pressure regulator Low pressure fuel system Out of gas

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Check that the fuel tank is 1/8 full of fuel.
- 2. Start the engine and warm it up to the normal operating temperature. **NOTE:**
 - When replacing ECM, warm up the engine until "COOLAN TEMP/S" on "DATA MONITOR" of CONSULT-III reaches at least 70°C (158°F).
- 3. Let the engine at idle for 60 seconds.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to <u>EC-398, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217788

1.PERFORM LOW PRESSURE FUEL PUMP COMPONENT FUNCTION CHECK

Refer to EC-512, "Component Function Check".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform low pressure fuel pump diagnosis. Refer to EC-512, "Diagnosis Procedure".

2. CHECK FUEL LEAKAGE

1. Start the engine.

2. Visually check that the low fuel pressure system has no fuel leakage.

Is inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

 ${\it 3.}$ CHECK LOW PRESSURE FUEL PIPING AND HOSE

1. Turn ignition switch OFF.

P008A LOW FUEL PRESSURE CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD] Check that the low pressure fuel piping and hose have no breakage, bend, and crush. Refer to FL-4. 2. "Inspection". А Is inspection result normal? YES >> Replace fuel level sensor unit and fuel pump (fuel pressure regulator malfunction). Refer to FL-5. "Removal and Installation". EC NO >> Repair or replace error-detected parts. С D Е F G Н J Κ L

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P008B LOW FUEL PRESSURE CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

P008B LOW FUEL PRESSURE CONTROL SYSTEM

DTC Logic

INFOID:000000006288272

[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P008B	Low fuel pressure too high	A condition of low fuel pressure 0.67 MPa (6.7 bar, 6.834 kg/cm ² , 97.15 psi) or more continues for 5 seconds or more after warming up the engine.	 Harness or connectors (The low pressure fuel pump circuit is open or shorted.) Fuel pressure regulator

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 11 V or more at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start the engine and keep the engine speed at idle for 60 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-200, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK FUEL PUMP CONTROL MODULE (FPCM) SIGNAL

Refer to EC-405, "Component Inspection (FPCM)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace FPCM. Refer to <u>EC-537</u>, "Removal and Installation".

2.CHECK FUEL PUMP CONTROL CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect FPCM harness connector and fuel level sensor unit and fuel pump harness connector.
- Check the continuity between FPCM harness connector and fuel level sensor unit and fuel pump harness connector.

FF	РСМ	Fuel level sensor unit and fuel pump		Continuity
Connector	Terminal	Connector	Terminal	Continuity
B41	6	C5	3	Existed
D41	7		1	Existed

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

Is inspection result normal?

- YES >> Replace fuel level sensor unit and fuel pump (fuel pressure regulator malfunction). Refer to <u>FL-5</u>, <u>"Removal and Installation"</u>.
- NO >> Repair or replace error-detected parts.

INFOID:000000006288273

< DTC/CIRCUIT DIAGNOSIS >

P0102, P0103 MAF SENSOR

DTC Logic

А

EC

INFOID:000000006217789

[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0102	MAF SEN/CIRCUIT-B1 (Mass air flow sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	 Harness or connectors (The mass air flow sensor circuit is open or shorted.) Intake air leakage Mass air flow sensor
P0103	MAF SEN/CIRCUIT-B1 (Mass air flow sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	 Harness or connectors (The mass air flow sensor circuit is open or shorted.) Mass air flow sensor
	NFIRMATION PROCE	DURE	
least 10 s <u>Which D⁻</u> P0102 P0103 2. PERF	seconds before conductin <u>FC is detected?</u> >> GO TO 2. >> GO TO 3. ORM DTC CONFIRMATI	ON PROCEDURE FOR DTC P0102	
2. Chec Is DTC d YES NO 3.PERF	>> Go to <u>EC-201, "Diagno</u> >> INSPECTION END ORM DTC CONFIRMATI	o <u>sis Procedure"</u> . ON PROCEDURE FOR DTC P0103-I	
2. Cheo Is DTC do YES NO	>> Go to <u>EC-201, "Diagne</u> >> GO TO 4.		
1. Start 2. Chec Is DTC d YES	engine and wait at least k DTC.	5 seconds.	
Diagno	sis Procedure		INFOID:00000006217790
1.INSPE	ECTION START		
Which D ⁻ P0102 P0103	he detected DTC. <u>FC is detected?</u> >> GO TO 2. >> GO TO 3. K INTAKE SYSTEM		
	K INTAKE SYSTEM		

Check the following for connection.

< DTC/CIRCUIT DIAGNOSIS >

• 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 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	MAF sensor		Voltage
Connector	Terminal	Ground	voltage
F31	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

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

• Loose or poor connection for each connector and harness

>> Repair open circuit, 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	MAF sensor		ECM	
Connector	Terminal	Connector	Terminal	Continuity
F31	4	F111	25	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.

 $\mathbf{6}$.CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between MAF sensor harness connector and ECM harness connector.

MAF	MAF sensor		ECM	
Connector	Terminal	Connector	Terminal	Continuity
F31	3	F111	22	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, short to ground or short to power in harness or connectors.

7.CHECK MASS AIR FLOW SENSOR

Refer to <u>EC-203</u>, "Component Inspection (MAF Sensor)". Is the inspection result normal?

Revision: 2010 May

DTC/CIRCL	JIT DIAGNOSIS	S >			[VK56VD]
	O TO 8.			<i></i>	
	•		r to EM-27, "Exploded V	<u>'iew"</u> .	
efer to <u>GI-40</u>	<u>, "Intermittent In</u>	<u>cident"</u> .			
>> IN	ISPECTION ENI	D			
omponent	t Inspection ((MAF Sensor)			INFOID:00000006290102
.CHECK MA	ASS AIR FLOW	SENSOR-I			
	SULT-III				
	on switch OFF. t all harness cor	nnectors disconne	ected		
Start engir	ne and warm it u	p to normal opera	ating temperature.		
		d select "DATA MO and check the ind			
Monitor item		Condition		Indication (
	_	N (Engine stopped.)	··· · · · · ·	Approx. 0.	
IAS A/F SE-B1			perating temperature.) rmal operating temperature.)	0.9 - 1.1	
	Idle to about 4,00		mai operating temperature.)	0.9 - 1.1 to Appr	
* Check for	-	•			
WITHOUT (Turn igniti Reconnec	CONSULT-III on switch OFF. t all harness cor	nnectors disconne		0 rpm.	
WITHOUT (Turn igniti Reconnec Start engir	CONSULT-III on switch OFF. at all harness cor ne and warm it u voltage betwee	nnectors disconne p to normal opera			conditions.
WITHOUT (Turn igniti Reconnec Start engir	CONSULT-III on switch OFF. t all harness cor ne and warm it u	nnectors disconne p to normal opera	ected. ating temperature.		
WITHOUT (Turn igniti Reconnec Start engir Check the	CONSULT-III on switch OFF. at all harness cor ne and warm it u voltage betwee ECM	nnectors disconne p to normal opera	ected. ating temperature. onnector terminals unde		conditions. Voltage (V)
WITHOUT (Turn igniti Reconnec Start engir Check the	CONSULT-III on switch OFF. et all harness cor ne and warm it u e voltage betwee ECM +	nnectors disconne p to normal opera n ECM harness c –	ected. ating temperature. onnector terminals unde	er the following	
WITHOUT (Turn igniti Reconnec Start engir Check the	CONSULT-III on switch OFF. et all harness cor ne and warm it u e voltage betwee ECM +	nnectors disconne ip to normal opera n ECM harness c 	ected. ating temperature. onnector terminals unde Condition	er the following stopped.)	Voltage (V)
WITHOUT (Turn igniti Reconnec Start engir Check the	CONSULT-III on switch OFF. et all harness cor ne and warm it u e voltage betwee ECM + Terminal	nnectors disconne p to normal opera n ECM harness c –	ected. ating temperature. onnector terminals unde Condition Ignition switch ON (Engine s Idle (Engine is warmed-up t	er the following stopped.)	Voltage (V) Approx. 0.4
WITHOUT (Turn ignition Reconnector Start engin Check the	CONSULT-III on switch OFF. et all harness cor ne and warm it u e voltage betwee ECM + Terminal	nnectors disconne ip to normal opera n ECM harness c 	ected. ating temperature. onnector terminals unde Condition Ignition switch ON (Engine s Idle (Engine is warmed-up t ing temperature.) 2,500 rpm (Engine is warmed	er the following stopped.)	Voltage (V) Approx. 0.4 0.9 - 1.1
WITHOUT (Turn igniti Reconnec Start engir Check the Connector F111 (M *: Check for	CONSULT-III on switch OFF. et all harness cor ne and warm it u e voltage betwee ECM + Terminal 22 IAF sensor signal)	nnectors disconne p to normal opera n ECM harness c 	ected. ating temperature. onnector terminals unde Condition Ignition switch ON (Engine s Idle (Engine is warmed-up t ing temperature.) 2,500 rpm (Engine is warmed operating temperature.)	er the following stopped.) o normal operat- ed-up to normal	Voltage (V) Approx. 0.4 0.9 - 1.1 1.4 - 1.9
WITHOUT (Turn igniti Reconnec Start engir Check the Connector F111 (M *: Check for the inspectio	CONSULT-III on switch OFF. It all harness cor ne and warm it u voltage betwee ECM + Terminal 22 IAF sensor signal) linear voltage rise ir on result normal	nnectors disconne p to normal opera n ECM harness c 	ected. ating temperature. onnector terminals unde Condition Ignition switch ON (Engine Idle (Engine is warmed-up t ing temperature.) 2,500 rpm (Engine is warme operating temperature.) Idle to about 4,000 rpm	er the following stopped.) o normal operat- ed-up to normal	Voltage (V) Approx. 0.4 0.9 - 1.1 1.4 - 1.9
WITHOUT (Turn ignition Reconnector Start engire Check the connector F111 (M *: Check for the inspection 'ES >> IN	CONSULT-III on switch OFF. et all harness cor ne and warm it u e voltage betwee ECM + Terminal 22 IAF sensor signal)	nnectors disconne p to normal opera n ECM harness c 	ected. ating temperature. onnector terminals unde Condition Ignition switch ON (Engine Idle (Engine is warmed-up t ing temperature.) 2,500 rpm (Engine is warme operating temperature.) Idle to about 4,000 rpm	er the following stopped.) o normal operat- ed-up to normal	Voltage (V) Approx. 0.4 0.9 - 1.1 1.4 - 1.9
WITHOUT (Turn ignition Reconnector Start engire Check the Connector F111 (M *: Check for the inspection ES >> IN IO >> Getting	CONSULT-III on switch OFF. et all harness cor ne and warm it u voltage betwee ECM + Terminal 22 IAF sensor signal) linear voltage rise ir on result normal ISPECTION ENI O TO 2.	nnectors disconne p to normal opera n ECM harness c 	ected. ating temperature. onnector terminals unde Condition Ignition switch ON (Engine Idle (Engine is warmed-up t ing temperature.) 2,500 rpm (Engine is warme operating temperature.) Idle to about 4,000 rpm	er the following of the stopped.) o normal operat- ed-up to normal 0 rpm.	Voltage (V) Approx. 0.4 0.9 - 1.1 1.4 - 1.9 0.9 - 1.1 to Approx. 2.4*
WITHOUT (Turn ignitic Reconnector Start engir Check the Connector F111 (M *: Check for the inspection ES >> IN IO >> GO CHECK FC Turn ignitic	CONSULT-III on switch OFF. et all harness cor- ne and warm it u voltage betwee ECM + Terminal 22 IAF sensor signal) linear voltage rise ir on result normal ISPECTION ENI O TO 2. DR THE CAUSE on switch OFF.	nnectors disconne p to normal opera n ECM harness c 	Condition Ignition switch ON (Engine s Idle (Engine is warmed-up t ing temperature.) 2,500 rpm (Engine is warmed-up t operating temperature.) Idle to about 4,000 rpm Decing increased to about 4,000	er the following of stopped.) o normal operat- ed-up to normal 0 rpm.	Voltage (V) Approx. 0.4 0.9 - 1.1 1.4 - 1.9 0.9 - 1.1 to Approx. 2.4* SENSOR
WITHOUT (Turn ignitic Reconnec Start engir Check the Connector F111 (M *: Check for the inspectio /ES >> IN JO >> GO .CHECK FC Turn ignitic Check for	CONSULT-III on switch OFF. et all harness cor ne and warm it u voltage betwee ECM + Terminal 22 IAF sensor signal) linear voltage rise ir on result normal ISPECTION ENI O TO 2. OR THE CAUSE on switch OFF. the cause of un-	nnectors disconne p to normal opera n ECM harness c 	ccted. ating temperature. onnector terminals under Condition Ignition switch ON (Engine s Idle (Engine is warmed-up t ing temperature.) 2,500 rpm (Engine is warmed-up t operating temperature.) Idle to about 4,000 rpm being increased to about 4,000	er the following of stopped.) o normal operat- ed-up to normal 0 rpm.	Voltage (V) Approx. 0.4 0.9 - 1.1 1.4 - 1.9 0.9 - 1.1 to Approx. 2.4* SENSOR
WITHOUT (Turn ignitic Reconnec Start engir Check the Connector F111 (M *: Check for the inspectio (ES >> IN NO >> Ge CHECK FC Turn ignitic Check for Crushed a Malfunctio	CONSULT-III on switch OFF. It all harness cor- ne and warm it u voltage betwee ECM + Terminal 22 IAF sensor signal) linear voltage rise in on result normal ISPECTION ENI O TO 2. OR THE CAUSE on switch OFF. the cause of un- air ducts oning seal of air of	nnectors disconne p to normal opera n ECM harness c 	Condition Ignition switch ON (Engine s Idle (Engine is warmed-up t ing temperature.) 2,500 rpm (Engine is warmed-up t operating temperature.) Idle to about 4,000 rpm Decing increased to about 4,000	er the following of stopped.) o normal operat- ed-up to normal 0 rpm.	Voltage (V) Approx. 0.4 0.9 - 1.1 1.4 - 1.9 0.9 - 1.1 to Approx. 2.4* SENSOR
WITHOUT (Turn ignitic Reconnec Start engir Check the Connector F111 (M *: Check for the inspectio (ES >> IN IO >> GO .CHECK FC Turn ignitic Check for Crushed a Malfunctic Uneven di	CONSULT-III on switch OFF. et all harness cor ne and warm it u voltage betwee ECM + Terminal 22 IAF sensor signal) linear voltage rise ir on result normal ISPECTION ENI O TO 2. DR THE CAUSE on switch OFF. the cause of un- air ducts oning seal of air of air of air cleaner	nnectors disconne p to normal opera n ECM harness c 	ected. ating temperature. onnector terminals under Condition Ignition switch ON (Engine s Idle (Engine is warmed-up t ing temperature.) 2,500 rpm (Engine is warmed- operating temperature.) Idle to about 4,000 rpm being increased to about 4,000 R FLOW THROUGH MA	er the following of stopped.) o normal operat- ed-up to normal 0 rpm.	Voltage (V) Approx. 0.4 0.9 - 1.1 1.4 - 1.9 0.9 - 1.1 to Approx. 2.4* SENSOR
WITHOUT (Turn ignitic Reconnec Start engir Check the Connector F111 (M *: Check for the inspectic (ES >> IN IO >> Go .CHECK FC Turn ignitic Check for Crushed a Malfunctic Uneven di Improper s	CONSULT-III on switch OFF. et all harness cor- ne and warm it u voltage betwee ECM + Terminal 22 IAF sensor signal) linear voltage rise in on result normal ISPECTION ENI O TO 2. OR THE CAUSE on switch OFF. the cause of un- air ducts oning seal of air of air cleaner specification of i	nnectors disconne p to normal opera n ECM harness c 	ected. ating temperature. onnector terminals under Condition Ignition switch ON (Engine s Idle (Engine is warmed-up t ing temperature.) 2,500 rpm (Engine is warmed- operating temperature.) Idle to about 4,000 rpm being increased to about 4,000 R FLOW THROUGH MA	er the following of stopped.) o normal operat- ed-up to normal 0 rpm.	Voltage (V) Approx. 0.4 0.9 - 1.1 1.4 - 1.9 0.9 - 1.1 to Approx. 2.4* SENSOR
WITHOUT (Turn ignitic Reconnec Start engir Check the Connector F111 (M *: Check for the inspectio (ES >> IN NO >> GO .CHECK FC Turn ignitic Check for Crushed a Malfunctio Uneven di Improper s the inspectio (ES >> GO	CONSULT-III on switch OFF. et all harness cor ne and warm it u voltage betwee ECM + Terminal 22 IAF sensor signal) linear voltage rise ir on result normal ISPECTION ENI O TO 2. DR THE CAUSE on switch OFF. the cause of un- air ducts oning seal of air of air of air cleaner	nnectors disconne p to normal opera n ECM harness c 	ected. ating temperature. onnector terminals under Condition Ignition switch ON (Engine s Idle (Engine is warmed-up t ing temperature.) 2,500 rpm (Engine is warmed- operating temperature.) Idle to about 4,000 rpm being increased to about 4,000 R FLOW THROUGH MA	er the following of stopped.) o normal operat- ed-up to normal 0 rpm.	Voltage (V) Approx. 0.4 0.9 - 1.1 1.4 - 1.9 0.9 - 1.1 to Approx. 2.4* SENSOR

< DTC/CIRCUIT DIAGNOSIS >

3. CHECK MASS AIR FLOW SENSOR-II

BWITH CONSULT-III

- 1. Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Connect CONSULT-III and select "DATA MONITOR" mode.
- 4. Select "MAS A/F SE-B1"", and check the indication.

Monitor item	Condition	Indication (V)
	Ignition switch ON (Engine stopped.)	Approx. 0.4
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1
MAS AN SE-DI	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9
	Idle to about 4,000 rpm	0.9 - 1.1 to Approx. 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

WITHOUT CONSULT-III

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 terminals under the following conditions.

ECM					
Connector	+ –		Condition	Voltage (V)	
Connector	Terminal	Terminal			
		25	Ignition switch ON (Engine stopped.)	Approx. 0.4	
F111	22		Idle (Engine is warmed-up to normal operat- ing temperature.)	0.9 - 1.1	
1 111	(MAF sensor signal)	23	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9	
			Idle to about 4,000 rpm	0.9 - 1.1 to Approx. 2.4*	

*: 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

BWITH CONSULT-III

- 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-III and select "DATA MONITOR" mode.
- 5. Select "MAS A/F SE-B1", and check the indication.

Monitor item	Condition	Indication (V)
	Ignition switch ON (Engine stopped.)	Approx. 0.4
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1
MAS AN SE-BI	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9
	Idle to about 4,000 rpm	0.9 - 1.1 to Approx. 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

WITHOUT CONSULT-III

- 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 terminals under the following conditions.

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[VK56VD]

	ECM			
Connector	+	_	Condition	Voltage (V)
Connector	Terminal	Terminal		
			Ignition switch ON (Engine stopped.)	Approx. 0.4
F111	22	25	Idle (Engine is warmed-up to normal operat- ing temperature.)	0.9 - 1.1
FIII	(MAF sensor signal)	23	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9
			Idle to about 4,000 rpm	0.9 - 1.1 to Approx. 2.4
	> INSPECTION EN > Clean or replace r		ass air flow sensor. Refer to <u>EM-27, "Re</u>	emoval and Installatio

< DTC/CIRCUIT DIAGNOSIS >

P0106 MANIFOLD ABSOLUTE PRESSURE SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0106 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0106	ABSL PRES SEN/CIRC [Manifold absolute pressure (MAP) circuit range/performance]	A difference exceeding the specified value develops between a value transmitted from the manifold abso- lute pressure (MAP) sensor to ECM and an estimated intake pressure of intake manifold calculated by ECM.	 Harness or connectors (The manifold absolute pressure (MAP) sensor circuit is open or shorted.) manifold absolute pressure (MAP) sensor Intake air leaks

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 engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch ON) instead of running engine at idle speed.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

(I) WITH CONSULT-III

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Accelerate the vehicle from 0 to 88 km/h (0 to 55 MPH) under the following conditions:

CAUTION: Always drive at a safe speed.

NOTE:

- Accelerate with the accelerator pedal kept constant.
- The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.

ACCEL SEN 1	1.4 – 2.0 V
Selector lever	D position

4. Check 1st trip DTC.

- **WITHOUT CONSULT-III**
- 1. Start engine and warm it up to normal operating temperature.
- 2. Drive the vehicle under the following conditions.
- 3. With selector lever in D position, accelerate the vehicle from 0 to 88 km/h (0 to 55 MPH) under the following conditions:

CAUTION: Always drive at a safe speed.

NOTÉ:

- Accelerate with the accelerator pedal kept constant.
- The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.

EC-206

INFOID:00000006288274

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

	aitian concert				
Accelerator pedal po		Ground	Voltage (V)		
Connector	Terminal				
E110 (Without ICC)	3	Ground	1.4 – 2.0		
E67 (With ICC)	10				
4. Check 1st trip					
ls 1st trip DTC dete					
	ed to <u>EC-207.</u> ECTION END	"Diagnosis P	rocedure".		
Diagnosis Proc	cedure				INF01D:000000062882
	E SYSTEM				
Check the following	g for connecti	on.			
Air duct					
 Vacuum hoses Intake air passag 	ne between ai	r duct and inta	ake manifold		
Is the inspection re	•				
YES >> GO TO					
^	r or replace m	-	•		
2.CHECK MANIF	OLD ABSOL	UTE PRESSI	JRE (MAP) SE	NSOR POWER SUP	PLY CIRCUIT FOR OPE
AND SHORT					
		te pressure (N	/IAP) sensor ha	rness connector.	
 Turn ignition s¹ Check the volt 					
			aluta progouro /	MAD) concer hornood	aconstate and around
	age between	manifold abso	olute pressure (MAP) sensor harness	connector and ground.
	-		olute pressure (MAP) sensor harness	connector and ground.
	bsolute pressure		blute pressure (MAP) sensor harness Ground	connector and ground. Voltage (V)
Manifold a	-	(MAP) sensor	blute pressure (
Manifold a Connector F65	bsolute pressure	(MAP) sensor Terminal	blute pressure (Ground	Voltage (V)
Manifold a Connector F65	bsolute pressure	(MAP) sensor Terminal	blute pressure (Ground	Voltage (V)
Manifold a Connector F65 Is the inspection re YES >> GO TO	bsolute pressure	(MAP) sensor Terminal 1		Ground	Voltage (V) Approx. 5
Manifold a Connector F65 Is the inspection re YES >> GO TC NO >> Repair	bsolute pressure esult normal? D 3. r open circuit,	(MAP) sensor Terminal 1 short to groui	nd or short to po	Ground Ground Ower in harness or cor	Voltage (V) Approx. 5
Manifold a Connector F65 Is the inspection re YES >> GO TO NO >> Repair 3. CHECK MANIF	bsolute pressure esult normal? D 3. r open circuit,	(MAP) sensor Terminal 1 short to groui	nd or short to po	Ground Ground Ower in harness or cor	Voltage (V) Approx. 5
Manifold a Connector F65 Is the inspection re YES >> GO TO NO >> Repair 3. CHECK MANIF SHORT 1. Turn ignition s	bsolute pressure esult normal? O 3. r open circuit, FOLD ABSOL witch OFF.	(MAP) sensor Terminal 1 short to groui UTE PRESS	nd or short to po	Ground Ground Ower in harness or cor	Voltage (V) Approx. 5
Manifold a Connector F65 Is the inspection re YES >> GO TO NO >> Repair 3. CHECK MANIF SHORT 1. Turn ignition so 2. Disconnect EC	bsolute pressure esult normal? O 3. r open circuit, FOLD ABSOL witch OFF. CM harness co	(MAP) sensor Terminal 1 short to groun UTE PRESS	nd or short to po	Ground Ground Ower in harness or cor ENSOR GROUND C	Voltage (V) Approx. 5 nnectors. IRCUIT FOR OPEN AN
Manifold a Connector F65 Is the inspection re YES >> GO TC NO >> Repair 3. CHECK MANIF SHORT 1. Turn ignition s 2. Disconnect EC 3. Check the con	bsolute pressure esult normal? O 3. r open circuit, FOLD ABSOL witch OFF. CM harness continuity betwee	(MAP) sensor Terminal 1 short to groun UTE PRESS	nd or short to po	Ground Ground Ower in harness or cor ENSOR GROUND C	Voltage (V) Approx. 5
Manifold a Connector F65 Is the inspection re YES >> GO TO NO >> Repair 3. CHECK MANIF SHORT 1. Turn ignition so 2. Disconnect EC	bsolute pressure esult normal? O 3. r open circuit, FOLD ABSOL witch OFF. CM harness continuity betwee	(MAP) sensor Terminal 1 short to groun UTE PRESS	nd or short to po	Ground Ground Ower in harness or cor ENSOR GROUND C	Voltage (V) Approx. 5 nnectors. IRCUIT FOR OPEN AN
Manifold a Connector F65 Is the inspection re YES >> GO TC NO >> Repair 3. CHECK MANIF SHORT 1. Turn ignition s 2. Disconnect EC 3. Check the con	bsolute pressure esult normal? O 3. r open circuit, FOLD ABSOL witch OFF. CM harness co tinuity betwee or.	(MAP) sensor Terminal 1 short to groun UTE PRESS onnector.	nd or short to po	Ground Ground Ower in harness or cor ENSOR GROUND C	Voltage (V) Approx. 5 INECUIT FOR OPEN ANI
Manifold a Connector F65 Is the inspection re YES >> GO TC NO >> Repair 3. CHECK MANIF SHORT 1. Turn ignition so 2. Disconnect EC 3. Check the con ness connector	bsolute pressure esult normal? O 3. r open circuit, FOLD ABSOL witch OFF. CM harness co tinuity betwee or.	(MAP) sensor Terminal 1 short to groun UTE PRESS onnector. on manifold at	nd or short to po	Ground Ground Ower in harness or cor ENSOR GROUND C e (MAP) sensor harnes	Voltage (V) Approx. 5 nnectors. IRCUIT FOR OPEN AN
Manifold a Connector F65 Is the inspection re YES >> GO TC NO >> Repair 3. CHECK MANIF SHORT 1. Turn ignition st 2. Disconnect EC 3. Check the con ness connecto Manifold absolute	bsolute pressure esult normal? O 3. r open circuit, FOLD ABSOL witch OFF. CM harness co tinuity betwee or.	(MAP) sensor Terminal 1 short to groun UTE PRESS onnector. on manifold at sensor	Desolute pressure	Ground Ground Ower in harness or cor ENSOR GROUND C e (MAP) sensor harnes ECM	Voltage (V) Approx. 5 INECUIT FOR OPEN ANI
Manifold a Connector F65 Is the inspection re YES >> GO TC NO >> Repair 3. CHECK MANIF SHORT 1. Turn ignition s 2. Disconnect EC 3. Check the con ness connector Manifold absolute Connector	bsolute pressure esult normal? O 3. r open circuit, FOLD ABSOL witch OFF. CM harness co thinuity betwee or.	(MAP) sensor Terminal 1 short to groun UTE PRESS onnector. on manifold at sensor hinal 3	Desolute pressure	Ground Ground Ower in harness or cor ENSOR GROUND C e (MAP) sensor harnes ECM Terminal	Voltage (V) Approx. 5 INCUIT FOR OPEN ANI ass connector and ECM ha Continuity
Manifold a Connector F65 Is the inspection re YES >> GO TC NO >> Repair 3. CHECK MANIF SHORT 1. Turn ignition st 2. Disconnect EC 3. Check the con ness connector Manifold absolute Connector F65	bsolute pressure esult normal? D 3. r open circuit, FOLD ABSOL witch OFF. CM harness co tinuity betwee or. e pressure (MAP) Term	(MAP) sensor Terminal 1 short to groun UTE PRESS onnector. on manifold at sensor hinal 3	Desolute pressure	Ground Ground Ower in harness or cor ENSOR GROUND C e (MAP) sensor harnes ECM Terminal	Voltage (V) Approx. 5 INCUIT FOR OPEN ANI ass connector and ECM ha Continuity
Manifold a Connector F65 Is the inspection re YES >> GO TC NO >> Repair 3. CHECK MANIF SHORT 1. Turn ignition s 2. Disconnect EC 3. Check the con ness connector Manifold absolute Connector F65 4. Also check hau Is the inspection re YES >> GO TC	bsolute pressure esult normal? O 3. r open circuit, FOLD ABSOL witch OFF. CM harness continuity between or. e pressure (MAP) Term continuity between or. e pressure (MAP) Term CM harness for shore or.	(MAP) sensor Terminal 1 short to groun UTE PRESS onnector. on manifold at sensor hinal t to ground ar	and or short to po URE (MAP) S posolute pressure Connector F110 and power.	Ground Ground Ground Dever in harness or cor ENSOR GROUND C (MAP) sensor harnes ECM Terminal 70	Voltage (V) Approx. 5 Approx. 5 Approx. 5 Approx. 6 Approx. 6 Approx. 7 Appr
Manifold a Connector F65 Is the inspection re YES >> GO TC NO >> Repair 3. CHECK MANIF SHORT 1. Turn ignition so 2. Disconnect EC 3. Check the con ness connector Manifold absolute Connector F65 4. Also check hat Is the inspection re YES >> GO TC NO >> Repair	bsolute pressure esult normal? O 3. r open circuit, FOLD ABSOL witch OFF. CM harness co tinuity betwee or. e pressure (MAP) ferm sorness for shor esult normal? O 4. r open circuit,	(MAP) sensor Terminal 1 short to groun UTE PRESS onnector. on manifold at sensor ninal t to ground ar short to groun	and or short to posolute pressure Connector F110 and power. and or short to po	Ground Ground Ground Dwer in harness or cor ENSOR GROUND C (MAP) sensor harnes ECM Terminal 70 Dwer in harness or cor	Voltage (V) Approx. 5 Approx. 5 Annectors. IRCUIT FOR OPEN ANI ass connector and ECM ha Continuity Existed Annectors.
Manifold a Connector F65 Is the inspection re YES >> GO TC NO >> Repair 3. CHECK MANIF SHORT 1. Turn ignition so 2. Disconnect EC 3. Check the con ness connector Manifold absolute Connector F65 4. Also check hat Is the inspection re YES >> GO TC NO >> Repair	bsolute pressure esult normal? O 3. r open circuit, FOLD ABSOL witch OFF. CM harness co tinuity betwee or. e pressure (MAP) ferm sorness for shor esult normal? O 4. r open circuit,	(MAP) sensor Terminal 1 short to groun UTE PRESS onnector. on manifold at sensor ninal t to ground ar short to groun	and or short to posolute pressure Connector F110 and power. and or short to po	Ground Ground Ground Dwer in harness or cor ENSOR GROUND C (MAP) sensor harnes ECM Terminal 70 Dwer in harness or cor	Voltage (V) Approx. 5 Approx. 5 Approx. 5 Approx. 6 Approx. 6 Approx. 7 Appr

Revision: 2010 May

ness connector.

EC-207

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

Manifold absolute pressure (MAP) sensor		E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F65	2	F110	67	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

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

 ${f 5.}$ CHECK MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

Refer to EC-208. "Component Inspection (MAP Sensor)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace manifold absolute pressure (MAP) sensor. Refer to EM-30, "Exploded View".

6.CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (MAP Sensor)

INFOID:000000006288276

1.CHECK MAP SENSOR-I

1. Turn ignition switch OFF.

- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
- 4. Check the voltage between ECM harness connector terminals as follows.

	ECM			
	+		-	
Connector	Terminal	Connector	Terminal	
F110	F110 67		70	

NOTE:

- To avoid the influence of intake manifold vacuum, check the voltage 1 or more minutes past after engine is stopped.
- Because the sensor is absolute pressure sensor, output value may differ depending on atmospheric pressure and altitude.
- 5. Measure the atmospheric pressure.

NOTE:

As the atmospheric pressure described on the synoptic chart is the value at sea level, compensate the pressure with the following chart.

Altitude (m)	Compensated pressure (hPa)
0	0
200	-24
400	-47
600	-70
800	-92
1000	-114
1500	-168
2000	-218

6. Check the manifold absolute pressure sensor value corresponding to the atmospheric pressure.

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

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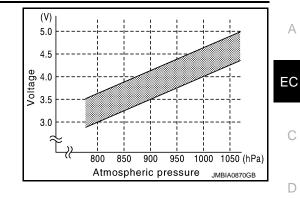
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Atmospheric pressure (hPa)	Voltage (V)
800	3.1 – 3.7
850	3.3 – 3.9
900	3.5 – 4.1
950	3.8 - 4.3
1000	4.0 - 4.6
1050	4.2 - 4.8



Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace MAP sensor.

2.CHECK MAP SENSOR-II

1. Start engine and let it idle.

2. Check intake manifold vacuum.

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

	ECM				
	+		_		
Connector	Terminal	Connector	Terminal		
F110	67	F110	70		

4. Confirm the difference of the voltage when engine is stopped and at idling is within the values shown in the following chart.

Intake manifold vacuum [kPA (mmHg)]	Voltage difference (V)
-40 (-300)	1.5 – 2.0
-53.3 (-400)	2.0 - 2.6
-66.7 (-500)	2.6 - 3.2
-80 (-600)	3.2 - 3.8

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace MAP sensor.

< DTC/CIRCUIT DIAGNOSIS >

P010A MANIFOLD ABSOLUTE PRESSURE SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P010A is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-381, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P010A	ABSL PRES SEN/CIRC	 An excessively low voltage from	 Harness or connectors
	[Manifold absolute pressure (MAP)	the sensor is sent to ECM. An excessively high voltage from	(Manifold absolute pressure sen-
	sensor circuit]	the sensor is sent to ECM.	sor circuit is shorted.) Manifold absolute pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 10 seconds.
- 2. Check DTC.

Is DTC detected?

- YES >> Go to EC-210, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217793

1.CHECK MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect manifold absolute pressure (MAP) sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between manifold absolute pressure (MAP) sensor harness connector and ground.

Manifold absolute pressure (MAP) sensor		Ground	Voltage (V)
Connector	Terminal	Ground	vollage (v)
F65	1	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 2.

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

2.CHECK MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.

3. Check the continuity between manifold absolute pressure (MAP) sensor harness connector and ECM harness connector.

Manifold absolute pressure (MAP) sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F65	3	F110	70	Existed

INFOID:000000006217792

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

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

Is the inspection result normal?

YES >> GO TO 3.

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

 $\mathbf{3}.$ check manifold absolute pressure (MAP) sensor input signal circuit for open and short

Check the continuity between manifold absolute pressure (MAP) sensor harness connector and ECM harness connector.

	Manifold absolute pres	ssure (MAP) sensor	EC	CM	Continuity	D
	Connector	Terminal	Connector	Terminal	Continuity	
	F65	2	F110	67	Existed	_
2	Also check harness	s for short to around	and short to power			E

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 MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

Refer to EC-211, "Component Inspection (MAP Sensor)".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace manifold absolute pressure (MAP) sensor. Refer to <u>EM-30, "Exploded View"</u>.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (MAP Sensor)	Component	Inspection	(MAP	Sensor)
-----------------------------------	-----------	------------	------	---------

1. CHECK MAP SENSOR-I	
------------------------------	--

- 1. Turn ignition switch OFF.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
- 4. Check the voltage between ECM harness connector terminals as follows.

ECM					
	+	_			
Connector	Terminal	Connector	Terminal		
F110	67	F110	70		

NOTE:

- To avoid the influence of intake manifold vacuum, check the voltage 1 or more minutes past after engine is stopped.
- Because the sensor is absolute pressure sensor, output value may differ depending on atmospheric pressure and altitude.
- 5. Measure the atmospheric pressure.

NOTE:

As the atmospheric pressure described on the synoptic chart is the value at sea level, compensate the pressure with the following chart.

Altitude (m)	Compensated pressure (hPa)
0	0
200	-24

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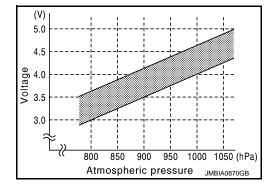
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< DTC/CIRCUIT DIAGNOSIS >

Altitude (m)	Compensated pressure (hPa)
400	-47
600	-70
800	-92
1000	-114
1500	-168
2000	-218

6. Check the manifold absolute pressure sensor value corresponding to the atmospheric pressure.

Atmospheric pressure (hPa)	Voltage (V)
800	3.1 – 3.7
850	3.3 - 3.9
900	3.5 – 4.1
950	3.8 - 4.3
1000	4.0 - 4.6
1050	4.2 - 4.8



Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace MAP sensor.

2.CHECK MAP SENSOR-II

1. Start engine and let it idle.

2. Check intake manifold vacuum.

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

ECM					
+		-			
Connector	Terminal	Connector	Terminal		
F110	67	F110	70		

4. Confirm the difference of the voltage when engine is stopped and at idling is within the values shown in the following chart.

Intake manifold vacuum [kPA (mmHg)]	Voltage difference (V)
-40 (-300)	1.5 – 2.0
-53.3 (-400)	2.0 – 2.6
-66.7 (-500)	2.6 - 3.2
-80 (-600)	3.2 - 3.8

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace MAP sensor.

P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

DTC DETECTION LOGIC

P0112, P0113 IAT SENSOR

DTC Logic

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INFOID:000000006217795

[VK56VD]

DTC No.		diagnosis na liagnosis cor		DTC detecting condition	Possible cause
P0112	IAT SEN/CI (Intake air te circuit low in	emperature s		excessively low voltage from the sensor sent to ECM.	Harness or connectors (The intake air temperature sensor cir-
P0113	IAT SEN/CI (Intake air te circuit high	emperature s	ensor	excessively high voltage from the sensor sent to ECM.	cuit is open or shorted.)Intake air temperature sensor
DTC CON 1.PRECC			CEDURE	1	
1. Turn ig 2. Turn ig	gnition swit	tch OFF ai tch ON.		least 10 seconds. least 10 seconds.	
~	> GO TO 2 RM DTC (ATION PI	ROCEDURE	
2. Check	1st trip D	TC.	d wait at l	east 5 seconds.	
	<u>DTC detec</u> > Go to <u>E(</u> > INSPEC	C-213, "Dia		rocedure".	
Diagnos	is Proce	dure			INFOID:00000006217796
				E SENSOR POWER SUPPLY CI	
2. Turn ig	gnition swit	tch ON.		sor (intake air temperature sensonson son harness connector and grout	
MAF Connector	sensor Terminal	Ground	Voltage	• (V)	
F31	2	Ground	Approx	к. 5	
YES >	<u>ection resı</u> > GO TO 2 > Repair o	2.		ground or short to power in harne	ess or connectors.
-	•		-	E SENSOR GROUND CIRCUIT F	
1. Turn ig 2. Discor	gnition swit	tch OFF. I harness o	connector		
		,			
	sensor	EC		Continuity	

4.	Also cl	heck harn	ess for sh	ort to grou	nd and sho	ort to power.
le f	ho inco	oction roc	ult normal	2		

25

Existed

F111

Is the inspection result normal?

1

F31

EC-213

P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 3.

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

3.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-214. "Component Inspection (Intake Air Temperature Sensor)".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace mass air flow sensor (with intake air temperature sensor).

4.CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Intake Air Temperature Sensor)

INFOID:000000006217797

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.

Terminals	Condition		Resistance (k Ω)
1 and 2	Temperature [°C (°F)]	25 (77)	1.94 - 2.06

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to <u>EM-27, "Removal and</u> <u>Installation"</u>.

P0116 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0116 ECT SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0116 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117, P0118. Refer to <u>EC-217, "DTC Logic"</u>.

	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0116	ECT SEN/CIRC (Engine coolant tempera- ture sensor circuit range/ performance)	Engine coolant temperature signal from engine coolant temperature sensor does not fluctuate, even when some time has passed after starting the engine with pre-warming up condition.	 Harness or connectors (High or low resistance in the circuit) Engine coolant temperature sensor
DTC CON	FIRMATION PROCE	DURE	
1. PRECC	ONDITIONING		
2. Turn iç 3. Turn iç TEST CON			
-	> GO TO 2.		
2.PERFO	RM DTC CONFIRMATIO	ON PROCEDURE	
 Rev er Move Check Soak becom CAUT 	ngine up to 2,000 rpm fo the vehicle to a cool plac resistance between "fue the vehicle until the resi nes 0.5 kΩ higher than the ION:	e, then stop engine. I level sensor unit and fuel pump" termina stance between "fuel level sensor unit a value measured before soaking.	
NOTE			
6. Start e	time changes dependir engine and let it idle for 2 t 1st trip DTC.	ng on ambient air temperature. It may t	
	NTC dotootod?	0 minutes.	ake several hours.
<u>ls 1st trip [</u> YES >: NO >:	FIC detected? Proceed to <u>EC-215, "D</u> INSPECTION END		ake several hours.
YES >: NO >:	> Proceed to EC-215, "D		ake several hours.
YES >: NO >: Diagnos	> Proceed to <u>EC-215, "D</u> > INSPECTION END is Procedure		
YES NO Diagnos 1.check	> Proceed to <u>EC-215, "D</u> > INSPECTION END is Procedure (ENGINE COOLANT TE	viagnosis Procedure".	INFOID:00000006288278
YES >: NO >: Diagnos 1.CHECK Refer to <u>E</u>	> Proceed to <u>EC-215, "D</u> > INSPECTION END is Procedure (ENGINE COOLANT TE	<u>Piagnosis Procedure"</u> . EMPERATURE SENSOR	INFOID:00000006288278
YES >: NO >: Diagnos 1.CHECK Refer to <u>E(</u> Is the inspective OK >:	> Proceed to <u>EC-215</u> , " <u>E</u> > INSPECTION END is Procedure CENGINE COOLANT TE <u>C-216</u> , " <u>Component Insp</u> <u>ection result normal?</u> > GO TO 2.	<u>Piagnosis Procedure"</u> . EMPERATURE SENSOR	INFOID:00000006288278 SOr)".

Refer to <u>GI-40, "Intermittent Incident"</u>.

>> INSPECTION END

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INFOID:000000006288277

P0116 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection (Engine Coolant Temperature Sensor)

[VK56VD]

INFOID:000000006288609

$1. {\sf CHECK} \ {\sf ENGINE} \ {\sf COOLANT} \ {\sf TEMPERATURE} \ {\sf SENSOR}$

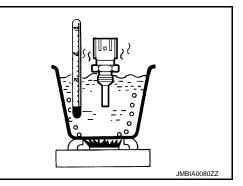
- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor.
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (k Ω)	
1 and 2	Temperature [°C (°F)]	20 (68)	2.35 - 2.73
		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 <u>EM-86, "Exploded View"</u>.



P0117, P0118 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0117, P0118 ECT SENSOR

DTC Logic

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INFOID:000000006217798

[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagn (Trouble diagno		DTC detecting condition	Possible cause
P0117	ECT SEN/CIRC (Engine coolant ture sensor circ	t tempera-	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (The engine conjugated to the engine con
P0118	ECT SEN/CIRC (Engine coolant ture sensor circ put)	t tempera-	An excessively high voltage from the sensor is sent to ECM.	(The engine coolant temperature sensor circuit is open or shorted.)Engine coolant temperature sensor
100 OTD	FIRMATION		DURE	
1.PRECO	ONDITIONING	6		
2. Turn i	gnition switch	ON.	vait at least 10 seconds. vait at least 10 seconds.	
-	> GO TO 2.			
	gnition switch	ON and w	ait at least 5 seconds.	
<u>Is DTC de</u>	tected?			
YES > NO >	> Go to EC-2 ² > INSPECTIO	<u>17, "Diagn</u> N END	osis Procedure".	
	is Procedu			
				INFOID:00000006217799
			EMPERATURE SENSOR POWER SU	
	nnect engine og nition switch		nperature (ECT) sensor harness conn	ector.
			CT sensor harness connector and gro	und.
	sensor			
Connector	(Ground	Voltage (V)	
F21		Ground	Approx. 5	
Is the insp	ection result n	ormal?		
	> GO TO 2.			
-			nort to ground or short to power in har	
	LECT SENSC		ND CIRCUIT FOR OPEN AND SHOR	1
	1.1	~ = =		
1. Turn i 2. Disco	gnition switch nnect ECM ha the continuity	rness con	nector. ECT sensor harness connector and E	ECM harness connector.

ECT s	ensor	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F21	2	F111	40	Existed

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

P0117, P0118 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

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

3.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-218. "Component Inspection (Engine Coolant Temperature Sensor)".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace engine coolant temperature sensor.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

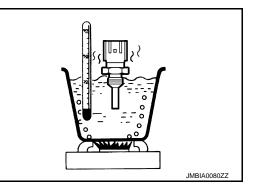
Component Inspection (Engine Coolant Temperature Sensor)

INFOID:000000006217800

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.
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance ($k\Omega$)
		20 (68)	2.35 - 2.73
1 and 2	Temperature [°C (°F)]	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 EM-86, "Exploded View".

P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0122, P0123 TP SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0122 or P0123 is displayed with DTC P0643, perform the trouble diagnosis for DTC P0643. Refer to <u>EC-381, "DTC Logic"</u>.

	Trouble diagnosis name (Trouble diagnosis content)	DTC o	detecting condition	Possible cause
P0122	TP SEN 2/CIRC-B1 (Throttle position sensor 2 circuit low input)	An excessively sensor 2 is sen	low voltage from the TP t to ECM.	 Harness or connectors (TP sensor 2 circuit is open or shorted.)
P0123	TP SEN 2/CIRC-B1 (Throttle position sensor 2 circuit high input)	An excessively sensor 2 is sen	high voltage from the TP t to ECM.	Electric throttle control actuator (TP sensor 2)
DTC CON	FIRMATION PROCED	URE		
1.PRECO	NDITIONING			
east 10 seo TESTING (Before per	conds before conducting	the next test.		vs turn ignition switch OFF and wait at oltage is 8 V or more at idle.
~	RM DTC CONFIRMATIC	N PROCEDU	RE	
1. Start er 2. Check	ngine and let it idle for 1	second.		
s DTC dete	-			
	Go to EC-219, "Diagno	sis Procedure	<u>.</u>	
NO >>	INSPECTION END			
NO >>				INFOID:00000006217802
NO >> Diagnosi	INSPECTION END	SENSOR 2 P		
NO >> Diagnosi: 1.CHECK 1. Discon	NSPECTION END S Procedure THROTTLE POSITION			
NO >> Diagnosi: 1.CHECK 1. Discon 2. Turn ig	NSPECTION END S Procedure THROTTLE POSITION nect electric throttle cont nition switch ON.	rol actuator ha	arness connector.	CUIT
NO >> Diagnosi: 1.CHECK 1. Discon 2. Turn ig	NSPECTION END S Procedure THROTTLE POSITION nect electric throttle cont nition switch ON.	rol actuator ha	arness connector.	
NO >> Diagnosi: 1.CHECK 1. Discon 2. Turn ig 3. Check	NSPECTION END S Procedure THROTTLE POSITION nect electric throttle cont nition switch ON.	rol actuator ha	arness connector. ontrol actuator harnes	CUIT
NO >> Diagnosi: 1.CHECK 1. Discon 2. Turn ig 3. Check	INSPECTION END S Procedure THROTTLE POSITION nect electric throttle cont nition switch ON. the voltage between electron	rol actuator ha	arness connector. ontrol actuator harnes Voltage	CUIT
NO >> Diagnosis 1.CHECK 1. Discon 2. Turn ig 3. Check Electric t Connect F66	NSPECTION END S Procedure THROTTLE POSITION nect electric throttle cont nition switch ON. the voltage between electric hrottle control actuator or Terminal 2	rol actuator ha	arness connector. ontrol actuator harnes	CUIT
NO >> Diagnosis 1.CHECK 1. Discon 2. Turn ig 3. Check Electric t Connect F66 s the inspe	NSPECTION END S Procedure THROTTLE POSITION nect electric throttle cont nition switch ON. the voltage between electric hrottle control actuator or Terminal 2 ection result normal?	ctric throttle co Ground	arness connector. ontrol actuator harnes Voltage	CUIT
NO >> Diagnosis 1.CHECK 1. Discon 2. Turn ig 3. Check Electric t Connect F66 s the inspe YES >>	NSPECTION END S Procedure THROTTLE POSITION nect electric throttle cont nition switch ON. the voltage between electric hrottle control actuator or Terminal 2	ctric throttle co Ground Ground	arness connector. ontrol actuator harnes Voltage Approx. 5 V	CUIT s connector and ground.

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.

EC-219

[VK56VD]

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P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

Electric throttle	lectric throttle control actuator		ECM	
Connector	Terminal	Connector	Terminal	Continuity
F66	4	F110	97	Existed

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

Is the inspection result normal?

YES >> GO TO 3.

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

 $\mathbf{3}$. 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	Continuity
F66	3	F110	79	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

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

4.CHECK THROTTLE POSITION SENSOR

Refer to EC-220, "Component Inspection (Throttle Position Sensor)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-30, "Removal and Installation".

>> INSPECTION END

6.CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Throttle Position Sensor)

INFOID:000000006217803

1. CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.

2. Reconnect all harness connectors disconnected.

3. Perform EC-147, "Work Procedure".

4. Turn ignition switch ON.

5. Set selector lever position to D.

6. Check the voltage between ECM harness connector terminals under the following conditions.

P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

	ECM					A
	+	_	Condit	tion	Voltage (V)	
Connector	Terminal	Terminal			· · · · · · · · · · · · · · · · · · ·	
	91 (TP sensor 1 signal)	97		Fully released Fully depressed	More than 0.36 Less than 4.75	- E0
F110	79 (TP sensor 2 signal)	(Sensor ground)	Accelerator pedal	Fully released Fully depressed	Less than 4.75 More than 0.36	C
Is the inspe	ection result normal	?				Ē
NO >>	 INSPECTION END GO TO 2. 					L
	CE ELECTRIC THR					E
Replace ele	ectric throttle contro	l actuator. Refer to	o <u>EM-30, "Remova</u>	Il and Installation	<u>1"</u> .	
>>	INSPECTION END	D				F
						G
						F
						I
						J
						k
						L
						N
						Ν
						C
						F

P0125 ECT SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117, P0118. Refer to <u>EC-217, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (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

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-III

- 1. Turn ignition switch ON.
- 2. Select "DATA MONITOR" mode with CONSULT-III.
- 3. Check that "COOLAN TEMP/S" is above 10°C (50°F).
- @ WITH GST

Follow the procedure "With CONSULT-III" above.

Is the temperature above 10°C (50°F)?

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

3.PERFORM DTC CONFIRMATION PROCEDURE

(B) WITH CONSULT-III

1. Start engine and run it for 65 minutes at idle speed.

If "COOLAN TEMP/S" increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.

CAUTION:

Never overheat engine.

2. Check 1st trip DTC.

WITH GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

YES >> <u>EC-222, "Diagnosis Procedure"</u> NO >> INSPECTION END

Diagnosis Procedure

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-218. "Component Inspection (Engine Coolant Temperature Sensor)".

Is the inspection result normal?

YES >> GO TO 2.

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P0125 ECT SENSOR

When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm that the

engine coolant does not flow.

NO

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 3.

NO >> Repair or replace thermostat. Refer to <u>CO-20, "Removal and Installation"</u>.

3.CHECK INTERMITTENT INCIDENT

2. CHECK THERMOSTAT OPERATION

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

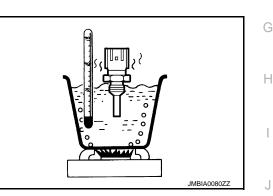
Component Inspection (Engine Coolant Temperature Sensor)

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

>> Replace engine coolant temperature sensor.

- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor.
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (k Ω)
		20 (68)	2.35 - 2.73
1 and 2	Temperature [°C (°F)]	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 EM-86, "Exploded View". [VK56VD]

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P0127 IAT SENSOR

DTC Logic

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[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (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 (The intake air temperature sensor circuit is open or shorted) Intake air temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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-III

- 1. Wait until engine coolant temperature is less than 90°C (194°F)
- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT-III.
- Check the engine coolant temperature.
- If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch OFF and cool down engine.

NOTĚ:

Perform the following steps before engine coolant temperature is above 90°C (194°F).

- 2. Turn ignition switch ON.
- 3. Select "DATA MONITOR" mode with CONSULT-III.
- 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-III" above.

Is 1st trip DTC detected?

- YES >> Proceed to EC-224, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-225, "Component Inspection (Intake Air Temperature Sensor)".

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace mass air flow sensor (with intake air temperature sensor).

2. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

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P0127 IAT SENSOR

Check resistance between mass air flow sensor terminals as per the following. Terminals Condition Resistance (kΩ) 1 and 2 Temperature [°C (°F)] 25 (77) 1.94 - 2.06 Is the inspection result normal? YES >> INSPECTION END NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to EM-30, "Removal and Installation".

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection (Intake Air Temperature Sensor)

1.CHECK INTAKE AIR TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- Disconnect mass air flow sensor harness connector. 2.
- 3.

EC-225

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P0128 THERMOSTAT FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

P0128 THERMOSTAT FUNCTION

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0128 is displayed with DTC P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307 or P0308, first perform the trouble diagnosis for DTC P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308. Refer to <u>EC-291. "DTC Logic"</u>.

Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough.

This is due to a leakage in the seal or the thermostat being stuck open.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0128	THERMSTAT FNCTN (Thermostat function)	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

1.PRECONDITIONING

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

TESTING CONDITION:

- For best results, perform at ambient temperature of -10°C (14°F) or higher.
- For best results, perform at engine coolant temperature of -10°C (14°F) to 52°C (126°F).
- Before performing the following procedure, do not add fuel.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

B WITH CONSULT-III

- 1. Turn A/C switch OFF.
- 2. Turn blower fan switch OFF.
- 3. Turn ignition switch ON.
- 4. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-III.
- Check the indication of "COOLAN TEMP/S". If it is below 52°C (126°F), go to next step. If it is above 52°C (126°F), cool engine down to less than 52°C (126°F). Then go to next step.
- 6. Start engine and drive vehicle for 10 consecutive minutes under the following conditions.

Vehicle speed More than 56 km/h (35 MPH)

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "COOLAN TEMP/S" increases to more than 71°C (160°F) within 10 minutes, turn ignition switch OFF because the test result will be OK.

7. Check 1st trip DTC.

@ WITH GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

- YES >> Proceed to EC-227, "Diagnosis Procedure".
- NO >> INSPECTION END

P0128 THERMOSTAT FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-227, "Component Inspection (Engine Coolant Temperature Sensor)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace engine coolant temperature sensor.

2. CHECK THERMOSTAT

Remove and Check the thermostat. Refer to <u>CO-20. "Removal and Installation"</u> and <u>CO-21. "Inspection"</u>. <u>Is the inspection result normal?</u>

YES >> INSPECTION END

NO >> Replace thermostat.

Component Inspection (Engine Coolant Temperature Sensor)

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

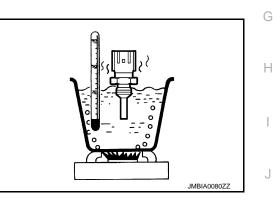
- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor.
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (k Ω)
		20 (68)	2.35 - 2.73
1 and 2	Temperature [°C (°F)]	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.



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[VK56VD]

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< DTC/CIRCUIT DIAGNOSIS >

P0130, P0150 A/F SENSOR 1

DTC Logic

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[VK56VD]

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 name (Trouble diagnosis content)		DTC detecting condition	Possible Cause	
P0130	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 (bank 1) circuit]	A) The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in a range other than approx. 1.5 V.			
		B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 1.5 V.	Harness or connectors (The A/F sensor 1 circuit is open	
P0150	A/F SENSOR1 (B2) [Air fuel ratio (A/F) sensor 1	A)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in a range other than approx. 1.5 V.	or shorted.) • A/F sensor 1	
	(bank 2) circuit]		The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 1.5 V.		

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Start engine and warm it up to normal operating temperature.
- 2. Let engine idle for 2 minutes.
- 3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-230. "Diagnosis Procedure".
- NO-1 >> With CONSULT-III: GO TO 3.
- NO-2 >> With GST: GO TO 7.

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

(I) WITH CONSULT-III

- T. Start engine and warm it up to normal operating temperature.
- 2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.

Does the indication fluctuate around 1.5 V?

- YES >> GO TO 4.
- NO >> Go to EC-230, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-I

1. Select "A/F SEN1 (B1) P1276" (for DTC P0130) or "A/F SEN1 (B2) P1286" (for DTC P0150) of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-III.

2. Touch "START".

3. When the following conditions are met, "TESTING" will be displayed on the CONSULT-III screen.

< DTC/CIRCUIT DIAGNOSIS >

ENG SPEED	1,750 - 3,200 rpm	
VHCL SPEED SE	More than 64 km/h (40 mph)	F
B/FUEL SCHDL	1.0 - 8.0 msec	
Selector lever	D position	
CAUTION:	et displayed after 20 seconds, retry from step 2. Sie at a safe speed.	
YES >> GO TO 5.	on CONSULT-III screen? sensor 1 function again. GO TO 3.	
.PERFORM DTC CO	NFIRMATION PROCEDURE FOR MALFUNCTION B-II	
elease accelerator peo IOTE:		_
Vhich does "TESTING" COMPLETED>>GO T		
OUT OF CONDITION>	>Retry DTC CONFIRMATION PROCEDURE. GO TO 4. NFIRMATION PROCEDURE FOR MALFUNCTION B-III	
ouch "SELF-DIAG RES		_
hich is displayed on C		
YES >> INSPECTIC		
PERFORM COMPO	NENT FUNCTION CHECK FOR MALFUNCTION B	
IOTE:	ction check. Refer to EC-229, "Component Function Check".	_
st trip DTC might not b		а
s the inspection result r		
YES >> INSPECTIC NO >> Go to EC-23	IN END 30, "Diagnosis Procedure".	
	-	
Component Function		05
.PERFORM COMPO	NENT FUNCTION CHECK	
 Drive the vehicle at Shift the selector le decreases to 50 km CAUTION: 		d
NOTÉ: Never apply brake v . Repeat steps 2 and		
. Wait at least 10 sec		

< DTC/CIRCUIT DIAGNOSIS >

Is 1st trip DTC detected?

YES >> Go to <u>EC-230, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217806

[VK56VD]

1. CHECK AIR FUEL RATIO 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.

DTC		A/F senso	r 1	Ground	Voltage	
DIC	Bank	Connector	Terminal	Ciouna		
P0130	1	F67	4	Ground	3.0 V	
P0150	2	F68	4	Giouna	3.0 V	

Is the inspection result normal?

YES >> GO TO 2.

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

2.CHECK 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.

DTC		A/F sensor	1	EC	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0130	1	F67	3	F110	88	Existed
P0150	2	F68	3	1110	78	LAISteu

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC	A/F sensor 1			ECM		Ground	Continuity	
DIC	Bank	Connector Terminal		Connector	Terminal	Orbund	Continuity	
P0130	1	F67	3	F110	88	Ground	Not existed	
P0150	2	F68	3	F110	78	Ground	NOL EXISTED	

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.

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

3.CHECK A/F SENSOR 1 GROUND 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.

DTC		A/F sensor	1	EC	Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0130	1	F67	6	F110 94		Existed
P0150	2	F68	6	1110	74	LAISIEU

4. Also check harness for short to power.

Is the inspection result normal?

YES	>> GO TO 4.

< DTC/CIRCUIT DIAGNOSIS >

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

4.CHECK INTERMITTENT INCIDENT

Perform GI-40, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace malfunctioning part.

5.REPLACE A/F SENSOR 1

Replace malfunctioning A/F sensor 1. Refer to <u>EM-40, "Removal and Installation"</u>. 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).

EC-231

>> INSPECTION END

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P0131, P0151 A/F SENSOR 1

DTC Logic

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[VK56VD]

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 name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0131	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 (bank 1) circuit low voltage]	The A/F signal computed by ECM from the A/F	Harness or connectors (The A/F sensor 1 circuit is open or
P0151	A/F SENSOR1 (B2) [Air fuel ratio (A/F) sensor 1 (bank 2) circuit low voltage]	sensor 1 signal is constantly approx. 0 V.	shorted.) • A/F sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 10.5 V or more at idle.

>> GO TO 2.

2. CHECK A/F SENSOR FUNCTION

(I) WITH CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Select "Ă/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.

B WITH GST

Follow the procedure "With CONSULT-III" above.

Is the indication constantly approx. 0 V?

YES >> Go to EC-233, "Diagnosis Procedure".

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

(I) WITH CONSULT-III

- 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. Restart engine.
- 5. 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.

6. Maintain the following conditions for approximately 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 mph)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever	Suitable position

NOTE:

• Keep the accelerator pedal as steady as possible during cruising.

EC-232

Revision: 2010 May

• If thi	s proc	edure is n	ot compl	eted with	in 1 minu	te after res	starting engine at step 1, return to ste	
7. Check		DTC.						A
	proced	dure "With C etected?	CONSULT	「-Ⅲ" above	9.			EC
) <u>EC-233, "</u> ECTION E		<u>Procedur</u>	<u>e"</u> .			С
Diagnosi	is Pro	ocedure					INFOID:000000062178)8
1. CHECK	AIR F	UEL RATIO) SENSO	R 1 POWE	ER SUPPI	LY CIRCUI	т	D
		ir fuel ratio	(A/F) sen	sor 1 harn	ess conne	ector.		-
		switch ON. Itage betwe	en A/F s	ensor 1 ha	irness cor	nector and	ground.	E
DTC	Bank	A/F senso Connector	r 1 Termina	Ground	Volta	ge		F
P0130 P0150	1	F67 F68	4	Ground	3.0	V		G
Is the inspe	ection	result norm	al?		I			0
NO >:		ir open circ		-		•	harness or connectors. ND SHORT	Н
1. Turn ig 2. Discor	nition nect E	switch OFF	s connec	tor.			nd ECM harness connector.	-
		A/F sensor	1	E	СМ			J
DTC	Bank	Connector	Terminal	Connector	Terminal	Continuity		
P0130	1	F67	3		88		-	K
P0150	2	F68	3	F110	78	- Existed		
4. Check and gr		ontinuity be	tween A/	F sensor 1	l harness	connector	and ground, or ECM harness connecto	r ∟
DTC		A/F sensor	1	EC	CM	Cround	Continuity	B. 4
DIC	Bank	Connector	Terminal	Connector	Terminal	Ground	Continuity	M
P0130	1	F67	3	F110	88	Ground	Not existed	
P0150	2	F68	3		78			Ν
		arness for s result norm		ower.				
YES >:	> GO 1	03.		to ground	or short to	o power in	harness or connectors.	0
3.снеск		•		-		•		-
1. Turn ig 2. Discor	nition nect E	switch OFF	: s connec	tor.			nd ECM harness connector.	- P

< DTC/CIRCUIT DIAGNOSIS >

DTC		A/F sensor	1	EC	CM	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0130	1	F67	6	F110	94	Existed
P0150	2	F68	6	1110	74	LAISIEU

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

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

4.CHECK INTERMITTENT INCIDENT

Perform GI-40, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace malfunctioning part.

5.REPLACE A/F SENSOR 1

Replace malfunctioning A/F sensor 1. Refer to <u>EM-40, "Removal and Installation"</u>. 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

< DTC/CIRCUIT DIAGNOSIS >

P0132, P0152 A/F SENSOR 1

DTC Logic

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 name (Trouble diagnosis content)	DTC detecting condition	Possible Cause						
P0132	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 (bank 1) circuit high voltage]								
P0152	A/F SENSOR1 (B2) [Air fuel ratio (A/F) sensor 1 (bank 2) circuit high voltage]		shorted.) • A/F sensor 1						
	NFIRMATION PROCE	EDURE							
1.PREC	ONDITIONING								
 Turn Turn TESTING 	ignition switch ON. ignition switch OFF and CONDITION:	wait at least 10 seconds. wait at least 10 seconds. g procedure, confirm that battery volt	age is 10.5 V or more at idle.						
•	>> GO TO 2.								
2. CHEC	K A/F SENSOR FUNCT	ION							
 Start Select Chect WITH 	ct "Ă/F SEN1 (B1)" or ["] A ck "A/F SEN1 (B1)" or "A	o normal operating temperature. /F SEN1 (B2)" in "DATA MONITOR" mod /F SEN1 (B2)" indication. SULT-III" above.	de with CONSULT-III.						
	ication constantly approx								
NO	>> Go to <u>EC-236, "Diagr</u> >> GO TO 3.								
3. PERF	ORM DTC CONFIRMAT	ION PROCEDURE							
1. Turn	CONSULT-III ignition switch OFF and ignition switch ON.	wait at least 10 seconds.							
3. Turn	ignition switch OFF and	wait at least 10 seconds.							
5. Drive	art engine. and accelerate vehicle TION:	to more than 40 km/h (25 MPH) within 2	0 seconds after restarting engine.						
	tain the following conditi	afe speed. ons for approximately 20 consecutive se	conds.						
ENG SPE	ED 1,000	- 3,200 rpm							
VHCL SP	FED SE More	than 40 km/h (25 mph)							

ENG	SPEED	1,000 - 3,200 rpm
VHCL	SPEED SE	More than 40 km/h (25 mph)
B/FUE	EL SCHDL	1.5 - 9.0 msec
Select	or lever	Suitable position

NOTE:

• Keep the accelerator pedal as steady as possible during cruising.

