SECTION ECEC ENGINE CONTROL SYSTEM o

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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. Information necessary to service the system safely is included in the SR and SB section of this Service Manual.

WARNING:

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

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

WARNING:

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

Precaution for Procedure without Cowl Top Cover

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

On Board Diagnostic (OBD) System of Engine and CVT

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

CAUTION:

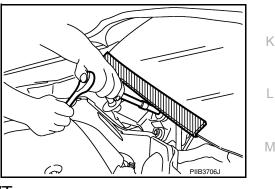
- Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to <u>PG-42</u>, "<u>Description</u>".
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.

Ε

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INFOID:000000009758322



Ν

PRECAUTIONS

< PRECAUTION >

- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EVAP system or fuel injection system, etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.

General Precautions

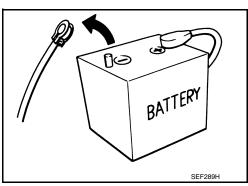
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage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

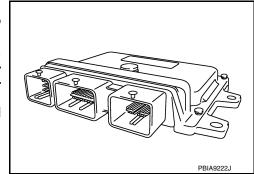
The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.

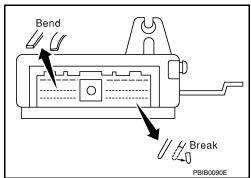
- If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values
- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).

Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.

- Securely connect ECM harness connectors.
 A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.
- Keep engine control system parts and harness dry.







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PRECAUTIONS

< PRECAUTION >

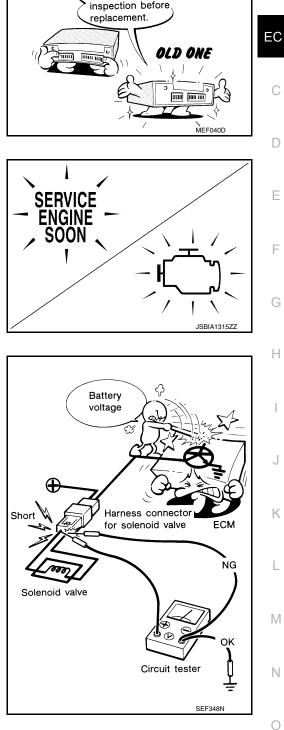
- Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to <u>EC-77, "Reference Value"</u>.
- Handle mass air flow sensor carefully to avoid damage.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).
- After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check. The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.

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

• Do not operate fuel pump when there is no fuel in lines.

EC-11

Tighten fuel hose clamps to the specified torque.



Perform ECM in-

put/output signal)

[MRA8DE]

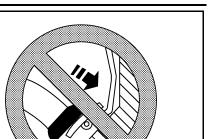
А

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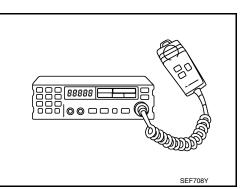
PRECAUTIONS

< PRECAUTION >

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



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



[MRA8DE]

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PREPARATION

< PREPARATION > PREPARATION

PREPARATION

Special Service Tools

NOTE:

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

Tool number		
(Kent-Moore No.) Tool name		Description
J-44321) Fuel pressure gauge kit	LEC642	Checks fuel pressure
J-44321-6) Fuel pressure adapter	LEIA0376E	Connects fuel pressure gauge to quick connector type fuel lines
≺V10120000 Fuel tube adapter	JSBIA0410ZZ	Measures fuel pressure
ommercial Servic	e Tools	INFOID:000000009758325
Tool name (Kent-Moore No.)		Description
(J-45488) Quick connector re- lease	PBIC0198E	Removes fuel tube quick connectors in engine room
Leak detector	PBICUI98E	Locates the EVAP leak

INFOID:000000009758324

EC

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PREPARATION

< PREPARATION >

[MRA8D	E]
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Tool name (Kent-Moore No.)		Description
EVAP service port adapter i.e.: (J-41413-OBD)	S-NT704	Applies positive pressure through EVAP service port
Fuel filler cap adapter i.e.: (MLR-8382)	S-NT815	Checks fuel tank vacuum relief valve opening pressure
Socket wrench	19 mm (0.75 in) Nore than 32 mm (1.26 in) S-NT705	Removes and installs engine coolant temperature sensor
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)	Mating surface shave cylinder Flutes	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- nia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Tita- nia Oxygen Sensor
Anti-seize lubricant i.e.: (Permatex TM 133AR or equivalent meeting MIL specifica- tion MIL-A-907)	S-NT779	Lubricates oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

[MRA8DE] < SYSTEM DESCRIPTION > SYSTEM DESCRIPTION А COMPONENT PARTS ENGINE CONTROL SYSTEM EC ENGINE CONTROL SYSTEM : Component Parts Location INFOID:000000009758326 ENGINE ROOM COMPARTMENT (4)3 (5) (2) D Õ Е 8 Н TUUU С 0 0 C 0 0 0 °°° ° 0 Κ (6) $\overline{7}$ (8) ALBIA0980ZZ L No. Component Function IPDM E/R control the internal relays and the actuators. Μ When CAN communication with ECM is impossible, IPDM E/R performs fail-safe control. With Intelligent Key System • PCS-7, "RELAY CONTROL SYSTEM : System Descrip-Ν tion" PCS-19, "Fail-safe" 1 IPDM E/R PCS-8, "POWER CONSUMPTION CONTROL SYSTEM System Description" Ο Without Intelligent Key System PCS-35, "RELAY CONTROL SYSTEM : System Description" Ρ PCS-47, "Fail-Safe" PCS-36, "POWER CONSUMPTION CONTROL SYS-TEM : System Description" EC-28, "Mass Air Flow Sensor (with Intake Air Temperature Mass air flow sensor 2 (with intake air temperature sensor) Sensor)" Electric throttle control actuator EC-22, "Electric Throttle Control Actuator"

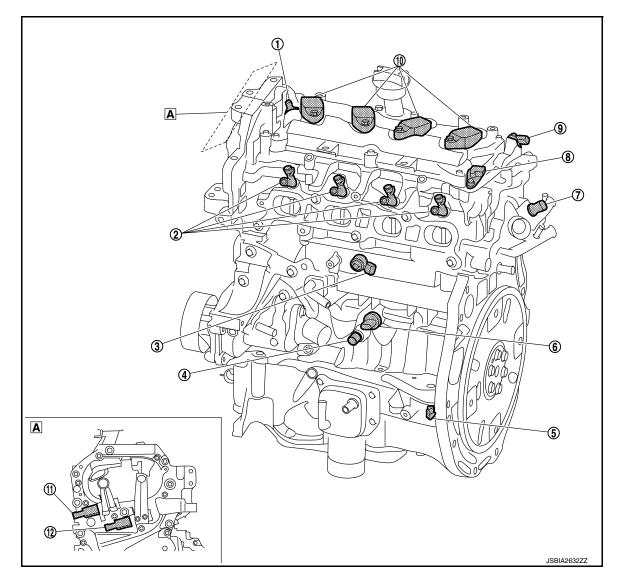
COMPONENT PARTS

3 (with built in throttle position sensor and throttle control motor)

< SYSTEM DESCRIPTION >

No.	Component	Function
4	EVAP canister purge volume control solenoid valve	EC-24, "EVAP Canister Purge Volume Control Solenoid Valve"
5	EVAP service port	EVAP service port is prepared in order to perform evapora- tive emission system leak check.
6	Intake manifold tuning valveIntake manifold runner control valve	 <u>EC-28. "Intake Manifold Tuning Valve"</u> <u>EC-27. "Intake Manifold Runner Control Valve"</u>
$\overline{\mathcal{O}}$	ECM	EC-22. "ECM"
8	Battery current sensor (with battery temperature sensor)	EC-20, "Battery Current Sensor (with Battery Temperature Sensor)"

ENGINE COMPARTMENT



A Engine front side

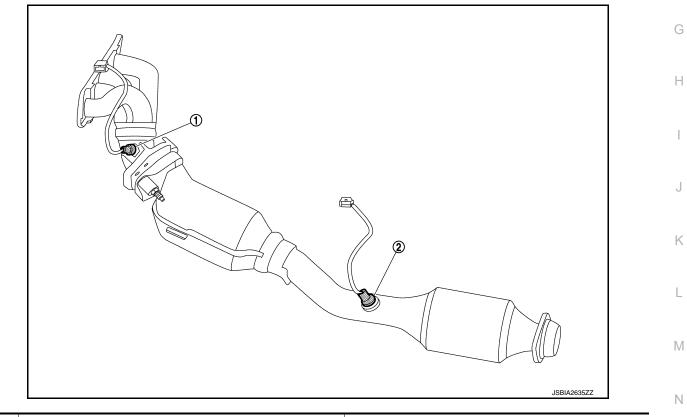
No.	Component	Function
1	PCV valve	The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
2	Fuel injector	EC-25, "Fuel Injector"
3	Knock sensor	EC-28, "Knock Sensor"