А

EC

INFOID:000000006217809

< DTC/CIRCUIT DIAGNOSIS >

If this procedure is not completed within 1 minute after restarting engine at step 1, return to step 1.
7. Check 1st trip DTC.

WITH GST
 Follow the procedure "With CONSULT-III" above.
 <u>Is 1st trip DTC detected?</u>

YES >> Go to <u>EC-236, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217810

[VK56VD]

1. CHECK AIR FUEL RATIO 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.

	DTC A/F		r 1	Ground	Voltage
DIC	Bank	Connector	Terminal	Giodila	voltage
P0130	1	F67	4	Ground	3.0 V
P0150	2	F68	4	Giouna	5.0 V

Is the inspection result normal?

YES >> GO TO 2.

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

2.CHECK 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.

DTC		A/F sensor	1	EC	CM	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0130	1	F67	3	F110	88	Existed
P0150	2	F68	3	FIIU	78	EXISTED

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC		A/F sensor	1	EC	CM	Ground	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Ground	Continuity
P0130	1	F67	3	F110	88	Ground	Not existed
P0150	2	F68	3	1110	78	Ground	NUL EXISIEU

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.

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

3.CHECK A/F SENSOR 1 GROUND 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.

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

		A/F sensor	1	EC	M	Continuity	
DTC -	Bank	Connector	Terminal	Connector	Terminal	Continuity	-
P0130	1	F67	6	F110	94	Existed	
P0150	2	F68	6	1110	74		
		arness for s	•	ower.			
		result norm	<u>al?</u>				
	GO T		suit chort	to around	or chort to	power in harness or connectors.	
		RMITTENT				power in namess of connectors.	
		ntermittent result norm					
	GO T						
NO >>	Repa	ir or replac		tioning pa	rt.		
REPLAC	E A/F	SENSOR	1				
	lfunct	ioning A/F	sensor 1.	Refer to	M-40, "Re	noval and Installation".	
AUTION: Discard a		/F sensor	which ba	is heen dr	onned fr	m a height of more than 0.5 m (19.7 i	n) onto a
hard surfa	ace s	uch as a c	oncrete f	loor; use	a new on		
Before in	stalli	ng new A	/F senso	or, clean	exhaust	ystem threads using Oxygen Senso	r Thread
		nercial se ervice tool		DI (J-4389	7-18 or .	43897-12)] and approved anti-seize	lubricant
			/-				
>>	INSP						
	11401	ECTION E	ND				
			ND				
			ND				
			ND				
			ND				
		ECTION E	U U				
		ECTION E	U U				
		ECTION E	ND				
		ECTION E	ND				
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		ECTION E	ND				
		ECTION E	ND				
		ECTION E	ND				
		ECTION E	ND				

P0133, P0153 A/F SENSOR 1

DTC Logic

DTC DETECTION LOGIC

To judge the malfunction of A/F sensor 1, 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 name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0133	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 (bank 1) circuit slow response]		Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
P0153	A/F SENSOR1 (B2) [Air fuel ratio (A/F) sensor 1 (bank 2) circuit slow response]	 The response of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time. 	 A/F sensor 1 A/F sensor 1 heater Fuel pressure Fuel injector Intake air leaks Exhaust gas leaks PCV Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more at idle. Will CONSULT-III be used?

YES >> GO TO 2.

NO >> GO TO 5.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

WITH CONSULT-III

- T. 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. Restart 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.
- Select "A/F SEN1(B1) P1278/P1279" (for DTC P0133) or "A/F SEN1(B2) P1288/P1289" (for DTC P0153) of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 8. Touch "START".
- Is "COMPLETED" displayed on CONSULT-III screen?

YES >> GO TO 3

NO >> GO TO 4.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END

NG >> Go to EC-239, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE-II

< DTC/CIRCUIT DIAGNOSIS >	[VK56VD]
 After perform the following procedure, "TESTING" will be displayed on the CONSULT-III scree- Increase the engine speed up to between 4,000 and 5,000 rpm and maintain that speed for Fully release accelerator pedal and then let engine idle for approximately 10 seconds. If "TESTING" is not displayed after 10 seconds, refer to <u>EC-161, "Component Function C</u> 	10 seconds. A
2. Wait for approximately 20 seconds at idle under the condition that "TESTING" is displayed SULT-III screen.	on the CON- EC
 Check that "TESTING" changes to "COMPLETED". If "TESTING" changed to "OUT OF CONDITION", refer to <u>EC-161, "Component Function</u>". Touch "SELF-DIAG RESULT". 	o <mark>n Check"</mark> . C
Which is displayed on CONSULT-III screen?	
OK >> INSPECTION END NG >> Go to <u>EC-239</u> , "Diagnosis Procedure".	D
5. CHECK AIR-FUEL RATIO SELF-LEARNING VALUE	_
 WITH GST Start engine and warm it up to normal operating temperature. Select Service \$01 with GST. 	E
3. Calculate the total value of "Short term fuel trim" and "Long term fuel trim" indications.	F
Is the total percentage within ±15%?	I
YES >> GO TO 7. NO >> GO TO 6.	
6. DETECT MALFUNCTIONING PART	G
Check the following. Intake air leaks Exhaust gas leaks Incorrect fuel pressure 	Н
 Lack of fuel Fuel injector Incorrect PCV hose connection PCV valve 	I
Mass air flow sensor	J
>> Repair or replace malfunctioning part.	
7. PERFORM DTC CONFIRMATION PROCEDURE	K
 Turn ignition switch OFF and wait at least 10 seconds. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute u Let engine idle for 1 minute. 	nder no load.
 Increase the engine speed up to between 4,000 and 5,000 rpm and maintain that speed for 7 Fully release accelerator pedal and then let engine idle for approximately 1 minute. Check 1st trip DTC. 	10 seconds. M
<u>Is 1st trip DTC detected?</u> YES >> Go to <u>EC-239, "Diagnosis Procedure"</u> . NO >> INSPECTION END	Ν
Diagnosis Procedure	NFOID:000000006217812
1.RETIGHTEN AIR FUEL RATIO SENSOR 1	0
Loosen and retighten the air fuel ratio (A/F) sensor 1. Refer to EM-40, "Exploded View".	
>> GO TO 2.	Р

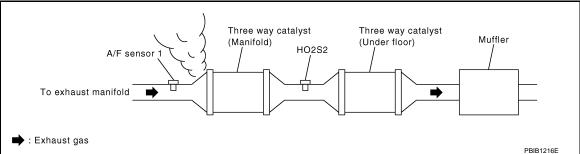
2.CHECK EXHAUST GAS LEAKAGE

1. Start engine and run it at idle.

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

2. Listen for an exhaust gas leakage before three way catalyst (manifold).



Is exhaust gas leakage detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 3.

3.CHECK FOR INTAKE AIR LEAKAGE

Listen for an intake air leakage after the mass air flow sensor.

Is intake air leakage detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 4.

4.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- 1. Clear the mixture ratio self-learning value. Refer to EC-152, "Work Procedure".
- 2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171, P172, P0174 or P0175 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to <u>EC-263, "DTC Logic"</u> or <u>EC-267, "DTC Logic"</u>.

NO >> GO TO 5.

 ${f b.}$ CHECK AIR FUEL RATIO 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.

DTC		A/F sensor	r 1	Ground	Voltage
DIC	Bank	Connector	Terminal	voltage	
P0133	1	F67	4	Ground	3.0 V
P0153	2	F68	4	Ciouna	5.0 V

Is the inspection result normal?

YES >> GO TO 6.

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

O.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.

DTC		A/F sensor	1	EC	CM	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0133	1	F67	3	F110	88	Existed
P0153	2	F68	3	1110	78	LAISteu

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

		A/F sensor 1		ECM		Ground	Continuity
DTC	Bank	Connector	Terminal	Connector	Terminal	Ground	Continuity
P0133	1	F67	3	E440	88		Net eviated
P0153	2	F68	3	F110	78	Ground	Not existed
Also c	heck h	arness for s	short to po	ower.			
the insp	ection I	esult norm	al?				
	> GO T			_	_		
	•	•		-		•	harness or connectors.
		ENSOR 1 (CIRCUIT	FOR OPE	IN AND SH	HORT
		switch OFF		1			
		CM harnes ntinuity bet			harness c	onnector a	nd ECM harness connector.
Chicon		intending bot					
		A/F sensor	1	EC	CM		•
DTC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0133	1	F67	6		94	- • • •	-
P0153	2	F68	6	F111	74	Existed	
Also c	heck h	arness for s	short to po	ower.			-
the insp	ection I	esult norm	<u>al?</u>				
	> GO T						
				to ground	or short to	power in	harness or connectors.
.CHECk	A/F S	ENSOR 1 H	HEATER				
		"Compone		tion (A/F S	ensor 1 H	<u>eater)"</u> .	
		esult norm	<u>al?</u>				
	> GO T > GO T						
		S AIR FLOV		D			
		ow sensor. "Compone		tion (MAF :	Sensor)"		
		esult norm			<u></u> .		
	> GO T						
~	•		ctioning m	hass air flo	w sensor.	Refer to E	M-30, "Removal and Installation".
0.CHE	CK PC	/ VALVE					
efer to <u>E</u>	C-534,	"Inspection	<u>ı"</u> .				
the insp	ection I	esult norm	<u>al?</u>				
	> GO T						
	-	ir or replac					
		ERMITTEN		NT			
		ntermittent					
		<u>esult norm</u>	<u>al?</u>				
	> GO T		o molfur-	tioning no	rt		
< 0 <i>1</i>	•	ir or replac		honing pa	ι.		
2		/F SENSO					

• 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.

EC-241

• 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

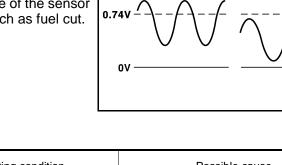
P0137, P0157 HO2S2

DTC Logic

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during various driving conditions such as fuel cut.

			JMBIA1572GB
DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0137	HO2S2 (B1) [Heated oxygen sensor 2 (bank 1) circuit low voltage]	The maximum voltage from the sensor does	Harness or connectors (The heated oxygen sensor 2 circuit is open or shorted)
P0157	HO2S2 (B2) [Heated oxygen sensor 2 (bank 2) circuit low voltage]	not reach the specified voltage.	 Heated oxygen sensor 2 Fuel pressure Fuel injector Intake air leaks
DTC CON	FIRMATION PROCED	DURE	
1 .PRECC	NDITIONING		
2. Turn ig	nition switch OFF and w nition switch ON.		
-	nition switch OFF and w <u>ULT-III be used?</u>	ait at least 10 seconds.	
	> GO TO 2.		
~	> GO TO 4.		
2.PERFO	RM DTC CONFIRMATIC	ON PROCEDURE	
	CONSULT-III		
	CONDITION: results, perform "DTC	WORK SUPPORT" at a temperatur	e of 0 to 30°C (32 to 86°F).
	ngine and warm it up to t nition switch OFF and w	the normal operating temperature.	
· · · · · ·	gnition switch ON.	ait at least 10 seconds.	
	nition switch OFF and w		0 mm for at least 1 minute under no
5. Restar load.	t engine and keep the e	ngine speed between 3,500 and 4,00	00 rpm for at least 1 minute under no
	gine idle for 1 minute.		
	"DATA MONITOR" mode that "COOLAN TEMP/S"	" indicates more than 70°C (158°F).	
lf not,	warm up engine and go t	o next step when "COOLAN TEMP/S	s" indication reaches 70°C (158°F).
10. Select	engine hood. "HO2S2 (B1) P1147" (f WORK SUPPORT" mode		167" (for DTC P0157) of "HO2S2" in
	the instruction of CONS		
It will t		intil "COMPLETED" is displayed.	



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EC-243

OK >> INSPECTION END

NG >> Go to EC-245, "Diagnosis Procedure".

CAN NOT BE DIAGNOSED>>GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

- 1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- 2. Perform DTC confirmation procedure again.

>> GO TO 2.

4.PERFORM COMPONENT FUNCTION CHECK

@ WITH GST

Perform component function check. Refer to EC-244. "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 >> Go to <u>EC-245</u>, "Diagnosis Procedure".

Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK-I

WITH GST

- 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. Restart 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 conditions.

		ECM			Voltage	
DTC	+	_	Condition			
	Connector	Terminal	Terminal			
P0137	F110	96	100	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.74 V at least once during this procedure.	
P0157	FIIU	87	100			
			10			

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 conditions.

ECM					
Connector	+	-	Condition	Voltage	
Connector	Terminal	Terminal			
E110	96	100	Keeping engine at idle for 10 minutes	The voltage should be above 0.74 V at least once during this procedure.	
F110	87	100			
	Connector F110	Connector Terminal F110	Connector Terminal F110 + - Terminal 96 100	+ - Condition Terminal Terminal Terminal 96 100 Keeping engine at idle for 10 minutes	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

INFOID:000000006217814

P0137, P0157 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

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3.PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector terminals under the following conditions.

		ECM					
DTC		+	_	Condition Voltage			
	Connector	Terminal	Terminal				-
P0137	-	96		Coasting fro	om 80 km/h	(50 MPH) with	se- The voltage should be above 0.74 V at
P0157	F110	87	100	Coasting from 80 km/h (s lector lever in the D posit		least once during this procedure.	
is the ins	spection re	esult norm	al?				
YES	>> INSPE	ECTION E	ND	_			
			Diagnosis	<u>Procedur</u>	<u>e"</u> .		
Diagno	sis Pro	Jeuure					INFOID:00000006217815
1.CLEA	R THE M	IXTURE R	RATIO SE	LF-LEARN	ING VAL	JE	
						C-152, "Wo	k Procedure".
	•			s at idle sp		11	in a D
						to start end	<u>iine?</u> er to <u>EC-263, "DTC Logic"</u> .
	>> GO T(ulagriosis			U174. Rel	$\pi \text{ to } \underline{\text{LO-200}}, \text{ D I O LOUIC}.$
•			EN SENS	OR 2 GRO	DUND CIF	CUIT FOR	OPEN AND SHORT
		witch OFF					
				r 2 (HO2S	2) harnes	s connecto	
3. Disc	onnect EC	CM harnes	s connec	tor.			
4. Che	ck the cor	itinuity bet	ween HC	2S2 harne	ess conne	ctor and EC	M harness connector.
		HO2S2		F	CM		
DTC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0137	1	F87	1				
P0157	2	F88	1	F110	100	Existed	
				round and	short to p	ower.	
		esult norm			0		
	>> GO T(
NO	>> Repai	r open circ	cuit, short	to ground	or short to	power in I	arness or connectors.
3. CHEC	CK HO2S2	2 INPUT S	IGNAL C	IRCUIT FO	OR OPEN	AND SHO	RT
1. Che	ck the cor	itinuity bet	ween HC	2S2 harne	ess conne	ctor and EC	M harness connector.
DTC		HO2S2		E	СМ	Continuity	
	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0137	1	F87	4	F110	96	Existed	
P0157	2	F88	4		87		
		ntinuity be	tween H	O2S2 harr	ness conn	ector and	ground, or ECM harness connector and
grou	ind.						
		ЦОЗОЗ			214		
DTC	Bank	HO2S2	T- mail and		CM	Ground	Continuity
	L RODK	Connector	Terminal	Connector	Terminal	1	

	вапк	Connector	Terminal	Connector	Terminal			
P0137	1	F87	4	F110	96	Ground	Not existed	
P0157	2	F88	4	1110	87	Oldalia	NUL EXISTED	

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 HEATED OXYGEN SENSOR 2

Refer to EC-246, "Component Inspection (HO2 sensor 2)".

Is the inspection result normal?

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

5.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to EM-40, "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 J-43897-12)] and approved anti-seize lubricant (commercial service tool).

>> INSPECTION END

6.CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (HO2 sensor 2)

INFOID:000000006217816

1.INSPECTION START

Will CONSULT-III be used?

Will CONSULT-III be used?

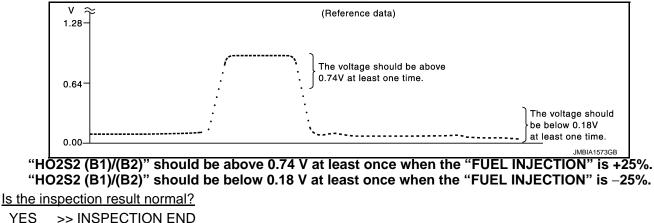
YES >> GO TO 2. NO >> GO TO 3.

NO >> GO IO 3.

2.CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

- T. Start engine and warm it up to the normal operating temperature.
- 2. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 3. Let engine idle for 1 minute.
- 4. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-III.
- 5. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.



P0137, P0157 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 6.

3.CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

- 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 conditions.

	ECM			
Connector -	+ –		Condition	Voltage
	Terminal	Terminal		
	96 [HO2S2 (bank 1)]	100	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.74 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
F110 -	87 [HO2S2 (bank 2)]	100		

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 conditions.

	ECM				
Connector -	+	_	Condition	Voltage	
	Terminal	Terminal			
F110	96 [HO2S2 (bank 1)]		Keeping engine at idle for 10 minutes	The voltage should be above 0.74 V at least once during this procedure.	
	87 [HO2S2 (bank 2)]	100		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 conditions.

	ECM			
Connector	+	-	Condition	Voltage
	Terminal	Terminal		
F110	96 [HO2S2 (bank 1)]	100	Coasting from 80 km/h (50 MPH) with se-	The voltage should be above 0.74 V at least once during this procedure.
	87 [HO2S2 (bank 2)]	100	lector lever in the D position	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.

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6.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to <u>EM-40, "Exploded View"</u>. **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 J-43897-12)] and approved anti-seize lubricant (commercial service tool).

>> INSPECTION END

P0138, P0158 HO2S2

DTC Logic

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[VK56VD]

DTC DETECTION LOGIC

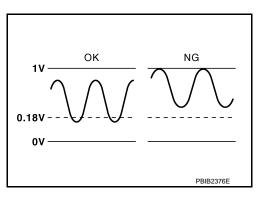
The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/ F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time.

MALFUNCTION A

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during 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 name (Trouble diagnosis content)		DTC detecting condition	Possible cause	
P0138	HO2S2 (B1) [Heated oxygen sensor 2 (bank 1) circuit high voltage]	A) An excessively high voltage from the sensor is sent to ECM.		 Harness or connectors (The heated oxygen sensor 2 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 heated oxygen sensor 2 circuit is open or shorted) Heated oxygen sensor 2 Fuel pressure Fuel injector 	
P0158		A)	An excessively high voltage from the sensor is sent to ECM.	 Harness or connectors (The heated oxygen sensor 2 circuit is open or shorted) Heated oxygen sensor 2 	
	HO2S2 (B2) [Heated oxygen sensor 2 (bank 2) circuit high voltage]	B)	The minimum voltage from the sensor is not reached to the specified voltage.	 Harness or connectors (The heated oxygen sensor 2 circuit is open or shorted) Heated oxygen sensor 2 Fuel pressure Fuel injector 	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. 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 2 minutes.
- 7. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-251, "Diagnosis Procedure".
- NO-1 >> With CONSULT-III: GO TO 3.
- NO-2 >> With GST: GO TO 5.

$\mathbf{3}.$ PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

(I) WITH CONSULT-III

NOTE:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

- 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 with CONSULT-III.
- 8. Check that "COOLAN TEMP/S" indicates more than 70°C (158°F).

If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F). 9. Open engine hood.

- 10. Select "HO2S2 (B1) P1146" (for DTC P0138) or "HO2S2 (B2) P1166" (for DTC P0158) of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 11. Follow the instruction of CONSULT-III display.
 - NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

12. Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END

NG >> Go to EC-251, "Diagnosis Procedure".

CON 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

WITH GST

Perform component function check. Refer to EC-251, "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?

P0138, P0158 HO2S2

Revision: 2010 May

WITH GST

1.PERFORM COMPONENT FUNCTION CHECK-I

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.

>> Go to EC-251, "Diagnosis Procedure".

- 3. Turn ignition switch ON.
- 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. D
- Let engine idle for 1 minute. 6.

< DTC/CIRCUIT DIAGNOSIS >

Component Function Check

>> INSPECTION END

YES

NO

Check the voltage between ECM harness connector terminals under the following conditions. 7.

EC		ECM			Voltage	
DTC Connector	+	_	Condition			
	Connector	Terminal	Terminal			F
P0138	F110	96	100 Revving up to 4,000 rpm under no load at	The voltage should be below 0.18 V at		
P0158	FIIU	87	100	least 10 times	least once during this procedure.	G

>> INSPECTION END

YES NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector terminals under the following conditions.

	ECM					
DTC Connector	Connector	+	-	Condition	Voltage	J
	Connector	Terminal	Terminal			
P0138	F110	96	100	Kooping ongine at idle for 10 minutes	The voltage should be below 0.18 V at	
P0158		87	100	Keeping engine at idle for 10 minutes	least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

>> GO TO 3. NO

3. PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector terminals under the following conditions.

	ECM					
DTC	Connector	+	-	Condition	Voltage	
		Terminal	Terminal			
P0138	F110	96	100	Coasting from 80 km/h (50 MPH) with se-	The voltage should be below 0.18 V at	
P0158		87	100	lector lever in the D position	least once during this procedure.	

the inspection result normal?

- YES >> INSPECTION END
- >> Go to EC-251, "Diagnosis Procedure". NO

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-249, "DTC Logic".

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Which malfunction is detected?

A >> GO TO 2

B >> GO TO 8.

2. CHECK HEATED OXYGEN SENSOR 2 CONNECTOR

1. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.

2. Check that water is not inside connectors.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness or connectors.

 $\mathbf{3}$. Check HO2S2 ground circuit for open and short

1. Disconnect ECM harness connector.

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

DTC		HO2S2		EC	Continuity		
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0138	1	F87	1	F110	100 Existe	Existed	
P0158	2	F88	1	1110	100	Existed	

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

Is the inspection result normal?

YES >> GO TO 4.

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

 ${f 4.}$ CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC		HO2S2		EC	Continuity		
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0138	1	F87	4	F110	96	Existed	
P0158	2	F88	4	1110	87	LAISIEU	

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

DTC	HO2S2			ECM		Ground	Continuity
	Bank	Connector	Terminal	Connector	Terminal	Ground	Continuity
P0138	1	F87	4	F110	96	Ground	Not existed
P0158	2	F88	4	FIIU	87	Ground	NUL EXISIEU

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-254, "Component Inspection (HO2 sensor 2)".

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 <u>EM-40, "Exploded View"</u>. CAUTION:

P0138, P0158 HO2S2

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< DTC/CIRCUIT DIAGNOSIS > 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 J-43897-12)] and approved anti-seize lubricant (commercial service tool). EC >> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

${f 8.}$ CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-152, "Work Procedure". Е 2. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine? >> Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-267, "DTC Logic". F YES NO >> GO TO 9. ${f 9.}$ CHECK HEATED OXYGEN SENSOR 2 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. Н Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC		HO2S2		EC	CM	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0138	1	F87	1	F110	100	Existed
P0158	2	F88	1	FIIU	100	Existed

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

Is the inspection result normal?

YES >> GO TO 10.

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

10. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC		HO2S2		EC	M	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0138	1	F87	4	F110	96	Existed
P0158	2	F88	4	1110	87	LAISIGU

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

r	отс		HO2S2		EC	CM	Ground	Continuity
L	510	Bank	Connector	Terminal	Connector	Terminal	Gibuna	Continuity
P	0138	1	F87	4	F110	96	Ground	Not existed
P	0158	2	F88	4	FIIU	87	Giouna	NUL EXISTED

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 11.

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

EC-253

11.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-254, "Component Inspection (HO2 sensor 2)".

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 12.

12.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to <u>EM-40, "Exploded View"</u>. 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 J-43897-12)] and approved anti-seize lubricant (commercial service tool).

>> INSPECTION END

13.CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (HO2 sensor 2)

1.INSPECTION START

Will CONSULT-III be used?

Will CONSULT-III be used?

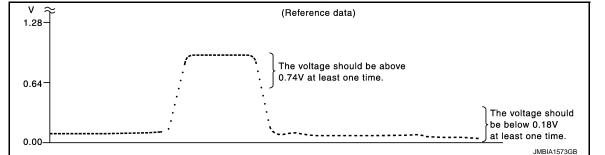
YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2

WITH CONSULT-III

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 3. Let engine idle for 1 minute.
- 4. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-III.
- 5. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)/(B2)" should be above 0.74 V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.18 V at least once when the "FUEL INJECTION" is -25%.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

3.CHECK HEATED OXYGEN SENSOR 2-1

WITHOUT CONSULT-III

1. Start engine and warm it up to the normal operating temperature.

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P0138, P0158 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

- 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.
- Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM				
Connector	+	-	Condition	Voltage	
Connector	Terminal	Terminal			С
F110	96 [HO2S2 (bank 1)]	100	Revving up to 4,000 rpm under no load at	The voltage should be above 0.74 V at least once during this procedure.	D
FIIU	87 [HO2S2 (bank 2)]	100	least 10 times	The voltage should be below 0.18 V at least once during this procedure.	F

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 conditions.

ECM + Condition Voltage Н Connector Terminal Terminal 96 [HO2S2 The voltage should be above 0.74 V at (bank 1)] least once during this procedure. F110 100 Keeping engine at idle for 10 minutes The voltage should be below 0.18 V at 87 least once during this procedure. [HO2S2 (bank 2)]

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 conditions.

	ECM				
Connector	+	-	Condition	Voltage	
Connector	Terminal	Terminal			
F110	96 [HO2S2 (bank 1)]	100	Coasting from 80 km/h (50 MPH) with se-	The voltage should be above 0.74 V at least once during this procedure.	
FIIU	87 [HO2S2 (bank 2)]	100	lector lever in the D position	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 <u>EM-40, "Exploded View"</u>.

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.

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• Before installing new oxygen 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).

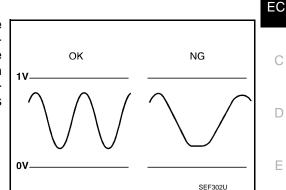
>> INSPECTION END

P0139, P0159 HO2S2

DTC Logic

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 various driving conditions such as fuel cut.



DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0139	HO2S2 (B1) [Heated oxygen sensor 2 (bank 1) circuit slow response]	It takes more time for the sensor to respond	Harness or connectors (The heated oxygen sensor 2 circuit is open or shorted)
P0159	HO2S2 (B2) [Heated oxygen sensor 2 (bank 2) circuit slow response]	between rich and lean than the specified time.	 Heated oxygen sensor 2 Fuel pressure Fuel injector Intake air leaks

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

Will CONSULT-III be used?

YES	>> GO TC) 2
YES	>> GO TC) 2

2. PERFORM DTC CONFIRMATION PROCEDURE

B WITH CONSULT-III

TESTING CONDITION:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

- 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. Restart 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 with CONSULT-III.
- 8. Check that "COOLAN TEMP/S" indicates more than 70°C (158°F).
- If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F). 9. Open engine hood.
- 10. Select "HO2S2 (B1) P0139" or "HO2S2 (B2) P0159" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 11. Start engine and follow the instruction of CONSULT-III display. **NOTE:**

It will take at most 10 minutes until "COMPLETED" is displayed.

12. Touch "SELF-DIAG RESULTS".

EC-257

[VK56VD]

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OK >> INSPECTION END

NG >> Go to EC-259, "Diagnosis Procedure".

CAN NOT BE DIAGNOSED>>GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

- 1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- 2. Perform DTC confirmation procedure again.

>> GO TO 2.

4.PERFORM COMPONENT FUNCTION CHECK

@ WITH GST

Perform component function check. Refer to EC-258. "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 >> Go to EC-259, "Diagnosis Procedure".

Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK-I

WITH GST

- 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. Restart 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 conditions.

		ECM			
DTC	Connector	+	-	Condition	Voltage
	Connector	Terminal	Terminal		
P0139	F110	96	100	Revving up to 4,000 rpm under no load at	
P0159	1110	87	100	least 10 times	0.24 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 terminals under the following conditions.

		ECM			
DTC	Connector	+	-	Condition	Voltage
	Connector	Terminal	Terminal		
P0139	F110	96	100	Keeping engine at idle for 10 minutes	A change of voltage should be more than
P0159	1110	87	100		0.24 V for 1 second during this procedure.
le the ine	naction ras	ult pormo	12		

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

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P0139, P0159 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

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3.PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector terminals under the following conditions.

		ECM						
DTC	.	+	-	-	Condi	tion		Voltage
	Connecto	r Terminal	Terminal	1				
P0139	E 110	96	400	Coasting f	rom 80 km/r	(50 MPH) with	se- A cha	ange of voltage should be more than
P0159	F110	87	- 100		r in the D po			V for 1 second during this procedure.
the ins	pection re	esult norm	al?					
		ECTION E <u>EC-259, "I</u>		Procedur	<u>e"</u> .			
iagno	sis Pro	cedure						INFOID:000000006217823
.CLEA	R THE M	IXTURE R	ATIO SE	LF-LEARN	NING VAL	JE		
						C-152, "Work	Procedu	re".
	-	r at least 1		-			1	
						ed? Is it diffic		
/ES		m trouble			20171, PO	174 of P0172	., PU175.	Refer to EC-263, "DTC Logic"
NO	>> GO T		<u> </u>					
CHEC	К НЕАТЕ	ED OXYGE	EN SENS	OR 2 GRO	OUND CIF	CUIT FOR C		ID SHORT
		witch OFF						
	0			r 2 (HO2S	2) harnes	s connector.		
		CM harnes						
. Cheo	ck the cor	ntinuity bet	ween HO	2S2 harne	ess conne	ctor and ECM	1 harness	s connector.
		HO2S2		E	CM			
DTC	Bank	Connector	Terminal	Connector	Terminal	Continuity		
P0139	1 Darik	F87		Connector	Terminal			
		_	1	F110	100	Existed		
P0159	2	F88	1					
		rness for s	-	ound and	short to p	ower.		
		esult norm	<u>al?</u>					
	>> GO T(>> Renai		uit short	to around	or short to	power in ha	rness or	connectors
	•	•		0		AND SHORT		
. Cheo	ck the cor	ntinuity bet	ween HO	2S2 harne	ess conne	ctor and ECM	1 harness	s connector.
		110000		F	214			
DTC		HO2S2	<u> </u>		CM	Continuity		
	Bank	Connector	Terminal	Connector	Terminal			
P0139	1	F87	4	F110	96	Existed		
P0159	2	F88	4		87			
. Cheo grou		ntinuity be	tween H	O2S2 harr	ness conn	ector and gro	ound, or	ECM harness connector and
		HO2S2		E/	CM			
DTC		HU252		E		Ground	Continuity	

DTC		HO2S2		EC	CM	Ground	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Ground	Continuity
P0139	1	F87	4	F110	96	Ground	Not existed
P0159	2	F88	4	FIIU	87	Gibulia	NUL EXISIEU

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 HEATED OXYGEN SENSOR 2

Refer to EC-260, "Component Inspection (HO2 sensor 2)".

Is the inspection result normal?

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

5.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to EM-40, "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 J-43897-12)] and approved anti-seize lubricant (commercial service tool).

>> INSPECTION END

6.CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (HO2 sensor 2)

INFOID:000000006217824

1.INSPECTION START

Will CONSULT-III be used?

Will CONSULT-III be used?

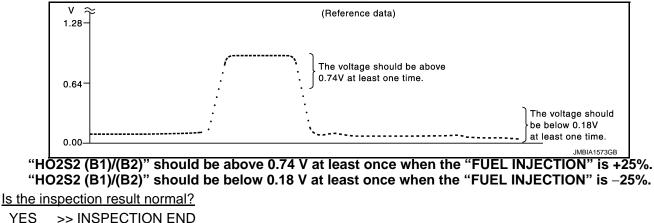
YES >> GO TO 2. NO >> GO TO 3.

NO >> GO IO 3.

2.CHECK HEATED OXYGEN SENSOR 2

WITH CONSULT-III

- T. Start engine and warm it up to the normal operating temperature.
- 2. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 3. Let engine idle for 1 minute.
- 4. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-III.
- 5. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.



P0139, P0159 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 6.

3.CHECK HEATED OXYGEN SENSOR 2-I

🛞 WITHOUT CONSULT-III

- 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 conditions.

	ECM			
Connector	+	-	Condition	Voltage
Connector	Terminal	Terminal		
F110 -	96 [HO2S2 (bank 1)]	100	Revving up to 4,000 rpm under no load at	The voltage should be above 0.74 V at least once during this procedure.
	87 [HO2S2 (bank 2)]	100	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 4.

4.CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals under the following conditions.

ECM					
Connector	+	_	Condition	Voltage	
Connector	Terminal	Terminal			
F110 —	96 [HO2S2 (bank 1)]	100	Keeping engine at idle for 10 minutes	The voltage should be above 0.74 V at least once during this procedure.	
	87 [HO2S2 (bank 2)]	100	Reeping engine at lote 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 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following conditions.

	ECM				
Connector	+	_	Condition	Voltage	
Connector	onnector Terminal Terminal				
E110	96 [HO2S2 (bank 1)]	(S2 (1)]	Coasting from 80 km/h (50 MPH) with se-	The voltage should be above 0.74 V at least once during this procedure.	
F110	87 [HO2S2 (bank 2)]	100	lector lever in the D position	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.

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6.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to <u>EM-40, "Exploded View"</u>. **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 J-43897-12)] and approved anti-seize lubricant (commercial service tool).

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:000000006217825

[VK56VD]

DTC DETECTION LOGIC

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

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

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause	F
P0171	FUEL SYS-LEAN-B1 [Fuel injection system too lean (bank 1)]	 Fuel injection system does not operate properly. 	 Intake air leakage A/F sensor 1 Fuel injector 	G
P0174	FUEL SYS-LEAN-B2 [Fuel injection system too lean (bank 2)]	• The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	 Exhaust gas leakage Incorrect fuel pressure Lack of fuel Mass air flow sensor Incorrect PCV hose connection 	Н

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to EC-152, "Work Procedure".

2. Start engine.

Is it difficult to start engine?

YES >> GO TO 3.

NO >> GO TO 4.

3.RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too. Crank engine while depressing accelerator pedal.

NOTE:

When depressing accelerator pedal three fourths (3/4) or more, the control system does not start the engine. O Do not depress accelerator pedal too much.

Does engine start?

YES >> Proceed to <u>EC-264, "Diagnosis Procedure"</u>.

NO >> Check exhaust and intake air leakage visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Keep engine idle for at least 5 minutes.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-264, "Diagnosis Procedure".

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< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

INFOID-000000006217826

NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE-III

- 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.
- 5. Maintain the following conditions for at least 10 consecutive minutes. Hold the accelerator pedal as steady as possible.

Vehicle speed 50 - 120 km/h (31 - 75 MPH)

CAUTION:

Always drive vehicle at a safe speed.

6. Check 1st trip DTC.

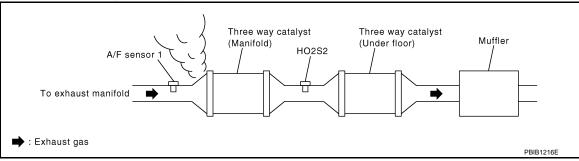
Is 1st trip DTC detected?

YES >> Proceed to <u>EC-264, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1.CHECK EXHAUST GAS LEAKAGE

- 1. Start engine and run it at idle.
- 2. Listen for an exhaust gas leakage before three way catalyst (manifold).



Is exhaust gas leakage detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAKAGE

- 1. Listen for an intake air leakage after the mass air flow sensor.
- 2. Check PCV hose connection.

Is intake air leakage detected?

YES >> Repair or replace malfunctioning part.

3. CHECK A/F SENSOR 1 CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect corresponding A/F sensor 1 harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

< DTC/CIRCUIT DIAGNOSIS >

DTC		A/F sensor	1	EC	CM	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
			3		88		
P0171	1	F67	4		90		
			6	E110	9 F110	94	Existed
	0174 2 F68		3	FIIU	78	EXISTED	
P0174		2 F68	4		80		
			6		74		

5. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC	A/F sensor 1			ECM		Continuity	ntinuity Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	Continuity
			3		88		
P0171	1	F67	4		90		
			6	F110 94 78		Existed	Not existed
			3		78	LAISIEU	NOT EXISTED
P0174	2	F68	4		80		
			6		74		
6. Also c	heck ha	arness for s	short to p	ower.			

Is the inspection result normal?

YES >> GO TO 4.

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

4.CHECK FUEL PRESSURE

Check fuel pressure. Refer to EC-153, "Work Procedure".

Is the inspection result normal?

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

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly". Refer to <u>FL-5. "Removal and Installation"</u>. NO >> Repair or replace malfunctioning part.

6.CHECK MASS AIR FLOW SENSOR

B WITH CONSULT-III

- Install all removed parts.
 Check "MASS AIR FLOW" in "DATA
- Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III. For specification, refer to <u>EC-538</u>, "Mass Air Flow Sensor".

@ WITH GST

- 1. Install all removed parts.
- Check mass air flow sensor signal in Service \$01 with GST. For specification, refer to EC-538, "Mass Air Flow Sensor".

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 <u>EC-201. "Diagnosis Procedure"</u>.

7.CHECK FUNCTION OF FUEL INJECTOR

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< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

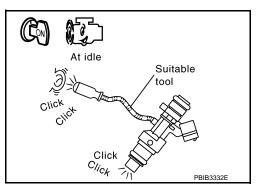
(I) WITH CONSULT-III

- 1. Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Check that each circuit produces a momentary engine speed drop.
- **WITHOUT CONSULT-III**
- 1. Start engine and let it idle.
- 2. Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Perform trouble diagnosis for fuel injector, refer to <u>EC-</u> <u>498, "Diagnosis Procedure"</u>.



8. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace fuel injector. Refer to EM-49, "Removal and Installation".
- NO >> Repair or replace malfunctioning part.

< DTC/CIRCUIT DIAGNOSIS >

P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:000000006217827

DTC DETECTION LOGIC

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

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

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause	F
P0172	FUEL SYS-RICH-B1 [Fuel injection system too rich (bank 1)]	 Fuel injection system does not operate properly. The amount of mixture ratio componention is too 	 A/F sensor 1 Fuel injector Exhaust gas leakage 	I
P0175	FUEL SYS-RICH-B2 [Fuel injection system too rich (bank 2)]	• The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	 Exhaust gas leakage Incorrect fuel pressure Mass air flow sensor 	G

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1.	Clear the mixture ratio self-learning value. Refer to EC-152, "Work Procedure".
2.	Start engine.
<u>ls i</u>	t difficult to start engine?

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

3.RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.

Crank engine while depressing accelerator pedal. **NOTE:**

When depressing accelerator pedal three fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Proceed to EC-268, "Diagnosis Procedure".

NO >> Remove spark plugs and check for fouling, etc.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Keep engine idle for at least 5 minutes.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-268, "Diagnosis Procedure".

NO >> GO TO 5.

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< DTC/CIRCUIT DIAGNOSIS >

5.PERFORM DTC CONFIRMATION PROCEDURE-III

- 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.
- 5. Maintain the following conditions for at least 10 consecutive minutes. Hold the accelerator pedal as steady as possible.

Vehicle speed 50 - 120 km/h (31 - 75 MPH)

CAUTION:

Always drive vehicle at a safe speed.

6. Check 1st trip DTC.

Is 1st trip DTC detected?

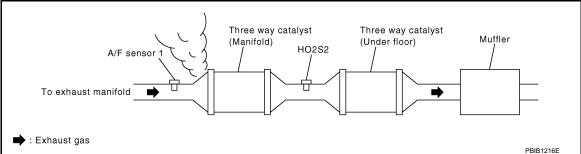
YES >> Proceed to <u>EC-268, "Diagnosis Procedure"</u>.

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK EXHAUST GAS LEAKAGE

- 1. Start engine and run it at idle.
- 2. Listen for an exhaust gas leakage before three way catalyst (manifold).



Is exhaust gas leakage detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAKAGE

Listen for an intake air leakage after the mass air flow sensor.

Is intake air leakage detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 3.

3. CHECK A/F SENSOR 1 CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect corresponding A/F sensor 1 harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

INFOID:000000006217828

< DTC/CIRCUIT DIAGNOSIS >

DTC		A/F sensor 1		EC	CM	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
			3		88		
P0171	1	F67	4		90		
			6	F110	94	Existed	
			3	FIIU	78	EXISTED	
P0174	2	F68	4		80		
			6		74		

5. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC		A/F sensor	1	EC	M	Continuity	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	Continuity
			3		88		
P0171	1	F67	4		90		
			6	F110	94	Existed	Not existed
			3	FIIU	78	Existed	NOT EXISTED
P0174	2	F68	4		80		
			6		74		
6. Also cl	neck ha	arness for s	short to po	ower.			
Is the inspe	ection r	esult norm	<u>al?</u>				
	> GO T	O 4.					

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

4.CHECK FUEL PRESSURE

Check fuel pressure. Refer to EC-153, "Work Procedure".

Is the inspection result normal?

YES	>> GO TO 5.
-----	-------------

NO >> Replace fuel filter and fuel pump assembly". Refer to <u>FL-5. "Removal and Installation"</u>.

5.CHECK MASS AIR FLOW SENSOR

WITH CONSULT-III	L
1. Install all removed parts.	
Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III.	
For specification, refer to <u>EC-538. "Mass Air Flow Sensor"</u> .	IVI
WITH GST	
1. Install all removed parts.	
Check mass air flow sensor signal in "Service \$01" with GST.	Ν
For specification, refer to EC-538, "Mass Air Flow Sensor".	
Is the measurement value within the specification?	
YES >> GO TO 6.	0
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or	
grounds. Refer to EC-201, "Diagnosis Procedure".	

6.CHECK FUNCTION OF FUEL INJECTOR

WITH CONSULT-III

- 1. Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Check that each circuit produces a momentary engine speed drop.
- **WITHOUT CONSULT-III**
- 1. Start engine and let it idle.

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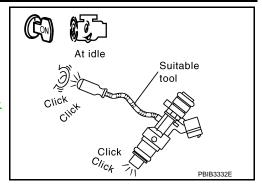
< DTC/CIRCUIT DIAGNOSIS >

2. Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Perform trouble diagnosis for fuel injector, refer to <u>EC-</u> <u>498. "Diagnosis Procedure"</u>.



[VK56VD]

7. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace fuel injector. Refer to EM-49, "Removal and Installation".
- NO >> Repair or replace malfunctioning part.

P0181 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0181 FTT SENSOR

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause	
P0181	FTT SENSOR [Fuel tank temperature sensor circuit range/performance]	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sen- sor and intake air temperature sensor.	 Harness or connectors (The FTT sensor circuit is open or shorted) Fuel tank temperature sensor Combination meter 	
DTC CON	FIRMATION PROCEDU	IRE		
1.preco	NDITIONING			
2. Turn ig	nition switch OFF and wai nition switch ON. nition switch OFF and wai			
>>	• GO TO 2.			
2.PERFO	RM DTC CONFIRMATION	I PROCEDURE-I		
	nition switch ON and wait 1st trip DTC.	at least 10 seconds.		
	TC detected?			
YES >>	Proceed to EC-271, "Dia	gnosis Procedure".		
• ·	GO TO 3. ENGINE COOLANT TEM			
_	ONSULT-III			
1. Select 2. Check WITH G	"COOLAN TEMP/S" in "D/ "COOLAN TEMP/S" value ST			
	procedure "With CONSUL TEMP/S" less than 60°C (*			
YES >>	• INSPECTION END • GO TO 4.			
1.PERFO	RM DTC CONFIRMATION	I PROCEDURE-II		
1. Cool ei 2. Wait at	ONSULT-III ngine down until "COOLAN least 10 seconds. 1st trip DTC.	N TEMP/S" is less than 60°C (140°F).		
WITH G	ST procedure "With CONSUL			
	TC detected?	1-111 auuve.		
YES >>	 Proceed to <u>EC-271, "Diad</u> INSPECTION END 	gnosis Procedure".		
Diagnosi	s Procedure		INFOID:00000006288290	
1.снеск	DTC WITH COMBINATIO	N METER		
	VI-30, "CONSULT-III Fund			
	ection result normal?			

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INFOID:000000006288289

P0181 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

NO >> Proceed to <u>MWI-69</u>, "Component Function Check".

2.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- 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		Voltage (V)	
Connector	Terminal			
C5	4	Ground	Approx. 5	

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 "fuel level sensor unit and fuel pump"
- · Loose or poor connection for each connector and harness

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

4.CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect "combination meter" harness connector.
- 3. Check the continuity between "fuel level sensor unit and fuel pump" harness connector and "combination meter" harness connector.

Fuel level sensor unit and fuel pump		Combinat	tion meter	Continuity
Connector	Terminal	Connector Terminal		
C5	5	M34	24	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 "fuel level sensor unit and fuel pump" and "combination meter"

• Loose or poor connection for each connector and harness

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

6.CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-273, "Component Inspection (Fuel Tank Temperature Sensor)".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace fuel level sensor unit and fuel pump. Refer to <u>FL-5, "Removal and Installation"</u>.

7. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

P0181 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection (Fuel Tank Temperature Sensor)

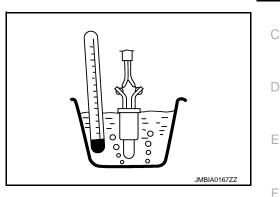
1.CHECK FUEL TANK TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 3. Remove fuel level sensor unit.
- 4. Check resistance between "fuel level sensor unit and fuel pump " terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (k Ω)	
4 and 5	and 5 Temperature [°C (°F)]		2.3 - 2.7
4 410 5		50 (122)	0.79 - 0.90

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace "fuel level sensor unit and fuel pump".



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P0182, P0183 FTT SENSOR

DTC Logic

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[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0182	FTT SEN/CIRCUIT (Fuel tank temperature sen- sor 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.)
P0183	FTT SEN/CIRCUIT (Fuel tank temperature sen- sor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	 Fuel tank temperature sensor Combination meter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> 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-274, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK DTC WITH COMBINATION METER

Refer to MWI-30, "CONSULT-III Function".

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Proceed to <u>MWI-69</u>, "Component Function Check".

2. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- 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 (V)
Connector	Terminal		
C5 4		Ground	Approx. 5

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 "fuel level sensor unit and fuel pump"

EC-274

INFOID:000000006288293

P0182, P0183 FTT SENSOR

	CUIT DIAGN						[VK56VD]
			ach conne	ctor and harne	ess		[
>>	Repair open	n circuit, s	short to gro	ound or short	to power in h	arness or conne	ctor.
1. CHECK F	UEL TANK	TEMPE	RATURE S	ENSOR GRO	OUND CIRCU	JIT FOR OPEN A	ND SHORT
	ition switch						
	ect combina				and fuel pur	on" harnaas aann	ector and "combination
	narness conr		i luei leve		anu iuei pui	np namess com	
					_		
Fuel level ser		Combin	ation meter		_		
fuel p Connector	Terminal	Connecto	r Terminal	Continuity			
Connector C5	5	M34	24	Existed	_		
	-	-		and short to p			
	ction result n		to ground				
	<u>GO TO 6.</u>						
NO >>	GO TO 5.						
DETECT	MALFUNCT	TIONING	PART				
Check the fo							
						ump" and "combi	nation meter"
Loose or p	oor connect	tion for ea	ach conne	ctor and harne	ess		
	Donoir onon	oirouit a	bort to are	und or abort	to nowar in k	orbood or oobbo	ator
~			-		to power in h	arness or conne	ctor.
6. снеск г	UEL TANK	TEMPER	RATURE S	ENSOR			ctor.
3. CHECK F Refer to <u>EC-</u>	UEL TANK	TEMPER	RATURE S				ctor.
D. CHECK F Refer to <u>EC-</u> s the inspec	UEL TANK 275, "Comp ption result n	TEMPER	RATURE S	ENSOR			ctor.
CHECK F Refer to <u>EC-</u> s the inspec YES >>0	FUEL TANK 275, "Comp ction result n GO TO 7.	TEMPER conent Ins cormal?	RATURE S	ENSOR uel Tank Tem	nperature Se	<u>nsor)"</u> .	
CHECK F Refer to <u>EC-</u> s the inspect YES >> (NO >>)	UEL TANK 275, "Comp ction result n GO TO 7. Replace "fue	TEMPER conent Ins cormal? el level se	RATURE S spection (F	ENSOR uel Tank Tem	nperature Se		
CHECK F Refer to <u>EC-</u> s the inspect YES >> 0 NO >> 1 CHECK II	UEL TANK 275, "Comp ction result n GO TO 7. Replace "fue NTERMITTE	TEMPER oonent Ins ormal? el level so ENT INC	RATURE S spection (F ensor unit DENT	ENSOR	nperature Se	<u>nsor)"</u> .	
D .CHECK F Refer to <u>EC-</u> s the inspec YES >> 0 NO >> 1 7 .CHECK II	UEL TANK 275, "Comp ction result n GO TO 7. Replace "fue	TEMPER oonent Ins ormal? el level so ENT INC	RATURE S spection (F ensor unit DENT	ENSOR	nperature Se	<u>nsor)"</u> .	
CHECK F Refer to <u>EC-</u> s the inspect YES >> 0 NO >> 1 CHECK II Refer to <u>GI-</u> 2	UEL TANK 275, "Comp ction result n GO TO 7. Replace "fue NTERMITTE	TEMPER conent Ins cormal? el level so ENT INC tent Incid	RATURE S spection (F ensor unit DENT	ENSOR	nperature Se	<u>nsor)"</u> .	
CHECK F Refer to <u>EC-</u> s the inspect YES >> 0 NO >> 1 CHECK II Refer to <u>GI-4</u>	UEL TANK 275, "Comp ction result n GO TO 7. Replace "fue NTERMITTE 40, "Intermitt	TEMPER ormal? el level se ENT INC tent Incid	RATURE S spection (F ensor unit DENT ent".	ENSOR iuel Tank Tem	p <u>erature Se</u> p". Refer to <u>F</u>	nsor)". ⁻ L-5. "Removal a	nd Installation".
CHECK F Refer to <u>EC-</u> s the inspect YES >> 0 NO >> 1 CHECK II Refer to <u>GI-4</u>	UEL TANK 275, "Comp ction result n GO TO 7. Replace "fue NTERMITTE 40, "Intermitt	TEMPER ormal? el level se ENT INC tent Incid	RATURE S spection (F ensor unit DENT ent".	ENSOR	p <u>erature Se</u> p". Refer to <u>F</u>	nsor)". ⁻ L-5. "Removal a	
COMPONE Compone	UEL TANK 275, "Comp ction result n GO TO 7. Replace "fue NTERMITTE 40, "Intermitt	TEMPER oonent Ins oormal? el level so ENT INC ENT INC tent Incid	RATURE S spection (F ensor unit DENT ent".	ENSOR uel Tank Tem and fuel pump	p <u>erature Se</u> p". Refer to <u>F</u>	nsor)". ⁻ L-5. "Removal a	nd Installation".
CHECK F Refer to <u>EC-</u> s the inspect YES >> 0 NO >> 1 CHECK II Refer to <u>GI-4</u> >> 1 Compone	UEL TANK 275, "Comp ction result n GO TO 7. Replace "fue NTERMITTE 40, "Intermitt INSPECTIO ent Inspec	TEMPER oonent Ins oormal? el level so ENT INC ENT INC tent Incid WN END tion (Fu TEMPER	RATURE S spection (F ensor unit DENT ent".	ENSOR uel Tank Tem and fuel pump	p <u>erature Se</u> p". Refer to <u>F</u>	nsor)". ⁻ L-5. "Removal a	nd Installation".
CHECK F Refer to EC- s the inspect YES >> 0 NO >> 1 CHECK II Refer to GI-4 >> 1 COMPONE I.CHECK F I. Turn ign 2. Disconn	UEL TANK 275, "Comp ction result n GO TO 7. Replace "fue NTERMITTE 40, "Intermitt INSPECTIO ont Inspec UEL TANK ition switch	TEMPER onent Ins ormal? el level se ENT INCI ENT INCI tent Incid N END tion (Fr TEMPER OFF. el sensor	RATURE S Spection (F ensor unit DENT ent". Jel Tank RATURE S unit and f	ENSOR uel Tank Tem and fuel pump	perature Se	nsor)". ⁻ L-5. "Removal a	nd Installation".
CHECK F Refer to EC- s the inspect YES >> 0 NO >> 1 CHECK II Refer to GI-2 >> 1 COMPONE .CHECK F . Turn ign 2. Disconn 3. Remove	UEL TANK 275. "Comp ction result n GO TO 7. Replace "fue NTERMITTE 40. "Intermitt INSPECTIO ont Inspec FUEL TANK ition switch ect "fuel level so	TEMPER onent Ins ormal? el level se ENT INC ENT INC tent Incid N END tion (Fu TEMPER OFF. el sensor ensor un	RATURE S spection (F ensor unit DENT ent". uel Tank RATURE S unit and f t.	ENSOR uel Tank Tem and fuel pump Temperatu ENSOR uel pump" hau	perature Se p". Refer to <u>F</u> ure Senso	nsor)". ⁻ L-5. "Removal a	nd Installation".
CHECK F Refer to EC- s the inspect YES >> 0 NO >> 1 CHECK II Refer to GI-2 >> 1 COMPONE 1.CHECK F 1. Turn ign 2. Disconn 3. Remove 4. Check refer	UEL TANK 275. "Comp ction result n GO TO 7. Replace "fue NTERMITTE 40. "Intermitt INSPECTIO ont Inspec UEL TANK ition switch ect "fuel level seistance be	TEMPER onent Ins ormal? el level so ENT INC ENT INC tent Incid N END tion (Fu TEMPER OFF. el sensor ensor un etween "f	RATURE S spection (F ensor unit DENT ent". uel Tank RATURE S unit and f t. uel level s	ENSOR uel Tank Tem and fuel pump Temperatu	perature Se o". Refer to <u>F</u> ure Senso rness conner d fuel pump	nsor)". ⁻ L-5. "Removal a	nd Installation".
COMPONE Compo	UEL TANK 275. "Comp ction result n GO TO 7. Replace "fue NTERMITTE 40. "Intermitt INSPECTIO ont Inspec UEL TANK ition switch ect "fuel level seistance be	TEMPER onent Ins ormal? el level so ENT INC ENT INC tent Incid N END tion (Fu TEMPER OFF. el sensor ensor un etween "f	RATURE S spection (F ensor unit DENT ent". uel Tank RATURE S unit and f t. uel level s	ENSOR uel Tank Tem and fuel pump Temperatu ENSOR uel pump" hau ensor unit and	perature Se o". Refer to <u>F</u> ure Senso rness conner d fuel pump	nsor)". ⁻ L-5. "Removal a	nd Installation".
D .CHECK F Refer to EC- s the inspect YES >> 0 NO >> 1 7 .CHECK II Refer to GI-2 Sompone 1 .CHECK F 1. Turn ign 2. Disconn 3. Remove 4. Check ref	UEL TANK 275. "Comp ction result n GO TO 7. Replace "fue NTERMITTE 40. "Intermitte INSPECTIO ont Inspec FUEL TANK ition switch bect "fuel level se esistance be als by heatin	TEMPER onent Ins ormal? el level so ENT INC ENT INC tent Incid N END tion (Fu TEMPER OFF. el sensor ensor un etween "f	RATURE S spection (F ensor unit DENT ent". uel Tank RATURE S unit and f t. uel level s ot water as	ENSOR uel Tank Tem and fuel pump Temperatu ENSOR uel pump" hau ensor unit and	perature Se o". Refer to <u>F</u> ure Senso rness conner d fuel pump	nsor)". ⁻ L-5. "Removal a	nd Installation".
6.CHECK F Refer to EC- Is the inspece YES >> 0 NO >> 1 7.CHECK II Refer to GI-2 >> 1 Compone 1.CHECK F 1. Turn ign 2. Disconn 3. Remove 4. Check re " terminals	UEL TANK 275. "Comp ction result n GO TO 7. Replace "fue NTERMITTE 40. "Intermitt INSPECTIO INSPECTIO TUEL TANK ition switch fuel level so esistance be als by heatin	TEMPER onent Ins ormal? el level so ENT INC ENT INC tent Incid N END tion (Fu TEMPER OFF. el sensor ensor un etween "f ng with ho	RATURE S spection (F ensor unit DENT ent". uel Tank RATURE S unit and f t. uel level s ot water as	ENSOR uel Tank Tem and fuel pump Temperatu ENSOR uel pump" han ensor unit and shown in the	perature Se o". Refer to <u>F</u> ure Senso rness conner d fuel pump	nsor)". ⁻ L-5. "Removal a	nd Installation".
CHECK F Refer to EC- s the inspec YES >> 0 NO >> 1 CHECK II Refer to GI-2 COMPONE	UEL TANK 275. "Comp ction result n GO TO 7. Replace "fue NTERMITTE 40. "Intermitte INSPECTIO ont Inspec FUEL TANK ition switch bect "fuel level se esistance be als by heatin	TEMPER onent Ins ormal? el level se ENT INC ENT INC tent Incid N END tion (Fe OFF. el sensor ensor un etween "f ng with ho ndition	RATURE S spection (F ensor unit DENT ent". uel Tank RATURE S unit and f t. uel level s ot water as	ENSOR uel Tank Tem and fuel pump Temperatu ENSOR uel pump" hau ensor unit and shown in the Resistance (kΩ)	perature Se o". Refer to <u>F</u> ure Senso rness conner d fuel pump	nsor)". ⁻ L-5. "Removal a	nd Installation".
Ô.CHECK F Refer to EC- Is the inspect YES >> 0 YES >> 0 7.CHECK II Refer to GI-4 >> 0 7.CHECK II Refer to GI-4 >> 0 7.CHECK II Refer to GI-4 >> 0 1.CHECK F 1. Turn ign 2. Disconn 3. Remove 4. Check reference " terminals 4 and 5 Terminals	UEL TANK 275. "Comp ction result n GO TO 7. Replace "fue NTERMITTE 40. "Intermitt INSPECTIO INSPECTIO TUEL TANK ition switch fuel level so esistance be als by heatin	TEMPER onent Ins ormal? el level so ENT INC tent Incid W END tion (Fu TEMPER OFF. el sensor ensor un etween "f ng with ho ndition C (°F)]	RATURE S spection (F ensor unit DENT ent". Uel Tank RATURE S unit and f t. uel level s ot water as 20 (68)	ENSOR uel Tank Tem and fuel pump Temperate ENSOR uel pump" han ensor unit and shown in the Resistance (kΩ) 2.3 - 2.7	perature Se o". Refer to <u>F</u> ure Senso rness conner d fuel pump	nsor)". ⁻ L-5. "Removal a	nd Installation".

>> Replace "fuel level sensor unit and fuel pump". NO



JMBIA0167ZZ

P0190, P0192, P0193 FRP SENSOR

DTC Logic

[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0190	Fuel rail pressure sensor circuit low input and high in- put	Signal voltage from the fuel rail pressure sensor remains at more than 4.84 V / less than 0.2 V for 5 seconds or more.	 Harness or connectors (Fuel rail pressure sensor circuit is open or shorted.)
P0192	Fuel rail pressure sensor circuit low input	Signal voltage from the fuel rail pressure sensor remains at less than 0.37 V for 5 seconds or more.	(Power steering pressure sensor circuit is open or shorted.) (Low fuel pressure sensor circuit is open or shorted.)
P0193	Fuel rail pressure sensor circuit high input	Signal voltage from the fuel rail pressure sensor remains at more than 3.46 V for 5 seconds or more.	 (The electrically-controlled cooling fan coupling circuit is open or shorted) Fuel rail pressure sensor Power steering pressure sensor Low fuel pressure sensor Electrically-controlled cooling fan coupling

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine ON and wait at least 60 seconds.

2. Check DTC or 1st trip DTC.

Is DTC or 1st trip DTC detected?

- YES >> Proceed to EC-276, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK FRP SENSOR POWER SUPPLY-I

1. Turn ignition switch OFF.

2. Disconnect FRP sensor connector.

- 3. Turn ignition switch ON.
- 4. Check the voltage between FRP sensor harness connector terminals.

	FRP sensor		
Connector	+	_	Voltage (Approx.)
Connector	tern	ninal	(TT -)
F26	1	3	5 V

Inspection result normal?

YES >> GO TO 6.

NO >> GO TO 2.

Check the voltage between FRP sensor harness connector and the ground.

EC-276

INFOID:000000006288296

P0190, P0192, P0193 FRP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

+

Veltage

FRP	sensor	_	Voltage (Approx.)
Connector	Terminal		, , ,
F26	1	Ground	5 V
		·	

Is inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check harness connector for short to power and short to ground, between the following terminals.

ECM		Sensor				
Connector	Terminal	Name	Name Connector Termina			
	Low fuel pressure sensor	F25	3			
F111	27	Power steering pressure sensor	F35	1		
FIII		Cooling fan speed sensor	F39	2		
	28	FRP sensor	F26	1		

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to <u>EC-168. "Diagnosis Procedure"</u>.

NO >> Repair or replace error-detected parts.

4.CHECK FRP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between FRP sensor harness connector and ECM harness connector.

+			_	
FRP	sensor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F26	3	F111	40	Existed

Is inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and the ground.

ECM		Ground	Continuity
Connector	Terminal	Ground	Continuity
F111	5		
	114		
E80	115	Ground	Existed
200	174		
	175		

Is inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-40, "Intermittent Incident"</u>.

NO >> Repair or replace error-detected parts.

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P0190, P0192, P0193 FRP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

INFOID:000000006288297

6.CHECK FRP SENSOR SIGNAL CIRCUIT

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

+		-		
FRP	sensor	E	CM	Continuity
Connector	Terminal	Connector	Terminal	
F26	2	F111	31	Existed

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

Is inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK FRP SENSOR

Refer to EC-278, "Component Inspection (Fuel Rail Pressure Sensor)".

Is inspection result normal?

- YES >> Check intermittent incident. Refer to GI-40, "Intermittent Incident".
- NO >> Repair or replace error-detected parts.

Component Inspection (Fuel Rail Pressure Sensor)

1.CHECK FRP SENSOR

(I)WITH CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connector disconnected.
- 3. Start the engine.
- 4. Select "DATA MONITOR" mode with CONSULT-III.
- 5. Check that the "FUEL PRES SEN V" indication.

Monitor Item	Condition	Values/Status	
	Engine speed: Idle	980 – 1,200 mV	
FUEL PRES SEN V	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,100 – 2,900 mV	

WITHOUT CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connector disconnected.
- 3. Start the engine.
- 4. Check FRP sensor signal voltage.

	+		_) /alva
	EC	M		Condition	Value (Approx.)
Connector	Terminal	Connector	Terminal		
F111	31	F111	40	[Engine is running]Warm-up conditionIdle speed	0.98 – 1.2 V
	51	1 1 1 1	40	[Engine is running]Warm-up conditionRevving engine from idle to 4,000 rpm quickly	1.1 – 2.9 V

Is the inspection result normal?

YES >> INSPECTION END.

NO >> Replace FRP sensor. Refer to <u>EM-48, "Exploded View"</u>.