< SYSTEM DESCRIPTION >

[MRA8DE]

No.	Component	Function	
4	Engine oil temperature sensor	EC-24, "Engine Oil Temperature Sensor"	A
5	Crankshaft position sensor (POS)	EC-21, "Crankshaft Position Sensor (POS)"	FO
6	Engine oil pressure sensor	EC-23, "Engine Oil Pressure Sensor"	EC
$\overline{\mathcal{O}}$	Engine coolant temperature sensor	EC-23, "Engine Coolant Temperature Sensor"	0
8	Camshaft position sensor (PHASE)	EC-21, "Camshaft Position Sensor (PHASE)"	C
9	Exhaust valve timing control position sensor	EC-25. "Exhaust Valve Timing Control Position Sensor"	D
10	Ignition coil (with power transistor)	EC-27. "Ignition Coil with Power Transistor"	D
(1)	Exhaust valve timing control solenoid valve	EC-25, "Exhaust Valve Timing Control Solenoid Valve"	E
(12)	Intake valve timing control solenoid valve	EC-27. "Intake Valve Timing Control Solenoid Valve"	
EXHA	UST COMPARTMENT		F

EXHAUST COMPARTMENT

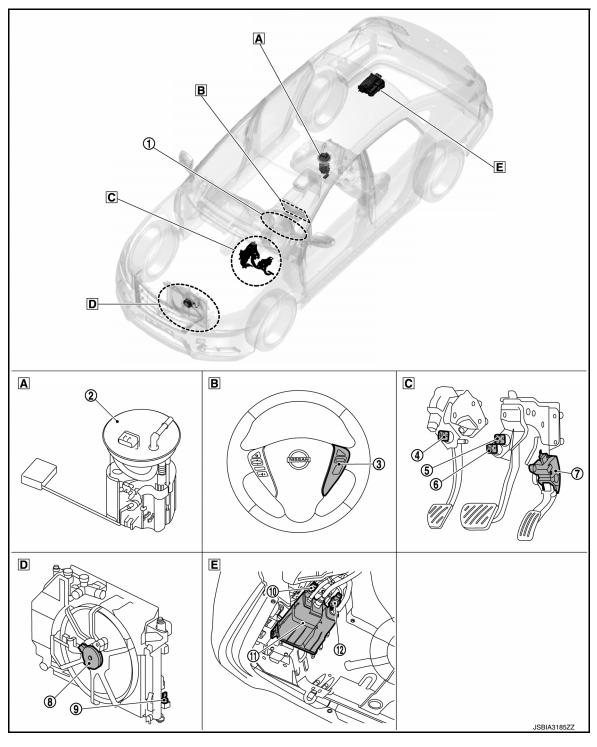


No.	Component	Function	
1	Air fuel ratio (A/F) sensor 1	EC-19, "Air Fuel Ratio (A/F) Sensor 1"	0
2	Heated oxygen sensor 2	EC-26. "Heated Oxygen Sensor 2"	

BODY COMPARTMENT

Ρ

< SYSTEM DESCRIPTION >



- Under the right side second seat Α
- On the steering wheel В
- C Periphery of pedals

- D Radiator assembly
- E Under the left side fuel tank
- Function No. Component 1 MWI-6, "METER SYSTEM : Component Description" Combination meter EC-26, "Fuel Level Sensor Unit, Fuel Filter and Fuel Pump 2 Fuel level sensor unit, fuel filter and fuel pump assembly Assembly" 3 EC-20, "ASCD Steering Switch" ASCD steering switch

< SYSTEM DESCRIPTION >

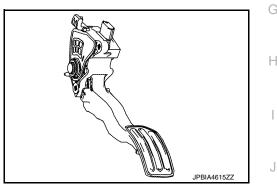
[MRA8DE]