EC-278

< DTC/CIRCUIT DIAGNOSIS >

P0191 FRP SENSOR

DTC Logic

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INFOID:000000006288298

[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0191	Fuel rail pressure sensor	Fuel rail pressure remains at more than 1.5 MPa (15 bar, 15.3 kg/cm ² , 217.5 psi) for 0.2 seconds or more during ignition ON.	 Harness or connectors (Fuel rail pressure sensor circuit is open or shorted.) (Power steering pressure sensor circuit is open or shorted.) (Low fuel pressure sensor circuit is open or shorted.) (The electrically-controlled cooling fan cou- pling circuit is open or shorted) Fuel rail pressure sensor Power steering pressure sensor Low fuel pressure sensor Electrically-controlled cooling fan coupling
	NFIRMATION PROCE	DURE	
PRECO	ONDITIONING		
		wait at least 10 seconds.	
	gnition switch ON. gnition switch OFF and v	wait at least 10 seconds.	
	CONDITION:		
		procedure, confirm that battery	voltage is 11 V or more at idle.
Sefore pe	erforming the following	procedure, confirm that battery	voltage is 11 V or more at idle.
Sefore pe	erforming the following		voltage is 11 V or more at idle.
sefore pe > PERFC	erforming the following -> GO TO 2. DRM DTC CONFIRMATI	ON PROCEDURE	
PERFC . Start t NOTE	FFORMING the following SOG TO 2. DRM DTC CONFIRMATI The engine and warm it u	ON PROCEDURE up to the normal operating tempera	ture.
PERFC . Start t NOTE Warm	FFORMING the following SOC TO 2. DRM DTC CONFIRMATI the engine and warm it us to up the engine until "Co	ON PROCEDURE up to the normal operating tempera	
Sefore pe PERFC Start t NOTE Warm 70°C Turn t	Frorming the following Solution of Constraints Constraints and warm it us the engine and warm it us the engine until "Constraints (158°F). The ignition switch OFF	ON PROCEDURE up to the normal operating tempera OOLAN TEMP/S" on "DATA MON	ture.
Sefore pe PERFC Start t NOTE Warm 70°C Turn t	Forming the following Solution of the following Solution of the solution of	ON PROCEDURE up to the normal operating tempera OOLAN TEMP/S" on "DATA MON	ture. IITOR" of CONSULT-III reaches at least
2.PERFC . Start t NOTE Warm 70°C 2. Turn t (95°F) CAUT • The	Forming the following Solution of the following Comparison of the second second The engine and warm it us the engine and the engine an	ON PROCEDURE up to the normal operating tempera OOLAN TEMP/S" on "DATA MON and cool the engine until the en r temperature and engine coolan	ture. IITOR" of CONSULT-III reaches at least
2.PERFC .Start t NOTE Warm 70°C 2. Turn t (95°F) CAUT • The • Do r	Frorming the following Solution of the following CORM DTC CONFIRMATI The engine and warm it us the engine and warm it us the engine until "Cu (158°F). the ignition switch OFF or less. CION:	ON PROCEDURE up to the normal operating tempera OOLAN TEMP/S" on "DATA MON and cool the engine until the en r temperature and engine coolan	ture. IITOR" of CONSULT-III reaches at least gine coolant temperature reaches 35°C
2.PERFC 2.PERFC 1. Start t NOTE Warm 70°C 2. Turn t (95°F) CAUT • The • Do n 3. Turn t 4. Check	erforming the following > GO TO 2. DRM DTC CONFIRMATI the engine and warm it u the engine and warm it u (158°F). the ignition switch OFF) or less. TION: difference between air not turn ignition switch gnition switch ON and w < 1st trip DTC.	ON PROCEDURE up to the normal operating tempera OOLAN TEMP/S" on "DATA MON and cool the engine until the en r temperature and engine coolan	ture. IITOR" of CONSULT-III reaches at least gine coolant temperature reaches 35°C
2.PERFC . Start t NOTE Warm 70°C 2. Turn t (95°F) CAUT • The • Do r 3. Turn to 4. Check s 1st trip l	erforming the following > GO TO 2. DRM DTC CONFIRMATI the engine and warm it u the engine and warm it u (158°F). the ignition switch OFF) or less. TION: difference between air not turn ignition switch gnition switch ON and w < 1st trip DTC. DTC detected?	ON PROCEDURE up to the normal operating tempera OOLAN TEMP/S" on "DATA MON and cool the engine until the en r temperature and engine coolan n ON. vait at least 60 seconds.	ture. IITOR" of CONSULT-III reaches at least gine coolant temperature reaches 35°C
Sefore pe PERFC Start t NOTE Warm 70°C CAUT (95°F) CAUT • The • Do r 8. Turn i 4. Check 5. 1st trip l YES >	erforming the following > GO TO 2. DRM DTC CONFIRMATI the engine and warm it u the engine and warm it u (158°F). the ignition switch OFF) or less. TION: difference between air not turn ignition switch gnition switch ON and w < 1st trip DTC.	ON PROCEDURE up to the normal operating tempera OOLAN TEMP/S" on "DATA MON and cool the engine until the en r temperature and engine coolan n ON. vait at least 60 seconds.	ture. IITOR" of CONSULT-III reaches at least gine coolant temperature reaches 35°C
2.PERFC 2.PERFC 3. Start t NOTE Warm 70°C 2. Turn t (95°F) CAUT • The • Do t 3. Turn is 4. Check s 1st trip t YES > NO >	 Forming the following GO TO 2. DRM DTC CONFIRMATI the engine and warm it u up the engine until "Content of the ignition switch OFF". the ignition switch OFF or less. TION: difference between air for turn ignition switch ON and ward start trip DTC. DTC detected? Proceed to EC-279. "If the ignition switch of the ignition second start if the ignition se	ON PROCEDURE up to the normal operating tempera OOLAN TEMP/S" on "DATA MON and cool the engine until the en r temperature and engine coolan n ON. vait at least 60 seconds.	ture. IITOR" of CONSULT-III reaches at least gine coolant temperature reaches 35°C
2.PERFC 2.PERFC 1. Start t NOTE Warm 70°C 2. Turn t (95°F) CAUT • The • Do r 3. Turn ig 4. Check <u>s 1st trip l</u> YES > NO > Diagnos	erforming the following > GO TO 2. ORM DTC CONFIRMATI the engine and warm it u (158°F). the ignition switch OFF) or less. TION: difference between air not turn ignition switch gnition switch ON and w < 1st trip DTC. DTC detected? > Proceed to EC-279. "IT > INSPECTION END sis Procedure	ON PROCEDURE up to the normal operating tempera OOLAN TEMP/S" on "DATA MON and cool the engine until the en r temperature and engine coolan n ON. vait at least 60 seconds.	ture. IITOR" of CONSULT-III reaches at least gine coolant temperature reaches 35°C It temperature must be 5°C or less.
2.PERFC 2.PERFC 1. Start t NOTE Warm 70°C 2. Turn t (95°F) CAUT • The • Do r 3. Turn in 4. Check s 1st trip I YES > NO > Diagnos 1.CHECK	erforming the following > GO TO 2. ORM DTC CONFIRMATI the engine and warm it u (158°F). the ignition switch OFF) or less. TION: • difference between air not turn ignition switch gnition switch ON and w < 1st trip DTC. DTC detected? > Proceed to EC-279. "IT > INSPECTION END sis Procedure < FRP SENSOR POWE	ON PROCEDURE up to the normal operating tempera OOLAN TEMP/S" on "DATA MON and cool the engine until the en r temperature and engine coolan n ON. vait at least 60 seconds.	ture. IITOR" of CONSULT-III reaches at least gine coolant temperature reaches 35°C It temperature must be 5°C or less.
2.PERFC 2.PERFC 1. Start t NOTE Warm 70°C 2. Turn t (95°F) CAUT • The • Do t 3. Turn t 4. Check s 1st trip t YES > NO > Diagnos 1.CHECK 1. Turn t	erforming the following > GO TO 2. ORM DTC CONFIRMATI the engine and warm it u (158°F). the ignition switch OFF) or less. TION: difference between air not turn ignition switch gnition switch ON and w < 1st trip DTC. DTC detected? > Proceed to EC-279. "IT > INSPECTION END sis Procedure	ON PROCEDURE up to the normal operating tempera OOLAN TEMP/S" on "DATA MON and cool the engine until the en r temperature and engine coolan n ON. vait at least 60 seconds. Diagnosis Procedure".	ture. IITOR" of CONSULT-III reaches at least gine coolant temperature reaches 35°C It temperature must be 5°C or less.

4. Check the voltage between FRP sensor harness connector terminals.

< DTC/CIRCUIT DIAGNOSIS >

	FRP sensor		
Connector	+	_	Voltage (Approx.)
Connector	tern		
F26	1	3	5 V

Inspection result normal?

YES >> GO TO 6.

NO >> GO TO 2.

2.CHECK FRP SENSOR POWER SUPPLY-II

Check the voltage between FRP sensor harness connector and the ground.

	+		Valtaga	
FRP s	FRP sensor Connector Terminal		Voltage (Approx.)	
Connector				
F26	1	Ground	5 V	

Is inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.

3. Check harness connector for short to power and short to ground, between the following terminals.

E	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
		Low fuel pressure sensor	F25	3
F111	27	Power steering pressure sensor	F35	1
FIII		Cooling fan speed sensor	F39	2
	28	FRP sensor	F26	1

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to EC-168. "Diagnosis Procedure".

NO >> Repair or replace error-detected parts.

4.CHECK FRP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between FRP sensor harness connector and ECM harness connector.

+		-				
FRP	sensor	ECM		ECM Continu		Continuity
Connector	Terminal	Connector	Terminal			
F26	3	F111	40	Existed		

Is inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and the ground.

< DTC/CIRCUIT DIAGNOSIS >

E	СМ	O martine al	Ocertie i	h. r	
Connector	Terminal	- Ground	Continuit	iy	
F111	5				
	114				
500	115	Ground	Ground Existed		
E80	174	174			
	175				
s inspection	result norma	<u>al?</u>			
		ittent inciden			<u>nt Incident"</u> .
`	•	lace error-de	•		
D. CHECK F	RP SENSO	R SIGNAL CI	RCUIT		
	tion switch (
		ness connect between FRF		ness conne	and ECM harness connector.
		20110011111			
+	-	_			
FRP s	ensor	ECM	Л	Continuity	
Connector	Terminal	Connector	Terminal		
F26	2	F111	31	Existed	
I. Also che	ck harness f	or short to gr	ound and to	power.	
s inspection		-			
	GO TO 7.				
_		lace error-de	tected parts.		
CHECK F	RP SENSO	र			
Refer to EC-2	278, "Compo	nent Inspect	ion <u>(Fuel Ra</u>	il Pressure	<u>;or)"</u> .
s inspection	result norma	<u>al?</u>			
		ittent inciden			<u>nt Incident"</u> .
	• •	lace error-de	•		
Componei	nt Inspect	ion (Fuel F	Rail Press	ure Sens	INFOID:0000000062
1. CHECK F		2			
		`			
WITH CON	NSULT-III)FF			
		connector disc	connected.		
2. Reconne				-	
3. Start the				1 111	
 Start the Select "E 	DATĂ MONIT	OR" mode w			
 Start the Select "E 	DATĂ MONIT	OR" mode w _ PRES SEN			
 Start the Select "E Check th 	DATĂ MONIT		V" indication		Values/Status
 Start the Select "E Check th 	DATA MONIT the "FUE		V" indication	٦.	Values/Status 980 – 1,200 mV

WITHOUT CONSULT-III

1. Turn ignition switch OFF.

Reconnect harness connector disconnected. 2.

quickly

- 3. Start the engine.
- 4. Check FRP sensor signal voltage.

Ρ

1,100 – 2,900 mV

< DTC/CIRCUIT DIAGNOSIS >

+ –		_			
	EC	CM		Condition	Value (Approx.)
Connector	Terminal	Connector	Terminal		
F111	31 F111 40		40	[Engine is running]Warm-up conditionIdle speed	0.98 – 1.2 V
FIII	31	F 111	40	[Engine is running]Warm-up conditionRevving engine from idle to 4,000 rpm quickly	1.1 – 2.9 V

Is the inspection result normal?

YES >> INSPECTION END.

NO >> Replace FRP sensor. Refer to <u>EM-48, "Exploded View"</u>.

P0196 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0196 EOT SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0196 is displayed with P0197 or P0198, first perform the trouble diagnosis for DTC P0197, P0198. Refer to EC-285, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detection	ng condition	Possible cause
P0196	EOT SENSOR (Engine oil temperature sen- sor range/performance)	Rationally incorrect volta sent to ECM, compared from engine coolant tem take air temperature ser	with the voltage signals perature sensor and in-	 Harness or connectors (The EOT sensor circuit is open or shorted) Engine oil temperature sensor
TC CO	NFIRMATION PROCED	DURE		
.PREC	ONDITIONING			
2. Turn 3. Turn F ESTING	ignition switch OFF and w ignition switch ON. ignition switch OFF and w CONDITION: erforming the following	vait at least 10 second	ds.	je is 11 V or more at idle.
:	>> GO TO 2.			
2.PERF	ORM DTC CONFIRMATIC	ON PROCEDURE-I		
4. Turn 5. Start 6. Chec <u>s 1st trip</u> YES :	ignition switch ON. ignition switch OFF and w engine and let it idle for 5 k 1st trip DTC. <u>DTC detected?</u> >> <u>EC-284, "Diagnosis Pr</u> >> GO TO 3.	minutes and 10 seco		
3.PERF	ORM DTC CONFIRMATIC	ON PROCEDURE-II		
1. Selec 2. Chec If it is	CONSULT-III ct "DATA MONITOR" mod k that "COOLAN TEMP/S above 80°C (176°F), go t	" indicates above 80° to the following steps	. ,	
Then Turn Turn	perform the following ste ignition switch OFF and s ignition switch ON.	ps.		ndicates more than 80°C (176°F).
. Seled	E: ot turn ignition switch C ct "DATA MONITOR" mod k the following.			
	<u> </u>			
COOLAN			Below 40°C (104°F)	
INT/A TEN			Below 40°C (104°F)	
Difference	between "COOLAN TEMP/S" a	and "INT/A TEMP SE"	Within 6°C (11°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.

EC-283

[VK56VD]

INFOID:000000006288301

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EC

С

P0196 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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-III" above.

Is 1st trip DTC detected?

- YES >> EC-284, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK ENGINE OIL TEMPERATURE SENSOR

Refer to EC-284, "Component Inspection (Engine Oil Temperature Sensor)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace engine oil temperature sensor. Refer to <u>EM-54, "Exploded View"</u>.

2. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Engine Oil Temperature Sensor)

1.CHECK ENGINE OIL TEMPERATURE SENSOR

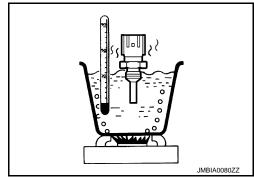
- 1. Turn ignition switch OFF.
- 2. Disconnect engine oil temperature sensor harness connector.
- 3. Remove engine oil temperature sensor.
- 4. Check resistance between engine oil temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (k Ω)
1 and 2	Temperature [°C (°F)]	20 (68)	2.35 - 2.73
		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.



INFOID:000000006288302

INEOID-000000006288303

P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0197, P0198 EOT SENSOR

DTC Logic

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INFOID:000000006217832

[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (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 sensor is sent to ECM.	 Harness or connectors (The engine oil temperature sensor circuit 				
P0198	EOT SEN/CIRC (Engine oil temperature sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	is open or shorted.)Engine oil temperature sensor				
DTC COI	VFIRMATION PROCE	DURE					
1.PREC	ONDITIONING						
2. Turn i	gnition switch ON.	wait at least 10 seconds. wait at least 10 seconds.					
~	> GO TO 2.						
	ORM DTC CONFIRMAT						
	engine and wait at least < 1st trip DTC.	5 seconds.					
	DTC detected?						
YES >	-> Go to <u>EC-285, "Diagr</u>	nosis Procedure".					
NO >	> INSPECTION END						
Diagnos	Diagnosis Procedure						
1. CHEC	K ENGINE OIL TEMPEI	RATURE SENSOR POWER SUPPLY (CIRCUIT				
		ature (EOT) sensor harness connector					
2. Turn i	gnition switch ON.						
2. Turn i	gnition switch ON.	ature (EOT) sensor harness connector					
 Turn i Check 	gnition switch ON.	OT sensor harness connector and gro					
2. Turn i 3. Chec EOT	gnition switch ON. < the voltage between E - sensor - Terminal - Ground	OT sensor harness connector and gro					
2. Turn i 3. Check EOT Connector F38	gnition switch ON. < the voltage between E - sensor Ground - Terminal Ground	OT sensor harness connector and gro					
2. Turn i 3. Check EOT Connector F38 Is the insp	gnition switch ON. < the voltage between E - sensor Ground - Terminal Ground - 1 Ground - Dection result normal?	OT sensor harness connector and gro					
2. Turn i 3. Check EOT Connector F38 Is the insp YES >	gnition switch ON. (the voltage between E - sensor Ground - Terminal Ground - 1 Ground - Dection result normal? -> GO TO 2.	OT sensor harness connector and gro	und.				
2. Turn i 3. Check EOT Connector F38 Is the insp YES > NO >	gnition switch ON. < the voltage between E - sensor Ground - Terminal Ground - 1 Ground - Oround - SGO TO 2. -> Repair open circuit, s	OT sensor harness connector and gro Voltage (V) Approx. 5 hort to ground or short to power in har	und. ness or connectors.				
2. Turn i 3. Check EOT Connector F38 Is the insp YES > NO > 2.CHECK	gnition switch ON. < the voltage between E - sensor Ground - Terminal Ground - 1 Ground - ection result normal? -> GO TO 2. -> Repair open circuit, s < EOT SENSOR GROU	OT sensor harness connector and gro Voltage (V) Approx. 5	und. ness or connectors.				
2. Turn i 3. Check EOT Connector F38 Is the insp YES > NO > 2.CHECH 1. Turn i 2. Disco	gnition switch ON. (the voltage between E sensor Terminal 1 Ground ection result normal? GO TO 2. SRepair open circuit, s (EOT SENSOR GROU gnition switch OFF. nnect ECM harness cor	OT sensor harness connector and gro Voltage (V) Approx. 5 hort to ground or short to power in harn IND CIRCUIT FOR OPEN AND SHOR nnector.	und. ness or connectors. T				
2. Turn i 3. Check EOT Connector F38 Is the insp YES > NO > 2.CHECH 1. Turn i 2. Disco	gnition switch ON. (the voltage between E sensor Terminal 1 Ground ection result normal? GO TO 2. SRepair open circuit, s (EOT SENSOR GROU gnition switch OFF. nnect ECM harness cor	OT sensor harness connector and gro Voltage (V) Approx. 5 hort to ground or short to power in harn IND CIRCUIT FOR OPEN AND SHOR	und. ness or connectors. T				
2. Turn i 3. Check EOT Connector F38 Is the insp YES > NO > 2.CHECH 1. Turn i 2. Disco 3. Check	gnition switch ON. (the voltage between E sensor Ground Terminal Ground ection result normal? GO TO 2. GO TO 2. Content open circuit, s (EOT SENSOR GROU gnition switch OFF. nnect ECM harness cor (the continuity betweer	OT sensor harness connector and gro Voltage (V) Approx. 5 hort to ground or short to power in harn IND CIRCUIT FOR OPEN AND SHOR nnector.	und. ness or connectors. T				
2. Turn i 3. Check EOT Connector F38 Is the insp YES > NO > 2.CHECH 1. Turn i 2. Disco 3. Check	gnition switch ON. (the voltage between E sensor Ground 1 Ground Dection result normal? > GO TO 2. > Repair open circuit, s (EOT SENSOR GROU gnition switch OFF. nnect ECM harness cor (the continuity between sensor ECM	OT sensor harness connector and gro Voltage (V) Approx. 5 hort to ground or short to power in harn IND CIRCUIT FOR OPEN AND SHOR nnector.	und. ness or connectors. T				

4.	Also check harness for short to ground and short to power.
<u>ls t</u>	he inspection result normal?

40

Existed

F111

Revision: 2010 May

2

F38

EC-285

P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

YES >> GO TO 3.

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

3.CHECK ENGINE OIL TEMPERATURE SENSOR

Refer to EC-286. "Component Inspection (Engine Oil Temperature Sensor)".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace engine oil temperature sensor. Refer to <u>EM-54, "Exploded View"</u>.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Engine Oil Temperature Sensor)

INFOID:000000006217834

1.CHECK ENGINE OIL TEMPERATURE SENSOR

1. Turn ignition switch OFF.

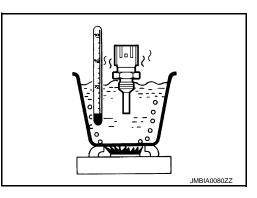
- 2. Disconnect engine oil temperature sensor harness connector.
- 3. Remove engine oil temperature sensor.
- 4. Check resistance between engine oil temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (k Ω)	
1 and 2		20 (68)	2.35 - 2.73
	Temperature [°C (°F)]	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 <u>EM-54</u>, <u>"Exploded View"</u>.



P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208 INJECTOR [VK56VD] < DTC/CIRCUIT DIAGNOSIS >

P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208 INJECTOR **DTC** Logic INFOID:000000006217835

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0201	No.1 fuel injector circuit	ECM detects No. 1 injector circuit is open or shorted.		
P0202	No. 2 fuel injector circuit	ECM detects No. 2 injector circuit is open or shorted.		
P0203	No. 3 fuel injector circuit	ECM detects No. 3 injector circuit is open or shorted.		
P0204	No. 4 fuel injector circuit	ECM detects No. 4 injector circuit is open or shorted.	 The fuel injector circuit is open or shorted Fuel injector 	
P0205	No. 5 fuel injector circuit	ECM detects No. 5 injector circuit is open or shorted.	• ECM	
P0206	No. 6 fuel injector circuit	ECM detects No. 6 injector circuit is open or shorted.		
P0207	No. 7 fuel injector circuit	ECM detects No. 7 injector circuit is open or shorted.		
P0208	No. 8 fuel injector circuit	ECM detects No. 8 injector circuit is open or shorted.		

DTC CONFIRMATION PROCEDURE

1	.PRECONDITIONING

1.PRECONDITIONING	
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. 	
 Turn ignition switch OFF and wait at least 10 seconds. TESTING CONDITION: 	J
Before performing the following procedure, comfirm that battery voltage is 11 V or more at idle.	
	Κ
>> GO TO 2.	
2.PERFORM DTC CONFIRMATION PROCEDURE	1
 Turn ignition switch OFF and wait at least 10 seconds. Start the engine and let it idle at least 30 seconds. 	L
3. Check 1st trip DTC.	
Is 1st trip DTC detected?	M
YES >> Proceed to <u>EC-287, "Diagnosis Procedure"</u> . NO >> INSPECTION END	
	Ν
Diagnosis Procedure	
1.PERFORM TROUBLE DIAGNOSIS FOR INJECTOR	0
Refer to EC-498, "Component Function Check".	
Is inspection result normal?	
 YES >> Check intermittent incident. Refer to <u>GI-40. "Intermittent Incident"</u>. NO >> Repair or replace error-detected parts. 	Ρ

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P0222, P0223 TP SENSOR

DTC Logic

NOTE:

If DTC P0222 or P0223 is displayed with DTC P0643, perform the trouble diagnosis for DTC P0643. Refer to <u>EC-381, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0222	TP SEN 1/CIRC-B1 (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.)
P0223	TP SEN 1/CIRC-B1 (Throttle position sensor 1 circuit high input)	An excessively high voltage from the TP sensor 1 is sent to ECM.	Electric throttle control actuator (TP sensor 1)

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 8 V or more 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-288, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217838

1.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-I

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 (V)
Connector	Terminal	Cround	voliage (v)
F66	2	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 2.

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

2.CHECK 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 and ECM harness connector.

INFOID:000000006217837

P0222, P0223 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

	control actuator	EC		Continuity		
Connector F66	Terminal	Connector	Terminal	Eviated		
	4	F110	97	Existed		
s the inspection	c harness for sl	•	u anu shon	to power.		
•	D TO 3.	<u>u:</u>				
		uit, short to g	round or sh	ort to power i	n harness or co	onnectors.
3.снеск тн	ROTTLE POS	TION SENS	OR 1 INPU	T SIGNAL CI	RCUIT FOR O	PEN AND SHORT
1. Check the	continuity betw	veen electric	throttle cor	ntrol actuator a	and ECM harne	ess connector.
	,					
Electric throttle	control actuator	EC	M	Continuity		
Connector	Terminal	Connector	Terminal	Continuity		
F66	1	F110	91	Existed		
	harness for sl	•	d and short	to power.		
	on result norma	<u>ll?</u>				
) TO 4. Mair open circu	lit short to a	round or ch	ort to nowor i	n harness or co	onnectors
4. CHECK TH						
Refer to <u>EC-28</u>			(Throttle Po	osition Sensor	<u>)"</u> .	
Is the inspection YES >> GC	on result norma D TO 6.	<u>u :</u>				
	D TO 5.					
5. REPLACE	ELECTRIC TH	ROTTLE CO	NTROL AC	TUATOR		
Replace electri					l and Installatio	on".
						<u></u> .
>> IN	SPECTION EN	1D				
6. снеск імт	ERMITTENT I	NCIDENT				
Refer to <u>GI-40</u> ,	"Intermittent I	ncident".				
>> IN3	SPECTION EN	1D				
Component	Inspection	(Throttle I	Position	Sensor)		INFOID:0000000621783
	-			,		
1.снеск тн		TION SENS	OR			
	on switch OFF.	unn a atara dia	a a man a stard			
	t all harness co C-147, "Work F		connected.			
4. Turn ignitio	on switch ON.					
	or lever position			otor torminals	under the falle	wing conditions
6. Check the	voltage betwee		iess conne			wing conditions.
	ECM					
				Condit	ion	

_	ECM				
Connector	+	_	Condit	Voltage (V)	
Connector	Terminal	Terminal			
F110	91			Fully released	More than 0.36
	(TP sensor 1 signal)	97	Accelerator pedal	Fully depressed	Less than 4.75
	79	(Sensor ground)	Accelerator pedar	Fully released	Less than 4.75
	(TP sensor 2 signal)			Fully depressed	More than 0.36

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal? YES >> INSPECTION END

NO >> GO TO 2.

 $2. {\tt REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR}$

Replace electric throttle control actuator. Refer to EM-30, "Removal and Installation".

>> INSPECTION END

P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308 MISFIRE < DTC/CIRCUIT DIAGNOSIS > [VK56VD]

P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308 MIS-FIRE

DTC Logic

INFOID:000000006217840

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DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function	
Crankshaft position sensor	Engine speed	On board diagnosis of misfire	D

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)

On the 1st trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.

When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.

When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off. If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink. When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on. If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.

 Two Trip Detection Logic (Exhaust quality deterioration) For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.

A misfire malfunction can be detected in any one cylinder or in multiple cylinders.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0300	MULTI CYL MISFIRE (Multiple cylinder misfires detected)	Multiple cylinders misfire.	
P0301	CYL 1 MISFIRE (No.1 cylinder misfire detected)	No. 1 cylinder misfires.	
P0302	CYL 2 MISFIRE (No. 2 cylinder misfire detected)	No. 2 cylinder misfires.	Improper spark plugInsufficient compression
P0303	CYL 3 MISFIRE (No. 3 cylinder misfire detected)	No. 3 cylinder misfires.	Incorrect fuel pressureThe fuel injector circuit is open or shorted
P0304	CYL 4 MISFIRE (No. 4 cylinder misfire detected)	No. 4 cylinder misfires.	 Fuel injector Intake air leakage The ignition signal circuit is open or shorted
P0305	CYL 5 MISFIRE (No. 5 cylinder misfire detected)	No. 5 cylinder misfires.	Lack of fuel Signal plate
P0306	CYL 6 MISFIRE (No. 6 cylinder misfire detected)	No. 6 cylinder misfires.	 A/F sensor 1 Incorrect PCV hose connection
P0307	CYL 7 MISFIRE (No. 7 cylinder misfire detected)	No. 7 cylinder misfires.	
P0308	CYL 8 MISFIRE (No. 8 cylinder misfire detected)	No. 8 cylinder misfires.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308 MISFIRE

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

>> 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. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Restart engine and let it idle for about 15 minutes.
- 6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-292, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

- 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 drive the vehicle under similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.

Hold the accelerator pedal as steady as possible.

Similar conditions to (1st trip) Freeze Frame Data mean that the following conditions should be satisfied at the same time.

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 \pm 10 km/h (6 MPH)				
Base fuel schedule	Base fuel schedule in the freeze frame data \times (1 \pm 0.1)				
Engine coolant temperature (T)	When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).				
condition	When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).				

Driving time varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-292, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK FOR INTAKE AIR LEAKAGE AND PCV HOSE

- 1. Start engine and run it at idle speed.
- 2. Listen for the sound of the intake air leakage.
- 3. Check PCV hose connection.

Is intake air leakage detected?

YES >> Discover air leakage location and repair.

NO >> GO TO 2.

2. CHECK FOR EXHAUST SYSTEM CLOGGING

INFOID:000000006217841

top engine and visually check exhaust tube, three way catalyst and r	nuffler for dents.
the inspection result normal?	
YES-1 >> With CONSULT-III: GO TO 3. YES-2 >> Without CONSULT-III: GO TO 4.	
NO >> Repair or replace malfunctioning part.	
PERFORM POWER BALANCE TEST	
WITH CONSULT-III	
 Start engine. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CON 	SULT-III.
. Check that each circuit produces a momentary engine speed drop	
the inspection result normal?	
YES >> GO TO 9. NO >> GO TO 4.	
CHECK FUNCTION OF FUEL INJECTOR-I	
Start engine and let it idle.	
Listen to each fuel injector operation.	
Oliobian accord should be beend	
Clicking sound should be heard.	At idle Suitable
the inspection result normal? YES >> GO TO 5.	
NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to	Click of
EC-498, "Diagnosis Procedure".	Click Click
	Click
	Click
CHECK FUNCTION OF IGNITION COIL-I	
AUTION:	
erform the following procedure in a place with no combustible of	bjects and good ventilation.
 Turn ignition switch OFF. Remove fuel pump fuse No. in IPDM E/R to release fuel pressure 	
NOTE:	
Do not use CONSULT-III to release fuel pressure, or fuel pressure cedure.	e applies again during the following pro-
Start engine.	<u>)</u>
Start engine. After engine stalls, crank it 2 or 3 times to release all fuel pressure	
Start engine. After engine stalls, crank it 2 or 3 times to release all fuel pressure Turn ignition switch OFF. Remove all ignition coil harness connectors to avoid the electrical	discharge from the ignition coils.
Start engine. After engine stalls, crank it 2 or 3 times to release all fuel pressure Turn ignition switch OFF. Remove all ignition coil harness connectors to avoid the electrical Remove ignition coil and spark plug of the cylinder to be checked	discharge from the ignition coils.
Start engine. After engine stalls, crank it 2 or 3 times to release all fuel pressure Turn ignition switch OFF. Remove all ignition coil harness connectors to avoid the electrical Remove ignition coil and spark plug of the cylinder to be checked Crank engine for 5 seconds or more to remove combustion gas in	discharge from the ignition coils.
 Start engine. After engine stalls, crank it 2 or 3 times to release all fuel pressure Turn ignition switch OFF. Remove all ignition coil harness connectors to avoid the electrical Remove ignition coil and spark plug of the cylinder to be checked Crank engine for 5 seconds or more to remove combustion gas in Connect spark plug and harness connector to ignition coil. D. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 	discharge from the ignition coils.
 Start engine. After engine stalls, crank it 2 or 3 times to release all fuel pressure. Turn ignition switch OFF. Remove all ignition coil harness connectors to avoid the electrical. Remove ignition coil and spark plug of the cylinder to be checked. Crank engine for 5 seconds or more to remove combustion gas in Connect spark plug and harness connector to ignition coil. 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. 	discharge from the ignition coils.
 Start engine. After engine stalls, crank it 2 or 3 times to release all fuel pressure. Turn ignition switch OFF. Remove all ignition coil harness connectors to avoid the electrical Remove ignition coil and spark plug of the cylinder to be checked. Crank engine for 5 seconds or more to remove combustion gas in Connect spark plug and harness connector to ignition coil. 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. Crank engine for approximately 3 seconds, and check whether 	discharge from the ignition coils.
 Start engine. After engine stalls, crank it 2 or 3 times to release all fuel pressure. Turn ignition switch OFF. Remove all ignition coil harness connectors to avoid the electrical. Remove ignition coil and spark plug of the cylinder to be checked. Crank engine for 5 seconds or more to remove combustion gas in Connect spark plug and harness connector to ignition coil. 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. Crank engine for approximately 3 seconds, and check whether spark is generated between the spark plug and the grounded 	discharge from the ignition coils.
 Start engine. After engine stalls, crank it 2 or 3 times to release all fuel pressure Turn ignition switch OFF. Remove all ignition coil harness connectors to avoid the electrical Remove ignition coil and spark plug of the cylinder to be checked Crank engine for 5 seconds or more to remove combustion gas in Connect spark plug and harness connector to ignition coil. 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. Crank engine for approximately 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion. 	discharge from the ignition coils.
 Start engine. After engine stalls, crank it 2 or 3 times to release all fuel pressure. Turn ignition switch OFF. Remove all ignition coil harness connectors to avoid the electrical Remove ignition coil and spark plug of the cylinder to be checked. Crank engine for 5 seconds or more to remove combustion gas in Connect spark plug and harness connector to ignition coil. 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. Crank engine for approximately 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion. 	discharge from the ignition coils. the cylinder.
 Start engine. After engine stalls, crank it 2 or 3 times to release all fuel pressure. Turn ignition switch OFF. Remove all ignition coil harness connectors to avoid the electrical Remove ignition coil and spark plug of the cylinder to be checked. Crank engine for 5 seconds or more to remove combustion gas in Connect spark plug and harness connector to ignition coil. 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. Crank engine for approximately 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion. 	discharge from the ignition coils. the cylinder.

voltage becomes 20 kV or more.
It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made.
NOTE:

EC-293

P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308 MISFIRE

< DTC/CIRCUIT DIAGNOSIS >

When the gap is less than 13 mm (0.52 in), a spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 6.

6.CHECK FUNCTION OF IGNITION COIL-II

- 1. Turn ignition switch OFF.
- 2. Disconnect spark plug and connect a non-malfunctioning spark plug.
- 3. Crank engine for approximately 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

YES >> GO TO 7.

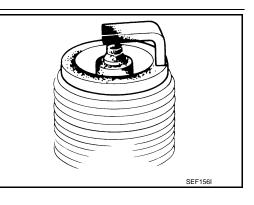
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-506, "Diagnosis Procedure".

7.CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-132</u>, "Spark Plug".
- NO >> Repair or clean spark plug. Then GO TO 8.



[VK56VD]

8. CHECK FUNCTION OF IGNITION COIL-III

- 1. Reconnect the initial spark plugs.
- 2. Crank engine for approximately 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-132. "Spark</u> <u>Plug"</u>.

9.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-16, "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. Check fuel pressure. Refer to EC-153, "Work Procedure".

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?

P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308 MISFIRE

< DTC/CIRCUIT DIAGNOSIS >	[VK56VD]	
YES >> Replace "fuel filter and fuel pump assembly". NO >> Repair or replace malfunctioning part.		А
12. CHECK IDLE SPEED AND IGNITION TIMING	_	
Check idle speed and ignition timing. For procedure, refer to <u>EC-530, "Inspection"</u> and <u>EC-531, "Inspection"</u> . For specification, refer to <u>EC-538, "Idle Speed"</u> and <u>EC-538, "Ignition Timing"</u> .		EC
<u>Is the inspection result normal?</u> YES >> GO TO 13. NO >> Follow the <u>EC-139, "Work Procedure"</u> .		С
13. CHECK AIR FUEL RATIO SENSOR 1 POWER SUPPLY CIRCUIT		D
 Disconnect air fuel ratio (A/F) sensor 1 harness connector. Turn ignition switch ON. Check the voltage between A/F sensor 1 harness connector and ground. 		_
		E

DTC		A/F senso	Ground	Voltage	
ыс	Bank	Connector Terminal			
P0130	1	F67	4	Ground	3.0 V
P0150	2	F68	4	Giouna	5.0 V

Is the inspection result normal?

YES >> GO TO 14.

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

14.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.

DTC	A/F sensor 1			ECM		Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0130	1	F67	3	F110	88	Existed	
P0150	2	F68	3	1110	78	LXISIGU	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC Bank Connector Terminal Connector Terminal Ground Continuity
P0130 1 F67 3 F110 88 Ground Not existed
P0150 2 F68 3 78 Glound Not existed

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 15.

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

15. CHECK A/F SENSOR 1 GROUND 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.

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DTC		A/F sensor	1	EC	Continuity		
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0130	1	F67	6	F110	94	Existed	
P0150	2	F68	6	1110	74	LAISICU	

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 16.

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

16.CHECK A/F SENSOR 1 HEATER

Refer to EC-182, "Component Inspection (A/F Sensor 1 Heater)".

Is the inspection result normal?

YES >> GO TO 17.

NO >> Replace malfunctioning A/F sensor 1. Refer to EX-5, "Exploded View".

17.CHECK MASS AIR FLOW SENSOR

WITH CONSULT-III

Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT-III.

For specification, refer to EC-538, "Mass Air Flow Sensor".

WITH GST

Check mass air flow sensor signal in Service \$01 with GST.

For specification, refer to EC-538, "Mass Air Flow Sensor".

Is the measurement value within the specification?

- YES >> GO TO 18.
- NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to <u>EC-201, "Diagnosis Procedure"</u>.

18.CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in EC-524, "Symptom Table".

Is the inspection result normal?

YES >> GO TO 19.

NO >> Repair or replace malfunctioning part.

19. ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.

Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to <u>EC-63</u>, <u>CONSULT-III</u> <u>Function</u> or <u>EC-60</u>, <u>On Board Diagnosis Function</u>.

>> GO TO 20.

20. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

P0327, P0328, P0332, P0333 KS

DTC Logic

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INFOID:000000006217842

[VK56VD]

EC

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis nam (Trouble diagnosis conte		DTC d	etected cond	dition	Possible cause		
P0327 [ł	NOCK SEN/CIRC-B1 Knock sensor (bank 1) cir w input]	ICUIT I	excessively lo ent to ECM.	ow voltage fr	om the sensor			
P0328 [ł	NOCK SEN/CIRC-B1 Knock sensor (bank 1) cir igh input]	CHIE	excessively hi ent to ECM.	igh voltage fi	om the sensor	Harness or connectors (The knock sensor circuit is open or		
P0332 [ł	NOCK SEN/CIRC-B2 Knock sensor (bank 2) cir w input]	CHIE	excessively lo ent to ECM.	ow voltage fr	om the sensor	shorted.)Knock sensor		
P0333 [ł	NOCK SEN/CIRC-B2 Knock sensor (bank 2) cir igh input]	CHIE	excessively hi ent to ECM.	igh voltage fi	rom the sensor			
DTC CONF	IRMATION PROC	EDURE						
1.PRECON	DITIONING							
>> 2.PERFOR 1. Start eng	GO TO 2. M DTC CONFIRMA gine and run it for at	TION PR	OCEDUR	E	_	age is 10 V or more at idle.		
Before perference >> 2.PERFOR 1. Start eng 2. Check 1	GO TO 2. M DTC CONFIRMA gine and run it for at st trip DTC.	TION PR	OCEDUR	E	_	age is 10 V or more at idle.		
Before perference 2.PERFOR 1. Start eng 2. Check 1 Is 1st trip DT YES >>	GO TO 2. M DTC CONFIRMA gine and run it for at st trip DTC. <u>C detected?</u> Go to <u>EC-297, "Diac</u>	TION PR least 5 s	OCEDUR	E	_	age is 10 V or more at idle.		
Before perf 2.PERFOR 1. Start eng 2. Check 1 Is 1st trip DT YES >> NO >>	GO TO 2. M DTC CONFIRMA gine and run it for at st trip DTC. <u>C detected?</u> Go to <u>EC-297, "Diac</u> INSPECTION END	TION PR least 5 s	OCEDUR	E	_			
Before perference 2.PERFOR 1. Start eng 2. Check 1 Is 1st trip DT YES >> NO >> Diagnosis	GO TO 2. M DTC CONFIRMA gine and run it for at st trip DTC. <u>C detected?</u> Go to <u>EC-297, "Diac</u> INSPECTION END Procedure	TION PR least 5 s	OCEDUR econds at ocedure".	E idle speed	J.	- INFO/D:000000006217843		
Before perference 2.PERFOR 1. Start eng 2. Check 1 Is 1st trip DT YES >> NO >> Diagnosis	GO TO 2. M DTC CONFIRMA gine and run it for at st trip DTC. <u>C detected?</u> Go to <u>EC-297, "Diac</u> INSPECTION END	TION PR least 5 s	OCEDUR econds at ocedure".	E idle speed	J.	- INFO/D:000000006217843		
Before performance 2.PERFOR 1. Start eng 2. Check 1 Is 1st trip DT YES >> NO >> Diagnosis 1.CHECK H 1. Disconn	GO TO 2. M DTC CONFIRMA gine and run it for at st trip DTC. <u>C detected?</u> Go to <u>EC-297, "Diac</u> INSPECTION END Procedure KNOCK SENSOR G ect knock sensor ha	TION PR least 5 s anosis Pro ROUND	OCEDUR econds at ocedure". CIRCUIT I nnector ar	E idle speed FOR OPE nd ECM ha	d. N AND SHC	INF0/D:0000000621784		
Before perf >> 2.PERFOR 1. Start eng 2. Check 1 Is 1st trip DT YES >> NO >> Diagnosis 1.CHECK M 1. Disconn 2. Check th	GO TO 2. M DTC CONFIRMA gine and run it for at st trip DTC. <u>C detected?</u> Go to <u>EC-297, "Diac</u> INSPECTION END Procedure KNOCK SENSOR G ect knock sensor ha	TION PR least 5 s nosis Pro ROUND arness co	OCEDUR econds at ocedure". CIRCUIT F nnector ar sensor har	E idle speed FOR OPE nd ECM ha	d. N AND SHC arness conn nector and E	INFOID:0000000621784 DRT ector.		
Before performance 2.PERFOR 1. Start eng 2. Check 1 Is 1st trip DT YES >> NO >> Diagnosis 1.CHECK H 1. Disconn	GO TO 2. M DTC CONFIRMA gine and run it for at st trip DTC. C detected? Go to <u>EC-297, "Diac</u> INSPECTION END Procedure (NOCK SENSOR G ect knock sensor ha he continuity betwee	TION PR least 5 s nosis Pro ROUND arness co	OCEDUR econds at ocedure". CIRCUIT F nnector ar sensor har	E idle speed FOR OPE nd ECM ha	d. N AND SHC	INFOID:0000000621784 DRT ector.		
Before perf >> 2.PERFOR 1. Start eng 2. Check 1 Is 1st trip DT YES >> NO >> Diagnosis 1.CHECK M 1. Disconn 2. Check th	GO TO 2. M DTC CONFIRMA gine and run it for at st trip DTC. C detected? Go to EC-297, "Diac INSPECTION END Procedure KNOCK SENSOR G ect knock sensor ha he continuity betwee Knock sensor Bank Connector B 1 F203	TION PR least 5 s gnosis Pro ROUND arness co en knock	OCEDURI econds at ocedure". CIRCUIT I nnector ar sensor har	E idle speed FOR OPE nd ECM ha rness conr	d. N AND SHC arness conn nector and E	INFOID:0000000621784 DRT ector.		

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

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

P0327, P0328, P0332, P0333 KS

< DTC/CIRCUIT DIAGNOSIS >

- Harness for open or short between knock sensor and ECM
- · Loose or poor connection for each connector and harness

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

 $\mathbf{3}$. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between knock sensor harness connector and ECM harness connector.

DTC	Knock sensor			EC	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0327, P0328	1	F203	1	F111	29	Existed
P0332, P0333	2	F204	1		33	EXISTED

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

Harness for open or short between ECM and knock sensor

Loose or poor connection for each connector and harness

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

5.CHECK KNOCK SENSOR

Refer to EC-298. "Component Inspection (Knock Sensor)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning knock sensor. Refer to <u>EM-106, "Exploded View"</u>.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Knock Sensor)

INFOID:000000006217844

1.CHECK KNOCK SENSOR

1. Turn ignition switch OFF.

2. Disconnect knock sensor harness connector.

3. Check resistance between knock sensor terminals as per the following. **NOTE:**

It is necessary to use an ohmmeter which can measure more than 10 $\text{M}\Omega.$

Terminals	Resistance
1 and 2	Approx. 532 - 588 kΩ [at 20°C (68°F)]

CAUTION:

Never use any knock sensors that have been dropped or physically damaged. Use only new ones. Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning knock sensor. Refer to <u>EM-106, "Exploded View"</u>.

P0335 CKP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0335 CKP SENSOR

DTC Logic

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INFOID:000000006217845

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0335	CKP SEN/CIRCUIT (Crankshaft position sensor circuit)	 The crankshaft position sensor signal is not detected by the ECM during the first few seconds of engine cranking. The proper pulse signal from the crank- shaft position sensor is not sent to ECM while the engine is running. The crankshaft position sensor signal is not in the normal pattern during engine running. 	 Harness or connectors (Crankshaft position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is shorted.) (Battery current sensor circuit is shorted.) [Camshaft position sensor (bank 1) circuit is shorted.] (Refrigerant pressure sensor circuit is open or shorted.) (EVAP control system pressure sensor circuit is open or shorted.) Crankshaft position sensor Accelerator pedal position sensor Battery current sensor Camshaft position sensor (bank 1) Refrigerant pressure sensor (bank 1) Refrigerant pressure sensor EVAP control system pressure sensor Signal plate

1.PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 second	ds.
---	-----

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 10.5 V or more with ignition switch ON.

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-299, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK CRANKSHAFT POSITION SENSOR POWER SUPPLY CIRCUIT-I

1. Disconnect crankshaft position (CKP) sensor harness connector.

2. Turn ignition switch ON.

3. Check the voltage between CKP sensor harness connector and ground.

CKP s	sensor	Ground	Voltage (V)	
Connector	Connector Terminal		voltage (v)	
F74	1	Ground	Approx. 5	

INFOID:000000006217846

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 2.

2. CHECK CKP SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch ON.

2. Disconnect ECM harness connector.

3. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP	sensor	E	Continuity	
Connector	Terminal Connector		Terminal	Continuity
F74	1	F110	76	Existed

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit.

 $\mathbf{3}$.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		
F110 76 77		CKP sensor	F74	1		
		Camshaft position sensor (bank 1)	F84	1		
	131	APP sensor 2 (Without ICC)	E110	1		
	131	APP sensor 2 (With ICC)	E67	9		
E80		Battery current sensor	E63	2		
200	133	133 Refrigerant pressure sensor		1		
		EVAP control system pressure sen- sor	C17	3		

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.

- Battery current sensor (Refer to EC-414, "Component Inspection (Battery Current Sensor)".)
- Camshaft position sensor (bank 1) (Refer to EC-306, "Component Inspection (Camshaft Position Sensor)".)
- Refrigerant pressure sensor (Refer to <u>EC-520, "Component Function Check"</u>.)
- EVAP control system pressure sensor (Refer to <u>EC-335</u>, "Component Inspection (EVAP Control System <u>Pressure Sensor)</u>".)

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning component.

5.CHECK APP SENSOR

Refer to EC-470, "Component Inspection (Accelerator Pedal Position Sensor)".

Is the inspection result normal?

YES >> GO TO 11. NO >> GO TO 6.

NO >> GO 10 6.

6.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to <u>ACC-3</u>. "MODELS WITHOUT DISTANCE CONTROL ASSIST <u>SYSTEM</u> : <u>Removal and Installation</u>" (Without distance control assist system) or <u>ACC-4</u>. "<u>MODELS WITH</u> <u>DISTANCE CONTROL ASSIST SYSTEM</u> : <u>Removal and Installation</u>" (With distance control assist system).

EC-300

P0335 CKP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

_	INSPECTIO	N END R GROUND					А
1. Turn ign 2. Disconn	ition switch lect ECM ha	OFF. rness connec	tor.		ector and ECM harness co		EC
CKP	sensor	EC	M				С
Connector	Terminal	Connector	Terminal	Continuity			
F74	2	F110	98	Existed			D
4. Also che	eck harness	for short to gr	ound and s	short to powe	r.		
Is the inspec	ction result n	ormal?					_
	GO TO 8.	dimensional de moto	(1	E
~			-	•	wer in harness or connect YEN AND SHORT	lors.	
							F
1. Check t	he continuity	between CK	P sensor ha	arness conne	ector and ECM harness co	nnector.	
CKP	sensor	EC	M				G
Connector	Terminal	Connector	Terminal	Continuity			0
F74	3	F110	86	Existed			
2. Also che	eck harness	for short to gr	ound and s	short to powe	r.		Η
Is the inspec	ction result n	ormal?					
	GO TO 9.	dimensional de moto	(1	
•			•	or short to po	wer in harness or connect	lors.	
		FT POSITION			• ••••		I
		onent Inspect	tion (Crank	shaft Position	<u>i Sensor)"</u> .		0
<u>Is the inspec</u> YES >>	GO TO 10.	<u>onnai (</u>					
-		nkshaft positi	on sensor.				Κ
10.CHECł	K GEAR TO	ОТН					
Visually che	ck for chippi	ng signal plate	e gear tootl	า.			L
Is the inspec		ormal?					
	GO TO 11.	aignal plata					N /I
		signal plate. TENT INCIDE					Μ
Relef 10 <u>GI-4</u>	40, intermiti	ent Incident".					Ν
>>	INSPECTIO	N END					
Compone	nt Inspec	tion (Crank	kshaft Po	sition Sen	isor)	INFOID:00000006217847	0
1.снеск о	CRANKSHA	FT POSITION	SENSOR	-1			_
	ition switch						Ρ
		It of the sense aft position se		ss connector			
	the sensor.						

4. Remove the sensor.

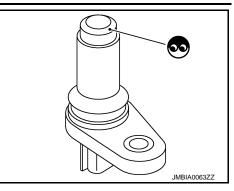
P0335 CKP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

- 5. Visually check the sensor for chipping.
- Is the inspection result normal?

NO >> Replace crankshaft position sensor. Refer to <u>EM-57</u>. <u>"Exploded View"</u>.



2. CHECK CRANKSHAFT POSITION SENSOR-II

Check resistance between crankshaft position sensor terminals as per the following.

Terminals (Polarity)	Resistance
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or $\infty \Omega$ [at 25°C (77°F)]
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace crankshaft position sensor. Refer to <u>EM-57, "Exploded View"</u>.

P0340, P0345 CMP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0340, P0345 CMP SENSOR

DTC Logic

EC

INFOID:000000006217848

[VK56VD]

DTC DETECTION LOGIC

	Trouble diagnosis nome		
DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0340	CMP SEN/CIRC-B1 [Camshaft position sensor (bank 1) 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 (bank 1) circuit is open or shorted.] (APP sensor 2 circuit is shorted.) (Battery current sensor circuit is shorted.) [Crankshaft position sensor circuit is shorted.] (Refrigerant pressure sensor circuit is open or shorted.) (EVAP control system pressure sensor circuit is open or shorted.) Camshaft position sensor (bank 1) Accelerator pedal position sensor Battery current sensor Crankshaft position sensor Battery current sensor Crankshaft position sensor Battery current sensor Crankshaft position sensor Starter motor Starting system circuit Dead (Weak) battery
P0345	CMP SEN/CIRC-B2 [Camshaft position sensor (bank 2) circuit]		 Harness or connectors [Camshaft position sensor (bank 2) circuit is open or shorted.] Camshaft position sensor (bank 2) Camshaft (INT) Starter motor Starting system circuit Dead (Weak) battery
TC CO	NFIRMATION PROCED	DURE	
.PRECO	ONDITIONING		
2. Turn i 3. Turn i F ESTING		ait at least 10 seconds.	voltage is 10.5 V or more with ignition
>	> GO TO 2.		
2.PERFC	ORM DTC CONFIRMATIC	N PROCEDURE-I	
lf eng	engine and let it idle for at ine does not start, crank e < 1st trip DTC.	least 5 seconds. engine for at least 2 seconds.	
	DTC detected?		
	→ Go to <u>EC-304, "Diagno</u> → GO TO 3.	<u>sis Procedure"</u> .	
	ORM DTC CONFIRMATIC	N PROCEDURE-I	

1. Maintain engine speed at more than 800 rpm for at least 5 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

P0340, P0345 CMP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

YES >> Go to EC-304, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

YES >> GO TO 2.

NO >> Check starting system. (Refer to <u>STR-11, "Work Flow"</u>.)

2.CHECK CAMSHAFT POSITION SENSOR POWER SUPPLY CIRCUIT-I

- 1. Disconnect camshaft position (CMP) sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between CMP sensor harness connector and ground.

DTC		CMP senso	r	Ground	Voltage (V)	
DIC	Bank Connector		Terminal	Oround	voltage (v)	
P0340	1	F84	1	Ground	Approx. 5	
P0345	2	F83	1	Giouna	Applox. 3	

Is the inspection result normal?

YES >> GO TO 8.

NO-1 >> P0340: GO TO 3.

NO-2 >> P0345: Repair open circuit, short to ground or short to power in harness or connectors.

3.CHECK CMP SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between CMP sensor harness connector and ECM harness connector.

	CMP sens	sor	EC	CM	Continuity
Bank	Connector	Terminal	Connector	Terminal	Continuity
1	F84	1	F110	77	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.

EC	М	Sensor				
Connector	Terminal	Name	Connector	Terminal		
F110	76	CKP sensor	F74	1		
FIIU	77	Camshaft position sensor (bank 1)	F84	1		
	131	APP sensor 2 (Without ICC)	E110	1		
		APP sensor 2 (With ICC)	E67	9		
E80	133	Battery current sensor	E63	2		
		133 Refrigerant pressure sensor		1		
		EVAP control system pressure sensor	C17	3		

Is the inspection result normal?

YES >> GO TO 5.

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P0340, P0345 CMP SENSOR

< DTC/	CIRCL	JIT DIAGN	NOSIS >				[VK56VD]	
NO	>> R	epair short	to groun	d or short t	o power i	n harness	or connectors.	
5. CHE	CK CO		ITS					ŀ
 Crank Refrig EVAP 	ry curre (shaft p gerant ? contre	ent sensor position sei pressure se	nsor (Ref ensor (Re	er to <u>EC-30</u> efer to <u>EC-</u>	01, "Com 520, "Cor	ponent Insp nponent Fu	on (Battery Current Sensor)".) Dection (Crankshaft Position Sensor)".) Inction Check".) Demponent Inspection (EVAP Control System	E
		on result n	ormal?					
YES NO	>> G >> R	O TO 6. eplace ma PP SENSO	lfunctioni	ng compon	ent.			
Refer to	D <u>EC-4</u>	70, "Comp	onent Ins	pection (A	ccelerato	Pedal Pos	sition Sensor)".	E
		on result n						
YES NO	>> G	O TO 12. O TO 7.						F
		ACCELER						
<u>SYSTE</u>	<u>M : R</u>	emoval an	d Installa	<u>tion"</u> (With	out dista	nce contro	<u>S WITHOUT DISTANCE CONTROL ASSIST</u> I assist system) or <u>ACC-4, "MODELS WITH</u> ation" (With distance control assist system).	(
	>> IN	ISPECTIO	N END					ŀ
8. CHE		MP SENSC	OR GROL	IND CIRCU	JIT FOR) SHORT	
2. Dis	conne	ion switch ct ECM ha	rness cor		sor harne	ss connect	or and ECM harness connector.	
				•••••••				
DTC		CMP sens	or	EC	M	Continuity		
	Bank	Connector	Terminal	Connector	Terminal	Continuity	_	
P0340	1	F84	2	F110	68	Existed		ŀ
P0345	2	F83	2		99	1		
		k harness on result n		to ground a	and short	to power.		
YES		0 TO 9.	<u>onnan.</u>					
NO		• •		-			r in harness or connectors.	ľ
9. CHE		MP SENSC	or input	SIGNAL	CIRCUIT	FOR OPEI	N AND SHORT	
1. Ch	eck the	e continuity	between	CMP sens	sor harne	ss connect	or and ECM harness connector.	1
DTC		CMP sens	or	EC	М	Continuity	•	
	Bank	Connector	Terminal	Connector	Terminal	Continuity	_	(
P0340	1	F84	3	F110	95	Existed		
P0345	2	F83	3		73			
		k harness		to ground a	and short	to power.		
YES NO	>> G	<u>on result n</u> O TO 10. epair open		hort to area	ind or sh	ort to nowe	er in harness or connectors.	
		CAMSHAF						
						Position Se	psor)"	
	- <u></u>	oo, oomp			amonalt	USHIUL OF	<u>1301/</u> .	

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Is the inspection result normal?

EC-305

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

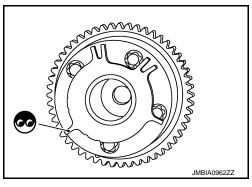
YES >> GO TO 11

NO >> Replace malfunctioning camshaft position sensor. Refer to EM-61, "Exploded View".

11.CHECK CAMSHAFT (INT)

Check the following.

- Accumulation of debris to the signal plate of camshaft front end
- Chipping signal plate of camshaft front end
- Is the inspection result normal?
- YES >> GO TO 12.
- NO >> Remove debris and clean the signal plate of camshaft front end or replace camshaft.



12. CHECK INTERMITTENT INCIDENT

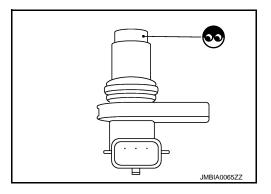
Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Camshaft Position Sensor)

1.CHECK CAMSHAFT POSITION SENSOR-I

- 1. Turn ignition switch OFF.
- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect camshaft position sensor harness connector.
- 4. Remove the sensor.
- 5. Visually check the sensor for chipping.
- Is the inspection result normal?
- YES >> GO TO 2.
- NO >> Replace malfunctioning camshaft position sensor.



2. CHECK CAMSHAFT POSITION SENSOR-II

Check resistance camshaft position sensor terminals as per the following.

Terminals (Polarity)	Resistance
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or $\infty \Omega$ [at 25°C (77°F)]
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning camshaft position sensor. Refer to EM-61, "Exploded View".

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< DTC/CIRCUIT DIAGNOSIS >

P0420, P0430 THREE WAY CATALYST FUNCTION

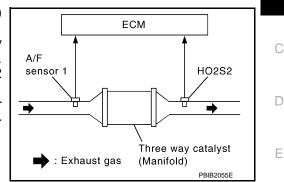
DTC Logic

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 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 name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0420	TW CATALYST SYS-B1 [Catalyst system efficiency below threshold (bank 1)]	 Three way catalyst (manifold) does not operate properly. 	Three way catalyst (manifold)Exhaust tubeIntake air leakage
P0430	TW CATALYST SYS-B2 [Catalyst system efficiency below threshold (bank 2)]	 Three way catalyst (manifold) does not have enough oxygen storage capacity. 	 Fuel injector Fuel injector leakage Spark plug Improper ignition timing

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

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-III be used?

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

2. PERFORM DTC CONFIRMATION PROCEDURE-I

WITH CONSULT-III

TESTING CONDITION: M Do not maintain engine speed for more than the specified minutes below. Start engine and warm it up to the normal operating temperature. 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch ON. Ν 3. Turn ignition switch OFF and wait at least 10 seconds. 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. 5. Let engine idle for 1 minute. 6. Select "DATA MONITOR" mode with CONSULT-III. 7. Check that "COOLAN TEMP/S" indicates more than 70°C (158°F). 8. If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F). Ρ 9. Open engine hood. 10. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT-III. 11. Rev engine between 2,000 and 3,000 rpm and hold it for 3 consecutive minutes then release the acceler-

- Rev engine between 2,000 and 3,000 rpm and hold it for 3 consecutive minutes then release the accel ator pedal completely.
- 12. Check the indication of "CATALYST".

Which is displayed on CONSULT-III screen?

CMPLT>> GO TO 5.

INCMP >> GO TO 3.

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< DTC/CIRCUIT DIAGNOSIS >

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3.PERFORM DTC CONFIRMATION PROCEDURE-II

- 1. Wait 5 seconds at idle.
- 2. Rev engine between 2,000 and 3,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take approximately 5 minutes).

Does the indication change to "CMPLT"?

YES >> GO TO 5.

NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

- 1. Stop engine and cool it down to less than 70°C (158°F).
- 2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 2.

5. PERFORM DTC CONFIRMATION PROCEDURE-III

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-309, "Diagnosis Procedure".

NO >> INSPECTION END

6.PERFORM COMPONENT FUNCTION CHECK

WITH GST

Perform component function check. Refer to EC-308. "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-309, "Diagnosis Procedure"

Component Function Check

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1.PERFORM COMPONENT FUNCTION CHECK

ITH GST

- 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. Open engine hood.
- 6. Check the voltage between ECM harness connector terminals under the following conditions.

		ECM			
DTC	Connector	+	-	Condition	Voltage
	Connector	Terminal	Terminal		
P0420	E110	96 [HO2S2 (bank 1)]	100	Keeping engine speed at 2,500 rpm	The voltage fluctuation cycle takes more
P0430	F110	87 [HO2S2 (bank 2)]	100	Keeping engine speed at 2,500 rpm constant under no load	 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-309, "Diagnosis Procedure".

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

[VK56VD]

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CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dents.

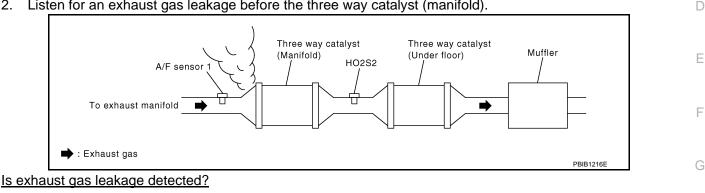
Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning part.

2.CHECK EXHAUST GAS LEAKAGE

- 1. Start engine and run it at idle.
- 2. Listen for an exhaust gas leakage before the three way catalyst (manifold).



- YES >> Repair or replace malfunctioning part.
- NO >> GO TO 3.

3.CHECK INTAKE AIR LEAKAGE

Listen for an intake air leakage after the mass air flow sensor.

Is intake air leakage detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 4.

4.CHECK IDLE SPEED AND IGNITION TIMING

Check idle speed and ignition timing.

For procedure, refer to EC-530, "Inspection" and EC-531, "Inspection". For specification, refer to EC-538, "Idle Speed" and EC-538, "Ignition Timing".

Is the inspection result normal?

YES	>>	GO	то	5.	
-					_

NO >> Follow the EC-139, "Work Procedure".

5.CHECK FUEL INJECTORS

Refer to EC-498, "Component Function Check".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform EC-498, "Diagnosis Procedure".

6.CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Perform the following procedure in a place with no combustible objects and good ventilation.

1. Turn ignition switch OFF.

- 2. Remove fuel pump fuse in IPDM E/R to release fuel pressure. NOTE:
 - For the fuse number, refer to EC-114, "Wiring Diagram".
 - For the fuse arrangement, refer to PG-140, "Fuse, Connector and Terminal Arrangement".
 - Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
- 3. Start engine.
- 4. After engine stalls, crank it 2 or 3 times to release all fuel pressure.
- 5. Turn ignition switch OFF.

EC-309

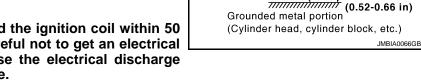
< DTC/CIRCUIT DIAGNOSIS >

- 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.
- Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 11. Crank engine for approximately 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

• Never place the spark plug and the ignition coil within 50 cm (19.7 in) each other. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.



• It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made. NOTE:

When the gap is less than 13 mm (0.52 in), a spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 7.

7.CHECK FUNCTION OF IGNITION COIL-II

- 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 8.

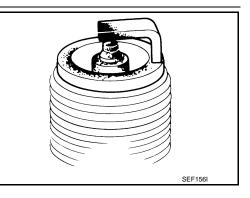
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-506, "Diagnosis Procedure".