INFOID:000000009758327

No.	Component	Function	^
4	Clutch pedal position switch	EC-21, "Clutch Pedal Position Switch"	A
5	Stop lamp switch	EC-29. "Stop Lamp Switch & Brake Pedal Position Switch"	FO
6	Brake pedal position switch	EC-29, "Stop Lamp Switch & Brake Pedal Position Switch"	EC
$\overline{\mathcal{O}}$	Accelerator pedal position sensor	EC-19, "Accelerator Pedal Position Sensor"	C
8	Cooling fan motor	EC-21, "Cooling Fan"	C
9	Refrigerant pressure sensor	EC-29, "Refrigerant Pressure Sensor"	D
10	EVAP control system pressure sensor	EC-25, "EVAP Control System Pressure Sensor"	D
11	EVAP canister	EVAP canister stores the generated fuel vapors in the sealed fuel tank to activated charcoals of EVAP canister when the engine is not operating or when refueling to the tank.	E
12	EVAP canister vent control valve	EC-24, "EVAP Canister Vent Control Valve"	F

Accelerator Pedal Position Sensor

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

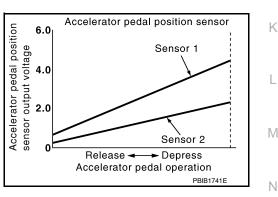


Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

Air Fuel Ratio (A/F) Sensor 1

DESCRIPTION



INFOID:000000009758328

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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 sensor element of the A/F sensor 1 is composed an electrode

layer, which transports ions. It has a heater in the element.

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°C (1,400°F).

A/F SENSOR 1 HEATER

< SYSTEM DESCRIPTION >

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 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.

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-8</u>. "System Description".

CAUTION:

Never connect the electrical component or the ground wire

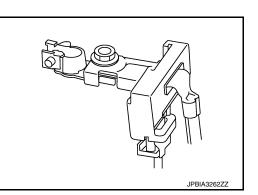
directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then the battery discharge may occur.

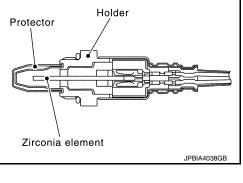
BATTERY CURRENT SENSOR

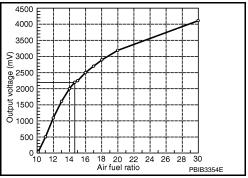
The battery current sensor is installed to the battery negative cable. The sensor measures the charging/discharging current of the battery.

EC-20

BATTERY TEMPERATURE SENSOR







INFOID:000000009758329

INFOID:000000009758330

< SYSTEM DESCRIPTION >

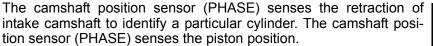
Battery temperature sensor is integrated in battery current sensor. The sensor measures temperature around the battery. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Temperature [°C (°F)]	Voltage [*] (V)	Resistance (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 battery temperature sensor signal terminal and sensor ground.

Camshaft Position Sensor (PHASE)



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

The sensor consists of a permanent magnet and Hall IC.

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

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

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

Clutch Pedal Position Switch

Stop lamp switch is installed to clutch pedal bracket. The switch detects the state of the clutch pedal and transmits an ON/OFF signal to ECM.

Clutch pedal	Clutch pedal position switch
Released	OFF
Depressed	ON

Crankshaft Position Sensor (POS)

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet and Hall IC.

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

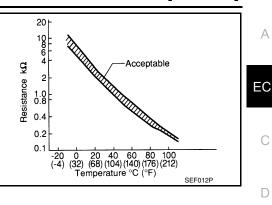
The changing gap causes the magnetic field near the sensor to change.

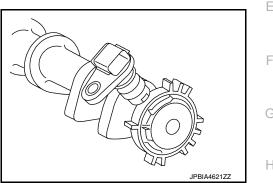
Due to the changing magnetic field, the voltage from the sensor changes.

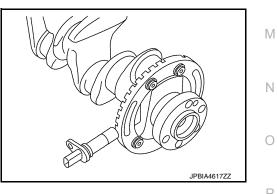
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

Cooling Fan

Cooling fan operates when the current flows in the cooling fan motor. For control details, refer to <u>EC-47, "COOLING FAN CONTROL : System Description"</u>.