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 <u>EM-132, "Spark Plug"</u>.
- 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 approximately 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

YES >> INSPECTION END

[VK56VD]

13 - 17 mm

< DTC/CIRCUIT DIAGNOSIS >

Plug".	NO	>> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-	132, "Spark
		<u>Plug"</u> .	-

10. CHECK FUEL INJECTOR

		-
	Turn ignition switch OFF.	EC
2.	Remove fuel injector assembly.	
	Refer to EM-49, "Removal and Installation".	
	Keep fuel hose and all fuel injectors connected to fuel tube.	
	Disconnect all ignition coil harness connectors.	С
	Reconnect all fuel injector harness connectors disconnected.	
	Turn ignition switch ON.	
6.	Check that fuel does not drip from fuel injector.	D
Doe	es fuel drip from fuel injector?	D
YE	S >> Replace the fuel injector(s) from which fuel is dripping.	
NC		_
	CHECK INTERMITTENT INCIDENT	E
11		
Ref	er to <u>GI-40, "Intermittent Incident"</u> .	
<u>Is th</u>	ne inspection result normal?	F
YE	S >> Replace three way catalyst assembly.	
NC		
		G

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< DTC/CIRCUIT DIAGNOSIS >

P0441 EVAP CONTROL SYSTEM

DTC Logic

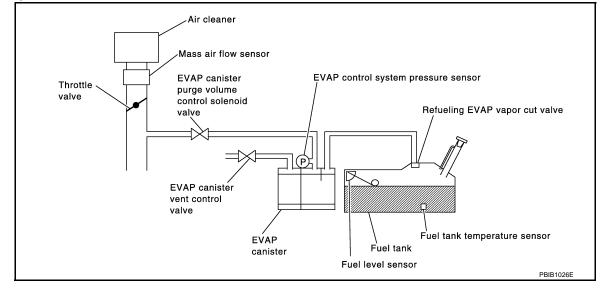
DTC DETECTION LOGIC

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.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0441	EVAP PURG FLOW/MON (EVAP control system incor- rect 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

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-III be used?

YES >> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

P0441 EVAP CONTROL SYSTEM	
< DTC/CIRCUIT DIAGNOSIS > [VK56]	VDJ
	А
TESTING CONDITION: Always perform test at a temperature of 5°C (41°F) or more.	A
1. Start engine and warm it up to normal operating temperature.	
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. 	EC
4. Turn ignition switch OFF and wait at least 10 seconds.	
 Start engine and let it idle for at least 70 seconds. Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with C 	ON- C
 Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with C SULT-III. 	ON- C
7. Touch "START".	
Is "COMPLETED" displayed on CONSULT-III screen?	D
YES >> GO TO 4. NO >> GO TO 3.	
	E
3.PERFORM DTC CONFIRMATION PROCEDURE-II	
When the following conditions are met, "TESTING" will be displayed on the CONSULT-III screen. Maintair conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)	n the
conditions continuously until TEOTING changes to COMITELTED . (It will take at least 55 seconds.)	F
Selector lever Suitable position	
VHCL SPEED SE 32 - 120 km/h (20 - 75 MPH)	G
ENG SPEED 500 - 3,000 rpm	
B/FUEL SCHDL 1.3 - 9.0 msec	
COOLAN TEMP/S More than 0°C (32°F)	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-III screen?	
YES >> GO TO 4.	
NO >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 2.	
4.PERFORM DTC CONFIRMATION PROCEDURE-III	ŀ
Touch "SELF-DIAG RESULTS".	
Which is displayed on CONSULT-III screen? OK >> INSPECTION END	
OK >> INSPECTION END NG >> Proceed to <u>EC-314, "Diagnosis Procedure"</u> .	L
5. PERFORM COMPONENT FUNCTION CHECK	
@ WITH GST	
Perform component function check. Refer to <u>EC-313, "Component Function Check"</u> .	
NOTE:	
Use component function check to check the overall monitoring function of the EVAP control system purge monitoring. During this check, a 1st trip DTC might not be confirmed.	flow
Is the inspection result normal?	
YES >> INSPECTION END	C
NO >> Proceed to <u>EC-314, "Diagnosis Procedure"</u> .	
Component Function Check	6288305
1	Г
I .PERFORM COMPONENT FUNCTION CHECK	
1.PERFORM COMPONENT FUNCTION CHECK	

- Lift up drive wheels.
 Start engine (VDC switch OFF) and warm it up to normal operating temperature.
 Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and wait at least 70 seconds.

< DTC/CIRCUIT DIAGNOSIS >

5. Set voltmeter probes to ECM harness connector terminals under the following conditions.

ECM			
Connector	+	_	
Connector	Terminal	Terminal	
E80	143 (EVAP control system pressure sensor signal)	150	

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 <u>EC-314, "Diagnosis Procedure"</u>.

Diagnosis Procedure

1.CHECK EVAP CANISTER

- 1. Turn ignition switch OFF.
- 2. Check EVAP canister for cracks.

Is the inspection result normal?

- YES-1 >> With CONSULT-III: GO TO 2.
- YES-2 >> Without CONSULT-III: GO TO 3.
- NO >> Replace EVAP canister. Refer to FL-12. "Removal and Installation".

2.CHECK PURGE FLOW

WITH CONSULT-III

- 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 with CONSULT-III.
- Touch "Qd" and "Qu" on CONSULT-III 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-III

- 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 <u>EC-45. "EVAPORATIVE</u> <u>EMISSION SYSTEM : System Description"</u>.

EC-314

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P0441 EVAP CONTROL SY < DTC/CIRCUIT DIAGNOSIS >	STEM [VK56VD]
 Start engine and let it idle. Never depress accelerator pedal even slightly. Check vacuum gauge indication before 60 seconds pass after sta 	
Vacuum should not exist.	E
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	
 Turn ignition switch OFF. Check EVAP purge line for improper connection or disconnection Refer to <u>FL-10, "Hydraulic Layout"</u>. 	I.
<u>Is the inspection result normal?</u> YES >> GO TO 5. NO >> Repair EVAP purge line.	F
5. CHECK EVAP PURGE HOSE AND PURGE PORT	C
 Disconnect purge hoses connected to EVAP service port (A) and EVAP canister purge volume control solenoid valve (B). Blow air into each hose and EVAP purge port (C). 	EVAP service port
	EVAP canister purge volume control solenoid valve
	Intake manifold SEF367U
3. Check that air flows freely.	
Is the inspection result normal? YES-1 >> With CONSULT-III: GO TO 6. YES-2 >> Without CONSULT-III: GO TO 7. NO >> Repair or clean hoses and/or purge port.	
	Intake manifold
6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENCE	DID VALVE
 WITH CONSULT-III Start engine. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CO ies according to the valve opening. Does engine speed vary according to the valve opening? 	NSULT-III. Check that engine speed var-
YES >> GO TO 8.	

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

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to <u>EC-320</u>, "Component Inspection (EVAP Canister Purge Volume Control Solenoid Valve)". Is the inspection result normal?

EC-315

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 8.

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to <u>FL-10, "Exploded View"</u>.

 $\mathbf{8}$. 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 <u>FL-10, "Exploded View"</u>.

9.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to EC-336, "DTC Logic" for DTC P0452, EC-341, "DTC Logic" for DTC P0453.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace EVAP control system pressure sensor.

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

Refer to EC-327, "Component Inspection (EVAP Canister Vent Control Valve)".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace EVAP canister vent control valve.

12.CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.

Refer to FL-10, "Hydraulic Layout".

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

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VK56VD]

< DTC/CIRCUIT DIAGNOSIS >

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Logic

INFOID:000000006288307

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
PURG VOLUME CONT/V (EVAP canister purge vol-		A The canister purge flow is detected dur- ing the vehicle is stopped while the en- gine 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.)
P0443	ume control solenoid valve)	B The canister purge flow is detected dur- ing the specified driving conditions, even when EVAP canister purge volume con- trol solenoid valve is completely closed.	 EVAP canister vent control valve EVAP canister Hoses (Hoses are connected incorrectly or clogged.)
	FIRMATION PROCED	DURE	
I.PRECO	NDITIONING		
3. Turn ig TESTING (• Perform vehicle is • Always p	s placed on flat level so perform test at a tempe	I PROCEDURE" when the fuel level i	
	ve CONSULT-III		
YES >>	> GO TO 2.		
~	> GO TO 4.		
	RM DTC CONFIRMATIC	ON PROCEDURE A	
 Turn ig Check 	ONSULT-III Inition switch ON. that the following condit T/TMP SE: 0 - 35°C (32	- 95°F)	
 Start e Check 	ngine and wait at least 6 1st trip DTC.	0 300000	
 Start er Check <u>IS 1st trip E</u> 	1st trip DTC. DTC detected?		
3. Start e 4. Check <u>IS 1st trip I</u> OK >>	1st trip DTC.		
3. Start e 4. Check IS 1st trip [OK >> NG >>	1st trip DTC. <u>DTC detected?</u> > Proceed to <u>EC-318. "D</u>	iagnosis Procedure".	
3. Start e 4. Check <u>IS 1st trip [</u> OK >> NG >> 3. PERFO PWITH CO	1st trip DTC. <u>DTC detected?</u> > Proceed to <u>EC-318, "D</u> > GO TO 3. RM DTC CONFIRMATIC ONSULT-III	iagnosis Procedure". DN PROCEDURE B	
3. Start e 4. Check <u>IS 1st trip I</u> OK >> NG >> 3. PERFO (1. Start e)	1st trip DTC. <u>DTC detected?</u> > Proceed to <u>EC-318, "D</u> > GO TO 3. RM DTC CONFIRMATIC ONSULT-III ngine and warm it up to	iagnosis Procedure". DN PROCEDURE B normal operating temperature.	
3. Start e 4. Check <u>IS 1st trip I</u> OK >> NG >> 3. PERFO WITH CO 1. Start e 2. Turn ig 3. Turn ig	1st trip DTC. <u>DTC detected?</u> > Proceed to <u>EC-318, "D</u> > GO TO 3. RM DTC CONFIRMATIC ONSULT-III ngine and warm it up to gnition switch OFF and w gnition switch ON.	DN PROCEDURE B normal operating temperature. vait at least 10 seconds.	
3. Start e 4. Check <u>IS 1st trip I</u> OK >> NG >> 3. PERFO WITH CO 1. Start e 2. Turn ig 3. Turn ig 4. Turn ig	1st trip DTC. <u>DTC detected?</u> > Proceed to <u>EC-318. "D</u> > GO TO 3. RM DTC CONFIRMATIC ONSULT-III ngine and warm it up to gnition switch OFF and w gnition switch OFF and w	DN PROCEDURE B normal operating temperature. vait at least 10 seconds.	
3. Start e 4. Check IS 1st trip [OK >> NG >> 3. PERFO () WITH CO 1. Start e 2. Turn ig 3. Turn ig 4. Turn ig 5. Turn ig 6. Select CONS	1st trip DTC. <u>DTC detected?</u> > Proceed to <u>EC-318. "D</u> > GO TO 3. RM DTC CONFIRMATIC ONSULT-III ngine and warm it up to gnition switch OFF and w gnition switch OFF and w gnition switch OFF and w gnition switch OFF and w	DN PROCEDURE B normal operating temperature. vait at least 10 seconds.	TC WORK SUPPORT" mode with

If "TESTING" is not displayed after 5 minutes, retry from step 2.

9. Touch "SELF-DIAG RESULTS".

EC-317

А

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

Which is displayed on CONSULT-III screen? OK >> INSPECTION END

NG >> Proceed to EC-318, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE A

WITH GST

1. Turn ignition switch ON.

2. Set voltmeter probes to ECM harness connector terminals.

Connector	+	_	Voltage (V)
Connector	Terminal	Terminal	
E80	134 (Fuel tank temperature sensor signal)	175 (Sensor ground)	3.1 - 4.0

3. Start engine and wait at least 60 seconds.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-318, "Diagnosis Procedure".
- NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE B

@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. 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 20 seconds.
- 6. Check 1st trip DTC.

Is 1st trip DTC displayed?

- YES >> Proceed to EC-318, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006288308

[VK56VD]

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 volun	Ground	Voltage	
Connector	Terminal	Glound Vollage	
F48	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 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

Loose or poor connection for each connector and harness

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

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

${\it 3.}$ check evap canister purge volume control solenoid valve output signal circuit А FOR OPEN AND SHORT 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. EC Check the continuity between EVAP canister purge volume control solenoid valve harness connector and 3. ECM harness connector. EVAP canister purge volume control solenoid valve ECM Continuity Connector Terminal Connector Terminal F110 F48 2 64 Existed D Also check harness for short to ground and short to power. 4. Is the inspection result normal? YES >> GO TO 4. NO >> Repair open circuit, short to ground or short to power in harness or connectors. ${f 4.}$ CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR Disconnect EVAP control system pressure sensor harness connector. 1. Check that water is not inside connectors. 2. Is the inspection result normal? YES >> GO TO 5. NO >> Replace EVAP control system pressure sensor. ${f 5.}$ CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR Н Refer to EC-335, "Component Inspection (EVAP Control System Pressure Sensor)". Is the inspection result normal? YES-1 >> With CONSULT-III: GO TO 6. YES-2 >> Without CONSULT-III: GO TO 7. >> Replace EVAP control system pressure sensor. NO 6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE WITH CONSULT-III 1. Turn ignition switch OFF. Κ 2. Reconnect harness connectors disconnected. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed var-4 ies according to the valve opening. Does engine speed vary according to the valve opening? YES >> GO TO 8. Μ NO >> GO TO 7. I.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE Refer to EC-320, "Component Inspection (EVAP Canister Purge Volume Control Solenoid Valve)". Ν Is the inspection result normal? YES >> GO TO 8. NO >> Replace EVAP canister purge volume control solenoid valve. Refer to FL-10. "Exploded View". 8.CHECK RUBBER TUBE FOR CLOGGING Disconnect rubber tube connected to EVAP canister vent control valve. 1. Ρ 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 Refer to EC-327, "Component Inspection (EVAP Canister Vent Control Valve)".

[VK56VD]

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 10.

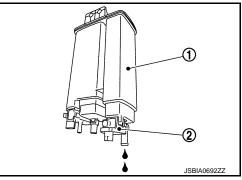
NO >> Replace EVAP canister vent control valve. Refer to <u>FL-10, "Exploded View"</u>.

10. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

- 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 (1).
- EVAP canister vent control valve (2)

Does water drain from the EVAP canister?

- YES >> GO TO 11.
- NO >> GO TO 13.



[VK56VD]

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 2.5 kg (5.5 lb).

Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 12.

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-10. "Hydraulic Layout".

13. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (EVAP Canister Purge Volume Control Solenoid Valve)

INFOID:000000006288309

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

B WITH CONSULT-III

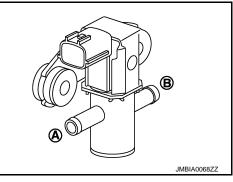
- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 4. Turn ignition switch ON.
- 5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III.

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VK56VD]

< DTC/CIRCUIT DIAGNOSIS >

6. Touch "Qd" and "Qu" on CONSULT-III 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



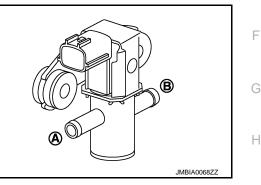
WITHOUT CONSULT-III

- Ĩ. 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-10, "Hydraulic Layout".



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P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Logic

INFOID:000000006217854

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0444	PURG VOLUME CONT/V (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	PURG VOLUME CONT/V (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 shorted.) EVAP canister purge volume control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for at least 13 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-322, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217855

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.

	r purge volume enoid valve	Ground	Voltage
Connector	Terminal		
F48	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

• Loose or poor connection for each connector and harness

• Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

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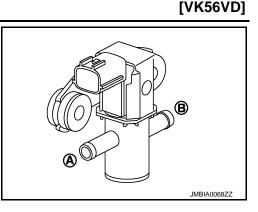
 Harness for open or short between EVAP canister purge volume control solenoid valve and ECM >> Repair open circuit, short to ground or short to power in harness or connectors. ${
m 3.}$ CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch OFF. Disconnect ECM harness connector. 2. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and 3. ECM harness connector. EVAP canister purge volume ECM control solenoid valve Continuity Connector Terminal Connector Terminal F48 2 F110 64 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES-1 >> With CONSULT-III: GO TO 4. YES-2 >> Without CONSULT-III: GO TO 5. NO >> Repair open circuit, short to ground or short to power in harness or connectors. ${f 4}$. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION (P) WITH CONSULT-III 1. Reconnect all harness connectors disconnected. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. 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-320, "Component Inspection (EVAP Canister Purge Volume Control Solenoid Valve)". Is the inspection result normal? YES >> GO TO 6. NO >> Replace EVAP canister purge volume control solenoid valve. **6.**CHECK INTERMITTENT INCIDENT Refer to GI-40, "Intermittent Incident". >> INSPECTION END Component Inspection (EVAP Canister Purge Volume Control Solenoid Valve) INEOID:00000000628836 1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (P) WITH CONSULT-III Turn ignition switch OFF. 1. 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. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. 5.

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

 Touch "Qd" and "Qu" on CONSULT-III 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	



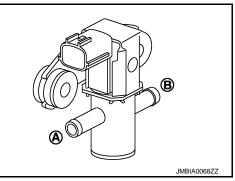
WITHOUT CONSULT-III

- 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.

Air passage continuity between (A) and (B)
Existed
Not existed

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace EVAP canister purge volume control solenoid valve. Refer to <u>FL-10, "Hydraulic Lavout"</u>.



< DTC/CIRCUIT DIAGNOSIS >

P0447 EVAP CANISTER VENT CONTROL VALVE

DTC Logic

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EC

INFOID:000000006288310

[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0447	(Trouble diagnosis content) 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 (The valve circuit is open or shorted.) EVAP canister vent control valve
DTC CON	FIRMATION PROCED	URE	
	NDITIONING		
1. Turn ig 2. Turn ig 3. Turn ig TESTING (nition switch OFF and w nition switch ON. nition switch OFF and w CONDITION:		is 11 V or more at idle.
>>	> GO TO 2.		
2.perfo	RM DTC CONFIRMATIO	ON PROCEDURE	
2. Check	ngine and wait at least 8 1st trip DTC.	seconds.	
	<u>)TC detected?</u>		
	Proceed to <u>EC-325, "D</u> INSPECTION END	lagnosis Procedure.	
Diagnosi	s Procedure		INFOID:00000006288311
1.INSPEC	TION START		
	ULT-III be used?		
Will CONS	ULT-III be used?		
	> GO TO 2. > GO TO 3.		
~		T CONTROL VALVE CIRCUIT	
WITH C UITH C UITH C	ONSULT-III Inition switch OFF and th		
3. Touch	"ON/OFF" on CONSULT for operating sound of th	-III screen.	
Clic	king sound should be	heard.	
	ection result normal?		
	> GO TO 7. > GO TO 3.		
-		T CONTROL VALVE POWER SUPPL	Y CIRCUIT
	nition 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.

EC-325

< DTC/CIRCUIT DIAGNOSIS >

EVAP canister vent control valve		Ground	Voltage
Connector	Terminal		
C18	1	Ground	Battery voltage

Is the inspection result normal?

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

NO >> GO 10 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between EVAP canister vent control valve and IPDM E/R
- · Loose or poor connection for each connector and harness

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

5. CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 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	
C18	2	E80	120	Existed

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

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

• Loose or poor connection for each connector and harness

• Harness for open or short between EVAP canister vent control valve and ECM

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

7.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 8.

NO >> Clean the rubber tube using an air blower.

8.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-327, "Component Inspection (EVAP Canister Vent Control Valve)".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP canister vent control valve. Refer to <u>FL-10, "Exploded View"</u>.

9.CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection (EVAP Canister Vent Control Valve)

[VK56VD]

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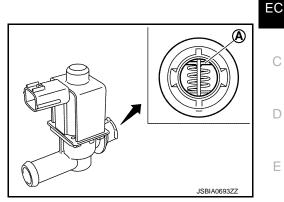
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1.CHECK EVAP CANISTER VENT CONTROL VALVE-I

- 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 rust.

Is it rusted?

- YES >> Replace EVAP canister vent control valve. Refer to <u>FL-</u> <u>10, "Exploded View"</u>.
- NO $>> \overline{\text{GO TO } 2}$.



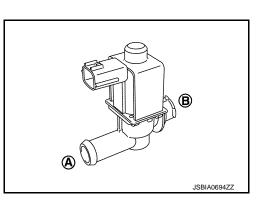
2.CHECK EVAP CANISTER VENT CONTROL VALVE-II

WITH CONSULT-III

- 1. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 4. Check air passage continuity and operation delay time. Check that new O-ring is installed properly.

VENT CONTROL/V Condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.



WITHOUT CONSULT-III

- 1. Disconnect EVAP canister vent control valve harness connector.
- 2. Check air passage continuity and operation delay time under the following conditions. Check that 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
OFF Operation takes less than 1 se	

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace EVAP canister vent control valve. Refer to <u>FL-10</u>, "Exploded View".

${\it 3.}$ check evap canister vent control valve-III

(I) WITH CONSULT-III

T. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.

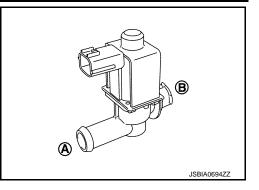
2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.

< DTC/CIRCUIT DIAGNOSIS >

3. Check air passage continuity and operation delay time. Check that new O-ring is installed properly.

VENT CONTROL/V Condition	Air passage continuity between (A) and (B)	
ON	Not existed	
OFF	Existed	
Operation takes loss than 1 second		

Operation takes less than 1 second.



[VK56VD]

WITHOUT CONSULT-III

- 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. Check that 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 <u>FL-10, "Exploded View"</u>.

< DTC/CIRCUIT DIAGNOSIS >

P0448 EVAP CANISTER VENT CONTROL VALVE

DTC Logic

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INFOID:000000006288313

[VK56VD]

DTC DETECTION LOGIC

	Trouble diagnosis name (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
_	FIRMATION PROCED	URE	
2. Turn igr	nition switch OFF and wa nition switch ON. nition switch OFF and wa		
2.PERFOR	GO TO 2. RM DTC CONFIRMATIO		
2. Turn iğr 3. Start en 4. Repeat Increas		ait at least 10 seconds. least 1 minute. s.	naintain that speed for 2 minutes and
Do not ex Fully re	onds to 3 minutes. ceed 3 minutes. leased accelerator peda next procedure 20 times	l and keep engine idle for approxima	tely 5 seconds.
Dopod			
Quickly 30 seco	onds.		pm and maintain that speed for 25 to seconds
Quickly 30 seco	onds.	eed up to between 4,000 and 4,500 r	
Quickly 30 seco	onds. leased accelerator peda Engine speed	l and keep engine idle for at least 35	

6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-329, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

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.

EC-329

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INFOID:000000006288314

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 2.

NO >> Clean rubber tube using an air blower.

2. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-327, "Component Inspection (EVAP Canister Vent Control Valve)".

Is the inspection result normal?

YES >> GO TO 3.

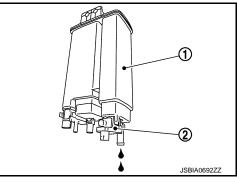
NO >> Replace EVAP canister vent control valve. Refer to <u>FL-10, "Exploded View"</u>.

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 (1).
 - 2 : EVAP canister vent control valve

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 2.5 kg (5.5 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-10, "Hydraulic Layout".

6.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 7.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-10, "Exploded View"</u>.

I.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-335, "Component Inspection (EVAP Control System Pressure Sensor)".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-10, "Exploded View"</u>.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

[VK56VD]

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection (EVAP Canister Vent Control Valve)

[VK56VD]

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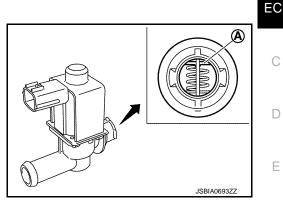
P

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 rust.

Is it rusted?

- YES >> Replace EVAP canister vent control valve. Refer to <u>FL-</u> <u>10, "Exploded View"</u>.
- NO >> GO TO 2.



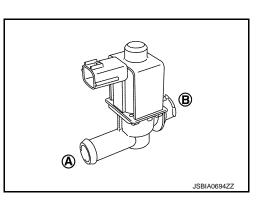
2.CHECK EVAP CANISTER VENT CONTROL VALVE-II

WITH CONSULT-III

- 1. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 4. Check air passage continuity and operation delay time. Check that new O-ring is installed properly.

VENT CONTROL/V Condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.



WITHOUT CONSULT-III

- 1. Disconnect EVAP canister vent control valve harness connector.
- 2. Check air passage continuity and operation delay time under the following conditions. Check that 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 <u>FL-10</u>, "Exploded View".

3.CHECK EVAP CANISTER VENT CONTROL VALVE-III

(I) WITH CONSULT-III

T. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.

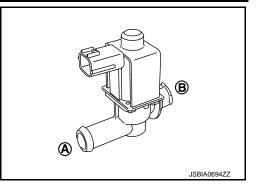
2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.

< DTC/CIRCUIT DIAGNOSIS >

3. Check air passage continuity and operation delay time. Check that new O-ring is installed properly.

VENT CONTROL/V Condition	Air passage continuity between (A) and (B)	
ON	Not existed	
OFF	Existed	
Operation takes less than 1 second		

Operation takes less than 1 second.



[VK56VD]

WITHOUT CONSULT-III

- 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. Check that 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 <u>FL-10, "Exploded View"</u>.

< DTC/CIRCUIT DIAGNOSIS >

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

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INFOID:000000006288316

[VK56VD]

DTC DETECTION LOGIC

P0451EVAP SYS PRES SEN (EVAP control system pressure sensor circuit (EVAP control system pressure sensor perfor- mance)ECM detects a sloshing signal from the EVAP control system pressure sensor• (EVAP control system pressure sensor circuit is open or sh (Accelerator pedal position sensor 2 circuit (Crankshaft position sensor circuit is shorted (Refrigerant pressure sensor circuit is shorted (Refrigerant pressure sensor • EVAP control system pressure sensor • EVAP control system pressure sensor • EVAP control system pressure sensor • Camshaft position sensor (bank 1)	norted.) is shorted.) is shorted.]
Crankshaft position sensor Refrigerant pressure sensor	
DTC CONFIRMATION PROCEDURE	
1. PRECONDITIONING	
1. Turn ignition switch OFF and wait at least 10 seconds.	
 Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. 	
>> GO TO 2. 2.PERFORM DTC CONFIRMATION PROCEDURE	
1. Start engine and wait at least 40 seconds.	<u>.</u>
NOTE:	
Do not depress accelerator pedal even slightly.2. Check 1st trip DTC.	
Is 1st trip DTC detected?	
YES >> Proceed to <u>EC-333, "Diagnosis Procedure"</u> . NO >> INSPECTION END	
	OID:000000006288317
1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	
 Disconnect EVAP control system pressure sensor harness connector. Check that water is not inside connectors. 	
Is the inspection result normal?	
YES >> GO TO 2.	
NO >> Repair or replace harness connector.	
2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT	
 Turn ignition switch ON. Check the voltage between EVAP control system pressure sensor harness connector and group 	und
2. Oncon the voltage between E VAL control system pressure sensor harness connector and group	

	trol system e sensor	Ground	Voltage (V)
Connector	Terminal		
C17	3	Ground	Approx. 5 V

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EC

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

EC	М	Sensor		
Connector	Terminal	Name	Connector	Terminal
F110	76	Crankshaft position sensor	F74	1
1110	77	Camshaft position sensor (bank 1)	F84	1
		EVAP control system pressure sen- sor	C17	3
	133	Battery current sensor	E63	2
E80		Refrigerant pressure sensor	E77	1
	131	APP sensor 2 (Without ICC)	E110	1
	131	APP sensor 2 (with ICC)	E67	9

Is the inspection result normal?

YES >> GO TO 4.

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

4.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (Refer to EC-301, "Component Inspection (Crankshaft Position Sensor)".)
- Camshaft position sensor (bank 1) (Refer to EC-306, "Component Inspection (Camshaft Position Sensor)".)
- Battery current sensor (Refer to <u>EC-427, "Component Inspection (Battery Current Sensor)"</u>.)
 Refrigerant pressure sensor (Refer to <u>EC-520, "Component Function Check"</u>.)

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Replace malfunctioning component.

5. CHECK APP SENSOR

Refer to EC-470, "Component Inspection (Accelerator Pedal Position Sensor)".

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 6.

O.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly.

Refer to ACC-3, "MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation" (Without distance control assist system)

Refer to ACC-4. "MODELS WITH DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation" (With distance control assist system).

>> INSPECTION END

7.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-335, "Component Inspection (EVAP Control System Pressure Sensor)".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP control system pressure sensor.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR [VK56VD] < DTC/CIRCUIT DIAGNOSIS > >> INSPECTION END А Component Inspection (EVAP Control System Pressure Sensor) INEOID-000000006288318 1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR EC 1. Turn ignition switch OFF. Remove EVAP control system pressure sensor with its harness connector. 2. 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 terminals under the following conditions. D ECM Condition + _ Voltage (V) [Applied vacuum kPa (kg/cm², psi)] Е Connector Terminal Terminal Not applied 1.8 - 4.8 E80 143 150 -26.7 (-0.272, -3.87) 2.1 to 2.5 lower than above value F **CAUTION:** · Always calibrate the vacuum pump gauge when using it. • Never apply below -93.3 kPa (-0.952 kg/cm², -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm², 14.69 psi). Is the inspection result normal? Н YES >> INSPECTION END NO >> Replace EVAP control system pressure sensor. Κ L Μ Ν Ρ

< DTC/CIRCUIT DIAGNOSIS >

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

INFOID:000000006288319

[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0452	EVAP SYS PRES SEN (EVAP control system pres- sure sensor low input)	An excessively low voltage from the sensor is sent to ECM.	 (EVAP control system pressure sensor circuit is shorted.) Harness or connectors (Battery current sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is shorted.) [Camshaft position sensor (bank 1) circuit is shorted.] (Crankshaft position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) EVAP control system pressure sensor Battery current sensor Accelerator pedal position sensor Camshaft position sensor (bank 1) Crankshaft position sensor Camshaft position sensor Refrigerant pressure sensor Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT-III

- T. 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. Turn ignition switch ON.
- 6. Select "DATA MONITOR" mode with CONSULT-III.
- 7. Check that "FUEL T/TMP SE" is more than 0°C (32°F).
- 8. Start engine and wait at least 20 seconds.
- 9. 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 under the following conditions.

	ECM						
Connector	+	_					
Connector	Terminal	Terminal					
E80	134 (Fuel tank temperature sensor signal)	175					

- 3. Check that the voltage is less than 4.2 V.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- 6. Turn ignition switch OFF and wait at least 10 seconds.
- 7. Start engine and wait at least 20 seconds.

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		>		[VK56VD]
8. Check 1st trip				
Is 1st trip DTC dete		ID :		
	d to <u>EC-337</u> CTION END		sis Proceo	ure".
Diagnosis Proc	edure			INFOID:00000006288320
1. CHECK EVAP (ONTROL S	YSTEM P	RESSUR	E SENSOR CONNECTOR
				sor harness connector.
2. Check that wat				
s the inspection re				
YES >> GO TC NO >> Repair		ornocc oo	nnootor	
	or replace h			E SENSOR POWER SUPPLY CIRCUIT-I
			RESSUR	SENSOR FOWER SUFFLI CIRCUIT-I
 Turn ignition switched for the second se second second sec		EVAP co	ntrol syste	m pressure sensor harness connector and ground.
	ige between		introl bybic	
EVAP control syster	n			
pressure sensor	Ground	Voltage	e (V)	
Connector Termin				
C17 3	Ground	Appro	x. 5	
•				
YES >> GO TC	9.			
YES >> GO TC NO >> GO TC	9. 3.	VSTEMD		
YES >> GO TO NO >> GO TO 3. CHECK EVAP O	9. 3. CONTROL S	YSTEM P	RESSUR	E SENSOR POWER SUPPLY CIRCUIT-II
YES >> GO TO NO >> GO TO CHECK EVAP O Turn ignition sv	9. 3. ONTROL S` vitch OFF.			E SENSOR POWER SUPPLY CIRCUIT-II
YES >> GO TC NO >> GO TC CHECK EVAP C Turn ignition sv Disconnect EC Check the con	9. 3. ONTROL S' vitch OFF. M harness c tinuity betwe	onnector.		E SENSOR POWER SUPPLY CIRCUIT-II
YES >> GO TC NO >> GO TC CHECK EVAP C Turn ignition sv Disconnect EC	9. 3. ONTROL S' vitch OFF. M harness c tinuity betwe	onnector.		
YES >> GO TO NO >> GO TO .CHECK EVAP O . Turn ignition sv Disconnect EO . Check the con ness connecto	9. 3. ONTROL S' vitch OFF. M harness c tinuity betwe	onnector.		
YES >> GO TC NO >> GO TC CHECK EVAP C . Turn ignition sv Disconnect EC . Check the con	9. 3. ONTROL S' vitch OFF. M harness c tinuity betwe	onnector. een EVAP	control s	
YES >> GO TC NO >> GO TC CHECK EVAP C . Turn ignition sv Disconnect EC . Check the con ness connecto	9. 3. ONTROL S vitch OFF. M harness c tinuity betwe ECI	onnector. een EVAP		
YES >> GO TC NO >> GO TC CHECK EVAP C Use on the connect EC Check the connect of EVAP control system pressure sensor	9. 3. ONTROL S vitch OFF. M harness c tinuity betwe ECI	onnector. een EVAP	control s	
YES >> GO TC NO >> GO TC CHECK EVAP C Disconnect EC Check the con ness connecto EVAP control system pressure sensor Connector Termina	9. 3. ONTROL S vitch OFF. M harness c tinuity betwe ECI Connector E80	onnector. een EVAP M Terminal	Continuity	
YES >> GO TC NO >> GO TC CHECK EVAP C Disconnect EC Disconnect EC Check the con ness connecto EVAP control system pressure sensor Connector Termina	9. 3. ONTROL S vitch OFF. M harness c tinuity betwee ECI Connector E80 sult normal?	onnector. een EVAP M Terminal	Continuity	
YES >> GO TC NO >> GO TC CHECK EVAP C Turn ignition sv Disconnect EC Check the con ness connecto EVAP control system pressure sensor Connector Termina C17 3 S the inspection re YES >> GO TC NO >> GO TC	9. 3. ONTROL S vitch OFF. M harness c tinuity betwee Connector E80 Sult normal? 5. 4.	onnector. een EVAP M Terminal 133	Continuity	
YES >> GO TC NO >> GO TC CHECK EVAP C Disconnect EC Disconnect EC Check the conness connecto EVAP control system pressure sensor Connector Termina C17 3 S the inspection re YES >> GO TC NO >> GO TC	9. 3. ONTROL S vitch OFF. M harness c tinuity betwee Connector E80 Sult normal? 5. 4.	onnector. een EVAP M Terminal 133	Continuity	
YES $>>$ GO TC NO $>>$ GO TC 3. CHECK EVAP C 1. Turn ignition sv 2. Disconnect EC 3. Check the conness connecto EVAP control system pressure sensor Connector Termina C17 3 S the inspection re YES $>>$ GO TC NO $>>$ GO TC 1. DETECT MALF	9. 3. ONTROL S vitch OFF. M harness c tinuity betwee Connector E80 Sult normal? 5. 4. JNCTIONING	onnector. een EVAP M Terminal 133 G PART	Continuity Existed	ystem pressure sensor harness connector and ECM har-
YES >> GO TC NO >> GO TC CHECK EVAP C Disconnect EC Disconnect EC Check the con ness connecto EVAP control system pressure sensor Connector Termina C17 3 S the inspection re YES >> GO TC NO >> GO TC DETECT MALF Check the following Harness for open	9. 3. ONTROL S vitch OFF. M harness c tinuity betwee Connector E80 Sult normal? 5. 4. JNCTIONING between EC	onnector. een EVAP M Terminal 133 G PART CM and E	Continuity Existed	ystem pressure sensor harness connector and ECM har-
$\begin{array}{rrrr} YES & >> GO TC \\ NO & >> GO TC \\ \hline NO & >> GO TC \\ \hline S.CHECK EVAP C \\ \hline S.CHECK EVAP C \\ \hline S.Check the connect EC \\ \hline S.Check the connector \\ \hline Check the connector \\ \hline \hline Conn$	9. 3. ONTROL S vitch OFF. M harness c tinuity betwee Connector E80 Sult normal? 5. 4. JNCTIONING between EC	onnector. een EVAP M Terminal 133 G PART CM and E	Continuity Existed	ystem pressure sensor harness connector and ECM har-
YES >> GO TO NO >> GO TO 3.CHECK EVAP O 1. Turn ignition sv 2. Disconnect EO 3. Check the con ness connecto EVAP control system pressure sensor Connector Termina C17 3 Is the inspection re YES >> GO TO NO >> GO TO 4.DETECT MALF Check the following Harness for open Loose or poor co	9. 3. ONTROL S vitch OFF. M harness c tinuity betwee Connector E80 Sult normal? 5. 4. JNCTIONING between EC	onnector. een EVAP M Terminal 133 G PART CM and EV each conr	Continuity Existed	ystem pressure sensor harness connector and ECM har-
NO >> GO TC 3. CHECK EVAP C 1. Turn ignition sv 2. Disconnect EC 3. Check the conness connector EVAP control system pressure sensor Connector Termina C17 3 Is the inspection re YES >> GO TC NO >> GO TC 4. DETECT MALF Check the following Harness for open Loose or poor col >> Repair	9. 3. ONTROL S vitch OFF. M harness c tinuity betwee Connector E80 Sult normal? 5. 4. JNCTIONING between EC nection for a open circuit.	onnector. een EVAP M Terminal 133 G PART CM and EV each conr	Continuity Existed	ystem pressure sensor harness connector and ECM har-
YES >> GO TO NO >> GO TO 3.CHECK EVAP O 1. Turn ignition sv 2. Disconnect EC 3. Check the connecto EVAP control system pressure sensor Connector Termina C17 3 Is the inspection re YES >> GO TO NO >> GO TO 4.DETECT MALF Check the following Harness for open Loose or poor con >> Repair 5.CHECK SENSO	9. 3. ONTROL S vitch OFF. M harness c tinuity betwee Connector E80 Sult normal? 5. 4. JNCTIONING between EC nection for a open circuit. R POWER S	onnector. een EVAP M Terminal 133 G PART CM and EV each conr	Continuity Existed	ystem pressure sensor harness connector and ECM har-

EC	М	Sensor			
Connector	Terminal	Name	Connector	Terminal	
F110	76	Crankshaft position sensor	F74	1	
	77	Camshaft position sensor (bank 1)	F84	1	

< DTC/CIRCUIT DIAGNOSIS >

EC	М	Sensor		
Connector	Terminal	Name	Connector	Terminal
		EVAP control system pressure sen- sor	C17	3
	133	Battery current sensor	E63	2
E80		Refrigerant pressure sensor	E77	1
	131	APP sensor 2 (Without ICC)	E110	1
	131	APP sensor 2 (with ICC)	E67	9

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 (Refer to EC-301, "Component Inspection (Crankshaft Position Sensor)".)
- Camshaft position sensor (bank 1) (Refer to EC-306, "Component Inspection (Camshaft Position Sensor)".)
- Battery current sensor (Refer to EC-414, "Component Inspection (Battery Current Sensor)".)
- Refrigerant pressure sensor (Refer to <u>EC-520, "Component Function Check"</u>.)

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning component.

7.CHECK APP SENSOR

Refer to EC-470, "Component Inspection (Accelerator Pedal Position Sensor)".

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 8.

8.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly.

Refer to <u>ACC-3, "MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation"</u> (Without distance control assist system)

Refer to <u>ACC-4, "MODELS WITH DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation"</u> (With distance control assist system).

>> INSPECTION END

9. Check evap control system pressure sensor ground circuit for open and short

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		EC	Continuity	
Connector	Terminal	Connector Terminal		
C17	1	E80	150	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 10.

10. DETECT MALFUNCTIONING PART

Check the following.

Harness for open or short between EVAP control system pressure sensor and ECM

EC-338

< DTC/CIRCUIT DIAGNOSIS >

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Loose or poor connection for each connector and harness

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

11.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

ness c	onnector.					С
EVAP contr pressure	-	EC	CM	Continuity	-	D
Connector	Terminal	Connector	Terminal			
C17	2	E80	143	Existed		
2. Also ch	neck harn	ess for sho	ort to grou	nd and sho	ort to power.	E
Is the inspe			-			
-	• GO TO • GO TO	-				F
12.DETE				т		
Check the				·		
 Harness 	for open o				system pressure sensor and ECM	G
 Loose or 	poor con	nection for	each con	nector and	harness	
	Donoir a	non oirouit	- abart ta	around or	abort to now or in bornoop or connectors	Н
				-	short to power in harness or connectors. IRE SENSOR	
-						I
				<u>i (EVAP Co</u>	ontrol System Pressure Sensor)".	1
Is the inspe YES >>	oction resion resion of the section		<u>,</u>			
-			ntrol svste	m pressure	e sensor. Refer to <u>FL-10, "Exploded View"</u> .	J
14.снес			•	•		
Refer to GI	-40, "Inte	rmittent Inc	cident".			Κ
>>	> INSPEC	TION END)			

Component Inspection (EVAP Control System Pressure Sensor)

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Turn ignition switch OFF.

2. Remove EVAP control system pressure sensor with its harness connector. 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 terminals under the following conditions.

	ECM		Condition	
Connector	+	_	Condition [Applied vacuum kPa (kg/cm ² , psi)]	Voltage (V)
Connector	Terminal	Terminal		
E80	143	150	Not applied	1.8 - 4.8
LOU	145	150	-26.7 (-0.272, -3.87)	2.1 to 2.5 lower than above value

CAUTION:

• Always calibrate the vacuum pump gauge when using it.

< DTC/CIRCUIT DIAGNOSIS >

Never apply below -93.3 kPa (-0.952 kg/cm², -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm², 14.69 psi).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP control system pressure sensor.

< DTC/CIRCUIT DIAGNOSIS >

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

INFOID:000000006288322

[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0453	EVAP SYS PRES SEN (EVAP control system pres- sure sensor high input)	An excessively high voltage from the sensor is sent to ECM.	 Harness or connectors (EVAP control system pressure sensor circuit is short- ed.) (Crankshaft position sensor circuit is open or shorted.) [Camshaft position sensor (bank 1) circuit is shorted.] (Accelerator pedal position sensor 2 circuit is shorted.) (Battery current sensor circuit is shorted.) (Battery current sensor circuit is shorted.) EVAP control system pressure sensor Crankshaft position sensor Crankshaft position sensor (bank 1) Accelerator pedal position sensor 2 Battery current sensor Refrigerant pressure sensor EVAP canister vent control valve EVAP canister Rubber hose from EVAP canister vent control valve to vehicle frame

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

I.FRECONDITIONING	1
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. TESTING CONDITION: Always perform test at a temperature of 5°C (41°F) or more. 	J
>> GO TO 2.	Κ
2. PERFORM DTC CONFIRMATION PROCEDURE	
WITH CONSULT-III	L
 Start engine and warm it up to normal operating temperature. Turn ignition switch OFF and wait at least 10 seconds. 	
3. Turn ignition switch ON.	M
4. Turn ignition switch OFF and wait at least 10 seconds.	1 V 1
5. Turn ignition switch ON.	
 Select "DATA MONITOR" mode with CONSULT-III. Check that "FUEL T/TMP SE" is more than 0°C (32°F). 	Ν
8. Start engine and wait at least 20 seconds.	
9. 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 under the following conditions.

	Ground	
Connector	+	-
	Terminal	Terminal
E80	134 (Fuel tank temperature sensor signal)	175

3. Check that the voltage is less than 4.2 V.

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< DTC/CIRCUIT DIAGNOSIS >

4. Turn ignition switch OFF and wait at least 10 seconds.

- 5. Turn ignition switch ON.
- 6. Turn ignition switch OFF and wait at least 10 seconds.
- 7. Start engine and wait at least 20 seconds.
- 8. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-342, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006288323

1. 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 2.

NO >> Repair or replace harness connector.

2. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.

2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

EVAP control system	n pressure sensor	Ground	Voltage (V)
Connector Terminal		Ground	voltage (v)
C17	3	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 3.

${f 3.}$ CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		EC	М	Continuity
Connector	Terminal	Connector Terminal		Continuity
C17	3	E80	133	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness for open between ECM and EVAP control system pressure sensor
- Loose or poor connection for each connector and harness

>> Repair open circuit.

5.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

		Senso	r			
Connector	Terminal	Name	Connector	Terminal		
F110	76	Crankshaft position sensor	F74	1		
FIIV	77	Camshaft position sensor (bank	1) F84	1		
		EVAP control system pressure se sor	en- C17	3		
	133	Battery current sensor	E63	2		
E80		Refrigerant pressure sensor	E77	1		
	131	APP sensor 2 (Without ICC)	E110	1		
	131	APP sensor 2 (with ICC)	E67	9		
s the inspe	ection res	<u>ult normal?</u>				
Camshaf	following. aft position t position	n sensor (Refer to <u>EC-301.</u> sensor (bank 1) (Refer to <u>E</u>	<u>C-306, "Comp</u>	onent Inspection ((Camshaft Position S	<u>"</u> .) ensor)".)
Refrigera	int pressu	nsor (Refer to <u>EC-427, "Con</u> ire sensor (Refer to <u>EC-520</u> <u>ult normal?</u>				
	> GO TO					
NO >>	> Replace	e malfunctioning component				
CHECK	APP SE	NSOR				
Refer to EC	C-470, "C	omponent Inspection (Accel	erator Pedal I	osition Sensor)"		
s the inspe	ection res	ult normal?				
	> GO TO					
•	> GO TO					
).REPLA		LERATOR PEDAL ASSEM	BLY			
	celerator	pedal assembly.		N		
Replace ac			CE CONTRO		M. Domovol and In-	vtollotion
Refer to A	<u>CC-3, "M</u> stance co	DELS WITHOUT DISTAN	<u>CE CONTRO</u>	ASSIST SYSTE	M: Removal and Ins	stallation'
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YES >> GO TO 11. NO >> GO TO 10.

< DTC/CIRCUIT DIAGNOSIS >

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between EVAP control system pressure sensor and ECM
- · Loose or poor connection for each connector and harness

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

11.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		2 ECM		Continuity
Connector	Terminal	Connector Terminal		
C17	2	E80	143	Existed

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

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between EVAP control system pressure sensor and ECM
- Loose or poor connection for each connector and harness

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

13.CHECK RUBBER TUBE

- Disconnect rubber tube connected to EVAP canister vent control valve. Refer to <u>FL-10, "Hydraulic Lay-out"</u>.
- 2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 14.

NO >> Clean the rubber tube using an air blower, repair or replace rubber tube.

14.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-327, "Component Inspection (EVAP Canister Vent Control Valve)".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace EVAP canister vent control valve. Refer to <u>FL-10, "Exploded View"</u>.

15.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-335, "Component Inspection (EVAP Control System Pressure Sensor)".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-10, "Exploded View"</u>.

16.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.

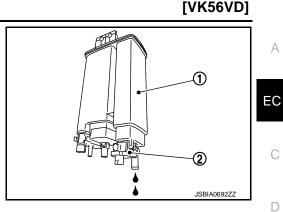
< DTC/CIRCUIT DIAGNOSIS >

- will drain from the E_{A}^{A} and E_{A}^{A}
- Check if water will drain from the EVAP canister (1).
 EVAP canister vent control valve (2)

Dess water droin from EVAB espirator?

Does water drain from EVAP canister?

YES >> GO TO 17. NO >> GO TO 19.



17.CHECK EVAP CANISTER

Veian the i					
ttached.	EVAP cani	ster with th	e EVAP canister vent control va	alve and EVAP control system	oressure sensor
The weight should be less than 2.5 kg (5.5 lb).					
<u>s the inspe</u>	ection resu	lt normal?			
	> GO TO 1				
	> GO TO 1	-			
Ö. DETE	CT MALFU	JNCTIONI	NG PART		
heck the					
	nister for d		nister and vehicle frame for clo	aging or poor connection	
	Se Detweel			gging of poor connection	
>`	> Repair ho	ose or repla	ace EVAP canister. Refer to <u>FL</u> -	10 "Hydraulic Layout"	
-				Tot Hydradilo Edybar.	
efer to G	<u>-40, "Interr</u>	<u>mittent Inci</u>	dent".		
	> INSPECT			- .	
			EVAP Control System Pro	essure Sensor)	INFOID:000000006288365
ompon	ent Insp	ection (E	-	essure Sensor)	INFOID:000000006288365
CHECK	ent Inspo EVAP CO	ection (E	EVAP Control System Pressure Sensor	essure Sensor)	INFOID:000000006288365
CHECK	ent Inspective EVAP CO	ection (E NTROL SY	STEM PRESSURE SENSOR		INFOID:000000006288365
CHECK	ent Inspo EVAP CO mition swite ve EVAP co s replace	ection (E NTROL S) ch OFF. ontrol syste O-ring wit	YSTEM PRESSURE SENSOR em pressure sensor with its hard h a new one.	ness connector.	INFOID:000000006288365
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Compone CHECK Turn ig Remove Alway Install Turn ig following	ent Inspe- EVAP CO gnition swite ve EVAP co s replace a vacuum gnition swite ng conditio	ection (E NTROL S) ch OFF. ontrol syste O-ring wit pump to E ch ON and	YSTEM PRESSURE SENSOR em pressure sensor with its hard h a new one. VAP control system pressure se d check output voltage betweer Condition [Applied vacuum kPa (kg/cm ² , psi)]	ness connector. ensor. n ECM harness connector term Voltage (V)	
Compone CHECK Turn ig Remove Alway Install Turn ig following	ent Inspe- EVAP CO mition swite ve EVAP co s replace a vacuum p gnition swit ng conditio ECM +	ection (E NTROL SY ch OFF. ontrol syste O-ring wit pump to E ch ON and ns.	YSTEM PRESSURE SENSOR em pressure sensor with its harn h a new one. VAP control system pressure se d check output voltage between Condition	ness connector. ensor. n ECM harness connector term	

- Always calibrate the vacuum pump gauge when using it.
- Never apply below -93.3 kPa (-0.952 kg/cm², -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm², 14.69 psi).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP control system pressure sensor.

EC-345

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< DTC/CIRCUIT DIAGNOSIS >

P0456 EVAP CONTROL SYSTEM

DTC Logic

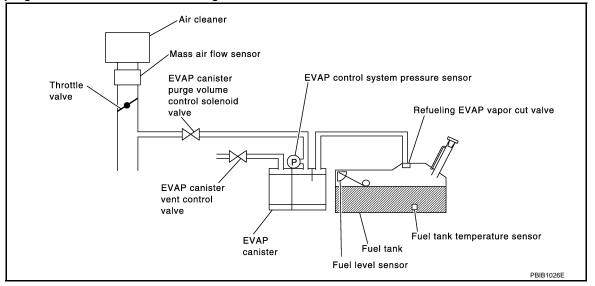
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[VK56VD]

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.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0456	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 EVAP canister purge volume control solenoid valve and the circuit EVAP canister purge volume 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

[VK56VD] < DTC/CIRCUIT DIAGNOSIS > 1.PRECONDITIONING А 1. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. 2. 3. Turn ignition switch OFF and wait at least 10 seconds. EC Do you have CONSULT-III? YES >> GO TO 2. NO >> GO TO 4. 2. PERFORM DTC CONFIRMATION PROCEDURE-I WITH CONSULT-III Turn ignition switch ON and select "EVAP DIAG READY" in "DATA MONITOR" mode with CONSULT-III. D 1. Start engine and wait at idle until "OFF" of "EVAP DIAG READY" changes to "ON". 2. NOTE: It will take at most 2 hours until "OFF" of "EVAP DIAG READY" changes to "ON". Е 3. Turn ignition switch OFF and wait at least 90 minutes. NOTE: Never turn ignition switch ON during 90 minutes. F Turn ignition switch ON and select "EVAP LEAK DIAG" in "DATA MONITOR" mode with CONSULT-III. 4. 5. Check that "EVAP LEAK DIAG" indication. Which is displayed on CONSULT-III? CMPLT>> GO TO 3. YET >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 1. 3.PERFORM DTC CONFIRMATION PROCEDURE-II Н Check 1st trip DTC. Is 1st trip DTC detected? YES >> Proceed to EC-347, "Diagnosis Procedure". NO >> INSPECTION END. **4.**PERFORM DTC CONFIRMATION PROCEDURE WITH GST 1. Start engine and wait engine idle for at least 2 hours. Turn ignition switch OFF and wait at least 90 minutes. 2. Κ 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-347, "Diagnosis Procedure". >> INSPECTION END. NO M Diagnosis Procedure INFOID:000000006288326 1.CHECK FUEL FILLER CAP DESIGN Ν Turn ignition switch OFF. 1. 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. Ρ

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NISSAN

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

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-350, "Component Inspection (Fuel Filler Cap)".

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 FL-12, "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 <u>FL-10, "Exploded View"</u>.

 EVAP canister vent control valve. Refer to <u>EC-327, "Component Inspection (EVAP Canister Vent Control Valve)"</u>.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace EVAP canister vent control valve and O-ring. Refer to FL-10, "Exploded View".

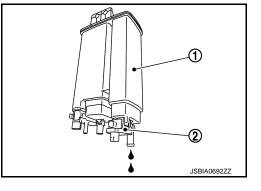
7.CHECK IF EVAP CANISTER SATURATED WITH WATER

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-III: GO TO 10.
- NO-2 >> Without CONSULT-III: 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 <u>FL-10, "Exploded View"</u>.

The weight should be less than 2.5 kg (5.5 lb).

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 10.

YES-2 >> Without CONSULT-III: GO TO 11.

NO >> GO TO 9.

< DTC/CIRCUIT DIAGNOSIS >	[VK56VD]
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-10, "Hydraulic Layout".	
10. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
 WITH CONSULT-III Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP ser 	vice port
2. Start engine and let it idle.	
 Select "PURG VOL CONT/V" in "ACTIVE TEST" mode. Touch "Qu" on CONSULT-III 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-III	
 Start engine and warm it up to normal operating temperature. Stop engine. 	
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP ser	vice port.
 Start engine and let it idle for at least 80 seconds. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. 	
Vacuum should exist.	
<u>Is the inspection result normal?</u> YES >> GO TO 13.	
NO >> GO TO 12.	
12.CHECK VACUUM HOSE	
Check vacuum hoses for clogging or disconnection. Refer to <u>FL-10. "Hydraulic Layout"</u> .	
<u>Is the inspection result normal?</u> YES >> GO TO 13.	
NO >> Repair or reconnect the hose.	
13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
Refer to EC-320, "Component Inspection (EVAP Canister Purge Volume Control Solenoid Valve)	"
Is the inspection result normal?	
 YES >> GO TO 14. NO >> Replace EVAP canister purge volume control solenoid valve. Refer to <u>FL-10, "Explore</u> 	ded View".
14.CHECK FUEL TANK TEMPERATURE SENSOR	
Refer to EC-273. "Component Inspection (Fuel Tank Temperature Sensor)".	
Is the inspection result normal?	
 YES >> GO TO 15. NO >> Replace fuel level sensor unit. Refer to <u>FL-5, "Removal and Installation"</u>. 	
15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	
Refer to EC-335, "Component Inspection (EVAP Control System Pressure Sensor)".	
Is the inspection result normal?	

YES >> GO TO 16.

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace EVAP control system pressure sensor. Refer to <u>EC-335</u>, "Component Inspection (EVAP <u>Control System Pressure Sensor</u>)".

16.CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to <u>FL-10, "Hydraulic Layout"</u>.

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 <u>FL-10, "Hydraulic Layout"</u>.

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. Refer to <u>FL-8, "Exploded View"</u>.

20. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-518, "Component Inspection (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 <u>FL-10, "Exploded View"</u>.

21. CHECK FUEL LEVEL SENSOR

Refer to <u>MWI-70, "Component Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 22.

NO >> Replace fuel level sensor unit. Refer to <u>FL-5</u>, "Removal and Installation".

22. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Fuel Filler Cap)

INFOID:000000006288327

1.CHECK FUEL FILLER CAP

1. Turn ignition switch OFF.

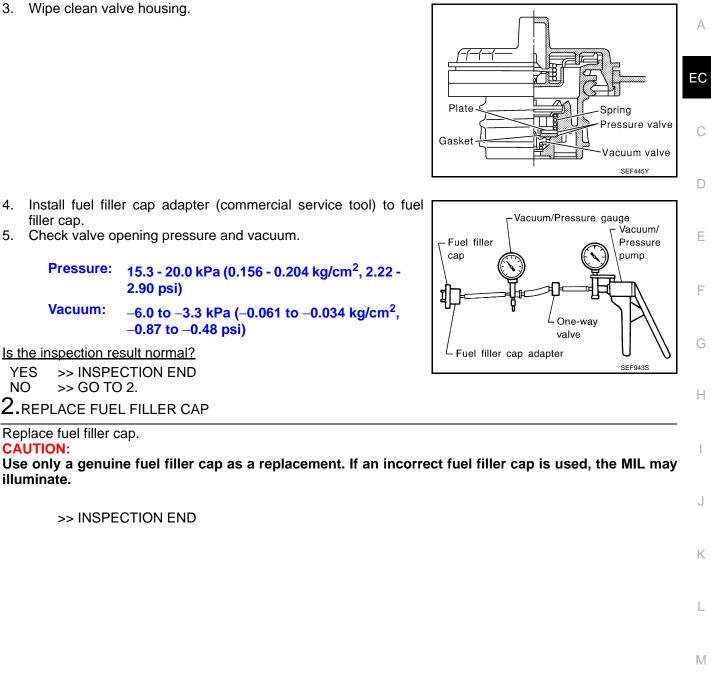
2. Remove fuel filler cap.

< DTC/CIRCUIT DIAGNOSIS >

3.

4.

5.



Ν

[VK56VD]

P0460 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0460 FUEL LEVEL SENSOR

DTC 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 <u>EC-378, "DTC Logic"</u>.

When the vehicle is parked, the fuel level in the fuel tank is naturally 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.	Trouble diagnosis name (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

- 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-352, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK DTC WITH "COMBINATION METER"

Refer to MWI-30, "CONSULT-III Function".

Is any DTC detected?

YES >> Perform trouble diagnosis of detected DTC.

- NO >> GO TO 2.
- 2. CHECK FUEL LEVEL SENSOR SIGNAL CIRCUIT

Check fuel level sensor signal circuit. Refer to MWI-69, "Component Function Check".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-40, "Intermittent Incident"</u>.
- NO >> Perform trouble diagnosis of fuel level sensor signal circuit. Refer to <u>MWI-69</u>, <u>"Diagnosis Procedure"</u>.

INFOID:00000006288328

INFOID:000000006288329

P0461 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0461 FUEL LEVEL SENSOR

DTC Logic

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-378, "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.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause	Е
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 short- ed) Harness or connectors (The sensor circuit is open or shorted) Combination meter Fuel level sensor 	F

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK	Н
Perform Component Function Check. Refer to <u>EC-353</u> , " <u>Component Function Check</u> ". Use component function check to check the overall function of the fuel level sensor. During this check, a 1st trip DTC might not be confirmed.	I
<u>Is the inspection result normal?</u> YES >> INSPECTION END NO >> Proceed to <u>EC-354, "Diagnosis Procedure"</u> .	J
Component Function Check	K
1.PRECONDITIONING	IX
WARNING: When performing the following procedure, always observe the handling of the fuel. Refer to <u>FL-2,</u> <u>"General Precautions"</u> . TESTING CONDITION: Before starting component function check, preparation of draining fuel and refilling fuel is required.	L
>> GO TO 2. 2.PERFORM COMPONENT FUNCTION CHECK	Ν
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.	0
 Prepare a fuel container and a spare hose. Release fuel pressure from fuel line. Refer to <u>EC-153, "Work Procedure"</u>. Remove the fuel feed hose on the fuel level sensor unit. Refer to <u>FL-5, "Removal and Installation"</u>. Connect a spare fuel hose where the fuel feed hose was removed. 	Ρ

- I urn ignition switch ON. Э.
- 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.
- Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal). 8.
- Confirm that the fuel gauge indication varies. 9.

Is the inspection result normal?

Revision: 2010 May

EC-353

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INFOID:00000006288330

P0461 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

YES >> INSPECTION END NO >> Proceed to <u>EC-354, "Diagnosis Procedure"</u>.

Diagnosis Procedure

INFOID:000000006288332

1. CHECK DTC WITH "COMBINATION METER"

Refer to MWI-30, "CONSULT-III Function".

Is any DTC detected?

YES >> Perform trouble diagnosis of detected DTC.

NO >> GO TO 2.

2. CHECK FUEL LEVEL SENSOR SIGNAL CIRCUIT

Check fuel level sensor signal circuit. Refer to <u>MWI-69, "Component Function Check"</u>.

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-40. "Intermittent Incident".
- NO >> Perform trouble diagnosis of fuel level sensor signal circuit. Refer to <u>MWI-69</u>, <u>"Diagnosis Procedure"</u>.

< DTC/CIRCUIT DIAGNOSIS >

P0462, P0463 FUEL LEVEL SENSOR

DTC Logic

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 <u>EC-378, "DTC Logic"</u>.

This diagnosis indicates the former, to detect open or short circuit malfunction.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause			
P0462	FUEL LEVL SEN/CIRC (Fuel level sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	 Harness or connectors (The CAN communication line is open or shorted) Harness or connectors 			
P0463	FUEL LEVL SEN/CIRC (Fuel level sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	(The sensor circuit is open or shorted)Combination meterFuel level sensor			
DTC CON	DTC CONFIRMATION PROCEDURE G					
1.PRECO	NDITIONING					
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is 11 V or more at ignition switch ON. 						
>> GO TO 2.						
2. PERFORM DTC CONFIRMATION PROCEDURE						
 Turn ignition switch ON and wait at least 5 seconds. Check 1st trip DTC. 						
	DTC detected?					
YES >> Proceed to <u>EC-355, "Diagnosis Procedure"</u> .						
Diagnosis Procedure						
1.CHECK DTC WITH "COMBINATION METER"						
Refer to MWI-30, "CONSULT-III Function".						
Is any DTC detected?						
YES >> Perform trouble diagnosis of detected DTC. NO >> GO TO 2.						
2.CHECK FUEL LEVEL SENSOR SIGNAL CIRCUIT						
Check fuel level sensor signal circuit. Refer to <u>MWI-69</u> . "Component Function Check". Is the inspection result normal?						
 YES >> Check intermittent incident. Refer to <u>GI-40, "Intermittent Incident"</u>. NO >> Perform trouble diagnosis of fuel level sensor signal circuit. Refer to <u>MWI-69</u>, <u>"Diagnosis Procedure"</u>. 						

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< DTC/CIRCUIT DIAGNOSIS > P0500 VSS

Description

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:000000006217858

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 <u>EC-378, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0500	VEH SPEED SEN/CIRC (Vehicle speed sensor)	The vehicle speed signal sent to ECM is almost 0 km/h (0 MPH) 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) Wheel sensor Combination meter ABS actuator and electric unit (control unit)

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

- 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-III be used?

YES >> GO TO 2.

2.CHECK VEHICLE SPEED SIGNAL

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.

(I) WITH CONSULT-III

- 1. Start engine (VDC switch OFF).
- 2. Read "VHCL SPEED SE" in "DATA MONITOR" mode with CONSULT-III.

The vehicle speed on CONSULT-III should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Go to EC-357, "Diagnosis Procedure".

3. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Select "DATA MONITOR" mode with CONSULT-III.
- 2. Warm engine 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	More than 1,500 rpm
COOLAN TEMP/S	More than 70°C (158°F)

INFOID:00000006217857

P0500 VSS

< DTC/CIRCUIT DIAGNOSIS >

< DTC/CIRCUIT	DIAGNOSIS >		
B/FUEL SCHDL	5.5 - 31.8 msec		
Selector lever	Except P or N position		А
PW/ST SIGNAL	OFF		
4. Check 1st tr	ip DTC.		EC
<u>Is 1st trip DTC d</u>	etected?		
NO >> INSI	to <u>EC-357, "Diagnosis Proc</u> PECTION END		С
4. PERFORM C	OMPONENT FUNCTION	CHECK	
Use Component	nent Function Check. Refe Function Check to check DTC might not be confirme	r to <u>EC-357, "Component Function Check"</u> . the overall function of the vehicle speed signal circuit. During this ed.	D
Is the inspection	-		E
	PECTION END		
NO >> Go t	to <u>EC-357, "Diagnosis Proc</u>	cedure".	F
Component F	Function Check	INFOID:000000006217859	1
1.PERFORM C	OMPONENT FUNCTION	СНЕСК	G
	e speed signal in Service \$ speed signal on GST sho	001 with GST. uld be able to exceed 10 km/h (6 MPH) when rotating wheels with	Н
Is the inspection	•		
	PECTION END		
	o <u>EC-357. "Diagnosis Proc</u>	cedure".	J
Diagnosis Pr	ocedure	INF0ID:00000006217860	0
		AND ELECTRIC UNIT (CONTROL UNIT)"	K
Refer to <u>BRC-40</u> <u>Is the inspection</u> YES >> GO			L
	air or replace malfunctionir	ng part.	
	WITH "COMBINATION MI		
	, "CONSULT-III Function".		M
>> INSI	PECTION END		Ν
			0

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< DTC/CIRCUIT DIAGNOSIS >

P0506 ISC SYSTEM

Description

INFOID:000000006217861

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 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:000000006217862

DTC DETECTION LOGIC

NOTE:

If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name (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 actuatorIntake air leakage	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

If the target idle speed is out of the specified value, perform <u>EC-148, "Work Procedure"</u>, before conducting DTC Confirmation Procedure.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.
- Always perform 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. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Restart engine and run it for at least 1 minute at idle speed.
- 6. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-358, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK INTAKE AIR LEAKAGE

- 1. Start engine and let it idle.
- 2. Listen for an intake air leakage after the mass air flow sensor.

Is intake air leakage detected?

YES >> Discover air leakage location and repair.

Revision: 2010 May

EC-358

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INFOID:000000006217863

[VK56VD]

- F	P0506 ISC SYSTEM	[VK56VD]	
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1.	Stop engine. Replace ECM.		EC
	>> INSPECTION END		С
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< DTC/CIRCUIT DIAGNOSIS >

P0507 ISC SYSTEM

Description

INFOID:000000006217864

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 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:000000006217865

DTC DETECTION LOGIC **NOTE**:

If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name (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 actuatorIntake air leakagePCV system

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- If the target idle speed is out of the specified value, perform <u>EC-148, "Work Procedure"</u>, before conducting DTC Confirmation Procedure.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.
- Always perform 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. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and run it for at least 1 minute at idle speed.
- 6. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-360, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

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 malfunctioning part.

INFOID:000000006217866

[VK56VD]

P0507 ISC SYSTEM

	[VK56VD]	
		А
nsor.		
		EC

2.CHECK INTAKE AIR LEAKAGE

< DTC/CIRCUIT DIAGNOSIS >

 Start engine and let it idle.
 Listen for an intake air leakage after the mass air flow sensor.
 Is intake air leakage detected?
 YES >> Discover air leakage location and repair. NO >> GO TO 3.
 REPLACE ECM
 Stop engine.
 Replace ECM.
 Perform additional service when replacing ECM. Refer to EC-143, "Work Procedure".

>> INSPECTION END

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< DTC/CIRCUIT DIAGNOSIS >

P050E COLD START CONTROL

Description

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

NOTE:

INFOID:000000006288337

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DTC DETECTION LOGIC

If DTC P050E is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P050E	Cold start engine exhaust temper- ature 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.	Lack of intake air volumeFuel injection systemECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

WITH CONSULT-III

- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Select "DATA MONITOR" mode with CONSULT-III.
- 4. Check the indication of "COOLAN TEMP/S".

WITH GST

Follow the procedure "With CONSULT-III" above.

Is the value of "COOLAN TEMP/S" between 5°C (41°F) and 36°C (97°F)?

- YES >> GO TO 3.
- NO-1 [If it is below 5°C (41°F)]>>Warm up the engine until the value of "COOLAN TEMP/S" reaches 5°C (41°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-III

- 1. Set the select lever in N range.
- Start the engine and warm up in idle with the value of "COOLAN TEMP/S" between 5°C (41°F) and 40°C (104°F) for more than 15 seconds.
- 3. Check 1st trip DTC.

WITH GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

- YES >> Proceed to EC-362, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.PERFORM IDLE AIR VOLUME LEARNING

INFOID:000000006288338

P050E COLD START CONTROL

P050E COLD START CONTROL		
< DTC/CIRCUIT DIAGNOSIS >	[VK56VD]	
Perform <u>EC-148, "Work Procedure"</u> .		
Is Idle Air Volume Learning carried out successfully?		А
YES >> GO TO 2. NO >> Follow the instruction of Idle Air Volume Learning.		
2.CHECK INTAKE SYSTEM		EC
 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 		С
Is the inspection result normal?		
YES >> GO TO 3. NO >> Repair or replace malfunctioning part		D
3. CHECK FUEL INJECTION SYSTEM FUNCTION		_
Perform DTC Confirmation Procedure for DTC P0171, P0174. Refer to EC-263, "DTC Logic".		E
Is the inspection result normal? YES >> GO TO 4.		F
NO >> Proceed to <u>EC-264, "Diagnosis Procedure"</u> for DTC P0171, P0174. 4.PERFORM DTC CONFIRMATION PROCEDURE		
		G
 Turn ignition switch ON. Erase DTC. Perform DTC Confirmation Procedure. See <u>EC-362</u>, "<u>DTC Logic</u>". 		Н
Is the 1st trip DTC P050E displayed again?		
YES >> GO TO 5. NO >> INSPECTION END		
5.REPLACE ECM		
Replace ECM. Refer to EC-535, "Removal and Installation".		J
>> INSPECTION END		K
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P0524 ENGINE OIL PRESSURE

< DTC/CIRCUIT DIAGNOSIS >

P0524 ENGINE OIL PRESSURE

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0524 is displayed with DTC P0075 or P0081, perform trouble diagnosis for DTC P0075 or P0081 first. Refer to <u>EC-193, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	Detecting condition	Possible cause
P0524	ENGINE OIL PRESSURE (Engine oil pressure too low)	Engine oil pressure is low because there is a gap between angle of target and phase-control angle.	 Engine oil pressure or level too low 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-I

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. PRECONDITIONING-II

Check oil level and oil pressure. Refer to <u>LU-7. "Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Proceed to <u>LU-7, "Inspection"</u>.

3. PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT-III

1. Select "DATA MONITOR" mode with CONSULT-III.

2. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	More than 1,700 rpm
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-III" above.
Is 1st trip DTC detected?

YES >> Proceed to EC-365, "Diagnosis Procedure"

< DTC/CIRCUIT DIAGNOSIS >	[VK56VD]
NO >> INSPECTION END	
Diagnosis Procedure	A INFOID:000000006288343
1. CHECK OIL PRESSURE WARNING LAMP	EC
 Start engine. Check oil pressure warning lamp and confirm it is not illumi- 	
nated. <u>Is oil pressure warning lamp illuminated?</u>	· · ·
YES >> Proceed to <u>LU-7, "Inspection"</u> . NO >> GO TO 2.	
2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE	PBIA8559J
Refer to EC-179, "Component Inspection (Intake Valve Timing Control Solenoid Valve)".	
Is the inspection result normal? YES >> GO TO 3.	G
NO >> Replace malfunctioning intake valve timing control solenoid valve.	
3. CHECK CRANKSHAFT POSITION SENSOR	Н
Refer to EC-301, "Component Inspection (Crankshaft Position Sensor)".	
Is the inspection result normal?	1
YES >> GO TO 4. NO >> Replace crankshaft position sensor.	I
4. CHECK CAMSHAFT POSITION SENSOR	
Refer to EC-306, "Component Inspection (Camshaft Position Sensor)".	J
Is the inspection result normal?	
YES >> GO TO 5. NO >> Replace malfunctioning camshaft position sensor.	K
5. CHECK CAMSHAFT SPROCKET (SIGNAL PLATE)	
Check the following.	L
Accumulation of debris to the signal plate of camshaft sprocket (INT)	
Chipping signal plate of camshaft sprocket (INT)	M
Is the inspection result normal? YES >> GO TO 6.	3
NO >> Remove debris and clean the signal plate of camshaft sprocket (INT) or replace camshaft sprocket (INT).	N
Refer to <u>EM-61, "Exploded View"</u> .	JMBIA0962ZZ
6. CHECK TIMING CHAIN INSTALLATION	
Check service records for any recent repairs that may cause timing chain misaligned.	Ρ
Are there any service records that may cause timing chain misaligned?	
YES >> Check timing chain installation. Refer to <u>EM-61, "Exploded View"</u> . NO >> GO TO 7.	
7. CHECK LUBRICATION CIRCUIT	

P0524 ENGINE OIL PRESSURE

Perform "Inspection of Camshaft Sprocket (INT) Oil Groove". Refer to LU-7, "Inspection".

EC-365

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 8.

NO >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

P0527 COOLING FAN SPEED SENSOR

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DT	C detecting condition	Possible cause
P0527	Cooling fan speed sen- sor circuit range/perfor- mance	The number of less during eng	fan speed signals is 16 rpm or gine rev.	 Harness or connectors (The Fuel rail pressure sensor circuit is open or shorted.) (The Power steering pressure sensor cir- cuit is open or shorted) (The Electrically-controlled cooling fan coupling circuit is open or shorted) Fuel rail pressure sensor Power steering pressure sensor Cooling fan speed sensor Electrically-controlled cooling fan cou- pling Cooling fan IPDM E/R
OTC CON	FIRMATION PROC	EDURE		
1.PRECO	NDITIONING			
1. Turn ig	nition switch OFF and	d wait at least	10 seconds.	
	nition switch ON. nition switch OFF and	d wait at least	10 seconds.	
	CONDITION:			
Before per	forming the followin	ig procedure	, confirm that battery vo	Itage is 11 V or more at idle.
	-	ig procedure	, confirm that battery vo	ltage is 11 V or more at idle.
>>	GO TO 2.		· · ·	ltage is 11 V or more at idle.
>> 2.perfor	GO TO 2.	TION PROCE	· · ·	Itage is 11 V or more at idle.
>> 2.PERFOR 1. Start er 2. Keep th	GO TO 2. RM DTC CONFIRMA ngine and warm it up ne engine speed appr	TION PROCE	DURE operating temperature.	Itage is 11 V or more at idle.
>> 2.PERFOF 1. Start er 2. Keep th 3. Check	GO TO 2. RM DTC CONFIRMA ngine and warm it up ne engine speed appr 1st trip DTC.	TION PROCE	DURE operating temperature.	Itage is 11 V or more at idle.
>> 2.PERFOR 1. Start er 2. Keep th 3. Check s 1st trip D	GO TO 2. RM DTC CONFIRMA ngine and warm it up ne engine speed appr 1st trip DTC. TC detected?	TION PROCE to the normal oximately 1,0	DURE operating temperature. 00 rpm at no load.	Itage is 11 V or more at idle.
>> 2.PERFOR 1. Start er 2. Keep th 3. Check <u>s 1st trip D</u> YES >>	GO TO 2. RM DTC CONFIRMA ngine and warm it up ne engine speed appr 1st trip DTC.	TION PROCE to the normal oximately 1,0	DURE operating temperature. 00 rpm at no load.	Itage is 11 V or more at idle.
>> 2.PERFOR 1. Start er 2. Keep tr 3. Check s 1st trip D YES >> NO >>	GO TO 2. RM DTC CONFIRMA ngine and warm it up ne engine speed appr 1st trip DTC. <u>TC detected?</u> Proceed to <u>EC-367</u> ,	TION PROCE to the normal oximately 1,0	DURE operating temperature. 00 rpm at no load.	Itage is 11 V or more at idle.
>> 2.PERFOF 1. Start er 2. Keep th 3. Check (s 1st trip D YES >> NO >> Diagnosis	GO TO 2. RM DTC CONFIRMATions and warm it up to re engine speed apprend the engine speed apprend to the engine speed apprend to the engine speed to the engines speed to the engine speed to the engine speed to the engine spee	TION PROCE to the normal oximately 1,0	DURE operating temperature. 00 rpm at no load.	
>> 2.PERFOR 1. Start er 2. Keep th 3. Check <u>s 1st trip D</u> YES >> NO >> Diagnosis 1.CHECK	GO TO 2. RM DTC CONFIRMATingine and warm it up the engine speed approved approved to <u>TC detected?</u> Proceed to <u>EC-367,</u> NSPECTION END S Procedure COOLING FAN SPEE	TION PROCE to the normal oximately 1,0	DURE operating temperature. 00 rpm at no load.	
>> 2.PERFOF 1. Start er 2. Keep th 3. Check s 1st trip D YES >> NO >> Diagnosis 1.CHECK 1. Turn ig	GO TO 2. RM DTC CONFIRMAT ngine and warm it up to ne engine speed apprend 1st trip DTC. <u>TC detected?</u> Proceed to <u>EC-367,</u> INSPECTION END S Procedure COOLING FAN SPEE nition switch OFF.	TION PROCE to the normal oximately 1,0 "Diagnosis Pi ED SENSOR	DURE operating temperature. 00 rpm at no load.	INFOID:00000006217868
>> 2.PERFOR 1. Start er 2. Keep th 3. Check 1. Stattrip D YES NO 2. Diagnosis 1.CHECK 1. Turn ig 2. Discon 3. Turn ig	GO TO 2. RM DTC CONFIRMATion regine and warm it up the engine speed apprend 1st trip DTC. <u>TC detected?</u> Proceed to <u>EC-367.</u> INSPECTION END S Procedure COOLING FAN SPEE nition switch OFF. nect electrically-contra- nition switch ON.	TION PROCE to the normal oximately 1,0 "Diagnosis Pr ED SENSOR	DURE operating temperature. 00 rpm at no load. rocedure". POWER SUPPLY CIRCU	IT-I ector.
>> 2.PERFOR 1. Start er 2. Keep th 3. Check 1. Stattrip D YES NO 2. Diagnosis 1.CHECK 1. Turn ig 2. Discon 3. Turn ig	GO TO 2. RM DTC CONFIRMATion regine and warm it up the engine speed apprend 1st trip DTC. <u>TC detected?</u> Proceed to <u>EC-367.</u> INSPECTION END S Procedure COOLING FAN SPEE nition switch OFF. nect electrically-contra- nition switch ON.	TION PROCE to the normal oximately 1,0 "Diagnosis Pr ED SENSOR	DURE operating temperature. 00 rpm at no load. rocedure". POWER SUPPLY CIRCU	INFOID:00000006217868
>> 2.PERFOF 1. Start er 2. Keep th 3. Check s 1st trip D YES >> NO >> Diagnosis 1.CHECK 1. Turn ig 2. Discont 3. Turn ig 4. Check	GO TO 2. RM DTC CONFIRMATions and warm it up to the engine speed apprend to the engine speed apprend to the engine speed apprend to the engine speed to the engines	TION PROCE to the normal oximately 1,0 "Diagnosis Pr ED SENSOR olled cooling f electrically-co	DURE operating temperature. 00 rpm at no load. rocedure". POWER SUPPLY CIRCU	IT-I ector.
>> 2.PERFOP 1. Start er 2. Keep th 3. Check 3. Check 3. 1st trip D YES >> NO >> Diagnosis 1.CHECK 1. Turn ig 2. Discon 3. Turn ig 4. Check	GO TO 2. RM DTC CONFIRMAT Ingine and warm it up the engine speed apprent 1st trip DTC. <u>TC detected?</u> Proceed to <u>EC-367.</u> INSPECTION END S Procedure COOLING FAN SPEE nition switch OFF. nect electrically-control nition switch ON. the voltage between end cally-controlled cooling far	TION PROCE to the normal oximately 1,0 "Diagnosis Pr ED SENSOR olled cooling f electrically-co	DURE operating temperature. 00 rpm at no load. rocedure". POWER SUPPLY CIRCU fan coupling harness conn ntrolled cooling fan couplin	IT-I ector.
>> 2.PERFOF 1. Start er 2. Keep th 3. Check Is 1st trip D YES >> NO >> Diagnosis 1.CHECK 1. Turn ig 2. Discont 3. Turn ig 4. Check	GO TO 2. RM DTC CONFIRMAT Ingine and warm it up the engine speed apprent 1st trip DTC. <u>TC detected?</u> Proceed to <u>EC-367.</u> INSPECTION END S Procedure COOLING FAN SPEE nition switch OFF. nect electrically-control nition switch ON. the voltage between en- cally-controlled cooling far +	TION PROCE to the normal oximately 1,0 "Diagnosis Pr ED SENSOR olled cooling to electrically-co	DURE operating temperature. 00 rpm at no load. rocedure". POWER SUPPLY CIRCU fan coupling harness conn ntrolled cooling fan couplin	IT-I ector.

Is inspection result normal?

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

А INFOID:000000006217867

EC

< DTC/CIRCUIT DIAGNOSIS >

2.CHECK COOLING FAN SPEED SENSOR POWER SUPPLY CIRCUIT-II

1. Check the voltage between electrically-controlled cooling fan coupling harness connector and the ground.

	+		
Electrically-controlled	_	Voltage (Approx.)	
Connector	terminal		
F39	2	Ground	5 V

Is inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

 ${
m 3.}$ CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check harness connector for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
		Low fuel pressure sensor	F25	3
F111	27	Power steering pressure sensor	F35	1
1 111		Cooling fan speed sensor	F39	2
	28	FRP sensor	F26	1

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to EC-168, "Diagnosis Procedure".

NO >> Repair or replace error-detected parts.

4.CHECK COOLING FAN SPEED SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between electrically-controlled cooling fan coupling harness connector and ECM harness connector.

	_			
•	Electrically-controlled cooling fan coupling		М	Continuity
Connector	Connector Terminal		Connector Terminal	
F39	4	F111	45	Existed

Is inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

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

P0527 COOLING FAN SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

	+									
	CM	_	0	Continuity						
Connector	Terminal									
F111	10									
F 90	174	Ground		Existed						
E80	175									
Is inspection re-	sult normal?				1					
	pair or replace	error-detected	parts.		mittent Incident".					
 Turn ignitio Disconnect 	n switch OFF. ECM harness continuity betwe	connector.				ss connector and ECM har-				
	+	_			ı					
	rolled cooling fan pling	ECM	Continuity		Continuity		Continuity		Continuity	
Connector	Terminal	Connector Te	erminal		_					
F39	5	F111	37	Existed						
7. СНЕСК СО	pair or replace	EED SENSO	R							
2. Perform co	oling fan speed <u>eed Sensor)"</u> .				Refer to EC-369, "Co	omponent Inspection (Cool-				
YES >> GC										
	place electrical	y-controlled c	ooling	fan couplir	ıg.					
8.CHECK CO	OLING FAN RC	TATIONAL C	ONDIT	TION						
Rotate the cool	ing fan by hand									
Dose the coolin	•	moothly?								
YES >> GO		ling fon in not	interf	arad with -	thar parts					
•	eck that the coo CTRICALLY-C	-			itner parts. COUPLING SYSTEN	1				
Refer to EC-49	5, "Diagnosis P	rocedure".								
Is inspection rea	sult normal?									
	eck intermittent pair or replace				mittent Incident".					
Component	Inspection (Cooling Fa	in Sp	eed Ser	isor)	INFOID:00000006217869				
1. СНЕСК СО	OLING FAN SP	EED SENSO	R							

1. Turn ignition switch OFF.

2.

Disconnect electrically-controlled cooling fan coupling harness connector. Rotate the electrically-controlled cooling fan coupling slowly with hand and check the voltage between 3. electrically-controlled cooling fan coupling connector terminals under the following conditions.

P0527 COOLING FAN SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

	- /-controlled n coupling	Condition	Voltage (V) (Approx.)	
Terr	ninal	*		
5	4	 5V direct current supply to terminal 2 Terminal 4 connect to ground	0 ⇔ 5 NOTE: The voltage is in waveform	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Electrically-controlled cooling fan coupling.

P0550 PSP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0550 PSP SENSOR

DTC Logic

А

INFOID:000000006217870

[VK56VD]

EC

DTC DETECTION LOGIC

Trouble diagnosis name

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	C	TC detecting condition	Possible cause
P0550	PW ST P SEN/CIRC (Power steering pressure sensor circuit)		vely low or high voltage from the ent to ECM.	 Harness or connectors (The Fuel rail pressure sensor circuit is open or shorted.) (The Power steering pressure sensor cir- cuit is open or shorted) (The Electrically-controlled cooling fan coupling circuit is open or shorted) Fuel rail pressure sensor Power steering pressure sensor Electrically-controlled cooling fan cou- pling
	FIRMATION PROCED	URE		
1. PRECO	NDITIONING			
	nition switch OFF and w	ait at least	10 seconds.	
	nition switch ON. nition switch OFF and w	ait at least	10 seconds.	
-				
~	GO TO 2.			
	RM DTC CONFIRMATIC			
	ngine and let it idle for at 1st trip DTC.	least 5 se	conds.	
	TC detected?			
YES >> NO >>	Go to <u>EC-371, "Diagno</u> INSPECTION END	<u>sis Proced</u>	<u>ure"</u> .	
Diagnosi	s Procedure			INFO/D:00000006217871
		RESSURE	SENSOR POWER SUPPL	Y CIRCUIT-I
	nition switch OFF.			
2. Discon	nect power steering pres	ssure (PSF) sensor harness connecto	or.
	nition switch ON. the voltage between PS	P sensor h	arness connector terminals	5.
	PSP sensor		Voltage	
Connecto	or + terminal	_	(Approx.)	
F35	1	3	5 V	
Is the inspe	ection result normal?			
-	• GO TO 6. • GO TO 2.			
•		RESSURE	SENSOR POWER SUPPL	Y CIRCUIT-II
			arnoss connector and the	

1. Check the voltage between PSP sensor harness connector and the ground.

P0550 PSP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

	+			
PSP s	sensor	-	Voltage (Approx.)	
Connector	terminal			
F35	1	Ground	5 V	

Is inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check harness connector for short to power and short to ground, between the following terminals.

EC	CM	Sen	sor	
Connector	Terminal	Name	Connector	Terminal
		Low fuel pressure sensor	F25	3
F111	27	Power steering pressure sensor	F35	1
ГШ		Cooling fan speed sensor	F39	2
	28	FRP sensor	F26	1

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to EC-168, "Diagnosis Procedure".

NO >> Repair or replace error-detected parts.

4.CHECK PSP SENSOR GROUND CIRCUIT

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

	+			
PSP	PSP sensor		ECM	
Connector	Terminal	Connector	Terminal	
F35	3	F111	45	Existed

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

Is the inspection result normal?

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

5. CHECK ECM GROUND CIRCUIT

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

	+		
E	CM	-	Continuity
Connector	Terminal	1	
F111	10		
E80	174	Ground	Existed
EOU	175		

Is inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-40, "Intermittent Incident"</u>.

EC-372

P0550 PSP SENSOR

< DTC/CIF	RCUIT DI	AGNOSI	S >					[VK56VD]
~	> Repair of the second seco	•			•			
6. CHECK	PSP SEI	NSOR SI	GNAL CI	RCUIT				
1. Turn iç	nition sw	itch OFF.						
	nect ECN							
3. Check	the contil	nuity betw	veen PSF	- senso	or harness con	nector and EC	CM harness cor	inector.
DOI	+ P sensor		-		Continuitu			
			ECN nnector	Termin	Continuity			
Connector								
F35	2		F111	39	Existed	_		
			-	ound a	nd to power.			
<u>s the inspe</u> YES >:	<u>> GO TO</u>		<u>al :</u>					
	> GO TO > Repair o		error-de	tected	parts.			
CHECK	•	•						
			t loop oot	ion (Do	war Stearing F			
the inspe					wer Steering F	ressure Sens	<u>ior)</u> .	
	> GO TO		<u>al :</u>					
		PSP ser	nsor.					
NO >:	> Replace			т				
NO >: B.CHECK	> Replace INTERM	ITTENT	INCIDEN	Т				
NO >: B.CHECK	> Replace INTERM	ITTENT	INCIDEN	т				
NO >: CHECK Refer to <u>G</u>	> Replace INTERM -40, "Inte	ITTENT	INCIDEN ncident".	T				
NO >: S.CHECK Refer to <u>G</u> >:	> Replace INTERM -40, "Inte > INSPEC	ITTENT I rmittent I CTION EN	INCIDEN <u>ncident"</u> . ID					
NO >: CHECK refer to <u>G</u> >:	> Replace INTERM -40, "Inte > INSPEC	ITTENT I rmittent I CTION EN	INCIDEN <u>ncident"</u> . ID		ering Pressu	ure Sensor)	INFOID:000000006217872
NO >: CHECK efer to G >: Compon	 Replace INTERM -40, "Inte INSPEC ent Insp 	ITTENT I rmittent I CTION EN Dection	INCIDEN ncident". ND (Powe	r Stee	•	ure Sensor)	INFOID:00000006217872
NO >: CHECK efer to G >: Compon .CHECK	 Replace INTERM -40, "Inte INSPEC ent Insp POWER 	ITTENT I rmittent I CTION EN Dection STEERI	INCIDEN ncident". ID (Powe NG PRES	r Stee	ering Pressu	ure Sensor)	INFOID:000000006217872
NO >: CHECK efer to G >: CMECK . Turn ig	 Replace INTERM -40. "Inte INSPEC ent Insp POWER pnition sw 	ITTENT I rmittent I CTION EN Dection STEERII	INCIDEN ncident". ID (Powe NG PRES	r Stee SSURE	SENSOR	ure Sensor)	INFOID:000000006217872
NO >: CHECK efer to G >: COMPON .CHECK . Turn iç . Recon . Start e	 Replace INTERM -40, "Inte INSPEC ent Insp POWER mition sw nect all hangine and 	ITTENT I rmittent I CTION EN Dection STEERII itch OFF. arness co d let it idle	INCIDEN ncident". ND (Powe NG PRES onnectors	r Stee SSURE discon	SENSOR			
NO >: CHECK efer to G >: OMPON .CHECK Turn iç Recon Start e	 Replace INTERM -40, "Inte INSPEC ent Insp POWER mition sw nect all hangine and 	ITTENT I rmittent I CTION EN Dection STEERII itch OFF. arness co d let it idle	INCIDEN ncident". ND (Powe NG PRES onnectors	r Stee SSURE discon	SENSOR) the following co	
NO >: CHECK efer to G >: COMPON .CHECK . Turn iç . Recon . Start e	 Replace INTERM -40. "Inte INSPEC ent Insp POWER pnition sw nect all hangine and the voltage 	ITTENT I rmittent I CTION EN Dection STEERII itch OFF. arness co d let it idle	INCIDEN ncident". ND (Powe NG PRES onnectors	r Stee SSURE discon	SENSOR			
NO >: CHECK efer to G >: COMPON .CHECK . Turn iç . Recon . Start e	 Replace INTERM -40, "Inte INSPEC ent Insp POWER notion sw nect all hangine and the voltage ECM 	ITTENT I rmittent I CTION EN Dection STEERII itch OFF. arness co d let it idle	INCIDEN ncident". ND (Powe NG PRES onnectors	r Stee SSURE discon	SENSOR	minals under		
NO >: CHECK refer to G >: COMPON .CHECK . Turn ig . Recon . Start e . Check	Replace INTERM -40, "Inte INSPEC ent Insp POWER nect all hangine and the voltage ECM +	ITTENT I rmittent I CTION EN Dection STEERII itch OFF. arness cc d let it idle ge betwe	INCIDEN ncident". ND (Powe NG PRES onnectors	r Stee SSURE discon	SENSOR			
NO >: CHECK Refer to G >: COMPON .CHECK . Turn ig . Recon . Start e . Check	 Replace INTERM -40, "Inte INSPEC ent Insp POWER notion sw nect all hangine and the voltage ECM 	ITTENT I rmittent I CTION EN Dection STEERII itch OFF. arness co d let it idle	INCIDEN ncident". ND (Powe NG PRES onnectors	r Stee SSURE discon harness Cond	SENSOR Inected. Inected.	minals under Voltage (V)		
NO >: CHECK Refer to G >: COMPON .CHECK . Turn ig . Recon . Start e . Check	Replace INTERM -40, "Inte INSPEC ent Insp POWER nect all hangine and the voltage ECM +	ITTENT I rmittent I CTION EN Dection STEERII itch OFF. arness cc d let it idle ge betwe	INCIDEN ncident". ND (Powe NG PRES onnectors	r Stee SSURE discon harness Cond	E SENSOR Innected. Is connector ter lition	Woltage (V)		
NO >: CHECK efer to G >: COMPON CHECK CHECK Connector F111	Replace INTERM -40, "Inte -40,	ITTENT I rmittent I CTION EN Dection STEERII itch OFF. arness co d let it idle ge betwe - Terminal 45	INCIDEN ncident". ND (Powe NG PRES onnectors en ECM I Steering v	r Stee SSURE discon harness Cond	SENSOR Inected. Inected.	minals under Voltage (V)		
NO >: CHECK Refer to G >: Compon •CHECK • Turn ig • Recon • Start e • Check Connector • F111	 Replace INTERM -40, "Inte INSPEC ent Insp POWER met all hangine and the voltage ECM + Terminal 39 action res 	ITTENT I rmittent I CTION EN Dection STEERII itch OFF. arness cc d let it idle ge betwe 	INCIDEN ncident". ND (Powe NG PRES onnectors en ECM I Steering v	r Stee SSURE discon harness Cond	E SENSOR Innected. Is connector ter lition	Woltage (V)		
NO >: CHECK Refer to G >: Compon COMPON	 Replace INTERM -40, "Inte INSPEC ent Insp POWER mition sw nect all hangine and the voltage ECM + Terminal 39 Ection ress INSPEC 	ITTENT I rmittent I CTION EN Dection STEERII itch OFF. arness cc d let it idle ge betwe 	INCIDEN ncident". ND (Powe NG PRES onnectors en ECM I Steering v Al?	r Stee SSURE discon harness Cond	E SENSOR Inected. Is connector ter lition Being turned Not being turned	Woltage (V)		
NO >: CHECK Refer to G Sefer to G Sefe	 Replace INTERM -40, "Inte INSPEC ent Insp POWER met all hangine and the voltage ECM + Terminal 39 action res 	ITTENT I rmittent I CTION EN Dection STEERII itch OFF. arness cc d let it idle ge betwe 	INCIDEN ncident". ND (Powe NG PRES onnectors en ECM I Steering v Al?	r Stee SSURE discon harness Cond	E SENSOR Inected. Is connector ter lition Being turned Not being turned	Woltage (V)		

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P0603 ECM POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

P0603 ECM POWER SUPPLY

DTC Logic

INFOID:000000006217873

[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (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

- 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-374, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK ECM POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the voltage between ECM harness connector terminals.

-		E	ECM				
		+		-	Voltage		
	Connector	Terminal	Connector	Terminal			
-	E80	156	E80	175	Battery voltage		

Is the inspection result normal?

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

 $\sim 20002.$

2. DETECT MALFUNCTIONING PART

Check the following.

- 20 A fuse (No. 43)
- Harness for open or short between ECM and battery
- · Loose or poor connection for each connector and harness
 - >> Repair or replace harness or connectors.

3.CHECK INTERMITTENT INCIDENT

INFOID:000000006217874

P0603 ECM POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >	[VK56VD]		
Refer to GI-40, "Intermittent Incident".			
Is the inspection result normal?	A	L	
YES >> GO TO 4. NO >> Repair or replace harness or connectors.	EC		
4.PERFORM DTC CONFIRMATION PROCEDURE		,	
 Turn ignition switch ON. Erase DTC. Perform DTC Confirmation Procedure. 	C	1. 1	
See <u>EC-374, "DTC Logic"</u> .			
Is the 1st trip DTC P0603 displayed again?	D)	
YES >> GO TO 5. NO >> INSPECTION END		,	
5.REPLACE ECM			
	E		
Replace ECM.			
>> INSPECTION END	F	7	
	G	ļ	
	Н		
	1		
	I		
	J		
	K	r	
	L		
	M	1	
	Ν	1	
	1.4	1	
	0)	
	P)	

< DTC/CIRCUIT DIAGNOSIS > P0605 ECM

DTC Logic

INFOID:000000006217875

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
		A)	ECM calculation function is malfunctioning.	
P0605	Engine control module	B)	ECM EEP-ROM system is malfunctioning.	ECM
F0003		C)	ECM self shut-off function is malfunctioning.	ECIVI
		D)	ECM temperature sensor is malfunctioning.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND D

1. Turn ignition switch ON.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-376, "Diagnosis Procedure".
- NO >> GO TO 3.

$\mathbf{3}$. 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 it ON.
- 3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-376, "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 it ON.
- 3. Repeat step 2 for 32 times.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-376, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.INSPECTION START

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- Perform DTC Confirmation Procedure. See <u>EC-376. "DTC Logic"</u>.

Is the 1st trip DTC P0605 displayed again?

YES >> GO TO 2.

INFOID:000000006217876

P0605 ECM				
< DTC/CIRCUIT DIAGNOSIS >	[VK56VD]			
NO >> INSPECTION END				
2.REPLACE ECM		А		
Replace ECM. Refer to EC-535, "Removal and Installation".				
>> INSPECTION END		EC		
		С		
		D		
		Е		
		F		
		G		
		Н		
		I		
		J		
		K		
		L		
		Μ		
		Ν		
		0		

Ρ

< DTC/CIRCUIT DIAGNOSIS > P0607 ECM

DTC Logic

INFOID:000000006217877

INFOID:000000006217878

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (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 >> Go to EC-378, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.INSPECTION START

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure. See <u>EC-378, "DTC Logic"</u>.
- 4. Check DTC.
- Is the DTC P0607 displayed again?
- YES >> Replace ECM. Refer to EC-535, "Removal and Installation".
- NO >> INSPECTION END

P0611 ECM PROTECTION

< DTC/CIRCUIT DIAGNOSIS >

P0611 ECM PROTECTION

Description

This DTC is detected when the ECM protective function is activated due to an extreme temperature increase in ECM, resulting from severe conditions such as heavy load driving.

DTC Logic

INFOID:000000006288345

INFOID:000000006288344

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0611	ECM PROTECTION	ECM overheat protection control is activated.	ECM overheated
DTC CON	FIRMATION PROCED	URE	
1.PERFO	RM DTC CONFIRMATIO	N PROCEDURE	
		function history. If no malfunction is det ation of the protection function.	ected after the diagnosis, the cus-
>>	Proceed to <u>EC-379</u> , "Dial	agnosis Procedure".	
Diagnosi	s Procedure		INFOID:00000006288346
1.INSPEC	TION START		
	n DTC confirmation proce 1st trip DTC.	edure. Refer to <u>EC-379, "DTC Logic"</u> .	
	605 detected?		
	Proceed to EC-376, "Dia Eventsian the events of the sector of the sec		(*
NO >>	> Explain the customer at	bout the activation of the protection func	tion.

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< DTC/CIRCUIT DIAGNOSIS > P062B ECM

Description

This DTC is detected when the ECM-integrated injector driver unit has a malfunction. For injector driver unit, refer to <u>EC-23</u>, "ECM".

DTC Logic

INFOID:000000006217880

INFOID:000000006217879

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P062B	Internal control module fuel injector control performance	Injector driver unit is malfunctioning.	 Harness and connectors (Injector circuit is open or shorted) Battery power supply ECM (injector driver unit)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start the engine and keep the engine speed at idle for 30 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-380, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK FUEL INJECTOR

Perform fuel injector. Refer to EC-498. "Component Function Check".

Is inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC cfirmation procedure again. Refer to <u>EC-380, "DTC Logic"</u>.
- 4. Check 1st trip DTC.

Is the DTC P062B displayed again?

- YES >> Replace ECM. Refer to EC-535, "Removal and Installation".
- NO >> INSPECTION END

INFOID:000000006217881

P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

P0643 SENSOR POWER SUPPLY

DTC Logic

INFOID:000000006217882

[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis nam (Trouble diagnosis conte		Possible cause
P0643	SENSOR POWER/CIRC (Sensor power supply circ short)	ECM detects that the voltage of power source for sensor is ex- cessively low or high.	 Harness or connectors (Accelerator pedal position sensor 1 circuit is shorted.) [Camshaft position sensor (bank 2) circuit is shorted.] [Manifold absolute pressure (MAP) sensor circuit is shorted.] (Throttle position sensor circuit is shorted.) Accelerator pedal position sensor 1 Camshaft position sensor (bank 2) Manifold absolute pressure (MAP) sensor Throttle position sensor
-	NFIRMATION PROC	CEDURE	
	ONDITIONING		
	ignition switch OFF ar ignition switch ON.	d wait at least 10 seconds.	
3. Turn i	ignition switch OFF ar	d wait at least 10 seconds.	
	CONDITION:	na procedure, confirm that	battery voltage is 8 V or more at idle.
Deloie pe		ng procedure, comminatiat	battery voltage is o v or more at fute.
>	>> GO TO 2.		
2.PERFO	ORM DTC CONFIRM	ATION PROCEDURE	
	engine and let it idle for	or 1 second.	
	k DTC.		
<u>Is DTC de</u> YES >	<u>stected?</u> > Go to <u>EC-381, "Dia</u>	aposis Procedure"	
	>> INSPECTION END		
Diagnos	sis Procedure		INFOID:00000006217883
		DAL POSITION SENSOR 1 I	
	nnect accelerator pec ignition switch ON.	al position (APP) sensor harn	ess connector.
		APP sensor harness connect	tor and ground.
0. Once			
	APP sensor	Ground Voltage (V)	
Conn	ector Terminal	Ground Voltage (V)	
Conn E110 (Wit	ector Terminal hout ICC) 2	Ground Voltage (V) Ground Approx. 5	
Conn E110 (Wit E67 (Wi	ectorTerminalhout ICC)2ith ICC)12	Ground Approx. 5	
Conn E110 (Wit E67 (Wi Is the insp	ectorTerminalhout ICC)2ith ICC)12pection result normal?	Ground Approx. 5	
Conn E110 (Wit E67 (Wi Is the insp YES >	ectorTerminalhout ICC)2ith ICC)12	Ground Approx. 5	

Check harness for short to power and short to ground, between the following terminals.

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P0643 SENSOR POWER SUPPLY

ECM		Sensor		
Connector	Terminal	Name	Terminal	
	81	Electric throttle control actuator	F66	2
F111	83	Camshaft position sensor (bank 2)	F83	1
	85	Manifold absolute pressure (MAP) sensor	F65	1
E80	137	APP sensor 1 (Without ICC)	E110	2
EOU	137	APP sensor 1 (With ICC)	E67	12

Is the inspection result normal?

YES >> GO TO 3.

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

3.CHECK COMPONENTS

Check the following.

Camshaft position sensor (bank 2) (Refer to EC-306, "Component Inspection (Camshaft Position Sensor)".)

Manifold absolute pressure (MAP) sensor (Refer to <u>EC-208. "Component Inspection (MAP Sensor)"</u>.)

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace malfunctioning component.

4.CHECK THROTTLE POSITION SENSOR

Refer to EC-220, "Component Inspection (Throttle Position Sensor)".

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 5.

5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-30, "Removal and Installation".

>> INSPECTION END

6.CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to EC-470. "Component Inspection (Accelerator Pedal Position Sensor)".

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

I.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to <u>ACC-3</u>, "MODELS WITHOUT DISTANCE CONTROL ASSIST <u>SYSTEM : Removal and Installation</u>" (Without distance control assist system) or <u>ACC-4</u>, "MODELS WITH <u>DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation</u>" (With distance control assist system).

>> INSPECTION END

8.CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

P0850 PNP SWITCH

Description

When the selector lever position is P or N, park/neutral position (PNP) signal is sent to ECM from TCM.

DTC Logic

INFOID:000000006217885

INFOID:000000006217884

DTC DETECTION LOGIC

	Trouble diagnosis nome		
DTC No.	Trouble diagnosis name (Trouble diagnosis content) DTC detecting condition	Possible cause
P0850	P-N POS SW/CIRCUIT (Park/neutral position switch)	The signal of the park/neutral position (PNP) signal does not change during driving after the engine is started.	 Harness or connectors [The park/neutral position (PNP) signal circuit is open or shorted.] TCM
DTC CON	IFIRMATION PROCE	DURE	
1.INSPEC	CTION START		
Will CONS	ULT-III be used?		
	ULT-III be used?		
	> GO TO 2. > GO TO 5.		
-	NDITIONING		
		wait at least 10 seconds.	
2. Turn ig	nition switch ON.		
3. Turn ig	nition switch OFF and	wait at least 10 seconds.	
	> GO TO 3.		
_	PNP SIGNAL		
	ONSULT-III		
1. Turn ig	nition switch ON.		
	"P/N POSI SW" in "DA der the following condit	A MONITOR" mode with CONSULT-III.	Then check the "P/N POSI SW" sig-
	der the following condit		
Pos	ition (Selector lever)	Known-good signal	
N or P posit	ion	ON	
Except abov	ve position	OFF	
-	ection result normal?		
	> GO TO 4. > Go to <u>EC-384, "Diagr</u>	osis Procedure"	
	RM DTC CONFIRMAT		
	"DATA MONITOR" mo		
2. Start e	ngine and warm it up to	o normal operating temperature.	
		ons for at least 50 consecutive seconds.	
CAUT Alwav	ion: s drive vehicle at a sa	fe speed.	
· ···· · · · · · · · · · · · · · · · ·			
ENG SPEE	D 1,300	- 6,375 rpm	

ENG SPEED	1,300 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	2.0 - 31.8 msec

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P0850 PNP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

VHCL SPEED SE	More than 64 km/h (40 mph)	
Selector lever	Suitable position	

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-384, "Diagnosis Procedure".

NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

WITH GST

Perform Component Function Check. Refer to EC-384, "Component Function Check".

NOTE:

Use Component Function Check to 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-384, "Diagnosis Procedure".

Component Function Check

INFOID:000000006217886

INFOID:000000006217887

1.PERFORM COMPONENT FUNCTION CHECK

WITH GST

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

ECM						
Connector	tor + -			Condition		
Connector	Terminal	Terminal				
F111	11	175	P or N position		Battery voltage	
	11	175	Selector level	Except above position	Approx. 0	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-384, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK DTC WITH TCM

Refer to TM-61, "CONSULT-III Function (TRANSMISSION)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning part.

2. CHECK STARTING SYSTEM

Turn ignition switch OFF, then turn it to START.

Does starter motor operate?

YES >> GO TO 3.

NO >> Check DTC with BCM. Refer to BCS-57, "DTC Index".

 $\mathbf{3.}$ CHECK PNP SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect A/T assembly harness connector.

3. Disconnect ECM harness connector.

4. Check the continuity between A/T assembly harness connector and ECM harness connector.

P0850 PNP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

A/T ass	sembly	EC	CM	O and in it		А
Connector	Terminal	Connector	Terminal	Continuity		
F301	9	F111	11	Existed		EC
Is the inspective VES >: NO >:	ection res > GO TO > GO TO	ult normal? 5. 4.	2	nd and sho	ort to power.	С
4.DETEC	T MALFU	NCTIONIN	IG PART			
Check the • Harness • Loose or	for open of	or short be	tween A/T each con	assembly nector and	and ECM harness	D
>:	> Repair c	open circui	t, short to	ground or	short to power in harness or connectors.	
5. CHECK	INTERM	ITTENT IN	ICIDENT			F
Refer to G	-40, "Inte	rmittent Inc	<u>cident"</u> .			
>:	> INSPEC	TION END)			G
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< DTC/CIRCUIT DIAGNOSIS >

P1087, P1088 VVEL SYSTEM

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P1087 or P1088 is displayed with DTC P1090 or P1093. Perform the trouble diagnosis for DTC P1090 or P1093. Refer to <u>EC-390, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)			
P1087	VVEL SYSTEM-B1 [VVEL small event angle malfunction (bank 1)]	The event angle of VVEL control	 Harness or connectors (VVEL actuator motor assembly circuit is open or shorted.) VVEL actuator motor assembly VVEL actuator housing assembly VVEL ladder assembly VVEL control module 	
P1088	VVEL SYSTEM-B2 [VVEL small event angle malfunction (bank 2)]	shaft is always small.		

Diagnosis Procedure

INFOID:000000006217893

If DTC P1087 or P1088 is displayed with DTC P1090 or P1093. Perform the trouble diagnosis for DTC P1090 or P1093. Refer to <u>EC-390, "DTC Logic"</u>. INFOID:000000006217892

[VK56VD]

P1089, P1092 VVEL CONTROL SHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1089, P1092 VVEL CONTROL SHAFT POSITION SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P1089 or P1092 is displayed with DTC P1608, first perform the trouble diagnosis for DTC P1608. Refer to <u>EC-453, "DTC Logic"</u>.

DTC No.		ouble diagnosi uble diagnosis			DTC detecting	g condition	Possible cause
P1089	[VVEL c	OS SEN/CIR(ontrol shaft po k 1) circuit]	-	is sent • An exce	to VVEL contro	Itage from the sensor	Harness or connectors (VVEL control shaft position sen-
P1092	VVEL P [VVEL c sor (ban	 sor circuit is open or shorted.) VVEL control shaft position sensor VVEL control module 					
DTC CO	NFIRMA	TION PRO	OCEDURI				
1.PREC	ONDITIC	NING					
 Turn Turn TESTING 	ignition s ignition s GCONDI		and wait a	t least 10	seconds.	pattery voltage is	s 10 V or more at idle.
-	>> GO T(-					
		C CONFIR			JRE		
	engine a k DTC.	nd let it idle	e for 1 seco	ond.			
<u>Is DTC d</u>	etected?						
		EC-387, "E		rocedure	<u></u>		
Diagno							INFOID:00000006217895
				05100			
1. Disco 2. Turn	ignition s	VEL control witch ON.	snatt posit	tion sense	or harness c	onnector.	
			en VVEL c	ontrol sha	aft position s	ensor harness cor	nnector and ground.
	VVEL co	ntrol shaft pos	ition sensor				
DTC No.	Bank	Connector	Terminal	Ground	Voltage (V)		
DICINO.							
	1	EZO	3				
P1089	1	F72	3 6	Ground	Approx 5		
	1	F72 F70		Ground	Approx. 5		

Is the inspection result normal?

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

2. DETECT MALFUNCTIONING PART

Check the following.

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INFOID:000000006217894

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P1089, P1092 VVEL CONTROL SHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

- · Harness for open or short between VVEL control shaft position sensor and VVEL control module
- · Loose or poor connection for each connector and harness

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

 $\mathbf{3}$. Check vvel control shaft position sensor ground circuit for open and short

1. Turn ignition switch OFF.

- 2. Disconnect VVEL control module harness connector.
- 3. Check the continuity between VVEL control shaft position sensor harness connector and VVEL control module harness connector.

DTC No.	VVEL control shaft position sensor			VVEL control module		Continuity
DIC NO.	Bank	Connector	Terminal	Connector	Terminal	Continuity
P1089	1	F72	2		6	
F1009	I	172	5	F56	19	Existed
P1092	2	F70	2	F30	4	Existed
P1092	2	FIU	5		17	

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

Is the inspection result normal?

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

4. DETECT MALFUNCTIONING PART

Check the following.

Harness for open or short between VVEL control shaft position sensor and VVEL control module

· Loose or poor connection for each connector and harness

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

5.VVEL CONTROL SHAFT POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between VVEL control shaft position sensor harness connector and VVEL control module harness connector.

DTC No.	VVEL control shaft position sensor			VVEL con	Continuity	
DIC NO.	Bank	Connector	Terminal	Connector	Terminal	Continuity
P1089	1	F72	1		3	
F1009		F72	4	F56	16	Existed
P1002	P1092 2 F70 1	1	F30	5	EXISTED	
F1092	2	FTU	4		18	

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

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

• Harness for open or short between VVEL control shaft position sensor and VVEL control module

· Loose or poor connection for each connector and harness

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

/.CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

P1089, P1092 VVEL CONTROL SHAFT POSITION SENSOR	
< DTC/CIRCUIT DIAGNOSIS > [VK	(56VD]
Is the inspection result normal?	
YES >> GO TO 8. NO >> Repair or replace.	A
8. REPLACE VVEL CONTROL MODULE	
	EC
 Replace VVEL control module. Perform additional service when replacing VVEL control module. Refer to <u>EC-144</u>, "Work Procedual Control module." 	
>> GO TO 9.	C
9. PERFORM DTC CONFIRMATION PROCEDURE	
1. Turn ignition switch ON.	
 Erase DTC. Perform DTC Confirmation Procedure. See <u>EC-387, "DTC Logic"</u>. 	E
Is the DTC P1089 or P1092 displayed again?	L
YES >> GO TO 10.	
NO >> INSPECTION END	F
10. REPLACE VVEL ACTUATOR LADDER ASSEMBLY	
Replace VVEL actuator ladder assembly. Refer to EM-75. "Removal and Installation".	(
>> INSPECTION END	
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P1090, P1093 VVEL ACTUATOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

P1090, P1093 VVEL ACTUATOR MOTOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P1090 or P1093 is displayed with DTC P1091, first perform the trouble diagnosis for DTC P1091. Refer to <u>EC-393, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1090	VVEL ACTR MOT-B1 [VVEL system performance (bank 1)]	 Event angle difference between the actual and the target is detected. 	Harness or connectors (VVEL actuator motor assembly circuit is open or shorted.)
P1093	VVEL ACTR MOT-B2 [VVEL system performance (bank 2)]	 Abnormal current is sent to VVEL actuator motor assembly. 	 VVEL actuator motor assembly VVEL actuator housing assembly VVEL ladder assembly VVEL control module

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 10 V or more at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 10 second.
- 2. Keep the engine speed at approximately 3,500 rpm for at least 10 seconds under no load.
- 3. Check DTC.

Is DTC detected?

YES >> Go to EC-390, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217897

1.VVEL ACTUATOR MOTOR ASSEMBLY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect VVEL control module harness connector.
- 2. Disconnect VVEL actuator motor assembly harness connector.
- Check the continuity between VVEL control module harness connector and VVEL actuator motor assembly harness connector.

DTC No.	V	VEL control mode	control module		VVEL actuator motor assembly		
DICINO.	Bank	Connector	Terminal	Connector	Terminal	Continuity	
				10		1	Existed
P1090	4					12	F73
P 1090	25	25	_	1	Not existed		
			2	Existed			
		F56	C		1	Existed	
D1002	P1093 2	Z	F71	2	Not existed		
P1093		45		1	Not existed		
			15	15		2	Existed

[VK56VD] < DTC/CIRCUIT DIAGNOSIS > Also check harness for short to ground and power. 4. А Is the inspection result normal? YES >> GO TO 3. NO >> GO TO 2. EC 2.detect malfunctioning part Check the following. Harness for open or short between VVEL actuator motor assembly and VVEL control module Loose or poor connection for each connector and harness >> Repair open circuit, short to ground or short to power in harness or connectors. D ${ m 3.}$ CHECK VVEL ACTUATOR MOTOR ASSEMBLY Refer to EC-392, "Component Inspection (VVEL ACTUATOR MOTOR ASSEMBLY)". Е Is the inspection result normal? YES >> GO TO 5. NO >> GO TO 4. 4.REPLACE VVEL ACTUATOR MOTOR ASSEMBLY Replace VVEL actuator motor assembly. Refer to EM-75, "Removal and Installation". >> INSPECTION END 5-CHECK INTERMITTENT INCIDENT Н Refer to GI-40, "Intermittent Incident". Is the inspection result normal? YES >> GO TO 6. NO >> Repair or replace. **O**.REPLACE VVEL CONTROL MODULE 1. Replace VVEL control module. Perform additional service when replacing VVEL control module. Refer to EC-144, "Work Procedure". 2. Κ >> GO TO 7. 7. PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. Erase DTC. 3. Perform DTC Confirmation Procedure. See EC-390, "DTC Logic". M Is the DTC P1090 or P1093 displayed again? YES >> GO TO 8. NO >> INSPECTION END Ν ${f 8}.$ CHECK VVEL ACTUATOR HOUSING ASSEMBLY Refer to EC-392, "Component Inspection (VVEL ACTUATOR MOTOR ASSEMBLY)". Is the inspection result normal? YES >> GO TO 10. NO >> GO TO 9. ${f 9}.$ REPLACE VVEL ACTUATOR HOUSING ASSEMBLY Replace VVEL actuator housing assembly. Refer to EM-75, "Removal and Installation".

>> INSPECTION END 10. CHECK VVEL LADDER ASSEMBLY

Refer to EM-77, "Inspection".

Revision: 2010 May

P1090, P1093 VVEL ACTUATOR MOTOR

EC-391

P1090, P1093 VVEL ACTUATOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

11.REPLACE VVEL LADDER ASSEMBLY

Replace VVEL ladder assembly. Refer to EM-75, "Removal and Installation".

>> INSPECTION END

12. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (VVEL ACTUATOR MOTOR ASSEMBLY)

INFOID:000000006217898

1.CHECK VVEL ACTUATOR MOTOR

1. Turn ignition switch OFF.

2. Disconnect VVEL actuator motor harness connector.

3. Check resistance between VVEL actuator motor terminals as per the following.

VVEL actuator motor	Resistance	
Terminal	- Resistance	
1 and 2	16Ω or less	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE VVEL ACTUATOR SUB ASSEMBLY

Replace VVEL actuator sub assembly. Refer to EM-75, "Removal and Installation".

>> INSPECTION END

Component Inspection (VVEL ACTUATOR HOUSING ASSEMBLY)

INFOID:000000006217899

1.CHECK VVEL ACTUATOR HOUSING ASSEMBLY

1. Turn ignition switch OFF.

2. Remove VVEL actuator housing assembly. Refer to EM-75, "Removal and Installation".

3. Turn the ball screw shaft to check that it works smoothly.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE VVEL ACTUATOR HOUSING ASSEMBLY

Replace VVEL actuator housing assembly. Refer to EM-75, "Removal and Installation".

>> INSPECTION END

P1091 VVEL ACTUATOR MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

P1091 VVEL ACTUATOR MOTOR RELAY

DTC Logic

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EC

INFOID:000000006217900

[VK56VD]

DTC DETECTION LOGIC

	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting cond	dition	Possible cause
P1091	VVEL ACTR MOT PWR [VVEL actuator motor relay circuit]	 VVEL control module deteractuator motor relay is stu VVEL control module deteractuator motor relay is stu 	ects the VVEL ck OFF. ects the VVEL ck ON.	 Harness or connectors (VVEL actuator motor relay circuit is open or shorted.) (Abort circuit is open or shorted.) VVEL actuator motor relay VVEL control module ECM
OTC CO	NFIRMATION PROCE	DURE		
1. PREC	ONDITIONING			
2. Turn 3. Turn TESTING Before pe		wait at least 10 seconds		oltage is 10 V or more at idle.
•	>> GO TO 2.			
	ORM DTC CONFIRMAT			
2. Turn 3. Turn	ignition switch ON and w ignition switch OFF and ignition switch ON and w k 1st trip DTC.	wait at least 10 seconds		
l <u>s 1st trip</u> YES >	DTC detected? >> Go to <u>EC-393, "Diagr</u>	osis Procedure".		
l <u>s 1st trip</u> YES NO >	>> Go to <u>EC-393, "Diagr</u> >> INSPECTION END	osis Procedure".		
I <u>s 1st trip</u> YES NO Diagnos	>> Go to <u>EC-393, "Diagr</u> >> INSPECTION END sis Procedure			INFOID:000000062179
Is 1st trip YES NO Diagnos 1.vvel	>> Go to <u>EC-393, "Diagr</u> >> INSPECTION END sis Procedure ACTUATOR MOTOR RE		CIRCUIT-I	INFOID:000000062179
Is 1st trip YES NO Diagnos 1.VVEL 1. Turn 2. Disco	>> Go to <u>EC-393, "Diagr</u> >> INSPECTION END sis Procedure	ELAY POWER SUPPLY		
Is 1st trip YES NO Diagnos 1.VVEL 1. Turn 2. Disco 3. Chec	>> Go to <u>EC-393</u> , "Diagr >> INSPECTION END sis Procedure ACTUATOR MOTOR RE ignition switch OFF. onnect VVEL actuator model	ELAY POWER SUPPLY otor relay. VEL actuator motor rela	y harness col	
Is 1st trip YES NO Diagnos 1.VVEL 1. Turn 2. Disco 3. Chec	>> Go to <u>EC-393</u> , "Diagr >> INSPECTION END sis Procedure ACTUATOR MOTOR RE ignition switch OFF. onnect VVEL actuator mo k the voltage between V	ELAY POWER SUPPLY		
Is 1st trip YES NO Diagnos 1.VVEL 1. Turn 2. Disco 3. Chec	>> Go to EC-393, "Diagr >> INSPECTION END sis Procedure ACTUATOR MOTOR RE ignition switch OFF. onnect VVEL actuator mo k the voltage between V VEL actuator motor relay	ELAY POWER SUPPLY otor relay. VEL actuator motor rela	y harness col	nnector and ground.

Check the following.

• 50A fusible link (letter O)

• Harness for open or short between VVEL actuator motor relay and battery

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

EC-393

< DTC/CIRCUIT DIAGNOSIS >

3.VVEL ACTUATOR MOTOR RELAY POWER SUPPLY CIRCUIT-II

- 1. Disconnect VVEL control module harness connector.
- 2. Check the continuity between VVEL actuator motor relay harness connector and VVEL control module harness connector.

VVEL control module		VVEL actuate	Continuity	
Connector	Terminal	Connector Terminal		Continuity
F56	23	E62	2	Existed

3. Also check harness for short to ground and 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.VVEL ACTUATOR MOTOR RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between VVEL actuator motor relay harness connector and VVEL control module harness connector.

V	VVEL control module			VVEL actuator motor relay		
Bank	Connector	Terminal	Connector	Terminal	Continuity	
1	F56	13	E62	5	Existed	
2	1.50	1	LOZ	5	LAISted	

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

Is the inspection result normal?

YES >> GO TO 5.

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

5.CHECK VVEL ACTUATOR MOTOR RELAY

Refer to EC-395, "Component Inspection (VVEL Actuator Motor Relay)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace VVEL actuator motor relay.

 ${f 6}.$ CHECK ABORT CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.

2. Check the continuity between VVEL control module harness connector and ECM harness connector.

VVEL control module		E	Continuity		
Connector	Terminal	Connector Terminal		Continuity	
F56	21	E80	122	Existed	

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

Is the inspection result normal?

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

NO >> GO TO 7. 7

7.DETECT MALFUNCTIONING PART

Check the following.

• Harness for open and short between ECM and VVEL control module

• Loose or poor connection for each connector and harness

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

8. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

P1091 VVFL ACTUATOR MOTOR RELAY

	P1091 VVEL	ACTUATOR MOTO	IR RELAY	
< DTC/CIR(CUIT DIAGNOSIS >		[VK56V	D]
Is the inspec	ction result normal?			
	GO TO 9.			A
•	Repair or replace.			
	E VVEL CONTROL MODULE			— EC
	e VVEL control module. additional service when replacir	a VVEL control module	Refer to EC-144, "Work Procedure".	
21 1 0110111				0
>>	GO TO 10.			С
10.PERFO	ORM DTC CONFIRMATION PRO	DCEDURE		
	nition switch ON.			D
2. Erase D 3. Perform	DTC. DTC Confirmation Procedure.			
	-393, "DTC Logic".			E
Is the DTC I	P1091 displayed again?			
	Replace ECM. Refer to EC-535,	"Removal and Installatio	<u>n"</u> .	
-	INSPECTION END			F
Compone	ent Inspection (VVEL Actu	ator Motor Relay)	INFOID:0000000621	17902
1. CHECK	VVEL ACTUATOR MOTOR REL	AY		G
1. Turn iar	nition switch OFF.			
2. Remove	e VVEL actuator motor relay.			H
	he continuity between VVEL act der the following conditions.	uator motor relay termi-		
Terminal	Condition	Continuity		
2 and 5	12V direct current supply between terminals 1 and 2	Existed		
3 and 5	No current supply	Not existed		J

Not existed

Is the inspection result normal?

YES >> INSPECTION END

No current supply

NO >> Replace VVEL actuator motor relay. **D**

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P1148, P1168 CLOSED LOOP CONTROL

< DTC/CIRCUIT DIAGNOSIS >

P1148, P1168 CLOSED LOOP CONTROL

DTC Logic

DTC DETECTION LOGIC

NOTE:

DTC P1148 or P1168 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.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1148	CLOSED LOOP-B1 [Closed loop control function (bank 1)]	The closed loop control function for bank 1 does not operate even when vehicle is being driven in the specified condition.	 Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
P1168	CLOSED LOOP-B2 [Closed loop control function (bank 2)]	The closed loop control function for bank 2 does not operate even when vehicle is being driven in the specified condition.	 A/F sensor 1 A/F sensor 1 heater

Diagnosis Procedure

INFOID:000000006288348

DTC P1148 or P1168 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 <u>EC-</u><u>98, "DTC Index"</u>.

[VK56VD]

INFOID:000000006288347

P1197 OUT OF GAS

Description

This diagnosis result is detected when the fuel level of the fuel tank is extremely low and the engine does not run normally.

DTC Logic

INFOID:000000006217904

INFOID:000000006217903

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DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1197	FUEL RUN OUT (Out of gas)	 Fuel rail pressure remains at 1.5 MPa (15 bar, 15.3 kg/cm², 217.5 psi) or less for 3 seconds or more with the fuel level too low. Fuel rail pressure remains 2.7 MPa (27 bar, 27.5 kg/cm², 392 psi) lower than a target fuel pressure for 5 seconds or more with the fuel level too low. Fuel rail pressure remains at 0.23 MPa (2.3 bar, 2.346 kg/cm², 33.35 psi) or less for 5 seconds or more with the fuel level too low. NOTE: Allow engine coolant temperature to reach 70°C (158°F) or more once. 	 Out of gas Harness or connectors (The low pressure fuel pump circuit is open or shorted.) Low pressure fuel pump Fuel pressure regulator Low pressure fuel system Low fuel pressure sensor Harness or connectors (The high pressure fuel pump circuit is shorted.) High pressure fuel pump High pressure fuel system Fuel rail pressure sensor Disconnection of the fuel hose
	NFIRMATION PROCE	DURE	
1.PREC	ONDITIONING		
2. Turn	ignition switch OFF and vignition switch ON. ignition switch ON.		

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

Start the engine.	
Does the engine start?	M
YES >> GO TO 3.	
NO >> Proceed to EC-398, "Diagnosis Procedure".	NI
3. PERFORM DTC CONFIRMATION PROCEDURE-II	Ν
1. Warm up the engine to the normal operating temperature.	
NOTE:	\bigcirc
For best results, warm up the engine until "COOLAN TEMP/S" on "DATA MONITOR" of CONSULT-III reaches at least 70°C (158°F).)

2. Keep the engine speed at 3,500 rpm for 5 seconds and let it idle at least 60 seconds.

3. Check the 1st trip DTC.

NOTE:

If the fuel tank has sufficient fuel, this diagnosis result may not be detected.

Is 1st trip DTC detected?

YES >> Proceed to EC-398, "Diagnosis Procedure".

NO >> INSPECTION END [VK56VD]

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Diagnosis Procedure

1.REFUEL THE VEHICLE

1. Refuel 10 liter (10 US qt, 8 imp qt). CAUTION:

Never refuel more than 10 liter.

Start the engine and keep the engine speed at 3,000 rpm for 30 seconds.
 NOTE:
 For best results, warm up the engine until "COOLAN TEMP/S" on "DATA MON

For best results, warm up the engine until "COOLAN TEMP/S" on "DATA MONITOR" of CONSULT-III reaches at least 70°C (158°F).

- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Turn ignition switch ON.
- 7. Erase the DTC.
- 8. Start the engine and let it idle at least 60 seconds.
- 9. Perform the confirmation procedure again. Refer to EC-397, "DTC Logic".

Is 1st trip DTC detected?

- YES >> GO TO 2.
- NO >> INSPECTION END
- 2.CHECK LOW PRESSURE FUEL PUMP

Refer to EC-512, "Component Function Check".

Is inspection result normal?

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

${\it 3.}$ CHECK HIGH PRESSURE FUEL PUMP

Refer to EC-501, "Component Function Check".

Is inspection result normal?

- YES >> Check the fuel hose for disconnection and looseness.
- NO >> Repair or replace error-detected parts.

P1212 TCS COMMUNICATION LINE

Revision: 2010 May

< DTC/CIRCUIT DIAGNOSIS >

P1212 TCS COMMUNICATION LINE

Description

DTC Logic

NOTE:

DTC DETECTION LOGIC

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.

INFOID:000000006217907

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• If DTC P1212 is displayed with DTC UXXXX, perform the trouble diagnosis for DTC UXXXX.

• If DTC P1212 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause	F
P1212	TCS/CIRC (TCS communication line)	ECM cannot receive the information from "ABS actuator and electric unit (control unit)" continuously.	 Harness or connectors (The CAN communication line is open or short- ed.) ABS actuator and electric unit (control unit) Dead (Weak) battery 	G
DTC CO	NFIRMATION PROCEI	DURE		Н

1.PRECONDITIONING

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

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 10.5 V or more at idle.

>> GO TO 2. Κ 2.PERFORM DTC CONFIRMATION PROCEDURE Start engine and let it idle for at least 10 seconds. 1. Check 1st trip DTC. 2. L Is 1st trip DTC detected? YES >> Proceed to EC-399, "Diagnosis Procedure". NO >> INSPECTION END M Diagnosis Procedure INFOID:000000006217908 Ν Perform the trouble diagnosis for TCS. Refer to BRC-60, "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-98, "DTC Index".

Trouble diagnosis for DTC P0607 Refer to EC-378, "DTC Logic".

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EC-399

[VK56VD]

INFOID:000000006217906

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EC

P1217 ENGINE OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

P1217 ENGINE OVER TEMPERATURE

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1217 is displayed with DTC UXXXX, perform the trouble diagnosis for DTC UXXXX.
- If DTC P1217 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to <u>EC-378, "DTC Logic"</u>.
- If DTC P1217 is displayed with DTC P0527, perform the trouble diagnosis for DTC P0527. Refer to <u>EC-367. "DTC Logic"</u>.

If the cooling fan or any of other components in the cooling system has a malfunction, engine coolant temperature increases.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217	Engine over temperature (Overheat)	 Cooling fan does not operate properly (Overheat). Cooling fan system does not operate properly (Overheat). Engine coolant is not within the specified quantity. 	 Harness or connectors (The cooling fan circuit is open or shorted.) IPDM E/R Electrically-controlled cooling fan coupling Cooling fan speed sensor Radiator hose Radiator Reservoir tank cap Water pump Thermostat

CAUTION:

When a malfunction is indicated, always replace the coolant. Refer to <u>CO-8</u>, "<u>Draining</u>" and <u>CO-9</u>, "<u>Refilling</u>". Also, replace the engine oil. Refer to <u>LU-8</u>, "<u>Draining</u>" and <u>LU-8</u>, "<u>Refilling</u>".

- 1. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Always use coolant with the proper mixture ratio. Refer to <u>MA-11, "Anti-Freeze Coolant Mixture Ratio"</u>.
- 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-400, "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-401, "Diagnosis Procedure".

Component Function Check

INFOID:000000006217910

1.PERFORM COMPONENT FUNCTION CHECK-I

WARNING:

Never remove the reservoir tank cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

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

INFOID:000000006217909

P1217 ENGINE OVER TEMPERATURE



< DTC/CIRCUIT DIAGNOSIS >	[VK56VD]
Check the coolant level in the reservoir tank and radiator. Allow engine to cool before checking coolant level.	A
Is the coolant level in the reservoir tank and/or radiator below the proper range?	
YES >> Proceed to <u>EC-401, "Diagnosis Procedure"</u> . NO >> GO TO 2.	MAX. TOK MIN. C
2.PERFORM COMPONENT FUNCTION CHECK-II	SEF621W
Confirm whether customer filled the coolant or not.	
Did customer fill the coolant?	E
YES >> Proceed to <u>EC-401, "Diagnosis Procedure"</u> . NO >> GO TO 3.	
3. PERFORM COMPONENT FUNCTION CHECK-III	F
WITH CONSULT-III	
 Start the engine. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT-III. Check that cooling fan speed varies according to the percentage. NOTE: 	G
Fan speed changes as the percentage changes. WITHOUT CONSULT-III Start the engine.	Н
 Perform IPDM E/R auto active test. Refer to <u>PCS-10, "Diagnosis Description"</u>. Check that cooling fan speed increase. NOTE: 	I
Speed changes gradually when performing the auto active test. Is the inspection result normal?	J
YES >> INSPECTION END NO >> Proceed to <u>EC-401, "Diagnosis Procedure"</u> .	
Diagnosis Procedure	IFOID:000000006217911
1.CHECK COOLING FAN OPERATION	L
 Start the engine. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT-III. Check that cooling fan speed varies according to the percentage. NOTE: 	Μ
Speed changes gradually as the percentage changes.	Ν
 Stert the engine. Perform IPDM E/R auto active test and check cooling fan operation, refer to <u>PCS-10</u>, "<u>Diagno</u><u>tion</u>". 	osis Descrip-
 Check that cooling fan speed increase. NOTE: Speed changes gradually when performing the auto active test. 	Ρ
Is the inspection result normal?	1
YES >> GO TO 2.	
NO >> Proceed to <u>EC-495, "Diagnosis Procedure"</u> . 2.CHECK ENGINE COOLANT LEAKAGE-I	
Check cooling system for leakage. Refer to <u>CO-8</u> , "Inspection".	
Is leakage detected?	

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

3.CHECK ENGINE COOLANT LEAKAGE-II

Check the following for leakage.

Hose

Radiator

Water pump

>> Repair or replace malfunctioning part.

4.CHECK RESERVOIR TANK CAP

Check reservoir tank cap. Refer to CO-11, "RESERVOIR TANK CAP : Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace reservoir tank cap.

5.CHECK THERMOSTAT

Check thermostat. Refer to CO-21, "Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace thermostat. Refer to <u>CO-20, "Removal and Installation"</u>.

6.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-216. "Component Inspection (Engine Coolant Temperature Sensor)".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace engine coolant temperature sensor. Refer to EM-86, "Exploded View".

7.CHECK MAIN 12 CAUSES

If the cause cannot be isolated, check the CO-6. "Troubleshooting Chart".

>> INSPECTION END

P1220 FUEL PUMP CONTROL MODULE (FPCM)

< DTC/CIRCUIT DIAGNOSIS >

P1220 FUEL PUMP CONTROL MODULE (FPCM)

DTC Logic

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INFOID:000000006217912

[VK56VD]

	Trouble diagnosis nan	ne		
DTC No.	(Trouble diagnosis cont		DTC detecting condition	Possible cause
P1220	FPCM (Fuel pump control modul		engine cranking, the signal voltage PCM to the ECM is too low.	 Harness or connectors (FPCM circuit is open or shorted) (Fuel pump circuit is open or shorted) FPCM
	IFIRMATION PROCE	EDURE		
1. PRECO	NDITIONING			
2. Turn ig 3. Turn ig TESTING (• Before p	performing the follow	wait at leas	t 10 seconds. Ire, confirm that battery vo	Itage is between 12 - 15 V at idle. ne coolant temperature is –10°C
-	> GO TO 2. RM DTC CONFIRMAT		EDURE	
1. Start e If engii 2. Check I <u>s DTC det</u> YES >>	ngine and let it idle for ne does not start, cran DTC.	at least 5 se k engine for	econds. at least 5 seconds.	
	is Procedure			INFOID:00000006217913
1. снеск	FPCM POWER SUP	PLY CIRCUI	Т	
2. Discor 3. Turn ig	gnition switch OFF. Inect FPCM harness c gnition switch ON. the voltage between F		ss connector and ground.	
	FPCM	Crowned	Voltage	
Connecte	or Terminal	Ground	Voltage	
B41	10	Ground	Battery voltage	
YES >> NO >>	<u>ection result normal?</u> > GO TO 2. > GO TO 3. T MALFUNCTIONING	PART		
Check the • 15 A fuse	following.		and IPDM E/R	

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

EC-403

P1220 FUEL PUMP CONTROL MODULE (FPCM)

< DTC/CIRCUIT DIAGNOSIS >

$\mathbf{3}$.check fpcm ground circuit for open and short

1. Turn ignition switch OFF.

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

FP	СМ	Ground	Continuity	
Connector	Connector Terminal		Continuity	
B41	5	Ground	Existed	

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

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

${f 4.}$ CHECK FPCM INPUT AND OUTPUT CIRCUITS FOR OPEN AND SHORT

1. Disconnect ECM harness connector.

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

FPCM		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
B41	8	E80	125	Existed
541	9	200	142	LAISIEU

3. 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 FPCM and ECM

· Loose or poor connection for each connector and harness

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

6.CHECK FUEL PUMP CONTROL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect fuel level sensor unit and fuel pump harness connector.
- 2. Check the continuity between FPCM harness connector and fuel level sensor unit and fuel pump harness connector.

FPC	CM	Fuel level sensor	Continuity	
Connector Terminal		Connector		Terminal
B41	6	C5	3	Existed
D41	7	05	1	LAISIEU

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, short to ground or short to power in harness or connectors.

7.CHECK FPCM

Refer to EC-405, "Component Inspection (FPCM)".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace FPCM.

P1220 FUEL PUMP CONTROL MODULE (FPCM)

< DTC/CIRCUIT DIAGNOSIS >

8.CHECK INTERMITTENT INCIDENT Refer to <u>GI-40</u>, "Intermittent Incident".

>> INSPECTION END

Component Inspection (FPCM)

1.CHECK FUEL PUMP CONTROL MODULE (FPCM)

1. Check the voltage between FPCM terminals under the following conditions.

FPCM				
Connector -	+	-	Condition	Voltage
	Terminal	Terminal		
	7	7 6	For 1 second after turning ignition switch ON	Approx. 8.5 V
B41			More than 1 second after turning ignition switch ON	Approx. 0 V
			Idle speed	Approx. 8.5 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace FPCM.

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P1225 TP SENSOR

DTC Logic

[VK56VD]

INFOID:000000006217915

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause	
P1225	CTP LEARNING-B1 (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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 10 V or more at idle.

>> GO TO 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-406. "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217916

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.

- 2. Remove the intake air duct.
- 3. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to <u>EC-147</u>, "Work Procedure".

2.replace electric throttle control actuator

Replace electric throttle control actuator. Refer to EM-30, "Removal and Installation".

>> INSPECTION END

P1226 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1226 TP SENSOR

DTC Logic

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INFOID:000000006217917

[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1226	CTP LEARNING-B1 (Closed throttle position learning performance)	Closed throttle position learning is not per- formed successfully, repeatedly.	Electric throttle control actuator (TP sensor 1 and 2)
TC CON	FIRMATION PROCED	URE	
1.preco	NDITIONING		
2. Turn ig 3. Turn ig TESTING (nition switch OFF and wa nition switch ON. nition switch OFF and wa CONDITION: forming the following p		ge is 10 V or more at idle.
-	• GO TO 2.		
2.PERFO	RM DTC CONFIRMATIO	N PROCEDURE	
 Turn ig Turn ig Repeating Repeating Check <u>Is 1st trip D</u> YES >> 	nition switch ON. nition switch OFF and wa nition switch ON. t steps 2 and 3 for 32 tim 1st trip DTC. <u>TC detected?</u> > Go to <u>EC-407, "Diagnos</u> > INSPECTION END	es.	
Diagnosi	s Procedure		INFOID:00000006217918
1.снеск	ELECTRIC THROTTLE	CONTROL ACTUATOR VISUALLY	
2. Remov	nition switch OFF. /e the intake air duct. if foreign matter is caugh	t between the throttle valve and the ho	using.
•	ection result normal?		
		atter and clean the electric throttle co sition learning. Refer to <u>EC-147, "Work</u>	
2.REPLAC	CE ELECTRIC THROTTL	E CONTROL ACTUATOR	
Replace ele	ectric throttle control actu	ator. Refer to <u>EM-30, "Removal and In</u>	stallation".
>>	INSPECTION END		

P1421 COLD START CONTROL

Description

ECM controls ignition timing and engine idle speed when engine is started with prewarming up condition. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

DTC Logic

INFOID:000000006288264

INFOID:00000006288263

DTC DETECTION LOGIC

NOTE:

• If DTC P1421 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1421	Cold start emission reduction strategy monitoring	ECM does not control ignition timing and engine idle speed properly when engine is started with prewarming up condition.	Lack of intake air volumeFuel injection systemECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Select "DATA MONITOR" mode with CONSULT-III.
- 4. Check the indication of "COOLAN TEMP/S".
 If it is between 7°C (45°F) and 36°C (97°F), go to the following steps.
 If it is below 7°C (45°F), warm engine up to more than 7°C (45°F) and retry from step 1.
 If it is above 36°C (97°F), cool engine down to less than 36°C (97°F) and retry from step 1.
- 5. Start engine and let it idle for 5 minutes.
- 6. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-408. "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-148, "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
- Is the inspection result normal?

YES >> GO TO 3.

EC-408

INFOID:000000006288265

[VK56VD]

P1421 COLD START CONTROL

	[VK56VD]
< DTC/CIRCUIT DIAGNOSIS >	[113010]
NO >> Repair or replace malfunctioning part 3.CHECK FUEL INJECTION SYSTEM FUNCTION	
Perform DTC Confirmation Procedure for DTC P0171, P0174. Refer to <u>EC-263, "DTC Logic"</u> .	
<u>Is the inspection result normal?</u> YES >> GO TO 4.	
NO >> Go to <u>EC-264, "Diagnosis Procedure"</u> for DTC P0171, P0174.	
4. PERFORM DTC CONFIRMATION PROCEDURE	
1. Turn ignition switch ON.	
2. Erase DTC.	
3. Perform DTC Confirmation Procedure.	
See <u>EC-408, "DTC Logic"</u> . <u>Is the 1st trip DTC P1421 displayed again?</u>	
YES $>>$ GO TO 5.	
NO >> INSPECTION END	
5.REPLACE ECM	
1. Replace ECM.	
2. Go to EC-143, "Work Procedure".	
>> INSPECTION END	

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P1423, P1424 COLD START CONTROL

Description

ECM controls fuel injection timing and fuel injection quantity when engine is started with the engine cold. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

DTC Logic

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INFOID:00000006288266

DTC DETECTION LOGIC

NOTE:

• If DTC P1423 or P1424 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1423	COLD START CONTROL (Cold start emission reduction strategy monitoring)	ECM does not control fuel injection timing prop- erly when engine is started with the engine cold.	ECM
P1424	COLD START CONTROL (Cold start emission reduction strategy monitoring)	ECM does not control fuel injection quantity properly when engine is started with with the engine cold.	ECIVI

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- WITH CONSULT-III
- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Select "DATA MONITOR" mode with CONSULT-III.
- 4. Check that "COOLAN TEMP/S".
- If it is between 5°C (41°F) and 40°C (104°F) go to the following steps.
- If it is below 5°C (41°F) warm engine up to more than 5°C (41°F) and retry from step 1.
- If it is above 40°C (104°F) cool engine down to less than 40°C (104°F) and retry from step 1.
- 5. Start engine and let it idle for 5 minutes.
- 6. Check 1st trip DTC.

WITH GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

- YES >> Proceed to <u>EC-410, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

Diagnosis Procedure

1.INSPECTION START

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC confirmation procedure. Refer to <u>EC-410. "DTC Logic"</u>.
- 4. Check 1st trip DTC.

Is the 1st trip DTC P1423 or P1424 displayed again?

YES >> GO TO 2.

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P1423, P1424 COLD START CONTROL < DTC/CIRCUIT DIAGNOSIS >	[VK56VD]	
NO >> INSPECTION END		
2.REPLACE ECM		А
Replace ECM. Refer to EC-535, "Removal and Installation".		
>> INSPECTION END		EC
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P1550 BATTERY CURRENT SENSOR

DTC Logic

INFOID:000000006217919

[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1550	BAT CURRENT SENSOR (Battery current sensor cir- cuit range/performance)	The output voltage of the battery current sensor remains within the specified range while engine is running.	 Harness or connectors (Battery current sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is shorted.) [Camshaft position sensor (bank 1) circuit is shorted.] (Crankshaft position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) Battery current sensor Accelerator pedal position sensor Camshaft position sensor (bank 1) Crankshaft position sensor Refrigerant pressure sensor Refrigerant pressure sensor EVAP control system pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 8 V or more at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 10 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-412, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217920

1.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

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 cur	rent sensor	Ground	Voltage (V)
Connector	Connector Terminal		voltage (v)
E63	2	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 2.

2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

EC-412

P1550 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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3. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E63	2	E80	133	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness for open between battery current sensor and ECM
- Loose or poor connection for each connector and harness

>> 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
F110 76 77	76	Crankshaft position sensor	F74	1
	77	Camshaft position sensor (bank 1)	F84	1
1 E80	133	EVAP control system pressure sen- sor	C17	3
		Refrigerant pressure sensor	E77	1
-	404	APP sensor 2 (Without ICC)	E110	1
	131	APP sensor 2 (with ICC)	E67	9

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 (Refer to <u>EC-301, "Component Inspection (Crankshaft Position Sensor)"</u>.)
- Camshaft position sensor (bank 1) (Refer to EC-306, "Component Inspection (Camshaft Position Sensor)".)
- EVAP control system pressure sensor (Refer to <u>EC-520, "Component Function Check"</u>.)
 Refrigerant pressure sensor (Refer to <u>EC-520, "Component Function Check"</u>.)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning component.

6.CHECK APP SENSOR

Refer to EC-470, "Component Inspection (Accelerator Pedal Position Sensor)".

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 7.

I.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to <u>ACC-3</u>, "MODELS WITHOUT DISTANCE CONTROL ASSIST <u>SYSTEM</u> : <u>Removal and Installation</u>" (Without distance control assist system) or <u>ACC-4</u>, "<u>MODELS WITH</u> <u>DISTANCE CONTROL ASSIST SYSTEM</u> : <u>Removal and Installation</u>" (With distance control assist system).

>> INSPECTION END

P1550 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

${f 8}.$ 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 cur	rent sensor	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E63	4	E80	150	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 9.

9. DETECT MALFUNCTIONING PART

Check the following.

· Harness for open or short between battery current sensor and ECM

· Loose or poor connection for each connector and harness

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

10.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		E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E63	3	E80	138	Existed

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

Is the inspection result normal?

YES >> GO TO 12.

11. DETECT MALFUNCTIONING PART

Check the following.

Harness for open or short between battery current sensor and ECM

Loose or poor connection for each connector and harness

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

12. CHECK BATTERY CURRENT SENSOR

Refer to EC-414. "Component Inspection (Battery Current Sensor)".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace battery negative cable assembly.

13. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Battery Current Sensor)

1.CHECK BATTERY CURRENT SENSOR

2. Reconnect harness connectors disconnected.

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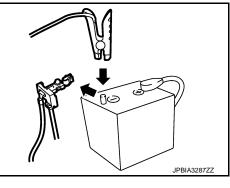
P1550 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

3. Disconnect battery negative cable.

To body ground

- 4. Install jumper cable between battery negative terminal and body ground.
- 5. Turn ignition switch ON.
- 6. Check the voltage between ECM harness connector terminals under the following conditions.



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Connector	+	_	Voltage (V)
Connector	Terminal	Terminal	
E80	138 (Battery current sensor signal)	150	Approx. 2.5

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-159, "How to Handle Battery".

- Is the inspection result normal?
- YES >> INSPECTION END
- NO >> Replace battery negative cable assembly.

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< DTC/CIRCUIT DIAGNOSIS >

P1551, P1552 BATTERY CURRENT SENSOR

DTC Logic

INFOID:000000006217922

[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1551	BAT CURRENT SENSOR (Battery current sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (Battery current sensor circuit is open or shorte (Accelerator pedal position sensor 2 circuit is
P1552	Battery current sensor circuit high input (BAT CURRENT SENSOR)	An excessively high voltage from the sensor is sent to ECM.	 shorted.) [Camshaft position sensor (bank 1) circuit is shorted.] (Crankshaft position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) Battery current sensor Accelerator pedal position sensor Camshaft position sensor (bank 1) Crankshaft position sensor Refrigerant pressure sensor Refrigerant pressure sensor EVAP control system pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 8 V or more with ignition switch ON

>> 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 >> Go to <u>EC-416. "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217923

1.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

- 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 cur	rent sensor	Ground	Voltage (V)	
Connector	Terminal	Ground	voltage (v)	
E63	2	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 2.

2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-II

EC-416

< DTC/CIRCUIT DIAGNOSIS >

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		E	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E63	2	E80	133	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

 ${\it 3.}$ detect malfunctioning part

Check the following.

Harness for open between battery current sensor and ECM

Loose or poor connection for each connector and harness

>> Repair open circuit.

${f 4.}$ CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

EC	М	Sensor		
Connector	Terminal	Name	Connector	Terminal
F110	76	Crankshaft position sensor	F74	1
FIIV	77	Camshaft position sensor (bank 1)	F84	1
133 E80	133	EVAP control system pressure sen- sor	C17	3
	Refrigerant pressure sensor	E77	1	
131	APP sensor 2 (Without ICC)	E110	1	
	131	APP sensor 2 (with ICC)	E67	9
Is the inspection result normal?				

<u>Is the inspection result normal?</u>

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 (Refer to EC-301, "Component Inspection (Crankshaft Position Sensor)".) Μ

 Camshaft position sensor (bank 1) (Refer to EC-306, "Component Inspection (Camshaft Position Sensor)".) • EVAP control system pressure sensor (Refer to EC-520, "Component Function Check".)

• Refrigerant pressure sensor (Refer to EC-520, "Component Function Check".)

Is the inspection result normal?

YES	>> GO TO 6.
	>> Replace malfunctioning component.
6	

6.CHECK APP SENSOR

Refer to EC-470, "Component Inspection (Accelerator Pedal Position Sensor)".

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 7.

I.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation" (Without distance control assist system) or ACC-4, "MODELS WITH DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation" (With distance control assist system).

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< DTC/CIRCUIT DIAGNOSIS >

>> INSPECTION END

${f 8.}$ 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		E	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E63	4	E80	150	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 9.

9. DETECT MALFUNCTIONING PART

Check the following.

Harness for open or short between battery current sensor and ECM

Loose or poor connection for each connector and harness

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

10. 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		EC	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E63	3	E80	138	Existed

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

Is the inspection result normal?

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

NO >> GO TO TI. 4 4

11. DETECT MALFUNCTIONING PART

Check the following.

Harness for open or short between battery current sensor and ECM

· Loose or poor connection for each connector and harness

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

12. CHECK BATTERY CURRENT SENSOR

Refer to EC-427, "Component Inspection (Battery Current Sensor)".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace battery negative cable assembly.

13. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection (Battery Current Sensor)

Revision: 2010 May

1.CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable.

To body ground

- 4. Install jumper cable between battery negative terminal and body ground.
- 5. Turn ignition switch ON.

-

6. Check the voltage between ECM harness connector terminals under the following conditions.

Connector	+	_	Voltage (V)
Connector	Terminal	Terminal	
E80	138 (Battery current sensor signal)	150	Approx. 2.5

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-159, "How to Handle Battery".

- Is the inspection result normal?
- YES >> INSPECTION END
- NO >> Replace battery negative cable assembly.





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P1553 BATTERY CURRENT SENSOR

DTC Logic

INFOID:000000006217925

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DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1553	BAT CURRENT SENSOR (Battery current sensor per- formance)	The signal voltage transmitted from the sensor to ECM is higher than the amount of the maximum power gener- ation.	 Harness or connectors (Battery current sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is shorted.) [Camshaft position sensor (bank 1) circuit is shorted.] (Crankshaft position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) Battery current sensor Accelerator pedal position sensor (bank 1) Crankshaft position sensor (bank 1) Crankshaft position sensor Camshaft position sensor Refrigerant pressure sensor Refrigerant pressure sensor EVAP control system pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 8 V or more at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for least 10 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-420, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217926

1.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

- 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 (V)	
Connector	Terminal	Glound	voltage (v)	
E63	2	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 2.

2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-II

EC-420

P1553 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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		E	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E63	2	E80	133	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

 ${\it 3.}$ detect malfunctioning part

Check the following.

Harness for open between battery current sensor and ECM

Loose or poor connection for each connector and harness

>> Repair open circuit.

${f 4.}$ CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

EC	Μ	Sensor		
Connector	Terminal	Name	Connector	Terminal
F110	76	Crankshaft position sensor	F74	1
FIIV	77	Camshaft position sensor (bank 1)	F84	1
133 E80	EVAP control system pressure sen- sor	C17	3	
	Refrigerant pressure sensor	E77	1	
131	APP sensor 2 (Without ICC)	E110	1	
	131	APP sensor 2 (with ICC)	E67	9
Is the inspection result normal?				

<u>Is the inspection result normal?</u>

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 (Refer to EC-301, "Component Inspection (Crankshaft Position Sensor)".) Μ

 Camshaft position sensor (bank 1) (Refer to EC-306, "Component Inspection (Camshaft Position Sensor)".) • EVAP control system pressure sensor (Refer to EC-520, "Component Function Check".)

• Refrigerant pressure sensor (Refer to EC-520, "Component Function Check".)

Is the inspection result normal?

VES	>> GO TO 6.
	>> Replace malfunctioning component.

6.CHECK APP SENSOR

Refer to EC-470, "Component Inspection (Accelerator Pedal Position Sensor)".

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 7.

I.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation" (Without distance control assist system) or ACC-4, "MODELS WITH DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation" (With distance control assist system).

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P1553 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

>> INSPECTION END

${f 8.}$ 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 cur	rent sensor	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E63	4	E80	150	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 9.

9. DETECT MALFUNCTIONING PART

Check the following.

Harness for open or short between battery current sensor and ECM

Loose or poor connection for each connector and harness

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

10. 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 cur	rent sensor	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E63	3	E80	138	Existed

2. 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 battery current sensor and ECM

· Loose or poor connection for each connector and harness

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

12. CHECK BATTERY CURRENT SENSOR

Refer to EC-427, "Component Inspection (Battery Current Sensor)".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace battery negative cable assembly.

13. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

P1553 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection (Battery Current Sensor)

Revision: 2010 May

1.CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable.

To body ground

- 4. Install jumper cable between battery negative terminal and body ground.
- 5. Turn ignition switch ON.
- 6. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM		
Connector	+	_	Voltage (V)
Connector	Terminal	Terminal	
E80	138 (Battery current sensor signal)	150	Approx. 2.5

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-159, "How to Handle Battery".

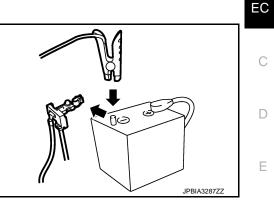
- Is the inspection result normal?
- YES >> INSPECTION END
- NO >> Replace battery negative cable assembly.



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P1554 BATTERY CURRENT SENSOR

DTC Logic

INFOID:000000006217928

[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1554	BAT CURRENT SENSOR (Battery current sensor per- formance)	The output voltage of the bat- tery current sensor is lower than the specified value while the battery voltage is high enough.	 Harness or connectors (Battery current sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is shorted.) [Camshaft position sensor (bank 1) circuit is shorted.] (Crankshaft position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is short- ed.) Battery current sensor Accelerator pedal position sensor Camshaft position sensor (bank 1) Crankshaft position sensor Refrigerant pressure sensor Refrigerant pressure sensor EVAP control system pressure sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform Component Function Check. Refer to <u>EC-424, "Component Function Check"</u>. **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-425, "Diagnosis Procedure".

Component Function Check

INFOID:000000006217929

1.PRECONDITIONING

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is 12.8 V or more 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-III

- 1. Start engine and let it idle.
- 2. Select "BAT CUR SEN" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "BAT CUR SEN" indication for 10 seconds. "BAT CUR SEN" should be above 2,300 mV at least once.
- **WITHOUT CONSULT-III**
- 1. Start engine and let it idle.
- 2. Check the voltage between ECM harness connector terminals as per the following.

P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

		ECM						
		+		_	Volta	ge (V)		
Connector		Terminal		Terminal	-	5 ()		ŀ
E80	(Battery c	138 current sensor s	signal)	150	Appro	ox. 2.5		
Is the inspe	ection res	ult normal?						
		CTION END C-425, "Diag	<u>gnosis</u>	Procedure	<u>.</u> .			
Diagnos	is Proce	edure					INFOID:00000006217930	
1.снеск	BATTER		IT SEN	SOR POW	ER SUPPL	Y CIRCUIT-		
		ery current	sensor	harness co	onnector.			
	nition sw		hattor	v current se	ansor harne	s connecto	r and ground.	
J. Offeck		ge between	Datter	y current se				
Batte	ry current s	ensor	-					
Connect	or -	Terminal	Gro	bund	Voltage (V)			
E63		2	Gro	ound	Approx. 5			
Is the inspe	ection res	ult normal?		L				
	> GO TO							
- ⁻	> GO TO							
		YCURREN	II SEN	ISOR POW	ER SUPPL	Y CIRCUIT-	I	
	nition sw	itch OFF. ∕I harness c						
					sensor harr	ness connec	tor and ECM harness connector.	
		-		-				
Battery c	urrent sense	or	ECN	N	Continuity			
Connector	Termir	nal Conne	ector	Terminal	Continuity			
E63	2	E8	C	133	Existed			
•		ult normal?						
	> GO TO > GO TO							
~		3. INCTIONIN	ם אם כ	т				
			J PAR	1				
 Check the Harness 		between bat	terv ci	irrent sensi	or and ECM			
		nection for e						
		open circuit.						
4. CHECK	SENSOF	R POWER S	SUPPL	Y CIRCUIT				
Check hari	ness for s	hort to powe	er and	short to gro	ound, betwe	en the follow	ving terminals.	
EC	M			Sensor				
Connector	Terminal		Name		Connector	Terminal		
	76	Crankshaft po	osition s	ensor	F74	1		
F110					+			

77

Camshaft position sensor (bank 1)

F84

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P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

EC	М	Sensor		
Connector	Terminal	Name	Connector	Terminal
	133	EVAP control system pressure sen- sor	C17	3
E80		Refrigerant pressure sensor	E77	1
	131	APP sensor 2 (Without ICC)	E110	1
	151	APP sensor 2 (with ICC)	E67	9

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 (Refer to EC-301, "Component Inspection (Crankshaft Position Sensor)".)
- Camshaft position sensor (bank 1) (Refer to EC-306, "Component Inspection (Camshaft Position Sensor)".)
- EVAP control system pressure sensor (Refer to <u>EC-520, "Component Function Check"</u>.)
- Refrigerant pressure sensor (Refer to <u>EC-520, "Component Function Check"</u>)

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Replace malfunctioning component.

6.CHECK APP SENSOR

Refer to EC-470, "Component Inspection (Accelerator Pedal Position Sensor)".

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 7.

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to <u>ACC-3</u>, "MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation" (Without distance control assist system) or <u>ACC-4</u>, "MODELS WITH DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation" (With distance control assist system).

>> INSPECTION END

${f 8}.$ 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 cur	rent sensor	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E63	4	E80	150	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 9.

9. DETECT MALFUNCTIONING PART

Check the following.

Harness for open or short between battery current sensor and ECM

Loose or poor connection for each connector and harness

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

10.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

Battery cu	irrent sensor	EC	M	Quatinuitu		
Connector	Terminal	Connector	Terminal	Continuity		
E63	3	E80	138	Existed		
Also ch	eck harness fo	or short to g	round and s	short to power.		
the inspe	ction result nor	mal?				
	GO TO 12. GO TO 11.					
_	CT MALFUNCT		лот			
Check the f Harness f		rt between	batterv curr	ent sensor and EC	Μ	
	poor connectio					
				or short to power in	harness or connectors.	
	K BATTERY C					
			tion (Batter	<u>y Current Sensor)"</u>		
	ction result nor GO TO 13.	<u>mar</u>				
-						
NO >>	Replace batte	ry negative	cable asse	mbly.		
	Replace batte			mbly.		
3. CHEC		ENT INCID	ENT	mbly.		
3. CHEC		ENT INCID	ENT	mbly.		
3. CHEC Refer to <u>GI</u>		ENT INCID	ENT	mbly.		
I3.CHEC Refer to <u>GI</u> >>	K INTERMITTI	ENT INCID	ENT		INFOID:000000	20062175
13.CHEC Refer to <u>GI</u> >> Compone	K INTERMITTE 40. "Intermitter INSPECTION ent Inspectio	ENT INCID nt Incident" END on (Batte	ENT ry Currer		INFOID:000000	00062175
3.CHEC Refer to <u>GI</u> >> Compone .CHECK	K INTERMITTE 40. "Intermitter INSPECTION ent Inspection BATTERY CUE	ENT INCID nt Incident" END on (Batte RRENT SE	ENT ry Currer		INFOID:000000	00062175
3.CHEC Refer to <u>GI</u> >> Compone .CHECK . Turn ig 2. Reconr	K INTERMITTE 40. "Intermitter INSPECTION ent Inspection BATTERY CUP nition switch Officer	ENT INCID nt Incident" END on (Batte RRENT SE FF. onnectors d	ENT ry Currer NSOR isconnected	nt Sensor)	INFOID:00000	00062179
I 3.CHEC Refer to <u>GI</u> >> Compone I.CHECK . Turn ig 2. Reconr	K INTERMITTE 40. "Intermitter INSPECTION ent Inspection BATTERY CUP	ENT INCID nt Incident" END on (Batte RRENT SE FF. onnectors d	ENT ry Currer NSOR isconnected	nt Sensor)	INFOID:000000	0006217
Arefer to GI Refer to GI >> Compone .CHECK . Turn ig . Reconr . Discon	K INTERMITTE 40. "Intermitter INSPECTION ent Inspection BATTERY CUP nition switch Officert harness con nect harness con	ENT INCID nt Incident" END on (Batte RRENT SE FF. onnectors d	ENT ry Currer NSOR isconnected	nt Sensor)		00062171
Arefer to GI Refer to GI >> Compone .CHECK . Turn ig . Reconr 3. Discon	K INTERMITTE 40. "Intermitter INSPECTION ent Inspection BATTERY CUP nition switch Office nect harness connect battery net fo body ground	ENT INCID nt Incident" END on (Batte RRENT SE FF. onnectors d gative cable	ENT ry Currer NSOR isconnected	nt Sensor)		00062177
Arefer to GI Refer to GI >> Compone I.CHECK . Turn ig . Reconr . Discon . Discon	K INTERMITTE 40. "Intermitter INSPECTION ent Inspection BATTERY CUP nition switch Office nect harness con nect battery ne To body ground umper cable be	ENT INCID nt Incident" END on (Batte RRENT SE FF. onnectors d gative cable	ENT ry Currer NSOR isconnected	nt Sensor)		00062171
Arefer to GI Refer to GI >> Compone .CHECK . Turn ig . Reconr . Discon . Discon	K INTERMITTE 40. "Intermitter INSPECTION ent Inspection BATTERY CUP nition switch Office nect barness con nect bartery ne fo body ground umper cable be	ENT INCID nt Incident" END on (Batte RRENT SE FF. onnectors d gative cable etween batt	TY Currer	nt Sensor) d.	y	00062173
Arrier to GI Refer to GI >> Compone .CHECK . Turn ig . Reconr . Discon . Install j ground . Turn ig . Check	K INTERMITTE 40. "Intermitter INSPECTION ent Inspection BATTERY CUP nition switch Office nect barness con nect bartery ne fo body ground umper cable be	ENT INCID <u>int Incident</u> END on (Batte RRENT SE FF. onnectors d gative cable etween batt N. tween ECM	TY Currer	nt Sensor)	y	00062177
Arrier to GI Refer to GI >> Compone .CHECK . Turn ig . Reconr . Discon . Install j ground . Turn ig . Check	K INTERMITTE 40. "Intermitter INSPECTION ent Inspection BATTERY CUP nition switch Off nect harness con nect battery ner To body ground umper cable be nition switch Off the voltage be	ENT INCID <u>int Incident</u> END on (Batte RRENT SE FF. onnectors d gative cable etween batt N. tween ECM	TY Currer	nt Sensor) d.	y	0006217
Arrier to GI Refer to GI >> Compone .CHECK . Turn ig . Reconr . Discon . Install j ground . Turn ig . Check	K INTERMITTE 40. "Intermitter INSPECTION ent Inspection BATTERY CUP nition switch Off nect harness con nect battery ner To body ground umper cable be nition switch Off the voltage be	ENT INCID <u>int Incident</u> END on (Batte RRENT SE FF. onnectors d gative cable etween batt N. tween ECM nditions.	TY Currer	nt Sensor) d. e terminal and bod connector terminal	y s	000062 17
Arrier to GI Refer to GI >> Compone .CHECK . Turn ig . Reconr . Discon . Install j ground . Turn ig . Check	K INTERMITTE 40. "Intermitter INSPECTION ent Inspection BATTERY CUP nition switch Off nect harness con nect battery ner fo body ground umper cable be nition switch Off the voltage be he following co	ENT INCID Int Incident" END On (Batte RRENT SE FF. Onnectors d gative cable etween batt N. tween ECM nditions.	TY Currer	nt Sensor) d.	y s	
Arefer to GI Refer to GI >> Compone .CHECK . Turn ig . Reconr . Discon . Discon . Install j ground . Turn ig . Check under t	K INTERMITTE 40. "Intermitter INSPECTION ent Inspection BATTERY CUP nition switch Of nect harness con nect battery new fo body ground umper cable be nition switch Of the voltage be he following co	ENT INCID Int Incident" END DON (Batter RRENT SE FF. Donnectors d gative cable etween batt N. etween ECM nditions.	ENT ry Currer NSOR isconnected ery negative A harness of	nt Sensor) d. e terminal and bod connector terminal	y s	

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace battery negative cable assembly.

P1556, P1557 BATTERY TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1556, P1557 BATTERY TEMPERATURE SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P1556 or P1557 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-381, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1556	BAT TMP SEN/CIRC (Battery temperature sensor circuit low input)	Signal voltage from Battery temperature sensor remains 0.16V or less for 5 seconds or more.	Harness or connectors [Battery current sensor (Battery temperature sensor) circuit is shorted.] (Crankshaft position sensor circuit is open or shorted.)
P1557	BAT TMP SEN/CIRC (Battery temperature sensor circuit high input)	Signal voltage from Battery temperature sensor remains 4.84V or more for 5 seconds or more.	 [Camshaft position sensor (bank 1) circuit is shorted.] (Accelerator pedal position sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is short- ed.) Battery current sensor (Battery temperature sensor) Crankshaft position sensor Camshaft position sensor (bank 1) Accelerator pedal position sensor 2 Refrigerant pressure sensor EVAP control system pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 10 V or more at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start the engine and let it idle at least 10 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-428, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217933

1.CHECK BATTERY TEMPERATURE SENSOR INPUT SIGNAL CIRCUIT-I

- 1. Disconnect battery current sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between battery current sensor hrness connector and ground.

Battery cur	rent sensor	Ground	Voltage (V)
Connector	Terminal	Ground	voltage (v)
E63	1	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 2.

EC-428

INFOID:000000006217932

P1556, P1557 BATTERY TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

 $\overline{2}$. CHECK BATTERY TEMPERATURE SENSOR INPUT SIGNAL CIRCUIT-II

- 1. Turn ignition switch ON.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery cur	rrent sensor	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E63	1	E80	139	Existed

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit.

3.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

	М	Sensor			
Connector	Terminal	Name	Connector	Terminal	
E110	76	Crankshaft position sensor	F74	1	
F110	77	Camshaft position sensor (bank 1)	F84	1	
		Battery current sensor	E63	2	
	133	Refrigerant pressure sensor	E77	1	
E80	100	EVAP control system pressure sen- sor	C17	3	
	131	APP sensor 2 (Without ICC)	E110	1	
	131	APP sensor 2 (with ICC)	E67	9	
4.снеск	•	short to ground or short to powe NENTS		ss or con	ctors.
4	COMPO	NENTS			ctors.
4.CHECK Check the Camshaf CKP sen Battery c Refrigera	COMPO following. t position sor (Refe urrent set ant pressu	NENTS sensor (bank 1) (Refer to <u>EC-</u> r to <u>EC-301, "Component Insp</u> nsor sensor (Refer to <u>EC-423,</u> ire sensor (Refer to <u>EC-520, "E</u>	306, "Comp ection (Cra "Compone Diagnosis F	oonent Ins nkshaft P nt Inspec Procedure	ection (Camshaft Position Sensor)" ition Sensor)".) n (Battery Current Sensor)".)
4.CHECK Check the Camshaf CKP sen Battery c Refrigera EVAP co	COMPO following. t position sor (Refe urrent set ant pressu	NENTS sensor (bank 1) (Refer to <u>EC-3</u> r to <u>EC-301, "Component Insp</u> nsor sensor (Refer to <u>EC-423,</u> ire sensor (Refer to <u>EC-520, "E</u> tem pressure sensor (Refer to	306, "Comp ection (Cra "Compone Diagnosis F	oonent Ins nkshaft P nt Inspec Procedure	ection (Camshaft Position Sensor)" ition Sensor)".) n (Battery Current Sensor)".)
4.CHECK Check the Camshaf CKP sen Battery c Refrigera EVAP co Pressure	COMPO following t position sor (Refe urrent set ant pressu ontrol system Sensor)	NENTS sensor (bank 1) (Refer to <u>EC-3</u> r to <u>EC-301, "Component Insp</u> nsor sensor (Refer to <u>EC-423,</u> ire sensor (Refer to <u>EC-520, "E</u> tem pressure sensor (Refer to	306, "Comp ection (Cra "Compone Diagnosis F	oonent Ins nkshaft P nt Inspec Procedure	ection (Camshaft Position Sensor)". ition Sensor)".)
4.CHECK Check the Camshaf CKP sen Battery c Refrigera EVAP co <u>Pressure</u> s the inspective YES >>	COMPO following. t position sor (Refe urrent set ant pressu ontrol syst <u>Sensor)</u> <u>ection res</u> > GO TO	NENTS sensor (bank 1) (Refer to <u>EC-3</u> r to <u>EC-301, "Component Insp</u> nsor sensor (Refer to <u>EC-423,</u> are sensor (Refer to <u>EC-520, "E</u> tem pressure sensor (Refer to .) <u>ult normal?</u>	306, "Comp ection (Cra "Compone Diagnosis F	oonent Ins nkshaft P nt Inspec Procedure	ection (Camshaft Position Sensor)" ition Sensor)".) n (Battery Current Sensor)".)
4.CHECK Check the Camshaf CKP sen Battery c Refrigera EVAP co <u>Pressure</u> s the inspective YES >>	COMPO following. t position sor (Refe urrent set ant pressu ontrol syst <u>Sensor)</u> ection res > GO TO > Replace	NENTS sensor (bank 1) (Refer to <u>EC-3</u> r to <u>EC-301. "Component Insp</u> nsor sensor (Refer to <u>EC-423,</u> are sensor (Refer to <u>EC-520, "E</u> tem pressure sensor (Refer to .) <u>ult normal?</u> 5. e malfunctioning component.	306, "Comp ection (Cra "Compone Diagnosis F	oonent Ins nkshaft P nt Inspec Procedure	ection (Camshaft Position Sensor)". ition Sensor)".) n (Battery Current Sensor)".)
4.CHECK Check the Camshaf CKP sen Battery c Refrigera EVAP co <u>Pressure</u> Sthe inspective YES >= NO >= 5.CHECK	COMPO following. t position sor (Refe urrent set ant pressu ontrol syst <u>Sensor)</u> ection res > GO TO > Replace	NENTS sensor (bank 1) (Refer to <u>EC-3</u> r to <u>EC-301. "Component Insp</u> nsor sensor (Refer to <u>EC-423,</u> are sensor (Refer to <u>EC-520, "E</u> tem pressure sensor (Refer to .) <u>ult normal?</u> 5. e malfunctioning component.	306, "Comp ection (Cra "Compone Diagnosis F D EC-335,	oonent Ins nkshaft P nt Inspec Procedure "Compon	ection (Camshaft Position Sensor)". ition Sensor)".) n (Battery Current Sensor)".) t Inspection (EVAP Control Syster

YES >> GO TO 9.

NO >> GO TO 6.

6.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly.

>> INSPECTION END

7.CHECK BATTERY TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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P1556, P1557 BATTERY TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

- 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		Continuity	
E63	4	E80	150	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, short to ground or short to power in harness or connectors.

8.CHECK BATTERY TEMPERATURE SENSOR

Refer to EC-430, "Component Inspection (Battery Temprature Sensor)".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace battery negative cable assembly.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Battery Temprature Sensor)

1.CHECK BATTERY TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect battery current sensor.

3. Check the resistance between battery current sensor connector terminals.

Battery cur	Resistance	
+		
Terr		
1	4	continuity with the resistance value 100 Ω or more

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

INFOID:000000006217934

P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

P1564 ASCD STEERING SWITCH

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-376, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (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 (The switch circuit is open or shorted.) ASCD steering switch ECM
DTC CO	NFIRMATION PROCEI	DURE	
1.PREC	ONDITIONING		
2. Turn i	ignition switch OFF and v ignition switch ON. ignition switch OFF and v		
>	>> GO TO 2.		
2.PERFC	ORM DTC CONFIRMATIO	ON PROCEDURE	
 Press Press Press onds. 	CANCEL switch for at le RESUME/ACCELERAT	ait at least 10 seconds. 10 seconds, then release it and wait at east 10 seconds, then release it and wai E switch for at least 10 seconds, then at least 10 seconds, then release it and	it at least 10 seconds. release it and wait at least 10 sec-
6. Checl	k DTC.	,	
	e <u>tected?</u> -> Go to <u>EC-431, "Diagno</u> -> INSPECTION END	osis Procedure".	
Diagnos	sis Procedure		INFOID:00000006217936
1. CHEC	K ASCD STEERING SW	ITCH CIRCUIT	
1. Turn i	CONSULT-III ignition switch ON. tt "MAIN SW", "CANCEL	SW", "RESUME/ACC SW" and "SET S	W" in "DATA MONITOR" mode with

- 2. Select "MAIN SW", "CANCEL SW", "RESUME// CONSULT-III.
- 3. Check each item indication under the following conditions.

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
MAIN SW		Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
CANCEL SW	CANCEL Switch	Released	OFF
RESUME/ACC SW	RESUME/ACCELERATE	Pressed	ON
RESUME/ACC SW	switch	Released	OFF

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P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

Monitor item	Condition		Indication	
SET SW	SET/COAST switch	Pressed	ON	
3L1 3W	SET/COAST SWIGH	Released	OFF	

♥ WITHOUT CONSULT-III

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals under the following conditions.

ECM				
Connector	+	_	- Condition	
Connector	Terminal	Terminal		
			MAIN switch: Pressed	Approx. 0
E80 (ASCD stee		130	CANCEL switch: Pressed	Approx. 1
	128 (ASCD steering switch signal)		SET/COAST switch: Pressed	Approx. 2
			RESUME/ACCELERATE switch: Pressed	Approx. 3
			All ASCD steering switches: Released	Approx. 4

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 2.

2. Check ascd steering switch ground circuit for open and short

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

Combination switch		ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
_	32	E80	130	Existed	

5. 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.

• Combination switch (spiral cable)

• Harness for open and short between ECM and combination switch

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

4.CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between combination switch and ECM harness connector.

Combinat	Combination switch		ECM	
Connector	Terminal	Connector Terminal		Continuity
_	25	E80	128	Existed

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

Is the inspection result normal?

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

FEA AGOD STEEDING SWITCH

		P1564 ASCD STEE	RING SWITCH	
< DTC/CI	RCUIT DI	AGNOSIS >		[VK56VD]
5.DETEC	T MALFU	NCTIONING PART		
	ation switcl	h (spiral cable) and short between ECM and combina	tion switch	EC
•	•	pen circuit, short to ground or short to FEERING SWITCH	power in harness or	connectors.
		omponent Inspection (ASCD Steering	Switch)".	
-		ult normal?		D
	> GO TO 7 > Replace	ASCD steering switch. Refer to <u>ST-3</u>	3, "Removal and Insta	allation".
	•			
Refer to G	il-40, "Inter	rmittent Incident".		
>	> INSPEC	TION END		F
Compor	nent Insp	pection (ASCD Steering Swite	h)	INF0ID:00000006217937
1 0150		TEERING SWITCH		G
2. Disco		bination switch (spiral cable) harness between combination switch harn		als under the following condi-
Combing	tion outlab			I
Combina	tion switch Terminals	Condition	Resistance (Ω)	
Connector	Terrininais	MAIN switch: Pressed	Approx. 0	
		CANCEL switch: Pressed	Approx. 250	0
M302	13 and 16	SET/COAST switch: Pressed	Approx. 660	
		RESUME/ACCELERATE switch: Pressed	Approx. 1,480	K
		All ASCD steering switches: Released	Approx. 4,000	
Is the insp	ection resu	ult normal?		L
		TION END		
NO >	> Replace	ASCD steering switch. Refer to ST-3	3, "Removal and Insta	
				N
				Ν
				C
				P

P1564 ICC STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

P1564 ICC STEERING SWITCH

DTC Logic

NOTE:

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-376, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause	
P1564	ASCD SW (ICC steering switch)	 An excessively high voltage signal from the ICC steering switch is sent to ECM. ECM detects that input signal from the ICC steering switch is out of the specified range. ECM detects that the ICC steering switch is stuck ON. 	 Harness or connectors (The switch circuit is open or shorted.) ICC steering switch ECM 	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 10 seconds.
- 2. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 3. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 5. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 6. Press DISTANCE switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 7. Press LDP switch for at least 10 seconds, then release it at wait at least 10 seconds.
- 8. Check DTC.

Is DTC detected?

YES >> Go to <u>EC-434, "Diagnosis Procedure"</u>.

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217939

1. CHECK ICC STEERING SWITCH CIRCUIT

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals under the following conditions.

INFOID:00000006217938

P1564 ICC STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

	ECM				
Connector	+		-	Condition	Voltage (V)
Connector	Termir	nal	Terminal		
				MAIN switch: Pressed	Approx. 0
				DYNAMIC DRIVER ASSISTANCE switch: Pressed	Approx. 1.0
				CANCEL switch: Pressed	Approx. 1.9
E80	E80 128 (ICC steering switch signal)			DISTANCE switch: Pressed	Approx. 2.6
(ICC steering switch signal)		······································		SET/COAST switch: Pressed	Approx. 3.2
				RESUME/ACCELERATE switch: Pressed	Approx. 3.7
				All ICC steering switches: Released	Approx. 4.2
NO >: CHECK Turn iç Discor Discor	nition switch (nect ECM hai nect combina	OFF. rness conn tion switch	ector. harness	ND CIRCUIT FOR OPEN AND SHORT connector. on switch and ECM harness connector.	
Combin	ation switch		ECM		
Connector		Connector	Termi	Continuity	
	32	E80	130	Existed	
ES >: IO >: DETEC neck the Combina Harness	- > Repair open	Diral cable) short betwee circuit, sho	een ECM	and combination switch und or short to power in harness or connector SIGNAL CIRCUIT FOR OPEN AND SHOR	
	-			on switch and ECM harness connector.	
	ation switch			Continuity	
Connector		Connector	Termi		
	25	E80	130		
			ground a	and short to power.	
YES >: NO >:	<u>ection result n</u> > GO TO 6. > GO TO 5. T MALFUNCT		ART		

Check the following.

Combination switch (spiral cable)

· Harness for open and short between ECM and combination switch

P1564 ICC STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

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

6.CHECK ICC STEERING SWITCH

Refer to EC-436, "Component Inspection (ICC Steering Switch)".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace ICC steering switch. Refer to <u>ST-33</u>, "Removal and Installation".

7. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ICC Steering Switch)

1. CHECK ICC STEERING SWITCH

- 1. Turn ignition switch OFF.
- 2. Disconnect combination switch (spiral cable) harness connector M302.
- 3. Check resistance between combination switch harness connector terminals under the following conditions.

Combinat	ion switch	Condition	Resistance (Ω)
Connector	Terminals	Condition	
		MAIN switch: Pressed	Approx. 0
		DYNAMIC DRIVER ASSISTANCE switch: Pressed	Approx. 270
		CANCEL switch: Pressed	Approx. 620
M302	13 and 16	DISTANCE switch: Pressed	Approx. 1,100
		SET/COAST switch: Pressed	Approx. 1,810
		RESUME/ACCELERATE switch: Pressed	Approx. 3,000
		All ICC steering switches: Released	Approx. 5,420

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ICC steering switch. Refer to <u>ST-33, "Removal and Installation"</u>.

INFOID:000000006217940

[VK56VD]

P1568 ICC FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

P1568 ICC FUNCTION

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1568 is displayed with DTC UXXXX, perform the trouble diagnosis for DTC UXXXX.
- If DTC P1568 is displayed with DTC P0605, perform the trouble diagnosis for DTC P0605. Refer to <u>EC-376, "DTC Logic"</u>.
- If DTC P1568 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to <u>EC-378, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC Detecting Condition	Possible Cause					
P1568	ICC COMMAND VALUE (ICC function)	ECM detects a difference between signals from ADAS control unit is out of specified range.	 Harness or connectors (The CAN communication line is open or shorted.) ADAS control unit ECM 	E				
DTC CO	DTC CONFIRMATION PROCEDURE							
1.PREC	1.PRECONDITIONING							
	gnition switch OFF and wa gnition switch ON.	ait at least 10 seconds.						
3. Turn i	0							
Step 2 ma	ay be conducted with the		by driving the vehicle. If a road test					
is expect	ed to be easier, it is unne	ecessary to lift the vehicle.						
>	> GO TO 2.							
2.PERFC	ORM DTC CONFIRMATIO	N PROCEDURE		J				
2. Press 3. Drive CAUT	-	0 km/h (25 MPH).		K				
4. Press 5. Checl	ys drive vehicle at a safe SET/COAST switch. < DTC.	speed.		L				
YES >								
Diagnos	Diagnosis Procedure							
1. REPLA	1.REPLACE ADAS CONTROL UNIT							
 Replace ADAS control unit. Refer to <u>DAS-63</u>, "<u>Removal and Installation</u>". Check DTC of ADAS control unit. Refer to <u>DAS-38</u>, "<u>DTC Index</u>". 								
>	> INSPECTION END			Ρ				

EC

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INFOID:000000006217941

[VK56VD]

< DTC/CIRCUIT DIAGNOSIS >

P1572 ASCD BRAKE SWITCH

DTC Logic

INFOID:000000006217943

[VK56VD]

DTC DETECTION LOGIC

NOTE

- If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-376, "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 is turned OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition		Possible cause
		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 (The stop lamp switch circuit is shorted.) Harness or connectors (The ASCD brake switch circuit is short-
P1572	ASCD BRAKE SW (ASCD brake switch)	B)	ASCD brake switch signal is not sent to ECM for extremely long time while the ve- hicle is being driven.	ed.) • Stop lamp switch • ASCD brake switch • Incorrect stop lamp switch installation • Incorrect ASCD brake switch installation • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

Turn ignition switch ON. 2.

3. Turn ignition switch OFF and wait at least 10 seconds.

NOTE:

The procedure for malfunction B is not described. It takes an extremely long time to complete the procedure for malfunction B. By performing the procedure for malfunction A, the condition that causes malfunction B can be detected.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Start engine (VDC switch OFF).
- 2. Press MAIN switch and check that CRUISE indicator is displayed in combination meter.
- 3. Drive the vehicle for at least 5 consecutive seconds under 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 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-439, "Diagnosis Procedure". >> GO TO 3.

NO

3.PERFORM DTC CONFIRMATION PROCEDURE

EC-438

^{1.} Drive the vehicle for at least 5 consecutive seconds under the following conditions. **CAUTION:**

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

А

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.

					EC
Vehicle speed	More than 30 km/h ((19 mph)			
Selector lever	Suitable position				
Driving location	Depress the brake p not to come off from				С
2. Check 1st trip D	TC.				
Is 1st trip DTC detect	<u>ted?</u>				D
YES >> Go to E NO >> INSPEC	<u>C-439, "Diagnosis</u> TION END	<u>s Procedure"</u> .			F
Diagnosis Proce	edure			INFOID:000000006217944	
1. CHECK OVERAL	L FUNCTION-I				F
WITH CONSULT	-111				
	itch ON. SW1" in "DATA M SW1" indication ι				G
Manitaritan	Candi	tion	Indication		
Monitor item	Condi		Indication		Н
BRAKE SW1	Brake pedal	ghtly depressed	OFF		

WITHOUT CONSULT-III

(ASCD brake switch)

1. Turn ignition switch ON.

Brake pedal

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

Fully released

	ECM					
Connector	+	_	C	ondition	Voltage (V)	K
Connector	Terminal	Terminal				1.
E80	147	175	Brake pedal	Slightly depressed	Approx. 0	
200	(ASCD brake switch signal)	175	Diake pedal	Fully released	Battery voltage	L

ON

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

WITH CONSULT-III

Select "BRAKE SW2" and check indication under the following conditions.

Monitor item	C	Indication	
BRAKE SW2	Brako podal	Slightly depressed	ON
(Stop lamp switch)	Brake pedal	Fully released	OFF

🛞 WITHOUT CONSULT-III

Check the voltage between ECM harness connector terminals under the following conditions.

Μ

Ν

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< DTC/CIRCUIT DIAGNOSIS >

ECM						
Connector	+	_	Condition		Voltage (V)	
Connector	Terminal	Terminal				
E80	158	175	Brake pedal	Slightly depressed	Battery voltage	
E80	(Stop lamp switch signal)	175	Diake pedai	Fully released	Approx. 0	

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 8.

3.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

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 bra	ike switch	Ground	Voltage	
Connector	Terminal	Giouna	voltage	
E109	1	Ground	Battery voltage	

Is the inspection result normal?

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

NU >> GU IU

4.DETECT MALFUNCTIONING PART

Check the following.

• 10 A fuse (No. 3)

- Harness for open or short between ASCD brake switch and fuse
- Loose or poor connection for each connector and harness

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

5. Check ascd brake switch input signal circuit for open and short

- 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 bra	ke switch	ECM				Continuity
Connector	Terminal	Connector Terminal		Continuity		
E109	2	E80	147	Existed		

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

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

Harness for open or short between ECM and ASCD brake switch

· Loose or poor connection for each connector and harness

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

7. CHECK ASCD BRAKE SWITCH

Refer to <u>EC-442</u>, "Component Inspection (ASCD Brake Switch)" Is the inspection result normal?

Revision: 2010 May

< DTC/CIR	CUIT DIAG	GNOSIS >		ZAJU	D BRARE SWITCH	[VK56VD]
	GO TO 13					
-	Replace A					A
Ö. CHECK	STOP LAN	IP SWITC	H POWE	ER SUPI	PLY CIRCUIT	
2. Disconr	nition switc nect stop la the voltage	amp switch			ctor. harness connector and ground.	EC
			1			С
· · · · · · · · · · · · · · · · · · ·	np switch	Ground	Volta	age		0
Connector	Terminal					
E115	1	Ground	Battery	voltage		D
	GO TO 10 GO TO 9.).				E
Check the fe						
 10 A fuse 	(No. 7)					F
					witch and battery	
 Loose or p 	boor conne	ection for e	each con	nector a	nd namess	G
>>	Repair op	en circuit.	short to	around a	or short to power in harness or connectors.	
				-	NAL CIRCUIT FOR OPEN AND SHORT	
	nect ECM ł					H
					ch harness connector and ECM harness connec	ctor.
					_	I
Stop lamp	switch	ECM	1	Continui	tv	
Connector	Terminal C	Connector	Terminal	Continua		I
E115	2	E80	158	Existed	<u>.</u>	J
			t to grou	nd and s	short to power.	
Is the inspe						K
	GO TO 12 GO TO 11					
	CT MALFU			г		1
Check the fo						L
		short betw	veen EC	M and st	top lamp switch	
 Loose or p 						M
				ground o	or short to power in harness or connectors.	Ν
12.снес	K STOP LA	AMP SWIT	ГСН			11
			spection	(Stop L	amp Switch)".	
Is the inspe						0
	GO TO 13		witch			
NO >> 13.снес	Replace s	• •		т		D
-				I		P
Refer to GI-	40, "Interm		<u>aent"</u> .			

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection (ASCD Brake Switch)

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 under the following conditions.

Terminals	С	Continuity	
1 and 2	2 Brake pedal	Fully released	Existed
i anu z		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 <u>BR-21, "Inspection and Adjustment"</u>.
- 2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	С	Continuity	
1 and 2	Brake nedal	Fully released	Existed
T and Z	1 and 2 Brake pedal	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD brake switch. Refer to <u>BR-20, "Removal and Installation"</u>.

Component Inspection (Stop Lamp Switch)

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	С	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 <u>BR-21, "Inspection and Adjustment"</u>.
- 2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	C	Continuity	
1 and 2	Brake pedal	Fully released	Not existed
r anu z		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to <u>BR-20, "Removal and Installation"</u>.

EC-442

INFOID:000000006217946

P1572 ICC BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

P1572 ICC BRAKE SWITCH

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-376, "DTC Logic"</u>.
- 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 is turned OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)		DTC detecting condition	Possible cause	E
		A)	ON signals from the stop lamp switch and the ICC brake switch are sent to ECM at the same time.	 Harness or connectors (The stop lamp switch circuit is shorted.) Harness or connectors 	F
P1572	ASCD BRAKE SW (ICC brake switch)	B)	ICC brake switch signal is not sent to ECM for extremely long time while the vehicle is being driven	 (The ICC brake switch circuit is shorted.) Stop lamp switch ICC brake switch ICC brake hold relay Incorrect stop lamp switch installation Incorrect ICC brake switch installation ECM 	G

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

NOTE:

The procedure for malfunction B is not described. It takes an extremely long time to complete the procedure for malfunction B. By performing the procedure for malfunction A, the condition that causes malfunction B can be detected.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine (VDC switch OFF).
- 2. Press MAIN switch and check that CRUISE indicator is displayed in combination meter.
- 3. Drive the vehicle for at least 5 consecutive seconds under 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.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to <u>EC-444, "Diagnosis Procedure"</u>. NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Drive the vehicle for at least 5 consecutive seconds under the following conditions. **CAUTION:**

EC-443

INFOID:000000006217947

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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 5 seconds so as not to come off from the above-mentioned vehicle speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-444, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217948

1. CHECK DTC WITH ADAS CONTROL UNIT

Refer to DAS-21, "CONSULT-III Function (ICC/ADAS)" and DAS-38, "DTC Index".

Are any DTCs detected?

YES >> Perform the Diagnosis Procedure corresponding to the detected DTC.

NO >> GO TO 2.

2. CHECK OVERALL FUNCTION-I

B WITH CONSULT-III

1. Turn ignition switch ON.

2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.

3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Co	Indication	
BRAKE SW1	Brake pedal	Slightly depressed	OFF
(ICC brake switch)	втаке редаг	Fully released	ON

WITHOUT CONSULT-III

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM				
Connector +		_	Condition		Voltage (V)
Connector	Terminal				
E80	147	175	Brake pedal	Slightly depressed	Approx. 0
LOU	(ICC brake switch signal)	175	Diake pedai	Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

3.CHECK ICC BRAKE SWITCH POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch OFF.
- 2. Disconnect ICC brake switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ICC brake switch harness connector and ground.

ICC brak	e switch	Ground	Voltage
Connector	Terminal	Ground	vollage
E68	1	Ground	Battery voltage

P1572	ICC	BRAKE	SWITCH
-------	-----	-------	--------

< DTC/CIRC	CUIT DIAG	NOSIS >	1 1012		[VK56VD]
s the inspec		normal?			
	GO TO 5. GO TO 4.				
			ART		
Check the fo	llowing.				
10 A fuse	(No. 3)				
				ke switch and fuse and harness	
-			•	und in harness or connectors.	
D.CHECK I	CC BRAKE	E SWITCH IN	NPUT SIG	NAL CIRCUIT FOR OPEN AND SHO	RT
	ition switch	n OFF. arness conn	octor		
				switch harness connector and ECM h	arness connector.
ICC brake		EC		Continuity	
Connector	Terminal	Connector	Terminal		
E68	2	E80	147	Existed	
			ground ar	nd short to power.	
	<u>ction result</u> GO TO 7.	<u>normal?</u>			
	GO TO 7. GO TO 6.				
.DETECT	MALFUNC		ART		
heck the fo	llowing.				
Harness fo	or open or s			ke switch and ECM	
Loose or p	oor connec	ction for each	n connecto	r and harness	
>>	Repair ope	n circuit. sho	ort to arou	nd or short to power in harness or con	inectors.
CHECK I				· · · · · · · · · · · · · · · · · · ·	
Refer to EC-	445. "Com	ponent Inspe	ection (ICC	Brake Switch)".	
s the inspec					
	GO TO 8.				
		C brake swi			
		ENT INCIDI			
efer to <u>GI-4</u>	40, "Intermi	ttent Inciden	<u>it"</u> .		
ompone	nt inspe	ction (ICC	Brake	Switch)	INFOID:00000006217949
.CHECK I	CC BRAKE	SWITCH-I			
. Turn ign	ition switch	OFF.			
2. Disconn	ect ICC bra	ake switch h			
. Check th	he continui	ty between l	CC brake	switch terminals under the following c	onditions.
Terminals		ondition	Co	ntinuity	
		Fully released		kisted	
1 and 2	Brake pedal		L,		

 1 and 2
 Brake pedal
 Fully released
 Existed

 Slightly depressed
 Not existed

Is the inspection result normal?

YES >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

- 2.CHECK ICC BRAKE SWITCH-II
- 1. Adjust ICC brake switch installation. Refer to <u>BR-21, "Inspection and Adjustment"</u>.
- 2. Check the continuity between ICC brake switch terminals under the following conditions.

Terminals	(Continuity	
1 and 2	Brake pedal	Fully released	Existed
	Diake pedal	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ICC brake switch. Refer to <u>BR-20, "Removal and Installation"</u>.

Component Inspection (Stop Lamp Switch)

INFOID:000000006217950

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	C	Continuity	
1 and 2	Brake pedal	Fully released	Not existed
	Diake pedai	Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

2.CHECK STOP LAMP SWITCH-II

- 1. Adjust stop lamp switch installation. Refer to <u>BR-21, "Inspection and Adjustment"</u>.
- 2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	С	Continuity	
1 and 2	Brake pedal	Fully released	Not existed
	Diake pedai	Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to <u>BR-20, "Removal and Installation"</u>.

P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1574 ASCD VEHICLE SPEED SENSOR

Description

The ECM receives two vehicle speed signals by the 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 <u>EC-48</u>, "<u>AUTOMATIC SPEED CONTROL DEVICE (ASCD)</u>: <u>System Description</u>" for ASCD functions.

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1574 is displayed with DTC UXXXX, perform the trouble diagnosis for DTC UXXXX.
- If DTC P1574 is displayed with DTC P0500, perform the trouble diagnosis for DTC P0500. Refer to <u>EC-356, "DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0605, perform the trouble diagnosis for DTC P0605. Refer to <u>EC-376, "DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to F EC-378, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause	G
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 (The CAN communication line is open or shorted.) Combination meter ABS actuator and electric unit (control unit) Wheel sensor TCM ECM 	H

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine (VDC switch OFF).
- 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 <u>EC-449</u>, "Diagnosis Procedure". NO >> INSPECTION END

Diagnosis Procedure

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to <u>TM-61, "CONSULT-III Function (TRANSMISSION)"</u>. Is the inspection result normal?

EC-447

INFOID:00000006288351

INFOID:000000006288349

INFOID:000000006288350

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P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 2.

NO >> Perform Diagnosis Procedure corresponding to the DTC indicated.

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

Refer to <u>BRC-40, "CONSULT-III Function"</u>.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform Diagnosis Procedure corresponding to the DTC indicated.

3.CHECK DTC WITH "COMBINATION METER"

Refer to MWI-30, "CONSULT-III Function".

>> INSPECTION END

P1574 ICC VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1574 ICC VEHICLE SPEED SENSOR

Description

The ECM receives two vehicle speed signals by the CAN communication line. One is sent from "combination meter", and the other is from TCM (Transmission control module). The ECM uses these signals for ICC control. Refer to <u>CCS-12</u>, "System Description" for ICC functions.

DTC Logic

DTC DETECTION LOGIC **NOTE**:

- If DTC P1574 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-356, "DTC Logic".
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-376, "DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-378, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1574	ASCD VHL SPD SEN (ICC vehicle speed sensor)	 Harness or connectors (The CAN communication line is open or shorted.) Combination meter ABS actuator and electric unit (control unit) Wheel sensor TCM ECM 	
_	NFIRMATION PROCE	EDURE	
1.PREC	ONDITIONING		
2. Turn	ignition switch ON.	wait at least 10 seconds.	
3. Turn	ignition switch OFF and	wait at least 10 seconds.	
	>> GO TO 2.		
2.PERF	ORM DTC CONFIRMAT	TION PROCEDURE	
	engine (VDC switch OF		
	e the vehicle at more tha TION:	n 40 km/n (25 MPH).	
Alwa NOT	iys drive vehicle at a s F·	afe speed.	
This	procedure may be cor	ducted with the drive wheels lifted in be easier, it is unnecessary to lift th	
	k DTC.		
<u>ls DTC d</u> YES	<u>etected?</u> >> Proceed to <u>EC-449, '</u>	"Diagnosis Procedure"	
	>> INSPECTION END	<u>Blaghosio Proceduro</u> .	
Diagno	sis Procedure		INFOID:00000006288354
1. CHEC	K DTC WITH TCM		
		M-61, "CONSULT-III Function (TRANSI	MISSION)".
	pection result normal?		
YES	>> GO TO 2.		

EC-449

[VK56VD]

INFOID:00000006288352

INFOID:000000006288353

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P1574 ICC VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

NO >> Perform Diagnosis Procedure corresponding to the DTC indicated.

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

Refer to BRC-40, "CONSULT-III Function".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform Diagnosis Procedure corresponding to the DTC indicated.

3. CHECK DTC WITH "COMBINATION METER"

Check combination meter function. Refer to <u>MWI-30, "CONSULT-III Function"</u>.

>> INSPECTION END

P1606 VVEL CONTROL MODULE

< DTC/CIRCUIT DIAGNOSIS >

P1606 VVEL CONTROL MODULE

DTC Logic

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INFOID:000000006217951

[VK56VD]

DTC DETECTION LOGIC EC Trouble diagnosis name DTC No. DTC detecting condition Possible cause (Trouble diagnosis content) · VVEL control module calculation function is VVEL CONTROL MODULE P1606 malfunctioning. VVEL control module (VVEL control module) VVEL EEP-ROM system is malfunctioning. D DTC CONFIRMATION PROCEDURE 1.PRECONDITIONING Ε Turn ignition switch OFF and wait at least 10 seconds. 1. Turn ignition switch ON. 2. Turn ignition switch OFF and wait at least 10 seconds. 3. F **TESTING CONDITION:** Before performing the following procedure, confirm that battery voltage is 10 V or more at idle. >> GO TO 2. 2. PERFORM DTC CONFIRMATION PROCEDURE Turn ignition switch ON and wait at least 1 second. 1. Н 2. Check DTC. Is DTC detected? YES >> Go to EC-451, "Diagnosis Procedure". >> INSPECTION END NO Diagnosis Procedure INFOID:000000006217952 1.PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. Κ Erase DTC. 2. 3. Perform DTC Confirmation Procedure. See EC-451, "DTC Logic". L Is the DTC P1606 displayed again? YES >> Replace VVEL control module. Refer to EC-536, "Removal and Installation". NO >> INSPECTION END Μ Ν

< DTC/CIRCUIT DIAGNOSIS >

P1607 VVEL CONTROL MODULE

DTC Logic

INFOID:000000006217953

[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1607	VVEL CONTROL MODULE (VVEL control module circuit)	 The internal circuit of the VVEL control module is malfunctioning. 	VVEL control module

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 10 V or more at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to EC-452, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217954

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.

- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure. See <u>EC-452, "DTC Logic"</u>.

Is the DTC P1607 displayed again?

- YES >> Replace VVEL control module. Refer to EC-536, "Removal and Installation".
- NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

DTC DETECTION LOGIC

P1608 VVEL SENSOR POWER SUPPLY

DTC Logic

INFOID:000000006217955

[VK56VD]

DTC No.	Trouble diagnosis na (Trouble diagnosis cor		DTC detecting condition		Possible cause
P1608	VVEL SENSOR POWER/ (VVEL sensor power supp		ontrol module detects a v r source for sensor is exc ^r high.	voltage cessive-	Harness or connectors (VVEL control shaft position sensor power supply circuit is open or shorted.) VVEL control shaft position sensor VVEL control module
DTC COI	VFIRMATION PROC	EDURE			
1.PREC	ONDITIONING				
2. Turn i 3. Turn i TESTING	gnition switch OFF an gnition switch ON. gnition switch OFF an CONDITION: erforming the followi	d wait at least 1	0 seconds.	y voltage	is 10 V or more at idle.
~	>> GO TO 2. DRM DTC CONFIRMA	TION PROCED	URE		
2. Chec <u>s DTC de</u> YES >	gnition switch ON and k DTC. <u>etected?</u> -> Go to <u>EC-453. "Diar</u> -> INSPECTION END				
Diagnos	sis Procedure				INFOID:00000006217956
1. CHEC	K VVEL CONTROL SH	AFT POSITIO	N SENSOR POWER	R SUPPLY	′ CIRCUIT-I
2. Turn i	nnect VVEL control sh gnition switch ON. k the voltage between	-			connector and ground.
	VVEL control shaft position	sensor			
Banl		Terminal	Ground	Voltage	
	F 70	3			
1	F72	6	Ground	Approx. 5V	
2	F70	3	Ground	Appiox. 5V	
2	170	6			
YES >	 > GO TO 5. > GO TO 2. 				
	K VVEL CONTROL SH	AFT POSITIO	N SENSOR POWER	R SUPPLY	′ CIRCUIT-II
2. Disco 3. Chec	gnition switch OFF. nnect VVEL control m k the continuity betwe le harness connector.			isor harne	ess connector and VVEL control

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P1608 VVEL SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

VVEL co	VVEL control shaft position sensor			VVEL control module		
Bank	Connector	Terminal	Connector	Terminal	Continuity	
1	F72	3		7		
I	F72	6	F56	20	Existed	
2	E70	3	F30	9	Existed	
2	F70	6		22		

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

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 VVEL control shaft position sensor and VVEL control module

Loose or poor connection for each connector and harness

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

4.CHECK INTERMITTENT INCIDENT

Refer to GI-40. "Intermittent Incident".

Is the inspection result normal?

YES >> Replace VVEL control module. Refer to <u>EC-536, "Removal and Installation"</u>.

NO >> Repair or replace.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace.

6.REPLACE VVEL LADDER ASSEMBLY

Replace VVEL ladder assembly. Refer to EM-75, "Removal and Installation".

>> NSPECTION END

P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

P1805 BRAKE SWITCH

DTC Logic

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INFOID:000000006217957

DTC No.	Trouble diagr (Trouble diagno		DTC detecting condition	Possible cause
P1805	BRAKE SW/CII (Brake switch)	RCUIT	A brake switch signal is not sent to ECM for extremely long time while the vehicle is being driven.	 Harness or connectors (Stop lamp switch circuit is open or shorted.) Stop lamp switch
	FIRMATION	I PROCEI	DURE	
1.PERFC	RM DTC CO	NFIRMATI	ON PROCEDURE	
2. Fully o 3. Erase 4. Check <u>s 1st trip I</u> YES >	the DTC. 1st trip DTC. DTC detected	ake pedal <u>?</u> 55, "Diagno	for at least 5 seconds. osis Procedure".	
Diagnos	is Procedu	re		INFOID:00000000621795
	STOP LAMF		CIRCUIT	
	gnition switch for stop lamp		on under the following conditions.	
	Condition		Stop lamp	
Brake peda	Fully rel	eased	Not illuminated	
Brake pour	 Slightly de	epressed	Illuminated	
•	ection result r	ormal?		
	> GO TO 4. > GO TO 2.			
^			POWER SUPPLY CIRCUIT	
			arness connector. op lamp switch harness connector a	and ground.
	amp switch	Ground	Veltage	
Stop I	Tarminal	Ground	Voltage	
Stop I Connecto	r Terminal			
	1 1	Ground	Battery voltage	
Connecto E115			Battery voltage	
Connecto E115 Is the insp YES > NO >	1 ection result r > GO TO 4. > GO TO 3.	ormal?		
Connecto E115 Is the insp YES > NO >	1 ection result r > GO TO 4.	ormal?		
Connecto E115 Is the insp YES > NO >	1 ection result r > GO TO 4. > GO TO 3. T MALFUNC	ormal?		
Connecto E115 Is the insp YES > NO > 3.DETEC Check the • 10 A fus	1 ection result r > GO TO 4. > GO TO 3. T MALFUNC ⁻ following. e (No. 7)	iormal? TIONING F		

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

EC-455

P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

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 stop lamp switch harness connector and ECM harness connector.

Stop lam	p switch	EC	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E115	2	E80	158	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 stop lamp switch

Loose or poor connection for each connector and harness

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

6.CHECK STOP LAMP SWITCH

Refer to EC-456, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace stop lamp switch. Refer to <u>BR-20, "Removal and Installation"</u>.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Stop Lamp Switch)

INFOID:000000006217959

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	C	Continuity	
1 and 2	1 and 2 Brake pedal	Fully released	Not existed
r anu z		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 <u>BR-21, "Inspection and Adjustment"</u>.

2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	C	Continuity	
1 and 2	Brake pedal	Fully released	Not existed
T and Z		Slightly depressed	Existed

Is the inspection result normal?

P1805 BRAKE SWITCH

YES >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace stop lamp switch. Refer to <u>BR-20, "Removal and Installation"</u>.

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P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

DTC Logic

INFOID:000000006217960

[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2100	ETC MOT PWR-B1 [Throttle control motor relay circuit open (bank 1)]	ECM detects that the 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	ETC MOT PWR (Throttle control motor relay circuit short)	ECM detects that 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

- 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 8 V or more at idle.

Which 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-458, "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-458, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217961

1.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Disconnect IPDM E/R harness connector E15.
- 4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

IPDM	E/R	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E15	60	E80	123	Existed

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

Is the inspection result normal?

YES >> GO TO 3.

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIR		AGNOSIS	 ; >			[VK56VD]
NO >>	GO TO :	2.				
2.DETECT	T MALFU	NCTIONIN	IG PART			A
Check the f	following.					
 Harness f 	for open o					EC
 Loose or 	poor coni	nection for	each con	nector and	harness	
	Popairo		t chart to	around or a	short to power in harness or connectors.	
•	-	•		-	/ INPUT SIGNAL CIRCUIT	С
1. Check	the contin	nuity betwe	en IPDM	E/R senso	r harness connector and ECM harness conr	nector.
IPDM	E/D	EC	СМ			
Connector	Terminal	Connector		Continuity		
E15	55	E80	Terminal 173	Existed		E
					ort to power.	
Is the inspe				nu anu shu		F
	• GO TO :		<u>.</u>			I
	GOTO					
4.DETEC	T MALFU	NCTIONIN	IG PART			G
Check the f	followina.					
 Harness f 	for open o					F
 Loose or 	poor con	nection for	each con	nector and	harness	1
	Popairo		t chart to	around or a	short to power in harness or connectors.	
5.CHECK	-			ground or a	short to power in harness of connectors.	
		v fuse (No. se is blowr		IPDM E/R.		1
Is the inspe						0
	GO TO		-			
NO >>	Replace	20 A fuse				K
6. CHECK	INTERM	ITTENT IN	ICIDENT			
Refer to GI	-40, "Inte	rmittent Ind	cident".			
Is the inspe	ection res	ult normal?	<u></u>			L
					Removal and Installation".	
NO >>	Repair c	or replace h	harness of	connector	S.	N
						A
						Ν

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< DTC/CIRCUIT DIAGNOSIS >

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:000000006217962

[VK56VD]

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. ECM controls the throttle valve opening angle in response to driving condition via the throttle control motor.

DTC Logic

INFOID:000000006217963

DTC DETECTION LOGIC

NOTE:

- If DTC P2101 is displayed with DTC P2100, first perform the trouble diagnosis for DTC P2100. Refer to <u>EC-458, "DTC Logic"</u>.
- If DTC P2101 is displayed with DTC P2119, first perform the trouble diagnosis for DTC P2119. Refer to <u>EC-466, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	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

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON 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-460. "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217964

1. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check the voltage between ECM harness connector and ground under the following conditions.

E	CM	Ground	Condition	Voltage
Connector	Terminal	Ground	Condition	voltage
E80	173	Ground	Ignition switch: OFF	Approx. 0 V
Loo	173	Ground	Ignition switch: ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 2.

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

2.CHECK THR	OTTLE CONT	ROL MOTOR R	ELAY POWER	SUPPLY CIRCUI	Т
 Disconnect Disconnect 	n switch OFF. ECM harness of IPDM E/R harr continuity betwe	ess connector.	ss connector ar	nd IPDM E/R harn	ess connector.
IPDM	E/R	EC	M		
Connector	Terminal	Connector	Terminal	Continuity	
E15	60	E80	123	Existed	
. Also check	harness for sho	ort to ground and	d short to powe	r.	
YES >> GO NO >> GO					
Check the follow Harness for op Loose or poor	pen or short be	ween ECM and each connector	IPDM E/R and harness		
	-	-		oower in harness IGNAL CIRCUIT-	
. Check the c	continuity betwe	en ECM harnes	s connector ar	nd IPDM E/R harn	ess connector.
IPDM	E/R	EC	M		
Connector	Terminal	Connector	Terminal	Continuity	
E15	55	E80	173	Existed	
YES >> GO NO >> GO DETECT MA	TO 5. LFUNCTIONIN	-			
	pen or short be	ween ECM and each connector			
>> Rep CHECK FUS	-	or short to grou	Ind or short to	oower in harness	or connectors.
		64) from IPDM	E/R.		
	fuse for blown				
YES >> GO					
NO >> Rep	place 20 A fuse				
	ERMITTENT IN	CIDENT			
CHECK INTE	Intermittent Inc				
CHECK INTE Refer to <u>GI-40, '</u> s the inspection YES >> Rep	<u>result normal?</u> blace IPDM E/R	-		and Installation".	
CHECK INTE efer to <u>GI-40.</u> the inspection YES >> Rep NO >> Rep	<u>result normal?</u> blace IPDM E/R bair or replace h	. Refer to <u>PCS-</u> arness or conn	ectors.		OPEN OR SHORT
CHECK INTE efer to <u>GI-40.</u> the inspection YES >> Rep NO >> Rep CHECK THR	<u>result normal?</u> blace IPDM E/R bair or replace h	. Refer to <u>PCS-</u> arness or conn	ectors.		OPEN OR SHORT

< DTC/CIRCUIT DIAGNOSIS >

- 3. Disconnect ECM harness connector.
- 4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle	ectric throttle control actuator ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F66	5	F110	57	Not existed
			63	Existed
			57	Existed
			63	Not existed

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

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace.

9.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.

2. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to <u>EC-147</u>, "Work Procedure".

10. CHECK THROTTLE CONTROL MOTOR

Refer to EC-462, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 12.

11.CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace harness or connectors.

12.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunction electric throttle control actuator. Refer to EM-30. "Removal and Installation".

2. Perform EC-463, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:000000006217965

[VK56VD]

1. CHECK THROTTLE CONTROL MOTOR

- 1. Turn ignition switch OFF.
- 2. Disconnect electric throttle control actuator harness connector.
- 3. Check the resistance between electric throttle control actuator terminals as per the following.

TerminalsResistance5 and 6Approx. 1 - 15 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

[VK56VD]

< DTC/CIRCUIT DIAGNOSIS >	[VK56VD]
2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR	
1. Replace electric throttle control actuator. Refer to EM-30, "Removal and Installation".	
2. Perform <u>EC-463, "Special Repair Requirement"</u> .	E
>> INSPECTION END	
Special Repair Requirement	INFOID:000000006217966
1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	
Refer to <u>EC-147. "Work Procedure"</u> .	
>> GO TO 2.	
2. PERFORM IDLE AIR VOLUME LEARNING	
Refer to EC-148. "Work Procedure".	
>> END	

P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

P2118 THROTTLE CONTROL MOTOR

DTC Logic

INFOID:000000006217967

[VK56VD]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2118	ETC MOT-B1 (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 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 2 seconds.
- 2. Start engine and let it idle for 5 seconds.
- 3. Check DTC.

Is DTC detected?

YES >> Go to <u>EC-464</u>, "DTC Logic".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217968

1. 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	Continuity	
F66	5	F110	57	Not existed	
			63	Existed	
	6		57	Existed	
			63	Not existed	

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

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning part.

2. CHECK THROTTLE CONTROL MOTOR

Refer to EC-465, "Component Inspection (Electric Throttle Control Motor)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 4.

3.CHECK INTERMITTENT INCIDENT

40 THE --

Р	2118 THROTTLE CONTROL MOTOR		
< DTC/CIRCUIT DIAGNOSIS	>	[VK56VD]	
Refer to <u>GI-40, "Intermittent Inc</u>			Δ
Is the inspection result normal? YES >> GO TO 4.	<u> </u>		А
	narness or connectors.		
4. REPLACE ELECTRIC THR	OTTLE CONTROL ACTUATOR		EC
Replace electric throttle contro	l actuator. Refer to EM-30, "Removal and Installation".		
			С
>> INSPECTION END			
Component inspection (Electric Throttle Control Motor)	INFOID:000000006217969	D
1. CHECK THROTTLE CONT	ROL MOTOR		
1. Turn ignition switch OFF.			Е
	control actuator harness connector. electric throttle control actuator terminals as per the following.		
			F
Terminals	Resistance		Г
5 and 6	Approx. 1 - 15 Ω [at 25°C (77°F)]		
Is the inspection result normal YES >> INSPECTION END			G
NO $>>$ GO TO 2.			
2.REPLACE ELECTRIC THR	OTTLE CONTROL ACTUATOR		Н
Replace electric throttle contro	l actuator. Refer to EM-30, "Removal and Installation".		
>> INSPECTION ENI			
>> INSPECTION LINE			
			J
			К
			L
			Μ
			Ν
			0
			Ρ

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Logic

INFOID:000000006217970

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition		Possible cause
P2119	ETC ACTR-B1 (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 detects that the throttle valve is stuck open.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2. Perform dTC confirmation procedure for malfunction A and B

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Selector lever position is D and wait at least 3 seconds.
- Selector lever position is P. 3.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON and wait at least 1 second. 5.
- Selector lever position is D and wait at least 3 seconds. 6.
- Selector lever position is P. 7.
- Turn ignition switch OFF, wait at least 10 seconds, and then turn ON. 8.
- 9. Check DTC.

Is DTC detected?

- YES >> Go to EC-466, "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. Selector lever position is D and wait at least 3 seconds.
- Selector lever position is N or P. 3.
- 4. Start engine and let it idle for 3 seconds.
- 5. Check DTC.

Is DTC detected?

YES >> Go to EC-466, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

INFOID:000000006217971

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- 1. Turn ignition switch OFF.
- 2. Remove the intake air duct.
- Check if foreign matter is caught between the throttle valve and the housing. 3.

Is the inspection result normal?

YES >> GO TO 2.

EC-466

[VK56VD]

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

NO	>> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to <u>EC-147</u> , "Work Procedure".	A
2.REF	PLACE ELECTRIC THROTTLE CONTROL ACTUATOR	
	e electric throttle control actuator. Refer to EM-30, "Removal and Installation".	EC
	>> INSPECTION END	С
		0
		D
		D
		E
		F
		Γ
		G
		0
		Н
		I
		J
		K
		L
		M
		Ν
		0
		Ρ

P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P2122, P2123 APP SENSOR

DTC Logic

NOTE:

If DTC P2122 or P2123 is displayed with DTC P0643, perform the trouble diagnosis for DTC P0643. Refer to <u>EC-381, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2122	APP SEN 1/CIRC (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	APP SEN 1/CIRC (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

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 8 V or more 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-468. "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217973

1.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect accelerator pedal position (APP) sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage (V)
Connector	Terminal	Giodila	voltage (v)
E110 (Without ICC)	2	Ground	Approx. 5
E67 (With ICC)	12	Gibana	

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 ECM and APP sensor
- Loose or poor connection for each connector and harness



INFOID:000000006217972

P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

	n switch Of	FF.			EC
		ess connect etween APF		ness connector and ECM harness connec	
APP se	nsor	EC	CM		С
Connector	Terminal	Connector	Terminal	Continuity	
E110 (Without ICC)	4	E80	140	Existed	D
E67 (With ICC)	11				E
4. Also check	harness fo	r short to gro	ound and s	ort to power.	
Is the inspectio		mal?			_
) TO 5.) TO 4.				F
4. DETECT M/	-	ONING PAR	т		
Check the follo			•		G
 Harness for or 	pen or sho				
 Loose or poo 	r connectio	n for each co	onnector ar	d harness	Н
>> Po	nair anan a	irouit chort (to around o	chart to power in horness or connectors	
_			-	short to power in harness or connectors. IT FOR OPEN AND SHORT	
T. Check the	continuity b	etween APF	sensor na	ness connector and ECM harness connec	loi.
APP se					
	nsor	EC	CM		J
Connector	nsor Terminal	EC Connector	CM Terminal	Continuity	J
Connector E110 (Without ICC)		Connector	Terminal		J
E110	Terminal		-	Continuity	J K
E110 (Without ICC) E67 (With ICC)	Terminal 3 10	Connector E80	Terminal		J K L
E110 (Without ICC) E67 (With ICC)	Terminal 3 10 harness fo	Connector E80 r short to gro	Terminal	Existed	J K L
E110 (Without ICC) E67 (With ICC) 2. Also check Is the inspectio YES >> GC	Terminal 3 10 harness fo n result nor 0 TO 7.	Connector E80 r short to gro	Terminal	Existed	J K L
E110 (Without ICC) E67 (With ICC) 2. Also check Is the inspectio YES >> GC NO >> GC	Terminal 3 10 harness fo n result nor 0 TO 7. 0 TO 6.	E80 r short to gro	Terminal 136 Dund and s	Existed	L
E110 (Without ICC) E67 (With ICC) 2. Also check Is the inspectio YES >> GC NO >> GC 6.DETECT M/	Terminal 3 10 harness fo n result nor) TO 7.) TO 6. ALFUNCTIO	E80 r short to gro	Terminal 136 Dund and s	Existed	L
$\begin{array}{r} E110 \\ (Without ICC) \\ \hline E67 \\ (With ICC) \\ \hline 2. Also check \\ \hline Is the inspectio \\ YES >> GC \\ NO >> GC \\ \hline 6.DETECT M/ \\ \hline Check the follow \\ \hline \end{array}$	Terminal 3 10 harness fo n result nor) TO 7.) TO 6. ALFUNCTIC wing.	Connector E80 r short to gro mal? DNING PAR	Terminal 136 Dund and s	Existed	L
E110 (Without ICC) E67 (With ICC) 2. Also check Is the inspectio YES >> GC NO >> GC 6.DETECT M/	Terminal 3 10 harness fo n result nor) TO 7.) TO 6. ALFUNCTIO wing. r connection	Connector E80 r short to gro mal? DNING PAR	Terminal 136 Dound and s T	Existed fort to power.	L
E110 (Without ICC) E67 (With ICC) 2. Also check Is the inspectio YES >> GC NO >> GC 6. DETECT M/ Check the follor • Loose or poo • Harness for c	Terminal 3 10 harness fo n result nor) TO 7.) TO 6. ALFUNCTIO wing. r connection pen or shor	Connector E80 r short to gro mal? DNING PAR n for each co rt between E	Terminal 136 Dound and s Dound and s T CM and Al	Existed Fort to power.	L
$\begin{array}{r} \text{E110} \\ (\text{Without ICC}) \\ \hline \text{E67} \\ (\text{With ICC}) \\ \hline 2. \text{Also check} \\ \hline \text{Is the inspectio} \\ \text{YES} >> \text{GC} \\ \text{NO} >> \text{GC} \\ \hline \textbf{6}.\text{DETECT M/} \\ \hline \text{Check the folloo} \\ \bullet \text{ Loose or poo} \\ \bullet \text{ Harness for co} \\ \hline \text{>> Re} \end{array}$	Terminal 3 10 harness fo <u>n result nor</u> TO 7. TO 6. ALFUNCTIC wing. r connection pen or shou pair open c	Connector E80 r short to gro mal? DNING PAR n for each co rt between E	Terminal 136 Dound and s Dound and s T CM and Al	Existed fort to power.	L M N
$\begin{array}{r} \text{E110} \\ (\text{Without ICC}) \\ \hline \text{E67} \\ (\text{With ICC}) \\ \hline 2. \text{Also check} \\ \hline \text{Is the inspectio} \\ \text{YES} >> \text{GC} \\ \text{NO} >> \text{GC} \\ \hline \textbf{0}.\text{DETECT M/} \\ \hline \textbf{Check the folloo} \\ \hline \text{Check the folloo} \\ \hline \text{Check the folloo} \\ \hline \text{Check the folloo} \\ \hline \text{Parness for co} \\ \hline \text{Some or poo} \\ \hline \text{Re} \\ \hline \textbf{7}.\text{CHECK APF} \end{array}$	Terminal 3 10 harness fo <u>n result nor</u> TO 7. TO 6. ALFUNCTIO wing. r connection pen or shou pen or shou pair open c	Connector E80 r short to gro mal? DNING PAR n for each co rt between E ircuit, short t	Terminal 136 Dound and s Dound and s T CM and Al to ground o	Existed Fort to power. d harness P sensor short to power in harness or connectors.	L M N
$\begin{array}{r} \text{E110} \\ (\text{Without ICC}) \\ \hline \text{E67} \\ (\text{With ICC}) \\ \hline 2. \text{Also check} \\ \hline \text{Is the inspection} \\ \text{YES} >> \text{GC} \\ \text{NO} >> \text{GC} \\ \hline \textbf{6}.\text{DETECT M/} \\ \hline \textbf{Check the folloo} \\ \hline \text{Check the folloo} \\ \hline \text{Refer to EC-47} \\ \hline \end{array}$	Terminal 3 10 harness fo n result nor 0 TO 7. 0 TO 6. ALFUNCTIC wing. r connection open or sho pair open c P SENSOR 0, "Compor	Connector E80 r short to gro mal? DNING PAR n for each co rt between E ircuit, short t	Terminal 136 Dound and s Dound and s T CM and Al to ground o	Existed Fort to power.	L M N O
$\begin{array}{r} {\sf E110}\\ {\sf (Without ICC)}\\ \hline {\sf E67}\\ {\sf (With ICC)}\\ \hline 2. {\sf Also check}\\ \hline {\sf Is the inspectio}\\ {\sf YES} >> {\sf GC}\\ {\sf NO} >> {\sf GC}\\ \hline {\sf 6.DETECT M/}\\ \hline {\sf Check the follor}\\ {\sf \bullet Loose or poo}\\ {\sf \bullet Harness for co}\\ \hline >> {\sf Re}\\ \hline {\sf 7.CHECK APP}\\ \hline {\sf Refer to EC-47}\\ \hline {\sf Is the inspectio}\\ \end{array}$	Terminal 3 10 harness fo <u>n result nor</u> TO 7. TO 6. ALFUNCTIO wing. r connection pen or shor pen or shor pair open c SENSOR 0, "Compor n result nor	Connector E80 r short to gro mal? DNING PAR n for each co rt between E ircuit, short t	Terminal 136 Dound and s Dound and s T CM and Al to ground o	Existed Fort to power. d harness P sensor short to power in harness or connectors.	L M N O
$\begin{array}{c} \text{E110} \\ (\text{Without ICC}) \\ \hline \text{E67} \\ (\text{With ICC}) \\ \hline 2. \text{Also check} \\ \hline \text{Is the inspectio} \\ \text{YES} >> \text{GC} \\ \hline \text{ODETECT M/} \\ \hline \text{Oheck the follor} \\ \hline \text{Check the follor} \\ \hline \ \ \ \ \text{Check the follor} \\ \hline \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	Terminal 3 10 harness fo n result nor 0 TO 7. 0 TO 6. ALFUNCTIC wing. r connection open or sho pair open c P SENSOR 0, "Compor	Connector E80 r short to gro mal? DNING PAR n for each co rt between E ircuit, short t	Terminal 136 Dound and s Dound and s T CM and Al to ground o	Existed Fort to power. d harness P sensor short to power in harness or connectors.	L M N O

8.REPLACE ACCELERATOR PEDAL ASSEMBLY

P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Replace accelerator pedal assembly. Refer to <u>ACC-3</u>, "<u>MODELS WITHOUT DISTANCE CONTROL ASSIST</u> <u>SYSTEM : Removal and Installation</u>" (Without distance control assist system) or <u>ACC-4</u>, "<u>MODELS WITH</u> <u>DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation</u>" (With distance control assist system).

>> INSPECTION END

9. CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:000000006217974

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Turn ignition switch ON.
- 4. Check the voltage ECM harness connector terminals under the following conditions.

	ECM			Voltage (V)		
Connector	+	-	Condition			
Connector	Terminal	Terminal				
	136 (APP sensor 1)	140		Fully released	0.65 - 0.87	
E80		140	Accelerator pedal	Fully depressed	4.3 - 4.8	
		129		Fully released	0.28 - 0.48	
	126 (APP sensor 2)	129		Fully depressed	2.0 - 2.5	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.replace accelerator pedal assembly

Replace accelerator pedal assembly. Refer to <u>ACC-3</u>, "MODELS WITHOUT DISTANCE CONTROL ASSIST <u>SYSTEM</u> : <u>Removal and Installation</u>" (Without distance control assist system) or <u>ACC-4</u>, "<u>MODELS WITH</u> <u>DISTANCE CONTROL ASSIST SYSTEM</u> : <u>Removal and Installation</u>" (With distance control assist system).

>> INSPECTION END

P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P2127, P2128 APP SENSOR

DTC Logic

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INFOID:000000006217975

[VK56VD]

DTC DETECTION LOGIC

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	L		

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause	
P2127	APP SEN 2/CIRC (Accelerator pedal position sensor 2 circuit low input)	An excessively low voltage from the APP sensor 2 is sent to ECM.	Harness or connectors (Accelerator pedal position sensor 2 circuit is open or shorted.)	
P2128	APP SEN 2/CIRC	An excessively high voltage from	(Battery current sensor circuit is shorted.) [Camshaft position sensor (bank 1) circuit is shorted. (Crankshaft position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.)	
P2128 (Accelerator pedal position sensor 2 circuit high input)	the APP sensor 2 is sent to ECM.	 Accelerator pedal position sensor (APP sensor 2) Battery current sensor Camshaft position sensor (bank 1) Crankshaft position sensor 		
		 Refrigerant pressure sensor EVAP control system pressure sensor 		

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 8 V or more 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 <u>EC-471, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217976

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1.CHECK ACCELERATOR PEDAL POSITION 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 se	nsor	Ground	
Connector	Terminal	Ground	Voltage (V)
E110 (Without ICC)	1	Ground	Approx 5
E67 (With ICC)	9	Ground	Approx. 5

Is the inspection result normal?

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

P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

2.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

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

APP sensor		ECM		Continuity
Connector Terminal		Connector	Terminal	Continuity
E110 (Without ICC)	1	E80	131	Existed
E67 (With ICC)	9	200	101	LAISIEU

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

Loose or poor connection for each connector and harness

Harness for open or short between ECM and APP sensor

>> Repair open circuit.

4.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

EC	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
F110 76		Crankshaft position sensor	F74	1
77	Camshaft position sensor (bank 1)	F84	1	
E80	133	Battery current sensor	E63	2
		Refrigerant pressure sensor	E77	1
		EVAP control system pressure sensor	C17	3
	404	APP sensor (Without ICC)	E110	1
	131	APP sensor (with ICC)	E67	9

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 (Refer to EC-301, "Component Inspection (Crankshaft Position Sensor)".)
- Camshaft position sensor (bank 1) (Refer to <u>EC-306, "Component Inspection (Camshaft Position Sensor)</u>".)
 Refrigerant pressure sensor (Refer to <u>EC-520, "Component Function Check"</u>.)
- EVAP control system pressure sensor (Refer to EC-335, "Component Inspection (EVAP Control System Pressure Sensor)")

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace malfunctioning component.

 ${f 6}.$ CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

Turn ignition switch OFF. 1.

- Disconnect ECM harness connector. 2.
- 3. Check the continuity between APP sensor harness connector and ECM harness connector.

EC-472

P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

	nsor	E	СМ	Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
E110 (Without ICC)	5	– E80	129	Existed	
E67 (With ICC)	8	200	120	Existed	
. Also check			ground a	nd short to	power.
s the inspectio		ormal?			
	D TO 8. D TO 7.				
			ART		
Check the follo					
Loose or poo	or connecti				
Harness for c	pen or sh	ort betwee	n ECM an	d APP sen	sor
n -				od ov -64	to power in hornoop or constant
•			•		to power in harness or connectors. OR OPEN AND SHORT
I. Check the	continuity	between A	APP sensc	or harness	connector and ECM harness connector.
APP sens	sor	EC	М		
Connector	Terminal	Connector	Terminal	Continuity	
E110					
(Without ICC)	6	E80	126	Existed	
E67 (With ICC)	7	200	120	Existed	
2. Also check	harness ⁻	for short to	ground a	nd short to	power.
s the inspectio		ormal?			
	D TO 10. D TO 9.				
9. DETECT M			ΔRT		
Check the follo Harness for c 		ort betwee	n ECM an	d APP sen	sor
Loose or poo					
_					
			ort to grou	nd or short	to power in harness or connectors.
10. CHECK A		-			
Refer to <u>EC-47</u>			ection (Ac	celerator P	<u>edal Position Sensor)"</u> .
		ormal?			
	テレコン				
YES >> GO					
NO >> GC	D TO 11.	RATOR P	EDAL ASS	SEMBLY	
YES >> GO NO >> GO 11. REPLACE	D TO 11. E ACCELE				MODELS WITHOUT DISTANCE CONTROL ASSIST
YES >> GC NO >> GC 11.REPLACE Replace accele SYSTEM : Re	D TO 11. E ACCELE erator ped moval and	al assemb	ly. Refer to on" (Witho	o <u>ACC-3, "</u> out distance	MODELS WITHOUT DISTANCE CONTROL ASSIST e control assist system) or <u>ACC-4, "MODELS WITH</u>
YES >> GC NO >> GC 11.REPLACE Replace accele SYSTEM : Rep	D TO 11. E ACCELE erator ped moval and	al assemb	ly. Refer to on" (Witho	o <u>ACC-3, "</u> out distance	
YES >> GC NO >> GC 11.REPLACE Replace accele SYSTEM : Rep DISTANCE CO	D TO 11. E ACCELE erator ped moval and	al assemb d Installatio SSIST SY	ly. Refer to on" (Witho	o <u>ACC-3, "</u> out distance	e control assist system) or ACC-4, "MODELS WITH

12.CHECK INTERMITTENT INCIDENT

Refer to GI-40. "Intermittent Incident".

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

>> INSPECTION END

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:000000006217977

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Turn ignition switch ON.
- 4. Check the voltage ECM harness connector terminals under the following conditions.

	ECM		Condition		Voltage (V)	
Connector	+	-				
Connector	Terminal	Terminal				
	136 (APP sensor 1)	140		Fully released	0.65 - 0.87	
E80		140	Accelerator pedal	Fully depressed	4.3 - 4.8	
	126 (ADD concer 2)	100		Fully released	0.28 - 0.48	
	126 (APP sensor 2)	129		Fully depressed	2.0 - 2.5	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to <u>ACC-3</u>, "MODELS WITHOUT DISTANCE CONTROL ASSIST <u>SYSTEM</u> : <u>Removal and Installation</u>" (Without distance control assist system) or <u>ACC-4</u>, "<u>MODELS WITH</u> <u>DISTANCE CONTROL ASSIST SYSTEM</u> : <u>Removal and Installation</u>" (With distance control assist system).

>> INSPECTION END

P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P2135 TP SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P2135 is displayed with DTC P0643, perform the trouble diagnosis for DTC P0643. Refer to <u>EC-</u><u>381, "DTC Logic"</u>.

	(Trouble diagnosis cont	ne DTC ent)	detecting condition	Possible cause
P2135	TP SENSOR-B1 (Throttle position sensor of range/performance)	circuit ECM compa	correct voltage is sent to red with the signals from and TP sensor 2.	 Harness or connector (TP sensor 1 or 2 circuit is open or shorted.) Electric throttle control actuator (TP sensor 1 or 2)
	FIRMATION PROCE	EDURE		
1.PRECO	NDITIONING			
2. Turn ig 3. Turn ig TESTING (Before per	nition switch OFF and nition switch ON. nition switch OFF and CONDITION: forming the followin	wait at least 10	seconds.	voltage is 8 V or more at idle.
~	RM DTC CONFIRMAT	ION PROCEDU	RE	
2. Check <u>Is DTC dete</u> YES >>			<u>.</u>	
Diagnosi	s Procedure			INFOID:00000006217979
1.снеск	THROTTLE POSITIC	N SENSOR PO	WER SUPPLY CIRC	UIT-I
2. Turn ig	nect electric throttle co nition switch ON. the voltage between e			ss connector and ground.
Electric t	hrottle control actuator	Ground	Voltage (V)	
Connect	or Terminal	Ground	voltage (v)	
F66	2	Ground	Approx. 5	
YES >>	<u>ction result normal?</u> · GO TO 2. · Repair open circuit, s	-	r short to power in ha OUND CIRCUIT FOI	arness or connectors.

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

EC

С

INFOID:000000006217978

[VK56VD]

P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Electric throttle	control actuator	E	Continuity		
Connector	Terminal	Connector Terminal		Continuity	
F66	4	F110	97	Existed	

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

Is the inspection result normal?

YES >> GO TO 3.

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

 $\mathbf{3}$. CHECK THROTTLE POSITION SENSOR 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	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F66	1	F110 91	Existed	
	3	1 110	79	LAISteu

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

Is the inspection result normal?

YES >> GO TO 4.

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

4.CHECK THROTTLE POSITION SENSOR

Refer to EC-476. "Component Inspection (Throttle Position Sensor)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-30, "Removal and Installation".

>> INSPECTION END

6.CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Throttle Position Sensor)

INFOID:000000006217980

1. CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform <u>EC-147, "Work Procedure"</u>.
- 4. Turn ignition switch ON.
- 5. Set selector lever position to D.
- 6. Check the voltage between ECM harness connector terminals under the following conditions.

P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

	ECM					
+ –		Condit	tion	Voltage (V)		
Connector	Terminal	Terminal			· · · · · · · · · · · · · · · · · · ·	
5440	91 (TP sensor 1 signal)	97		Fully released Fully depressed	More than 0.36 Less than 4.75	-
F110	79 (TP sensor 2 signal)	(Sensor ground)	Accelerator pedal	Fully released Fully depressed	Less than 4.75 More than 0.36	-
-	ection result normal					•
NO >>	 INSPECTION ENI GO TO 2. 					
2.REPLAC	CE ELECTRIC THR	OTTLE CONTRO	OL ACTUATOR			
Replace ele	ectric throttle contro	l actuator. Refer t	o <u>EM-30, "Remova</u>	I and Installation	<u>ı"</u> .	
>>	INSPECTION ENI	כ				

< DTC/CIRCUIT DIAGNOSIS >

P2138 APP SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-381, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2138	APP SENSOR (Accelerator pedal position sensor circuit range/perfor- mance)	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	 Harness or connectors (APP sensor 1 or 2 circuit is open or shorted.) [CKP sensor circuit is shorted.] [CMP sensor (bank 1) circuit is shorted.] (Battery current sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) Accelerator pedal position sensor (APP sensor 1 or 2) Crankshaft position sensor (bank 1) Refrigerant pressure sensor Battery current sensor Battery current sensor EVAP control system pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 8 V or more 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-478, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006217982

1.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect accelerator pedal position (APP) sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between APP sensor harness connector and ground.

APP	sensor	Ground	Voltage (V)	
Connector Terminal		Giodila	voltage (v)	
E110 (Without ICC)	2	Ground	Approx. 5	
E67 (With ICC)	12	Ground	Αρριοχ. 3	

Is the inspection result normal?

< DTC/CIF		IAGNO	SIS >	121307			[VK56VD]
	> GO TO > GO TO						
-			NING PAR	г			
Check the				-			
 Loose or 	poor cor	nnectior		onnector and			
namess	tor open	or shor		CM and AP	P sensor		
>:	> Repair	open ci	rcuit, short t	o ground or	short to po	ower in harness or connect	ctors.
3.снеск	APP SE	NSOR	2 POWER S	SUPPLY CI	RCUIT-I		
	nition sv						
2. Check	the volta	age betv	veen APP s	ensor harne	ess connect	or and ground.	
	APP sense	or					
Connecto	or	Terminal	Grc Grc	und V	/oltage (V)		
E110	20)	1					
(Without IC E67			Gro	und	Approx. 5		
(With ICC	C)	9					
s the inspe			mal?				
	> GO TO > GO TO						
4			2 POWER	SUPPLY CI	RCUIT-II		
	nition sv						
2. Discon	nect EC	M harne	ess connect			ator and ECM barnage a	opportor
3. Check	the cont		elween APr	sensor har	ness conne	ector and ECM harness c	onnector.
AF	PP sensor		EC	CM	Continuity		
Connecto	or Te	erminal	Connector	Terminal	Continuity		
E110 (Without IC	(00	1					
E67	,	0	E80	131	Existed		
(With ICC	,	9					
s the inspe			<u>mal?</u>				
	> GO TO > GO TO						
DETEC	T MALFU	JNCTIC		Г			
Check the							
Harness	for open	or shor	t between E	CM and acconnector and	celerator pe	edal position sensor	
20036 01					a namess		
>:	> Repair	open ci	rcuit.				
Б. СНЕСК	SENSO	R POW	ER SUPPL	Y CIRCUIT			
Check harr	ness for s	short to	power and	short to grou	und, betwe	en the following terminals)•
EC Connector			Name	Sensor	Connector	Terminal	
Connector	Terminal 76	Cranks	haft position s	ensor	Connector F74	1	
F110	77		aft position se		F84	1	

< DTC/CIRCUIT DIAGNOSIS >

ECM		Sensor				
Connector	Terminal	Name	Connector	Terminal		
E80	Battery current sensor	E63	2			
	133	Refrigerant pressure sensor	E77	1		
		EVAP control system pressure sen- sor	C17	3		
	131	APP sensor (Without ICC)	E110	1		
	131	APP sensor (with ICC)	E67	9		

Is the inspection result normal?

YES >> GO TO 7.

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

7. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (Refer to EC-301, "Component Inspection (Crankshaft Position Sensor)".)
- Camshaft position sensor (bank 1) (Refer to EC-306, "Component Inspection (Camshaft Position Sensor)".)
- Refrigerant pressure sensor (Refer to EC-520, "Component Function Check".)
- EVAP control system pressure sensor (Refer to <u>EC-335</u>, "Component Inspection (EVAP Control System <u>Pressure Sensor)</u>".)

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace malfunctioning component.

8.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.

APP set	nsor	ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
E110	4	E80	140	Existed	
(Without ICC)	5	EOU	129	EXISIEU	
E67	11	E80	140	Existed	
(With ICC)	8	L00	129	LAISLEU	

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

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

• Harness for open or short between ECM and accelerator pedal position sensor

· Loose or poor connection for each connector and harness

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

10. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

< DTC/CIRCUIT DIAGNOSIS >

	sensor	E	CM				ŀ
Connector	Terminal	Connector	Terminal	Contin	uity		
E110	3		136				
(Without ICC	6	E80	126	Exist	ed		E
E67	10		136				
(With ICC)	7	E80	126	Exist	ed		(
2. Also che	ck harness for	r short to gro	ound and sh	ort to p	oower.		
Is the inspec	tion result norr	mal?					-
-	GO TO 12.						
	GO TO 11.						
II.DETEC	T MALFUNCT	IONING PA	RT				E
Check the fo		4 h a fu v a a m T					
	r open or snor oor connectior				or pedal position : ess	sensor	_
20000 01 p				a nann			F
>>	Repair open ci	rcuit, short t	o ground or	short t	to power in harne	ss or connectors.	
12.снеск	APP SENSO	R					(
Refer to EC-	481, "Compon	ent Inspecti	on (Accelera	ator Pe	edal Position Sens	sor)".	
	tion result norr						ŀ
	GO TO 14.						1
	GO TO 13.						
13. REPLA	CE ACCELER	ATOR PED	AL ASSEME	BLY			
							ONTROL ASSIST
						vstem) or <u>ACC-4.</u> h distance control	<u>"MODELS WITH</u> assist system).
>>	NSPECTION	END					
14.снеск		NT INCIDE	NT				ŀ
Refer to GI-4	0, "Intermitten	t Incident".					
							L
>>	NSPECTION	END					
Compone	nt Inspectic	on (Accele	erator Peo	dal Po	osition Senso	r)	INFOID:000000006217983
		•				,	Ν
I.CHECK A	CCELERATO	R PEDAL P	OSITION SE	ENSO	२		
	ition switch OF		diagona o sta	. d			Ν
	ect all harness ition switch ON		aisconnecte	ea.			
			onnector ter	minals	under the followi	ing conditions.	
							(
	ECM						
Connector	+			Con	dition	Voltage (V)	F
	Terminal	Termina	al				
	136 (APP sense	or 1) 140			Fully released	0.65 - 0.87	
E80	· · · · · · · ·		Accelerator	r pedal	Fully depressed	4.3 - 4.8	
	126 (APP sense	or 2) 129			Fully released	0.28 - 0.48	
	, , , , , , , , , , , , , , , , , , ,				Fully depressed	2.0 - 2.5	
Is the inspec	tion result norr	mal?					

< DTC/CIRCUIT DIAGNOSIS >

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

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to <u>ACC-3</u>, "<u>MODELS WITHOUT DISTANCE CONTROL ASSIST</u> <u>SYSTEM</u> : <u>Removal and Installation</u>" (Without distance control assist system) or <u>ACC-4</u>, "<u>MODELS WITH</u> <u>DISTANCE CONTROL ASSIST SYSTEM</u> : <u>Removal and Installation</u>" (With distance control assist system).

>> INSPECTION END

P2539, P2541, P2542 LOW FUEL PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P2539, P2541, P2542 LOW FUEL PRESSURE SENSOR

DTC Logic

INFOID:000000006288355

[VK56VD]

P2539 P2541	Trouble diagnosis name (Trouble diagnosis content) LOW FUEL PRES SEN (Low fuel pressure sensor	DTC detecting condition	Dessible serves
P2539 P2541			Possible cause
P2541	circuit low input and high in- put)	Signal voltage from the low fuel pressure sensor remains at more than 4.84 V / less than 0.3 V for 5 seconds or more.	 Harness or connectors (Low fuel pressure sensor circuit is open or shorted.) (Power steering pressure sensor circuit is
	LOW FUEL PRES SEN (Low fuel pressure sensor circuit low input)	Signal voltage from the low fuel pressure sensor remains at less than 0.49 V for 5 seconds or more.	open or shorted.) (Cooling fan speed sensor circuit is open or shorted.) (FRP sensor circuit is open or shorted.)
P2542	LOW FUEL PRES SEN (Low fuel pressure sensor circuit high input)	Signal voltage from the low fuel pressure sensor remains at more than 4.1 V for 5 seconds or more.	 Low fuel pressure sensor Power steering pressure sensor Cooling fan speed sensor FRP sensor
DTC CON	FIRMATION PROCE	DURE	
	NDITIONING		
	nition switch OFF and w	vait at least 10 seconds	
2. Turn ig	nition switch ON.		
	nition switch OFF and w	ait at least 10 seconds.	
	CONDITION: forming the following	procedure, confirm that battery vo	tage is 11 V or more at idle.
		······································	
>>	> GO TO 2.		
2.PERFO	RM DTC CONFIRMATIO	ON PROCEDURE	
I. Start er	ngine and let it idle for a	t least 60 seconds.	
2. Check	1st trip DTC.		
<u>s 1st trip D</u>	DTC detected?		
	Proceed to <u>EC-483, "C</u>	<u>iagnosis Procedure"</u> .	
NO >>	> INSPECTION END		
	s Procedure		INFOID:00000006288356
Diagnosi			
	LOW FUEL PRESSUR	E SENSOR FOWER SUFFLIFI	
1. снеск	LOW FUEL PRESSUR	E SENSOR FOWER SUFFLI-I	
1 .CHECK 1. Turn ig 2. Discon	LOW FUEL PRESSUR Inition switch OFF. Inect low fuel pressure s		
1. CHECK 1. Turn ig 2. Discon 3. Turn ig	LOW FUEL PRESSUR Inition switch OFF. Inect low fuel pressure s Inition switch ON.	ensor connector.	
1. CHECK 1. Turn ig 2. Discon 3. Turn ig	LOW FUEL PRESSUR Inition switch OFF. Inect low fuel pressure s Inition switch ON.		ctor terminals.
1. CHECK 1. Turn ig 2. Discon 3. Turn ig 4. Check	LOW FUEL PRESSUR Inition switch OFF. Inect low fuel pressure s Inition switch ON. the voltage between low	ensor connector.	ctor terminals.
1. CHECK 1. Turn ig 2. Discon 3. Turn ig 4. Check	LOW FUEL PRESSUR Inition switch OFF. Inect low fuel pressure s Inition switch ON.	ensor connector. / fuel pressure sensor harness conne Voltage	ctor terminals.
1. CHECK 1. Turn ig 2. Discon 3. Turn ig 4. Check	LOW FUEL PRESSUR Inition switch OFF. Inect low fuel pressure s Inition switch ON. the voltage between lov	ensor connector. / fuel pressure sensor harness conne	ctor terminals.
1.CHECK 1. Turn ig 2. Discon 3. Turn ig 4. Check	LOW FUEL PRESSUR Inition switch OFF. Inect low fuel pressure s Inition switch ON. the voltage between low	ensor connector. / fuel pressure sensor harness conne Voltage (Approx.)	ctor terminals.

2.CHECK LOW FUEL PRESSURE SENSOR POWER SUPPLY-II

Check the voltage between low fuel pressure sensor harness connector and the ground.

EC-483

EC

P2539, P2541, P2542 LOW FUEL PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

	+			
Low fuel pre	ssure sensor	_	Voltage (Approx.)	
Connector	Terminal			
F25	3	Ground	5 V	

Is inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check harness connector for short to power and short to ground, between the following terminals.

EC	CM	Sensor			
Connector	Terminal	Name	Connector	Terminal	
		Power steering pressure sensor	F35	1	
F111	27	Low fuel pressure sensor	F25	3	
	-	Cooling fan speed sensor	F39	2	
	28	FRP sensor	F26	1	

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to EC-168. "Diagnosis Procedure".

NO >> Repair or replace error-detected parts.

4.CHECK LOW FUEL PRESSURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between low fuel pressure sensor harness connector and ECM harness connector.

	+			
Low fuel pre	ssure sensor	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F25	1	F111	45	Existed

Is inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

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

E	СМ	Ground	Continuity	
Connector	Connector Terminal		Continuity	
F111	5			
E80	114		Existed	
	115	Ground		
	174			
	175			

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-40. "Intermittent Incident".

EC-484

NO >> R	epair or re	place error-de	etected parts		
6. CHECK LC	W FUEL I	PRESSURE S	SENSOR SIG	GNAL CIRCUIT	
2. Disconne		rness connec		e sensor harness	connector and ECM harness connector.
+		-	-		
Low fuel press	sure sensor	EC	M	Continuity	
Connector	Terminal	Connector	Terminal		
F25	2	F111	23	Existed	
1. Also chec	k harness	for short to g	round and to	power.	
s inspection r	esult norm	<u>nal?</u>			
	O TO 7.		ete ete din evit		
	•	place error-de	•		
CHECK LC	OW FUEL I	PRESSURES	SENSOR		
Refer to <u>EC-4</u>			tion".		
s inspection r	esult norm	nal?			
<u>s inspection r</u> YES >> C	esult norm	nal? mittent incide	nt. Refer to <u>G</u>	61-40, "Intermittent	Incident".
<u>s inspection r</u> YES >> C NO >> R	esult norm heck interr eplace low	nal? mittent incider / fuel pressure	nt. Refer to <u>G</u>	GI-40, "Intermittent	
s inspection r YES >> C NO >> R Componen	esult norm heck interr eplace low t Inspec	nal? mittent inciden / fuel pressure tion	nt. Refer to <u>G</u> e sensor.	GI-40, "Intermittent	Incident".
s inspection r YES >> C NO >> R Componen	esult norm heck interr eplace low t Inspec	nal? mittent inciden / fuel pressure tion	nt. Refer to <u>G</u> e sensor.	81-40, "Intermittent	
s inspection r YES >> C NO >> R Componen 1.CHECK LC	esult norm heck interr eplace low t Inspec	nal? mittent inciden / fuel pressure tion	nt. Refer to <u>G</u> e sensor.	GI-40, "Intermittent	
Is inspection r YES >> C NO >> R Componen 1.CHECK LC WITH CON 1. Turn igniti	esult norm heck interr eplace low t Inspec DW FUEL I SULT-III ion switch	nal? mittent inciden fuel pressure tion PRESSURE S	nt. Refer to G e sensor. SENSOR	GI-40, "Intermittent	
s inspection r YES >> C NO >> R Componen 1.CHECK LC WITH CON 1. Turn igniti 2. Reconnec	esult norm heck interr eplace low t Inspec DW FUEL I SULT-III ion switch ct harness	nal? mittent inciden fuel pressure tion PRESSURE \$	nt. Refer to G e sensor. SENSOR	GI-40, "Intermittent	
s inspection r YES >> C NO >> R Componen 1.CHECK LC WITH CON 1. Turn igniti 2. Reconnec 3. Start the e 4. Select "D/	esult norm heck interr eplace low t Inspec DW FUEL I SULT-III ion switch ct harness engine. ATA MONI	nal? mittent inciden fuel pressure tion PRESSURE S OFF. connector dis TOR" mode v	nt. Refer to e sensor. SENSOR sconnected. with CONSUL		
s inspection r YES >> C NO >> R Componen 1.CHECK LC WITH CON 1. Turn igniti 2. Reconnec 3. Start the e 4. Select "D/	esult norm heck interr eplace low t Inspec DW FUEL I SULT-III ion switch ct harness engine. ATA MONI	nal? mittent inciden fuel pressure tion PRESSURE S OFF. connector dis	nt. Refer to e sensor. SENSOR sconnected. with CONSUL		
s inspection r YES >> C NO >> R Componen .CHECK LC WITH CON . Turn igniti 2. Reconnec 3. Start the e . Select "D/	esult norm heck interr eplace low t Inspec DW FUEL I SULT-III ion switch ct harness engine. ATA MONI	nal? mittent inciden fuel pressure tion PRESSURE S OFF. connector dis TOR" mode v	nt. Refer to e sensor. SENSOR sconnected. with CONSUL	_T-III.	
s inspection r YES >> C NO >> R Componen COMPONEN CHECK LC WITH CON CHECK LC WITH CON CHECK LC WITH CON CHECK LC SWITH CON CHECK LC SWITH CON CHECK LC SUBJECT (D)	esult norm heck interr eplace low t Inspec DW FUEL I SULT-III ion switch ct harness engine. ATA MONI at the "L/FU	nal? mittent inciden fuel pressure tion PRESSURE S OFF. connector dis TOR" mode v	nt. Refer to <u>G</u> e sensor. SENSOR sconnected. with CONSUL EN V" value.		
s inspection r YES >> C NO >> R Componen 1.CHECK LC WITH CON 1. Turn igniti 2. Reconnec 3. Start the e 4. Select "D/ 5. Check that Data monitor	esult norm heck interreplace low t Inspec DW FUEL I SULT-III ion switch ct harness engine. ATA MONI at the "L/FU item	nal? mittent inciden fuel pressure tion PRESSURE S OFF. connector dis TOR" mode v JEL PRES SI	nt. Refer to <u>G</u> e sensor. SENSOR sconnected. with CONSUL EN V" value.	-T-III. Value (Approx.)	
s inspection r YES >> C NO >> R Componen .CHECK LC WITH CON . Turn igniti 2. Reconnec 3. Start the e 4. Select "D/ 5. Check tha	esult norm heck interreplace low t Inspec DW FUEL I SULT-III ion switch SULT-III ion switch ct harness engine. ATA MONI at the "L/FU item	nal? mittent inciden fuel pressure tion PRESSURE S OFF. connector dis TOR" mode v JEL PRES SI Condit gine speed: idle	nt. Refer to e sensor. SENSOR sconnected. with CONSUL EN V" value.	_T-III. Value	
s inspection r YES >> C NO >> R Componen 1.CHECK LC WITH CON 1. Turn igniti 2. Reconnec 3. Start the e 4. Select "D/ 5. Check that Data monitor	esult norm heck interreplace low t Inspec DW FUEL I SULT-III ion switch ct harness engine. ATA MONI at the "L/FU item SEN V Eng	nal? mittent inciden / fuel pressure tion PRESSURE S OFF. connector dis TOR" mode v JEL PRES SI Condit gine speed: idle gine speed: 3,000	nt. Refer to e sensor. SENSOR sconnected. with CONSUL EN V" value.	-T-III. Value (Approx.)	

4. Check low fuel pressure sensor signal voltage.

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[VK56VD]

P2539, P2541, P2542 LOW FUEL PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

	+	-			
Low fuel pre	fuel pressure sensor Ground Condition		Value (Approx.)		
Connector	Terminal	Cibulia			
F25	2	Ground	[Engine is running]Warm-up conditionIdle speed	50mSec/div	
			[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	50mSec/div	

Is the inspection result normal?

YES >> INSPECTION END.

NO >> Replace low fuel pressure sensor. Refer to <u>EM-43, "Removal and Installation"</u>.

P2A00, P2A03 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

P2A00, P2A03 A/F SENSOR 1

DTC Logic

DTC DETECTION LOGIC

To judge the malfunction, the A/F signal computed by ECM from the A/F sensor 1 signal is monitored so it will not shift to LEAN side or RICH side.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause				
	(Trouble diagnosis content) A/F SENSOR1 (B1)	The output voltage computed by ECM from					
P2A00	(Air fuel ratio (A/F) sensor 1 (bank 1) circuit range/performance)	the A/F sensor 1 signal shifts to the lean side for a specified period.	A/F sensor 1 A/F sensor 1 heater Eucl procesure				
P2A03	A/F SENSOR1 (B2) • The A/F signal computed by ECM from the • Fuel injector						
	NFIRMATION PROCEDURE	E					
1. PREC	ONDITIONING						
 Turn Turn TESTING 	ignition switch OFF and wait at ignition switch ON. ignition switch OFF and wait at CONDITION: erforming the following proce		11 V or more at idle.				
•	>> GO TO 2.						
2.PERF	ORM DTC CONFIRMATION P	ROCEDURE					
 Turn Turn Turn Start Let e Keep Chec 	ignition switch OFF and wait at ignition switch ON. ignition switch OFF and wait at engine and keep the engine sp ngine idle for 1 minute. engine speed between 2,500 a ck 1st trip DTC.	least 10 seconds. eed between 3,500 and 4,000 rpm for 1					
	DTC detected?						
	>> Go to <u>EC-487, "Diagnosis P</u> >> INSPECTION END	rocedure".					
Diagno	sis Procedure		INFOID:00000006217988				
1. RETIG	GHTEN A/F SENSOR 1						
Loosen a	nd retighten the A/F sensor 1. I	Refer to EX-5, "Exploded View".					
:	>> GO TO 2.						
2.снес	K A/F SENSOR 1 CONNECTO	R					
	onnect A/F sensor 1 harness co k that water is not inside conne						
	pection result normal?						
	>> GO TO 3.						
-	>> Repair or replace harness of						
	K FOR INTAKE AIR LEAKAGE						
	onnect A/F sensor 1 harness co engine and run it at idle.	nnector.					

INFOID:000000006217987

А

EC

P2A00, P2A03 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

3. Listen for an intake air leakage after the mass air flow sensor.

Is intake air leakage detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 4.

4.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-152, "Work Procedure".

2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to <u>EC-264, "Diagnosis Procedure"</u> or <u>EC-268, "Diagnosis Procedure"</u>.

NO >> GO TO 5.

5.CHECK AIR FUEL RATIO 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.

DTC		A/F sensor	1	Ground	Voltage	
DIC	Bank	Connector Terminal		Giodila	vollage	
P2A00	1	F67	4	Ground	3.0 V	
P2A03	2	F68	4	Giouna	5.0 V	

Is the inspection result normal?

YES >> GO TO 6.

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

 $\mathbf{6}$.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.

DTC	A/F sensor 1			EC	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P2A00	1	F67	3	F110	88	Existed
P2A03	2	F68	3	FIIU	78	Existed

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC		A/F sensor 1			CM	Ground	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Ground	Continuity
P2A00	1	F67	3	F110	88	Ground	Not existed
P2A03	2	F68	3	1110	78		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.

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

7.CHECK A/F SENSOR 1 GROUND 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.

P2A00, P2A03 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

		A/F sensor	1	F	СМ		
DTC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P2A00	1	F67	6	Connector	94		·
P2A03	2	F68	6	F110	74	Existed	
		arness for s	-	ower.			-
		result norm	-				
-	> GO T						
•	-	-		to ground	or short to	power in	harness or connectors.
8.CHECK	(A/F S	ENSOR 1 I	HEATER				
Refer to E	<u>C-182,</u>	"Compone	nt Inspec	<u>tion (A/F S</u>	ensor 1 H	<u>eater)"</u> .	
•		result norm	<u>al?</u>				
	> GO T > GO T						
		RMITTENT		іт			
		ntermittent result norm					
	<u>ection </u> > GO T		<u>ai:</u>				
-		air or replac	e malfund	ctioning pa	rt.		
	-			• ·			
		atio (A/F) s				ded View"	
hard sur • Before Cleaner (comme	rface s installi [com rcial s	uch as a c ng new A mercial se ervice tool	oncrete f /F senso rvice too	loor; use or, clean	a new on exhaust	e. system th	ht of more than 0.5 m (19.7 in) onto a nreads using Oxygen Sensor Thread 2)] and approved anti-seize lubricant
<u>Will CONS</u> YES >	<u>SULI-III</u> > GO T						
	> GO T > GO T						
11.con	FIRM A	/F ADJUS	IMENT D	ATA			
		switch ON.					
							de with CONSULT-III.
).000" is dis	splayed of	n CONSUL	_1-III scree	en.	
<u>ls "0.000" (</u> YES >		<u>eu :</u> PECTION E	חא				
	> GO T						
12.CLEA		E MIXTURE	RATIO S	SELF-LEAF	RNING VA	LUE	
		ratio self-le					rocedure"
Will CONS							<u></u>
	> GO T						
		PECTION E					
1 3. con	FIRM A	VF ADJUS	TMENT C	ATA			
9		switch ON.					

- 1. Turn ignition switch ON.
- 2. Select "A/F ADJ-B1" and "A/F ADJ-B2" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check that "0.000" is displayed on CONSULT-III screen.

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

ASCD BRAKE SWITCH

Component Function Check

1.CHECK ASCD BRAKE SWITCH FUNCTION

B WITH CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	С	Indication	
BRAKE SW1	Brake pedal	Slightly depressed	OFF
(ASCD brake switch)	Diake peual	Fully released	ON

WITHOUT CONSULT-III

1. Turn ignition switch ON.

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

	ECM				
Connector	+	-	Co	Voltage (V)	
Connector	Terminal	Terminal			
E80	147	175	Brake nedal	Slightly depressed	Approx. 0
200	(ASCD brake switch signal)	al) 175 Brake pedal		Fully released	Battery voltage

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-490, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000006217990

1.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

- 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 bra	ake switch	Ground	Voltage	
Connector	Terminal	Ciouna	voltage	
E109	E109 1		Battery voltage	

Is the inspection result normal?

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

2. DETECT MALFUNCTIONING PART

Check the following.

10 A fuse (No. 3)

- · Harness for open or short between ASCD brake switch and fuse
- · Loose or poor connection for each connector and harness

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

${f 3.}$ CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

EC-490

INFOID:000000006217989

^{1.} Turn ignition switch OFF.

ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

ASCD bra	ke switch	ECM	1		А
Connector	Terminal	Connector	Terminal	- Continuity	
E109	2	E80	147	Existed	
4. Also cl	heck harn	ess for shor	t to grou	und and short to power.	EC
Is the inspe	ection resu	ult normal?	-		
	> GO TO S				С
	> GO TO 4				
		NCTIONING	5 PAR I		D
Check the		or short hatu	iaan EC	CM and ASCD brake switch	D
 Loose or 	poor conr	nection for e	ach con	nnector and harness	
					E
_	-	-		ground or short to power in harness or connectors.	
5. CHECK	ASCD B	RAKE SWIT	СН		F
Refer to E	C-491, "Co	omponent In	spectior	n (ASCD Brake Switch)".	
Is the inspe					
	> GO TO (> Replace		o switch	n. Refer to BR-20, "Removal and Installation".	G
•	•	ITTENT INC		T. Refer to <u>BR-20, Removal and Installation</u> .	
					Н
Refer to G	<u>1-40, "Intel</u>	rmittent Incid	<u>aent"</u> .		
>:	> INSPEC	TION END			I
				Brake Switch)	I
Compon					
1. CHECK	ASCD B	RAKE SWIT	CH-I		J
	nition swi				
				ness connector. D brake switch terminals under the following conditions.	К
J. CHECK		iuity betwee		brake switch terminals under the following conditions.	
Terminals		Condition		Continuity	
		Fully release	sed	Existed	L
1 and 2	Brake peda	Slightly dep	pressed	Not existed	
Is the inspe	ection resu	ult normal?			M
		TION END			
-	> GO TO 2				NI
		RAKE SWIT			Ν
				on. Refer to <u>BR-21, "Inspection and Adjustment"</u> . D brake switch terminals under the following conditions.	
Z. CHECK		fully betwee	II AGUL		0
Terminals		Condition		Continuity	
		Fully release	sed	Existed	P
1 and 2	Brake peda	al Slightly der		Not existed	Γ
Is the inspe	ection res	ult normal?	I		
YES >:	> INSPEC	TION END			
NO >:	> Replace	ASCD brak	e switch	n. Refer to <u>BR-20, "Removal and Installation"</u> .	

< DTC/CIRCUIT DIAGNOSIS >

ASCD INDICATOR

Component Function Check

INFOID:000000006217992

[VK56VD]

1.CHECK ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	SCD INDICATOR CONDITION S					
CRUISE LAMP	Ignition switch: ON	$ON\toOFF$				
Is the inspection result nor	mal?					
YES >> INSPECTION NO >> Go to <u>EC-492</u> ,	END "Diagnosis Procedure".					
Diagnosis Procedure)		INFOID:00000006217993			
1.снеск отс						
Check that DTC UXXXX is	not displayed.					
Is the inspection result nor	mal?					
YES >> GO TO 2. NO >> Perform troubl	e diagnosis for DTC UXX	XX.				
2. СНЕСК DTC WITH CO	MBINATION METER					
Refer to MWI-30, "CONSU	LT-III Function".					
Is the inspection result nor	mal?					
YES >> GO TO 3.						
-	ace malfunctioning part.					
3. CHECK INTERMITTEN	IT INCIDENT					
Refer to GI-40, "Intermitter	nt Incident".					

Is the inspection result normal?

- YES >> Replace combination meter. Refer to <u>MWI-85, "Removal and Installation"</u>.
- NO >> Repair or replace malfunctioning part.

ELECTRICAL LOAD SIGNAL

< DTC/CIRCUIT DIAGNOSIS > ELECTRICAL LOAD SIGNAL

Description

The electrical load signal (Rear window defogger switch signal, headlamp switch signal, heater fan switch signal, etc.) is transferred via the CAN communication line.

Component Function Check

1. CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

- 1. Turn ignition switch ON.
- 2. Select "DATA MONITOR" mode with CONSULT-III.
- 3. Select "LOAD SIGNAL" and check indication under the following conditions.

Monitor item		Condition		Indication
LOAD SIGNAL		Rear window defogger switch	ON	ON
		C		OFF
Is the ir	nspecti	on result normal?		
YES >> GO TO 2.				
NO >> Go to EC-493, "Diagnosis Procedure".				
0		-	_	

2. CHECK LIGHTING SWITCH FUNCTION

Check "LOAD SIGNAL" indication under the following conditions.

Monitor item	Co	Indication	
	Lighting switch	ON at 2nd position	ON
LOAD SIGNAL	Lighting Switch	OFF	OFF

Is the inspection result normal?

YES	>> GO TO 3.
NO	>> Go to EC-493, "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-493, "Diagnosis Procedure".

Diagnosis Procedure

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to <u>EC-493, "Compo-nent Function Check"</u>.

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

Refer to DEF-24, "Work Flow".

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ELECTRICAL LOAD SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

 $>> {\sf INSPECTION} \; {\sf END} \\ {\bf 3.} {\sf CHECK} \; {\sf HEADLAMP} \; {\sf SYSTEM} \\$

Refer to EXL-59, "Work Flow".

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Refer to HAC-60, "Work Flow".

>> INSPECTION END

ELECTRICALLY-CONTROLLED COOLING FAN COUPLING

ELECTRICALLY-CONTROLLED COOLING FAN COUPLING

А Component Function Check INFOID:000000006217997 1. CHECK COOLING FAN FUNCTION EC (I) WITH CONSULT-III 1. Start the engine. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT-III. 2. Check that cooling fan speed varies according to the percentage. 3. NOTE: Speed changes gradually as the percentage changes. D IN WITHOUT CONSULT-Ⅲ Start the engine and warm up the engine until engine coolant temperature reaches at least 98°C (209°F). 1 2. Check that cooling fan speed increase. Ε Is the inspection result normal? YES >> INSPECTION END >> Proceed to EC-495, "Diagnosis Procedure". NO F Diagnosis Procedure INFOID:000000006217998 1.CHECK DRIVE BELT 1 Turn ignition switch OFF. 2. Check that the drive belt is not broken. Н Is inspection result normal? YES >> GO TO 2. NO >> Replace drive belt. 2.CHECK ELECTRICALLY-CONTROLLED COOLING FAN COUPLING POWER SUPPLY 1. Disconnect electrically-controlled cooling fan coupling harness connector. 2. Turn ignition switch ON. 3. Check the voltage between electrically-controlled cooling fan coupling harness connector and ground. + Κ Electrically-controlled cooling fan coupling Voltage (Approx.) Connector Terminal F39 1 Ground Battery voltage Is inspection result normal? YES >> GO TO 3. M NO >> Perform trouble diagnosis for power supply circuit. ${
m 3.}$ CHECK ELECTRICALLY-CONTROLLED COOLING FAN COUPLING GROUND CIRCUIT Ν 1. Turn ignition switch OFF. 2. Check the continuity between electrically-controlled cooling fan coupling harness connector and ground. + Electrically-controlled cooling fan coupling Continuity Connector Terminal Ρ F39 6 Ground Existed Is inspection result normal? YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4. CHECK ELECTRICALLY-CONTROLLED COOLING FAN COUPLING CONTROL SIGNAL

(D)WITH CONSULT-III

EC-495

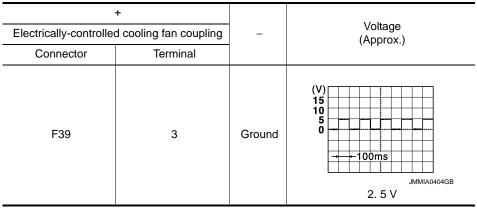
[VK56VD]

ELECTRICALLY-CONTROLLED COOLING FAN COUPLING

< DTC/CIRCUIT DIAGNOSIS >

- 1. Start the engine.
- 2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode of "ECM" with CONSULT-III.
- 3. Set the Duty value to 100%.
- 4. Check the voltage between electrically-controlled cooling fan coupling harness connector and ground. CAUTION:

Wait for 1 minute or more to measure.



WITHOUT CONSULT-III

- 1. Start the engine and warm up the engine until engine coolant temperature reaches at least 98°C (209°F).
- 2. Check the voltage between electrically-controlled cooling fan coupling harness connector and ground. CAUTION:

Wait for 1 minute or more to measure.

+ Electrically-controlled cooling fan coupling		_	Voltage (Approx.)	
Connector	Terminal			
F39	3	Ground	(V) 15 10 5 0 	

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 5.

${f 5.}$ CHECK ELECTRICALLY-CONTROLLED COOLING FAN COUPLING CONTROL CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector.
- Check the continuity between electrically-controlled cooling fan coupling harness connector and IPDM E/ R harness connector.

+		_			
Electrically-controlled cooling fan coupling		IPDM	E/R	Continuity	
Connector	Terminal	Connector	Terminal		
F39	3	E17	72	Existed	

- 4. Also check harness for short to power.
- Is the inspection result normal?

YES >> GO TO 6.

EC-496

ELECTRICALLY-CONTROLLED COOLING FAN COUPLING

< DTC/CIRCUIT DIAGNOSIS >	[VK56VD]
NO >> Repair or replace error-detected parts.	
6.CHECK CAN COMMUNICATION	A
Refer to LAN-18, "Trouble Diagnosis Flow Chart".	
Is inspection result normal?	EC
YES >> Check intermittent incident. Refer to <u>GI-40, "Intermittent Incident"</u> . NO >> Repair or Replace error-detected parts.	
7. CHECK COOLING FAN SPEED SENSOR	С
Refer to EC-367, "Diagnosis Procedure".	
Is inspection result normal?	
YES >> Replace electrically-controlled cooling fan coupling. Refer to <u>CO-16</u> , NO >> Repair or replace error-detected parts.	"Removal and Installation".
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FUEL INJECTOR

Component Function Check

1.INSPECTION START

Turn ignition switch to START.

Are any cylinders ignited?

YES >> GO TO 2.

NO >> Proceed to EC-498, "Diagnosis Procedure".

2. CHECK FUEL INJECTOR FUNCTION

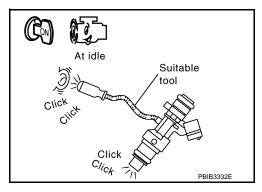
(I) WITH CONSULT-III

- 1. Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Check that each circuit produces a momentary engine speed drop.
- **WITHOUT CONSULT-III**
- 1. Start engine.
- 2. Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to EC-498, "Diagnosis Procedure".



INFOID:000000006218003

1.CHECK FUEL INJECTOR POWER SUPPLY

1. Turn ignition switch ON.

Diagnosis Procedure

2. Check the voltage between ECM harness connector and ground.

+				
E	CM	-	Voltage	
Connector	Terminal	-		
F111	46	Oreverd		
	51		Detter weltere	
E80	111	Ground	Battery voltage	
	112	-		

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform the trouble diagnosis for power supply circuit. Refer to <u>EC-168, "Diagnosis Procedure"</u>. 2.CHECK FUEL INJECTOR CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect fuel injector harness connector and ECM harness connector.
- 3. Check the continuity between fuel injector harness connector and ECM harness connector.

INFOID:000000006218002

FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

Image: constraint of the sector of the s	
$ \begin{array}{c c c c c c c } \hline \hline Connector & \hline Terminal & \hline Connector & \hline Terminal & \\ \hline \hline Connector & \hline Terminal & \hline Connector & \hline Terminal & \\ \hline \hline 1 & \hline F123 & \hline 1 & \hline F110 & \hline 103 & \\ \hline 2 & F124 & \hline 1 & \hline 2 & \hline 1 & \hline 2 & \\ \hline 2 & F124 & \hline 2 & F111 & \hline 4 & \\ \hline 2 & F111 & \hline 4 & \\ \hline 2 & F111 & \hline 4 & \\ \hline 3 & \hline 1 & $	
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2 109 7 F129 1 F110 106	
7 F129 F110	
2 103	
8 F130 1 F111 1	
2 8	
G .CHECK ECM GROUND CIRCUIT Check the continuity between ECM harness connector and ground.	
+	
ECM – Continuity	
Connector Terminal	
F111 5	
E80 114 Ground Exsisted	
E80 115	
s inspection result normal?	
YES >> GO TO 4.	
NO >> Repair or replace error-detected parts.	
Refer to <u>EC-499, "Component Inspection"</u> .	
s the inspection result normal?	
 YES >> Check intermittent incident. Refer to <u>GI-40, "Intermittent Incident"</u>. NO >> Replace malfunctioning fuel injector. Refer to <u>EM-49, "Removal and Installation"</u>. 	
Component Inspection	ND:000000006218004
1.CHECK FUEL INJECTOR	

Turn ignition switch OFF.
 Disconnect fuel injector harness connector.

3. Check the resistance between fuel injector terminals as per the following.

EC-499

FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

Injector					
+	-	Condition		Resistance	
Terminal					
1	2	Temperature	10 - 60°C (50 - 140°F)	1.44 - 1.73 Ω	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning fuel injector. Refer to EM-49. "Removal and Installation".

HIGH PRESSURE FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

HIGH PRESSURE FUEL PUMP

Component Function Check

1.CHECK HIGH PRESSURE FUEL PUMP FUNCTION

WITH CONSULT-III

1. Start engine.

2. Check "FUEL PRES SEN V" in "DATA MONITOR" mode with CONSULT-III.

Monitor Item	Condition	Values/Status	
	Engine speed: Idle	980 – 1,200 mV	D
FUEL PRES SEN V	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,100 – 2,900 mV	

🛞 WITHOUT CONSULT-III

1. Start engine.

2. Check the voltage between ECM harness connector and ground.

ECM					Voltage	
+		-		Condition		
Connector	Terminal	Connector	Terminal			
F110	105	E80	175	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	BATTERY VOLTAGE (11 - 14 V)★ 20mSec/div 20mSec/div 10V/div	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V)★ 20mSec/div	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-501, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK HIGH PRESSURE FUEL PUMP SOLENOID CIRCUIT

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

	+			
E	СМ	High pressure fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
F110	105	F24		Existed
1110	110	124	2	LAISIGU

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HIGH PRESSURE FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

INFOID:000000006218007

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

Is inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2. CHECK HIGH PRESSURE FUEL PUMP SOLENOID

Refer to EC-502, "Component Inspection".

Is inspection result normal?

YES >> GO TO 3.

NO >> Replace high pressure fuel pump. Refer to <u>EM-43, "Removal and Installation"</u>.

3. CHECK HIGH PRESSURE FUEL PUMP INSTALLATION CONDITION

- 1. Turn ignition switch OFF.
- 2. Check that the high pressure fuel pump is installed with no backlash and looseness.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK CAMSHAFT

1. Remove camshaft. Refer to EM-75, "Removal and Installation".

2. Check camshaft. Refer to EM-77, "Inspection".

Is inspection result normal?

YES >> INSPECTION END

NO >> Replace camshaft. Refer to <u>EM-75. "Removal and Installation"</u>.

Component Inspection

1.CHECK HIGH PRESSURE FUEL PUMP SOLENOID

1. Turn ignition switch OFF.

2. Disconnect high pressure fuel pump harness connector.

3. Check the resistance between high pressure fuel pump connector terminals as per the following.

+	-	Condition		Resistance	
High pressu	ire fuel pump				
Terr	ninal				
1	2	Temperature	20 – 30°C (68 – 86°F)	9 – 11 Ω	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace high pressure fuel pump. Refer to EM-43, "Removal and Installation".

< DTC/CIRCUIT DIAGNOSIS >

Component Function Check

ICC BRAKE SWITCH

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1. CHECK ICC BRAKE SWITCH FUNCTION

B WITH CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Co	Indication	
BRAKE SW1	Brake pedal	Slightly depressed	OFF
(ICC brake switch)	Diake pedal	Fully released	ON

🛞 WITHOUT CONSULT-III

Turn ignition switch ON.

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

	ECM				
Connector	+	-	С	ondition	Voltage
CONNECTOR	Terminal	Terminal			
E80	147	175	Brake pedal	Slightly depressed	Approx. 0 V
LOU	(ICC brake switch signal)	175	Brake pedar	Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-503, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK DTC WITH ADAS CONTROL UNIT

Refer to DAS-21, "CONSULT-III Function (ICC/ADAS)" and DAS-38, "DTC Index".	K
Are any DTCs detected?	
YES >> Perform the Diagnosis Procedure corresponding to the detected DTC.NO >> GO TO 2.	L
2. CHECK OVERALL FUNCTION	

WITH CONSULT-III

Turn ignition switch ON.

2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.

3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	C	Indication	
BRAKE SW1	Brako podal	Slightly depressed	OFF
(ICC brake switch)	Brake pedal	Fully released	ON

🛞 WITHOUT CONSULT-III

Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals under the following conditions.

INFOID-000000006218009

ICC BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

	ECM					
Connector	+	_	Condition		Voltage (V)	
Connector	Terminal	Terminal				
E80	147	175	Brake pedal	Slightly depressed	Approx. 0	
E80	(ICC brake switch signal)	175	Diake pedal	Fully released	Battery voltage	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

3.CHECK ICC BRAKE SWITCH POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.

2. Disconnect ICC brake switch harness connector.

- 3. Turn ignition switch ON.
- 4. Check the voltage between ICC brake switch harness connector and ground.

ICC brak	e switch	Ground	Voltage	
Connector Terminal		Ground	voltage	
E68	2	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 4.

4.CHECK ICC BRAKE SWITCH POWER SUPPLY CIRCUIT-II

Check the voltage between ICC brake switch harness connector and ground.

ICC brak	e switch	Ground	Voltage	
Connector	Terminal	Ground	voltage	
E68	1	Ground	Battery voltage	

Is the inspection result normal?

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

5. DETECT MALFUNCTIONING PART

Check the following.

• Fuse block (J/B) connector E103

• 10 A fuse (No. 3)

Harness for open or short between ICC brake switch and fuse

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

6.CHECK ICC BRAKE SWITCH

Refer to EC-445. "Component Inspection (ICC Brake Switch)".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace ICC brake switch. Refer to <u>BR-20. "Removal and Installation"</u>.

7.CHECK ICC BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between ICC brake switch harness connector and ECM harness connector.

ICC BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

	ake switch	ECM	Л		
Connector		Connector	Terminal	Continuity	
E68	2	E80	147	Existed	
I. Also c	heck harnes	s for short to	ground ar	d short to power.	
<u>s the insp</u>	ection result	normal?			
	> GO TO 9.				
`	> GO TO 8.				
			ARI		
	following.	short betweer	n ICC brak	e switch and ECM	
Loose or	poor conne	ction for each	connecto	r and harness	
	• •		-	nd or short to power in harness or connectors.	
		TENT INCIDE			
Refer to <u>G</u>	<u>I-40, "Interm</u>	ittent Incident	<u>t"</u> .		
	> INSPECTI				
Compon	ent Inspe	ction (ICC	Brake		218010
	KICC BRAK	E SWITCH-I			
1. Turn ig	gnition switcl	h OFF.			
2. Discor	nnect ICC br	ake switch ha			
3. Check	the continu	ity between IC	C brake s	switch terminals under the following conditions.	
Terminals	(Condition	Cor	tinuity	
		Fully released		isted	
1 and 2	Brake pedal	Slightly depres	sed Not	existed	
s the insp	ection result	normal?	l		
	> INSPECTI	ON END			
	> GO TO 2.				
NO >					
NO > 2.CHECK	CICC BRAK				
NO > 2.CHECk	ICC brake s	witch installa		r to <u>BR-21, "Inspection and Adjustment"</u> .	
NO > 2.CHECk	ICC brake s	witch installa		r to <u>BR-21, "Inspection and Adjustment"</u> . switch terminals under the following conditions.	
NO > 2.CHECk 1. Adjust	t ICC brake s the continu	witch installa	CC brake s		
NO > 2.CHECk 1. Adjust 2. Check Terminals	t ICC brake s the continu	switch installa ity between IC	CC brake s	switch terminals under the following conditions.	
NO > 2.CHECk . Adjust 2. Check	t ICC brake s the continu	witch installa ity between IC Condition	CC brake s	switch terminals under the following conditions.	
NO > 2.CHECk 1. Adjust 2. Check Terminals 1 and 2	t ICC brake s the continu	switch installa ity between IC Condition Fully released Slightly depres	CC brake s	switch terminals under the following conditions.	
NO > 2.CHECk 1. Adjust 2. Check Terminals 1 and 2 s the insp YES >	t ICC brake s the continue Brake pedal ection result	switch installa ity between IC Condition Fully released Slightly depres <u>normal?</u> ON END	CC brake s	switch terminals under the following conditions.	
NO > 2.CHECk 1. Adjust 2. Check Terminals 1 and 2 s the insp YES >	t ICC brake s the continue Brake pedal ection result	switch installa ity between IC Condition Fully released Slightly depres <u>normal?</u> ON END	CC brake s	switch terminals under the following conditions.	

< DTC/CIRCUIT DIAGNOSIS >

IGNITION SIGNAL

Component Function Check

INFOID:000000006218011

[VK56VD]

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES-1 >> With CONSULT-III: GO TO 2.

YES-2 >> Without CONSULT-III: GO TO 3.

NO >> Go to EC-506, "Diagnosis Procedure".

2. CHECK IGNITION SIGNAL FUNCTION

(B) WITH CONSULT-III

- 1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 2. Check that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-506, "Diagnosis Procedure".

3.CHECK IGNITION SIGNAL FUNCTION

🛞 WITHOUT CONSULT-III

1. Let engine idle.

2. Read the voltage signal between ECM harness connector terminals under the following conditions with an oscilloscope.

Cylinder	-	+	-	-	Voltage signal
Cymruer	Connector	Terminal	Connector	Terminal	
1		12			
2		13		175	
3		14	- E80		
4	F111	15			
5	- FIII	17			
6		18			→ 2.0V/Div 50 ms/Div
7		19			≥ 2.0V/Div 50 ms/Div PBIB0044E
8		20			

NOTE:

The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-506, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000006218012

1. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn it ON.

2. Check the voltage between ECM harness connector terminals under the following conditions.

< DTC/CIRCUIT DIAGNOSIS >

	ECM								
	+	_	Va	oltage					
Connector	Terminal	Termina		Shago					
E80	171 172	175		ry voltage					
Is the inspe		ult normal?	>						
YES >>	GO TO 2	2.	_	rocedure".					
2.снеск					CUIT-II				
1. Turn ig 2. Discon 3. Turn ig	nition swi nect cond nition swi	tch OFF. lenser har tch ON.	ness conn	ector.	s connector a	nd ground			
	lenser	Ground	Voltag	je					
Connector F8	Terminal 1		Botton						
-		Ground	Battery vo	maye					
	GO TO 5 GO TO 5 GO TO 5	5.	<u> </u>						
3.снеск			WER SU	PPLY CIR	CUIT-III				
	nition swi								
			ess conne en IPDM		ess connector	and conde	enser harnes	ss connector	
	the contir	uity betwe		E/R harne	ess connector	and conde	enser harnes	ss connector	
3. Check	the contir	uity betwe	en IPDM		ess connector	and conde	enser harnes	ss connector	-
3. Check IPDM	the contir E/R	nuity betwe	een IPDM	E/R harne	ess connector -	and conde	enser harnes	ss connector	
3. Check IPDM Connector E15 4. Also ch Is the inspe YES >>	E/R Terminal 61 neck harne ection resu Go to EC GO TO 4	Cond Connector F8 ess for sho ult normal? C-168, "Dia 4.	een IPDM enser Terminal 1 ort to grou 2 agnosis Pi	E/R harne Continuity Existed	ess connector	and conde	enser harnes	ss connector	
3. Check IPDM Connector E15 4. Also ch Is the inspe YES >> NO >> 4.DETEC Check the f	the contin	Cond Connector F8 ess for sho ult normal? C-168, "Dia 4. NCTIONIN or short be	een IPDM enser Terminal 1 ort to grou 2 agnosis Pi IG PART tween IPD	E/R harne Continuity Existed nd and sho rocedure".	- ort to power. d condenser	and conde	enser harnes	ss connector	
3. Check IPDM Connector E15 4. Also ch Is the inspe YES >> NO >> 4. DETECT Check the f • Harness f • Loose or >>	the contin	Cond Connector F8 ess for sho ult normal? C-168, "Dia C-168, "Dia A. NCTIONIN or short be nection for	een IPDM enser Terminal 1 ort to grou 2 agnosis Pi agnosis Pi IG PART tween IPD each con	E/R harne Continuity Existed nd and sho rocedure".	d condenser harness	er in harnes			
3. Check IPDM Connector E15 4. Also ch Is the inspe YES >> NO >> 4. DETECT Check the f • Harness f • Loose or >>	the contin	Cond Connector F8 ess for sho ult normal? C-168, "Dia C-168, "Dia A. NCTIONIN or short be nection for	een IPDM enser Terminal 1 ort to grou 2 agnosis Pi agnosis Pi IG PART tween IPD each con	E/R harne Continuity Existed nd and sho rocedure".	d condenser	er in harnes			
3. Check IPDM Connector E15 4. Also ch Is the inspe YES >> NO >> 4. DETECT Check the f • Harness f • Loose or >> 5.CHECK 1. Turn ig	the contin	Cond Connector F8 ess for sho ult normal? C-168, "Dia 2-168, "Dia	een IPDM enser Terminal 1 ort to grou agnosis Pi agnosis Pi each con t, short to DUND CIF	E/R harne Continuity Existed nd and sho rocedure". OM E/R an nector and ground or RCUIT FOI	d condenser harness	er in harnes SHORT	ss or connec		
3. Check IPDM Connector E15 4. Also ch Is the inspect YES >> NO >> 4. DETECT Check the f • Harness f • Loose or >> 5.CHECK 1. Turn ig 2. Check	the contin	Cond Connector F8 ess for sho ult normal? C-168, "Dia 2-168, "Dia	een IPDM enser Terminal 1 ort to grou agnosis Pi agnosis Pi each con t, short to DUND CIF	E/R harne Continuity Existed nd and sho rocedure". OM E/R an nector and ground or RCUIT FOI	d condenser harness short to powe	er in harnes SHORT	ss or connec		
3. Check IPDM Connector E15 4. Also ch Is the inspe YES >> NO >> 4. DETECT Check the f • Harness f • Loose or >> 5.CHECK 1. Turn ig	the contin	Cond Connector F8 ess for sho ult normal? C-168, "Dia 2-168, "Dia	een IPDM enser Terminal 1 ort to grou agnosis Pi agnosis Pi each con t, short to DUND CIF	E/R harne Continuity Existed nd and she rocedure". OM E/R and nector and ground or RCUIT FOI nser harne	d condenser harness short to powe	er in harnes SHORT	ss or connec		

3. Also check harness for short to power. Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 6.

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

6.CHECK CONDENSER

Refer to EC-510, "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 coi	Ground	Voltage				
Cylinder	Connector	Terminal	Gibana	voltage			
1	F75	3					
2	F76	3					
3	F77	3		Battery voltage			
4	F78	3	Ground				
5	F79	3	Gibunu	Dattery voltage			
6	F80	3					
7	F81	3					
8	F82	3					

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the following.

Harness connector F22 and E46

• Harness for open or short between ignition coil and harness connector F22

>> Repair or replace harness or connectors.

9. 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 coi	Ground	Continuity		
Cylinder	Connector	Terminal	Ground	Continuity	
1	F75	2			
2	F76	2	*	Existed	
3	F77	2	*		
4	F78	2	Ground		
5	F79	2	Ground		
6	F80	2	, 		
7	F81	2	1		
8	F82	2	Ţ		

3. Also check harness for short to power.

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 10.

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

10. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.

2. Check the continuity between ignition coil harness connector and ECM harness connector.

	Ignition coil		EC	CM		
Cylinder	Connector	Terminal	Connector	Terminal	- Continuity	C
1	F75	1		12		
2	F76	1	-	13		D
3	F77	1		14	-	
4	F78	1	F111	15	Existed	Е
5	F79	1		17		
6	F80	1		18		
7	F81	1		19		F
8	F82	1		20		
3. Also	check harr	ness for s	hort to gro	und and s	short to power.	0
	pection res		<u>al?</u>			G
	>> GO TO		uit abort to	around o	ar abort to power in bornees or connectors	
		•		•	or short to power in harness or connectors.	Н
					ANSISTOR	
				n (Ignition	n Coil with Power Transistor)".	
	<u>pection res</u> >> GO TO		<u>al?</u>			1
			tionina ian	ition coil w	with power transistor.	
	ECK INTER		00			J
	GI-40, "Inte					
						K
	>> INSPEC		١D			N
Compo	nent Ins	nection	(Ignition	. Coil wi	ith Power Transistor)	
		peouon	liginaoi			L
1. CHEC	K IGNITIO	N COIL V	WITH POW	ER TRAN	NSISTOR-I	
1. Turn	ignition sw	itch OFF.				в. /
	onnect igni				and a second to the faille with a	Μ
3. Cheo	ck resistant		en ignition (coll termin	nals as per the following.	
Terminal	s Resis	tance [at 25	5°C (77°F)]	_		Ν
1 and 2		Except 0 or		_		
1 and 3						0
2 and 3		Except 0	Ω			0
	pection res	sult norma	al?	_		
	>> GO TO		<u> </u>			Ρ
			tioning ign	ition coil w	with power transistor.	
2.снес	K IGNITIO	N COIL V	WITH POW	ER TRAN	NSISTOR-II	
	NI					

CAUTION:

Perform the following procedure in a place with no combustible objects and good ventilation.

1. Turn ignition switch OFF.

2. Reconnect all harness connectors disconnected.

А

EC

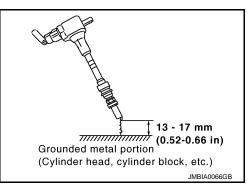
< DTC/CIRCUIT DIAGNOSIS >

- 3. Remove fuel pump fuse in IPDM E/R to release fuel pressure. **NOTE:**
 - For the fuse number, refer to EC-114, "Wiring Diagram".
 - For the fuse arrangement, refer to <u>PG-143, "Fuse, Connector and Terminal Arrangement"</u>.
 - Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
- 4. Start engine.
- 5. After engine stalls, crank it 2 or 3 times to release all fuel pressure.
- 6. Turn ignition switch OFF.
- 7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 8. Remove ignition coil and spark plug of the cylinder to be checked.
- 9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 10. Connect spark plug and harness connector to ignition coil.
- 11. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 12. Crank engine for approximately 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

• Never place the spark plug and the ignition coil within 50 cm (19.7 in) each other. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.



• It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made. NOTE:

When the gap is less than 13 mm (0.52 in), a spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace malfunctioning ignition coil with power transistor.

Component Inspection (Condenser)

INFOID:000000006218014

[VK56VD]

1.CHECK CONDENSER

- 1. Turn ignition switch OFF.
- 2. Disconnect condenser harness connector.
- 3. Check resistance between condenser terminals as per the following.

Terminals	Resistance
1 and 2	Above 1 M Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace condenser.

INFORMATION DISPLAY (ASCD)

INFORMATION DISPLAY (ASCD)	
< DTC/CIRCUIT DIAGNOSIS > [VK56VD]	-
INFORMATION DISPLAY (ASCD)	А
Component Function Check	
1. CHECK INFORMATION DISPLAY	EC
 Start engine. Press MAIN switch on ASCD steering switch. Drive the vehicle at more than 40 km/h (25 MPH). CAUTION: 	С
 Always drive vehicle at a safe speed. Press SET/COAST switch. Check that the reading of the speedometer shows the same value as the set speed indicated in the information display while driving the vehicle on a flat road. 	_ D
Is the inspection result normal? YES >> INSPECTION END NO >> Go to <u>EC-511, "Diagnosis Procedure"</u> .	E
Diagnosis Procedure	۶F
1.снеск отс	
Check that DTC UXXXX or P0500 is not displayed.	G
<u>Is the inspection result normal?</u> YES >> GO TO 2. NO-1 >> Perform trouble diagnosis for DTC UXXXX. NO-2 >> Perform trouble diagnosis for DTC P0500. Refer to <u>EC-356, "DTC Logic"</u> .	Н
2. CHECK DTC WITH "COMBINATION METER"	
Refer to MWI-30, "CONSULT-III Function".	-
Is the inspection result normal?	
YES >> GO TO 3. NO >> Perform trouble diagnosis for DTC indicated.	J
3. CHECK INTERMITTENT INCIDENT	
Refer to GI-40, "Intermittent Incident".	K
Is the inspection result normal?	
YES >> Replace combination meter. NO >> Repair or replace.	L
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LOW PRESSURE FUEL PUMP

Component Function Check

1.CHECK FUEL PUMP FUNCTION

1. Turn ignition switch ON.

2. Pinch fuel feed hose with two fingers. **NOTE:**

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

Is the inspection result normal?

YES >> INSPECTION END NO >> <u>EC-512, "Diagnosis Procedure"</u>.

Diagnosis Procedure

INFOID:000000006218018

1.CHECK FPCM POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect FPCM harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between FPCM harness connector and ground.

	+		
FP	СМ	_	Voltage
Connector	Terminal		
B41	10	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform the trouble diagnosis for power supply circuit. Refer to EC-168. "Diagnosis Procedure".

2. CHECK FPCM GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Check the continuity between FPCM harness connector and ground.

	+		
FP	CM	—	Continuity
Connector	Terminal	*	
B41	B41 5		Existed

Is the inspection result normal?

YES >> GO TO 3.

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

 $\mathbf{3.}$ CHECK FPCM INPUT AND OUTPUT CIRCUIT

1. Disconnect ECM harness connector.

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

	+				
FP	СМ	E	Continuity		
Connector	Terminal	Connector	Terminal		
B41	8	E80	125	Existed	
D41	9	LOU	142	LAISIEU	

3. Also check harness for short to ground and to power. <u>Is the inspection result normal?</u>

EC-512

LOW PRESSURE FUEL PUMP

		l		RESSU	RE FUE	L PU	JIVIP			
< DTC/CII	RCUIT DI	AGNOSIS >							[VK56VI	<u>)</u>
	> GO TO			norto						0
	-	or replace erro JMP CONTRC		•						A
		level sensor u						or unit and	fuel pump harne	EC
Z. Check		nulty between		11855 COI	mector and	u iuei i		Ji unit anu	nuel pump name	55
-	F		_							С
FP	СМ	Fuel level sens	or unit and f	uel pump	Continuity					
Connector	Terminal	Connec	tor	Terminal						D
	6	05		3	E 1969 I					
B41	7	C5		1	Existed					
3. Also c	heck harr	ess for short to	o ground a	and to po	wer.	_				E
Is the insp	ection res	ult normal?								
	> GO TO									F
_	•	or replace erro		parts.						1
D .CHEC	K LOW PF	RESSURE FUE	L PUMP							
Refer to E	<u>C-513, "C</u>	omponent Insp	pection (Lo	w Press	ure Fuel P	<u>'ump)"</u> .				G
		ult normal?								
	> GO TO		oor unit or	d fuel pu	mp Dofor	to El	E "Domo	ial and load	tollation"	Н
6.CHECH	-	e fuel level sen	sor unit ar	ia iuei pu	mp. Relei	10 <u>FL-</u>	<u>o, Remov</u>			11
		omponent Insp	pection (FI	<u>PCM)"</u> .						1
-		<u>ult normal?</u>	dant Dafe		0 "Untormail	ttoot lo	oidont"			
		ntermittent inci FPCM. Refer								
-										J
Compoi		pection (Lov	W LIG22		er Fump)			INFOID:000000006218	3019
1.CHECH	K FUEL PI	RESSURE RE	GULATOR	2						K
1. Turn i	gnition sw	itch OFF.								
		oressure. Refe	r to <u>EC-15</u>	<u>3, "Work</u>	Procedure	<u>e"</u> .				
<u>Is inspecti</u>										
-										
•	> GO TO									M
		ESSURE FUE								
	gnition sw	itch OFF. level sensor u	nit and fue							
		e between fue			and fuel pu	ump ter	minals as	follows.		Ν
					•					
+	-	-								0
Fuel level s	ensor unit a	nd fuel	Condition	Ra	sistance					-
	pump			ive	5.5(0)100					
TT	erminals									Ρ
1	3	-	ture: 25°C (7	7°F) 0.2	- 5.0 Ω					
Is the insp	ection res	ult normal?								

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel level sensor unit and fuel pump. Refer to <u>FL-5</u>, "Removal and Installation".

LOW PRESSURE FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection (FPCM)

1.CHECK FUEL PUMP CONTROL MODULE (FPCM)

1. Check the voltage between FPCM terminals under the following conditions.

FPCM				
+	-	Condition	Voltage	
Terminal	Terminal			
		For 1 second after turning ignition switch ON	Approx. 8.5 V	
7	6	More than 1 second after turning ignition switch ON	Approx. 0 V	
		Idle speed	Approx. 8.5 V	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace FPCM. Refer to EC-537, "Removal and Installation".

[VK56VD]

MALFUNCTION INDICATOR LAMP

< DTC/CIRCUIT DIAGNOSIS > [VK56VD]	
MALFUNCTION INDICATOR LAMP	•
Component Function Check	A 1
1.CHECK MIL FUNCTION	EC
 Turn ignition switch ON. Check that MIL illuminates. 	С
Is the inspection result normal? YES >> INSPECTION END NO >> Go to EC-515, "Diagnosis Procedure".	C
Diagnosis Procedure	2 2
1.снеск отс	Е
Check that DTC UXXXX is not displayed.	. –
<u>Is the inspection result normal?</u> YES >> GO TO 2. NO >> Perform trouble diagnosis for DTC UXXXX.	F
2. CHECK DTC WITH COMBINATION METER	
Refer to <u>MWI-30, "CONSULT-III Function"</u> .	G
<u>Is the inspection result normal?</u> YES >> GO TO 3. NO >> Perform trouble diagnosis for DTC indicated.	Н
3. CHECK INTERMITTENT INCIDENT	
Refer to <u>GI-40. "Intermittent Incident"</u> . Is the inspection result normal?	
YES >> Replace combination meter. NO >> Repair or replace malfunctioning part.	J
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< DTC/CIRCUIT DIAGNOSIS >

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

Component Function Check

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.

Are any symptoms present?

YES >> Proceed to EC-516, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

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 7.

2. CHECK EVAP CANISTER

- 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 2.5 kg (5.5 lb).

Is the inspection result normal?

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

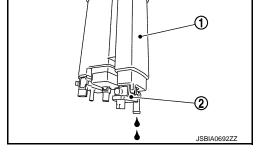
3.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister (1).

• EVAP canister vent control valve (2)

Does water drain from the EVAP canister?

YES >> GO TO 4. NO >> GO TO 6.



4.REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

Ó.CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-518, "Component Inspection (EVAP Vapor Cut Valve)".

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EC-516

[VK56VD]

INFOID:000000006256490

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Is the inspection result normal?	
YES >> INSPECTION END	А
NO >> Replace refueling EVAP vapor cut valve with fuel tank.	
7. CHECK EVAP CANISTER	
1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor	EC
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 2.5 kg (5.5 lb).	С
Is the inspection result normal?	
YES >> GO TO 8. NO >> GO TO 9.	D
8. CHECK IF EVAP CANISTER IS SATURATED WITH WATER	Е
Check if water will drain from EVAP canister (1). • EVAP canister vent control valve (2)	
Does water drain from the EVAP canister?	_
YES >> GO TO 9.	F
NO >> GO TO 11.	
	G
	Н
JSBIA0692ZZ	
9.REPLACE EVAP CANISTER	
Replace EVAP canister with a new one.	I
>> GO TO 10.	J
10. DETECT MALFUNCTIONING PART	
Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.	
	K
>> Repair or replace EVAP hose.	
11.CHECK VENT HOSES AND VENT TUBES	L
Check hoses and tubes between EVAP canister and refueling control valve for clogging, kinks, looseness and improper connection.	
Is the inspection result normal?	M
YES >> GO TO 12.	
NO >> Repair or replace hoses and tubes.	NI
12.CHECK FILLER NECK TUBE	Ν
Check recirculation line for clogging, dents and cracks.	
Is the inspection result normal?	0
YES >> GO TO 13. NO >> Replace filler neck tube.	
13. CHECK REFUELING EVAP VAPOR CUT VALVE	Ρ
Refer to EC-518. "Component Inspection (EVAP Vapor Cut Valve)".	
Is the inspection result normal?	
YES >> GO TO 14.	
NO >> Replace refueling EVAP vapor cut valve with fuel tank.	
14.CHECK FUEL FILLER TUBE	

Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.

EC-517

[VK56VD]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace fuel filler tube.

15.CHECK ONE-WAY FUEL VALVE-I

Check one-way fuel valve for clogging.

Is the inspection result normal?

YES >> GO TO 16.

NO >> Repair or replace one-way fuel valve with fuel tank.

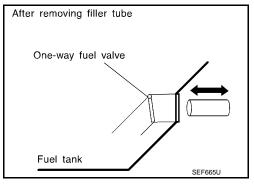
16.CHECK ONE-WAY FUEL VALVE-II

- 1. Check 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 (EVAP Vapor Cut Valve)

1. CHECK REFUELING EVAP VAPOR CUT VALVE

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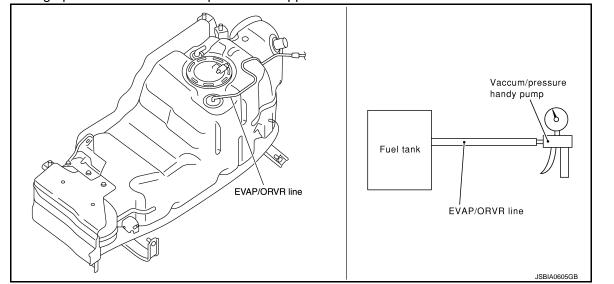
1. Turn ignition switch OFF.

- 2. Remove fuel tank. Refer to FL-8, "Removal and Installation".
- 3. 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.
- 4. 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.
- 5. 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.
- Turn fuel tank upside down.

[VK56VD]

< DTC/CIRCUIT DIAGNOSIS >

 Apply vacuum pressure to hose end [-13.3 kPa (-0.136 kg/cm³, -1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

[VK56VD]

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REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

REFRIGERANT PRESSURE SENSOR

Component Function Check

1.CHECK REFRIGERANT PRESSURE SENSOR FUNCTION

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn A/Č switch and blower fan switch ON.
- 3. Check the voltage between ECM harness connector terminals as per the following.

Connector	+	_	Voltage (V)
Connector	Terminal	Terminal	
E80	144 (Refrigerant pressure sensor signal)	150	1.0 - 4.0

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-520. "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000006218027

1.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 pr	essure sensor	Ground	Voltage (V)	
Connector	Terminal		voltage (v)	
E77	1	Ground	Approx. 5	

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 ECM and refrigerant pressure sensor

• Loose or poor connection for each connector and harness

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

3. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pre	essure sensor	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E77	3	E80	150	Existed

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

Is the inspection result normal?

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

REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

4.DETECT MAL	FUNCTIONING F	PART			
Check the followi	ng.				-
Harness for ope	en or short betwe			int pressure sensor	-
Loose or poor c	connection for eac	ch connecto	or and harr	ness	
	•	-		t to power in harness or connectors.	
D. CHECK REFR	RIGERANT PRES	SURE SEN	ISOR INP	UT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Check the co	ontinuity between	refrigerant	pressure	sensor harness connector and ECM harness connection	-
tor.					
Refrigerant pressure		СМ	Continuity		
Connector Te	erminal Connector				
E77	2 E80	144	Existed		
	arness for short t	o ground ar	nd short to	power.	
s the inspection					
YES >> GO 1 NO >> GO 1					
•					
J.DETECT MAL	FUNCTIONING I	PARI			_
Check the followi	ng.				
 Harness for ope 	en or short betwe			int pressure sensor	
 Harness for ope 	en or short betwe				
 Loose or poor c 	en or short betwe connection for eac	ch connecto	or and harr	ness	
 Harness for ope Loose or poor operation >> Repared 	en or short betwe connection for eac air open circuit, sh	ch connecto	or and harr		
 Harness for ope Loose or poor of >> Repa CHECK INTER 	en or short betwe connection for eac air open circuit, sh RMITTENT INCIE	ch connecto nort to grour DENT	or and harr	ness	_
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Harness for ope Loose or poor of 	en or short betwe connection for each air open circuit, sh RMITTENT INCIE <u>ntermittent Incide</u> result normal? ace refrigerant proval and Installati	ch connecto nort to grour DENT <u>nt"</u> . ressure sen <u>ion"</u> .	or and harr nd or short nsor. Refer	ness t to power in harness or connectors.	-
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Harness for ope Loose or poor of Repart CHECK INTER Refer to <u>GI-40, "In</u> s the inspection of YES >> Repla <u>Rem</u>	en or short betwe connection for each air open circuit, sh RMITTENT INCIE <u>ntermittent Incide</u> result normal? ace refrigerant proval and Installati	ch connecto nort to grour DENT <u>nt"</u> . ressure sen <u>ion"</u> .	or and harr nd or short nsor. Refer	ness t to power in harness or connectors.	-

SNOW MODE SWITCH

Description

The snow mode switch signal is sent to the combination meter from the snow mode switch. The combination meter then sends the signal to the ECM via the CAN communication line.

The snow mode is used for driving or starting the vehicle on snowy roads or slippery areas. If the snow mode is activated, the vehicle speed will not accelerate as quickly as normal to avoid vehicle slip. In other words, ECM controls rapid engine torque change by controlling the electric throttle control actuator operating speed.

Component Function Check

INFOID:000000006256404

1.CHECK SNOW MODE SWITCH FUNCTION

- 1. Turn ignition switch ON.
- 2. Select "SNOW MODE SW" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "SNOW MODE SW" indication under the following conditions.

Monitor item	Condition		Indication
SNOW MODE SW	Snow mode switch	ON	ON
SNOW MODE SW	Show mode switch	OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-522, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000006256405

1.CHECK DTC WITH COMBINATION METER

Refer to MWI-30, "CONSULT-III Function".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to <u>MWI-57</u>, "Work flow".

2.CHECK SNOW MODE SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect snow mode switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between snow mode switch harness connector and ground.

Snow mo	de switch	Ground	Voltage
Connector	Connector Terminal		voltage
M54	12	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.

Fuse block harness connector M3

• 10 A fuse (No. 13)

• Harness for open or short between snow mode switch and fuse.

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

4.CHECK SNOW MODE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

EC-522

SNOW MODE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VK56VD]

- 2. Disconnect combination meter harness connector.
- Check the continuity between snow mode switch harness connector and combination meter harness connector.

Snow mode switch		Combination meter		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
M54	22	M34	33	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 connector.

5.CHECK SNOW MODE SWITCH

Refer to EC-523, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO	>> Replace snow mode switch. Refer to <u>IP-25, "Removal and Installation"</u> .
~	

6.CHECK INTERMITTENT INCIDENT

Refer to GI-40, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK SNOW MODE SWITCH

- 1. Turn ignition switch OFF.
- 2. Disconnect snow mode switch harness connector.
- 3. Check the continuity between snow mode switch terminals under the following conditions.

Terminals	Condition		Continuity
12 and 22	2 and 22 Snow mode switch		Existed
12 anu 22	Show mode switch	OFF	Not Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace snow mode switch. Refer to IP-25. "Removal and Installation".

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< SYMPTOM DIAGNOSIS >

[VK56VD]

INFOID:000000006218028

SYMPTOM DIAGNOSIS ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

SYSTEM — BASIC ENGINE CONTROL SYSTEM

SYMPTOM															
		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)	Reference page
Warranty	y symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Low pressure fuel pump circuit	1	1	2	3	2		2	2			3		2	<u>EC-512</u>
	Low fuel pressure sensor circuit			4		4									<u>EC-483</u>
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			<u>EC-198</u>
	Fuel injector circuit	1	1	2	3	2		2	2			2			<u>EC-498</u>
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-532
	FRP sensor circuit	1	1	2	2	2		2	2			2			<u>EC-276</u> EC-279
	High pressure fuel pump circuit			4		3									EC-501
Air	Positive crankcase ventilation sys- tem	3	3	4	4	4	4	4	4	4		4	1		<u>EC-534</u>
	Incorrect idle speed adjustment						1	1	1	1		1			EC-139
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	<u>EC-460</u> <u>EC-466</u>
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-139
	Ignition circuit	1	1	2	2	2		2	2			2			EC-506
Main po	wer supply and ground circuit	2	2	3	3	3		3	3		2	3			EC-168

< SYMPTOM DIAGNOSIS >

[VK56VD]

		SYMPTOM												Δ	
	HARD/NO START/RESTART (EXCP. HA)	STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	BRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	/E FUEL CONSUMPTION	/E OIL CONSUMPTION	DEAD (UNDER CHARGE)	Reference page	A EC C D
	HARD/NO	ENGINE S	HESITATIO	SPARK KN	LACK OF	HIGH IDLE	ROUGH II	IDLING VIBRATION	SLOW/NC	OVERHE/	EXCESSIVE	EXCESSIVE	BATTERY		E
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		_
Mass air flow sensor circuit	1			2										<u>EC-201</u>	F
Engine coolant temperature sensor circuit						3			3					<u>EC-217</u>	
Air fuel ratio (A/F) sensor 1 circuit		1	2	3	2		2	2			2			EC-181 EC-228 EC-232 EC-235 EC-238	G
Throttle position sensor circuit						2			2					EC-219 EC-288 EC-406 EC-407 EC-475	I
Accelerator pedal position sensor circuit			3	2	1									EC-468 EC-471 EC-478	J
Knock sensor circuit			2								3			<u>EC-297</u>	
Engine oil temperature sensor			4		2						3			<u>EC-285</u>	K
Crankshaft position sensor circuit	2	2												<u>EC-299</u>	
Camshaft position sensor circuit	3	2												<u>EC-303</u>	L
Vehicle speed signal circuit		2	3		3						3			<u>EC-356</u>	
Power steering pressure sensor circuit		2					3	3						<u>EC-371</u>	
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-376 EC-378 EC-380	Μ
Intake valve timing control solenoid valve cir- cuit		3	2		1	3	2	2	3		3			<u>EC-193</u>	Ν
VVEL control module	3		4	4	3									<u>EC-451</u> <u>EC-452</u>	0
VVEL actuator motor	3		4	4	3									<u>EC-390</u>	
VVEL actuator motor relay	3		4	4	3									<u>EC-393</u>	_
VVEL control shaft position sensor	3		4	4	3									<u>EC-387</u>	Ρ
PNP signal circuit			3		3		3	3			3			<u>EC-383</u>	
Refrigerant pressure sensor circuit		2				3			3		4			<u>EC-520</u>	
Electrical load signal circuit							3							<u>EC-493</u>	
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	<u>HAC-60</u>	
ABS actuator and electric unit (control unit)			4											<u>BRC-60</u>	

Revision: 2010 May

< SYMPTOM DIAGNOSIS >

		SYMPTOM												
	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)	Reference page
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Manifold absolute pressure sensor circuit											3			<u>EC-210</u>
Battery current sensor						4	5	5					3	EC-412 EC-420 EC-424
Heated oxygen sensor 2			6		6		6	6			5			EC-243 EC-249 EC-257

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

							S١	(MPT)	ОМ						
		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)	Reference page
Warranty s	symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5													<u>FL-4</u>
	Fuel piping	5		5	5	5		5	5			5]		<u>FL-4</u>
	Vapor lock		5												_
	Valve deposit		Ŭ										1		
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5			5			_

< SYMPTOM DIAGNOSIS >

[VK56VD]

		SYMPTOM												٨		
		4)				NOI					HIGH				Ť	A
		(EXCP. HA)		SPOT		LERAT					ATURE	NOI	z	(GE)		EC
		ESTART (E)		NG/FLAT SI	ONATION	OOR ACCE	щ	ING		TO IDLE	R TEMPER/	ONSUMPT	CONSUMPTION	IDER CHAR	Reference page	С
		HARD/NO START/RESTART	STALL	HESITATION/SURGING/FLAT	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 CO	BATTERY DEAD (UNDER CHARGE)	F~30	D
		HARD/N	ENGINE STALL	HESITAI	SPARK I	LACK OI	HIGH ID	ROUGH		SLOW/N	OVERHI	EXCESS	EXCESS	BATTER		Е
Warranty s	ymptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		_
Air	Air duct														<u>EM-28</u>	F
	Air cleaner														<u>EM-27</u>	
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)		5	5		5		5	5			5			<u>EM-28</u>	G
	Electric throttle control actuator	5			5		5			5					<u>EC-460</u>	Ц
	Air leakage from intake manifold/ Collector/Gasket														<u>EM-30</u>	Η
Cranking	Battery	1	1	1		1		1	1					1	<u>PG-161</u>	1
	Generator circuit	•	•						•						<u>CHG-13</u>	
	Starter circuit	3										1			<u>STR-11</u>	
	Signal plate	6													<u>EM-106</u>	J
	PNP signal	4													<u>EC-383</u>	
Engine	Cylinder head	5	5	5	5	5		5	5			5			<u>EM-92</u>	K
	Cylinder head gasket		_		_				_	_	4		3	-		
	Cylinder block															
	Piston												4			L
	Piston ring	6	6	6	6	6		6	6			6			<u>EM-115</u>	
	Connecting rod															Μ
	Bearing															1 V I
	Crankshaft															
Valve mecha-	Timing chain														<u>EM-72</u>	Ν
nism	Camshaft														<u>EM-77</u>	
	Intake valve timing control	5	5	5	5	5		5	5			5		-	<u>EM-61</u>	0
	Intake valve												3		<u>EM-92</u>	0
	Exhaust valve															
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket Three way catalyst	5	5	5	5	5		5	5			5			<u>EM-42</u> <u>EX-6</u>	Ρ
	THEE WAY CALAIYSI															

< SYMPTOM DIAGNOSIS >

[VK56VD]

							S١	/MPT(MC						
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDRE/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)	Reference page
Warranty s	symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Lubrica- tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-56 EM-60 LU-9 LU-12 LU-14
	Oil level (Low)/Filthy oil														<u>LU-7</u>
Cooling	Radiator/Hose/Radiator filler cap														<u>CO-11</u> <u>CO-11</u>
	Thermostat									5					<u>CO-21</u>
	Water pump	5	5	5	5	5		5	5		4	5			<u>CO-19</u>
	Water gallery	5	5	5	5	5		5	5		7	5			<u>EM-115</u>
	Cooling fan														<u>CO-17</u>
	Coolant level (Low)/Contaminat- ed coolant									5					<u>CO-8</u>
IVIS (INFII NATS)	NITI Vehicle Immobilizer System —	1	1												<u>SEC-48</u>

1 - 6: The numbers refer to the order of inspection.

NORMAL OPERATING CONDITION

< SYMPTOM DIAGNOSIS >

NORMAL OPERATING CONDITION

Description

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 1,800 rpm under no load (for example, the selector lever position is neutral and engine speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled. **NOTE:**

This function is different from deceleration control listed under direct injection gasoline System, <u>EC-36.</u> <u>"DIRECT INJECTION GASOLINE SYSTEM : System Description"</u>.

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[VK56VD]

< PERIODIC MAINTENANCE >

PERIODIC MAINTENANCE IDLE SPEED

Inspection

1.CHECK IDLE SPEED

WITH CONSULT-III
 Check idle speed in "DATA MONITOR" mode with CONSULT-III.
 WITH GST
 Check idle speed with Service \$01 of GST.

>> INSPECTION END

IGNITION TIMING

< PERIODIC MAINTENANCE >

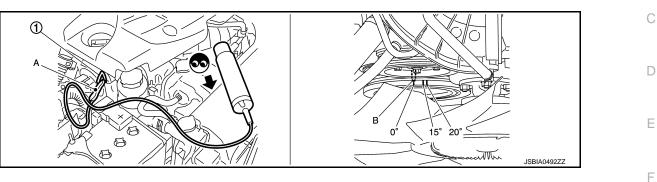
IGNITION TIMING

Inspection

INFOID:000000006218031

[VK56VD]

- **1.**CHECK IGNITION TIMING
- 1. Attach timing light to loop wire as shown.



- 1. Loop wire
- A. Timing light

- B. Timing indicator
- 2. Check ignition timing.
 - >> INSPECTION END

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< PERIODIC MAINTENANCE >

EVAP LEAK CHECK

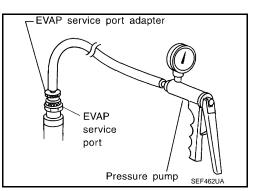
Inspection

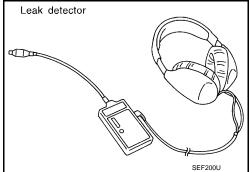
CAUTION:

- Do not use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in EVAP system.
- NOTE:
- Do not start engine.
- Improper installation of EVAP service port adapter (commercial service tool) to the EVAP service port may cause a leak.

(B) WITH CONSULT-III

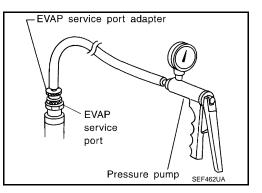
- 1. To locate the EVAP leak, install EVAP service port adapter (commercial service tool) and pressure pump to EVAP service port.
- 2. Turn ignition switch ON.
- 3. Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-III.
- 4. Touch "START". A bar graph (Pressure indicating display) will 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) and hose with pressure pump.
- Locate the leak using a leak detector (commercial service tool). Refer to <u>EC-45. "EVAPORATIVE EMISSION SYSTEM : System</u> <u>Diagram"</u>.





WITHOUT CONSULT-III

- 1. To locate the EVAP leak, install EVAP service port adapter (commercial service tool) 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.
- 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/cm², 0.2 to 0.4 psi).
- 4. Remove EVAP service port adapter (commercial service tool) and hose with pressure pump.

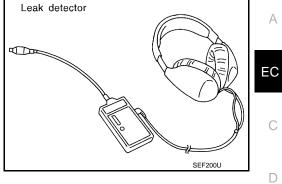


EVAP LEAK CHECK

< PERIODIC MAINTENANCE >

5. Locate the leak using a leak detector (commercial service tool). Refer to <u>EC-45, "EVAPORATIVE EMISSION SYSTEM : System</u> <u>Diagram"</u>.





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POSITIVE CRANKCASE VENTILATION

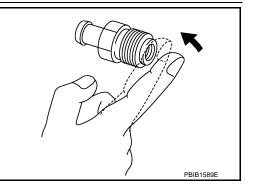
Inspection

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 <u>EM-33</u>, "Exploded View".



[VK56VD]

ECM

Removal and Installation

REMOVAL

INSTALLATION

- 1. Remove the battery and battery tray. Refer to PG-164, "Removal and Installation".
- 2. Disconnect ECM harness connectors (1) as shown in the figure.
- 3. Remove ECM bracket bolts (A).
- 4. Separate ECM (2) and ECM bracket (3).



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< REMOVAL AND INSTALLATION >

VVEL CONTROL MODULE

Removal and Installation

REMOVAL

- 1. Disconnect VVEL control module harness connector.
- 2. Remove the fix bolts. And then remove VVEL control module.

INSTALLATION

Install in the reverse order of removal.

CAUTION:

Must be perform additional service when replacing VVEL control module. Refer to <u>EC-144, "Work Pro-</u><u>cedure"</u>.

FUEL PUMP CONTROL MODULE (FPCM)

< REMOVAL AND INSTALLATION >

FUEL PUMP CONTROL MODULE (FPCM)

Removal and Installation

REMOVAL

1.	Remove the luggage side finisher lower (LH). Refer to INT-36, "LUGGAGE SIDE LOWER FINISHER :	
	Removal and Installation".	
2.	Disconnect fuel pump control module (FPCM) connector.	С
3.	Remove mounting bolts and then remove fuel pump control module (FPCM).	0

INSTALLATION

Install in the reverse order of removal.

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SERVICE DATA AND SPECIFICATIONS (SDS)

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Idle Speed

INFOID:000000006218038

[VK56VD]

Condition	Specification
No load* (in P or N position)	600 ± 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:000000006218039

Condition	Specification
No load* (in P or N position)	12 ± 2°BTDC

*: Under the following conditions

• A/C switch: OFF

• Electric load: OFF (Lights, heater fan & rear window defogger)

· Steering wheel: Kept in straight-ahead position

Calculated Load Value

INFOID:000000006218040

Condition	Specification (Using CONSULT-III or GST)
At idle	5 – 35%
At 2,500 rpm	5 – 35%

Mass Air Flow Sensor

INFOID:000000006218041

Supply voltage	Battery voltage (11 – 14 V)
Output voltage at idle	0.9 – 1.1 V*
Mass air flow (Using CONSULT-III or GST)	1.0 – 5.0 g/s at idle* 7.0 – 20.0 g/s at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.