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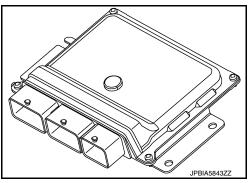
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< SYSTEM DESCRIPTION >

ECM

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

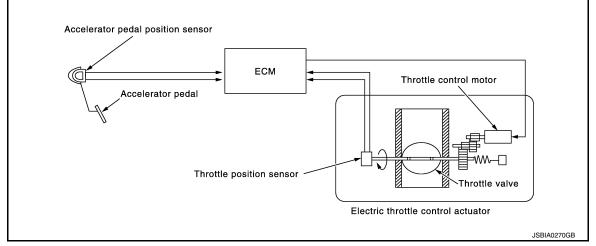


Electric Throttle Control Actuator

INFOID:000000009758336

OUTLINE

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



THROTTLE CONTROL MOTOR RELAY

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

THROTTLE CONTROL MOTOR

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

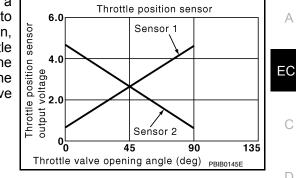
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

THROTTLE POSITION SENSOR

The throttle position sensor responds to the throttle valve movement.

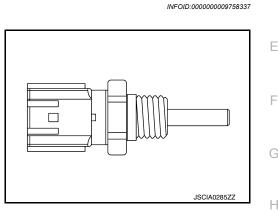
< SYSTEM DESCRIPTION >

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



Engine Coolant Temperature Sensor

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



Acceptable

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Resistance 1.0 0.4 0.2 0.

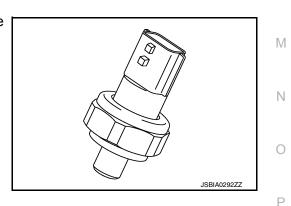
<Reference data>

Engine coolant temperature [°C (°F)]	Voltage [*] (V)	Resistance (k Ω)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260
-10 (14) 20 (68) 50 (122)	4.4 3.5 2.2	7.0 - 11.4 2.37 - 2.63 0.68 - 1.00

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

Engine Oil Pressure Sensor

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



0 20 40 60 80 100 (32) (68) (104) (140) (176) (212) Temperature °C (°F)

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INFOID:000000009758338

< SYSTEM DESCRIPTION >

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.

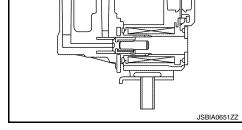
<Reference data>

Engine oil temperature [°C (°F)]	Voltage [*] (V)	Resistance (k Ω)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260
110 (230)	0.6	0.143 - 0.153

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

EVAP Canister Purge Volume Control Solenoid Valve

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



To atmosphere

Spring

O-ring

Valve

Canister side

Coil

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2 1.0 8.0 8.0 9.0 9.0 0.2 0.1

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.

INFOID:000000009758341

Terminal



Plunger

PBIB1263E

JPBIA5280ZZ

Acceptable

0 20 40 60 80 100 (32) (68) (104) (140) (176) (212) Temperature °C (°F)

[MRA8DE]



SEF012F

4.5 >

voltage 3.5 2.5 2.5

60.0

(0.61, 8.7)

tput , 1. Out 0.5

< 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.

Exhaust Valve Timing Control Position Sensor

Exhaust valve timing control position sensor detects the protrusion of the signal plate installed to the exhaust camshaft front end.

This sensor signal is used for sensing a position of the exhaust camshaft.

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.

Exhaust Valve Timing Control Solenoid Valve

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

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

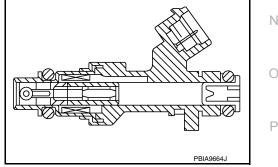
The longer pulse width retards valve angle.

The shorter pulse width advances valve angle.

When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the exhaust valve angle at the control position.

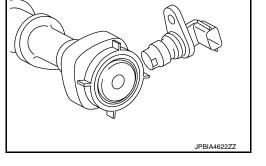
Fuel Injector

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



Н IPBIA462277

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



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< SYSTEM DESCRIPTION >

Fuel Level Sensor Unit, Fuel Filter and Fuel Pump Assembly

[MRA8DE]

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

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

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

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

Heated Oxygen Sensor 2

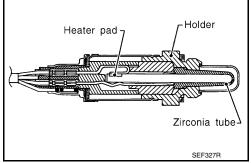
DESCRIPTION

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

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

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

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



HEATED OXYGEN SENSOR 2 HEATER

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

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Revision: October 2013

Ignition Coil with Power Transistor

< SYSTEM DESCRIPTION >

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.

Intake Manifold Runner Control Valve

Intake manifold runner control valve(1) is integrated to intake manifold.

Intake manifold runner control valve is mounted each port of the intake manifold and opened/closed by the intake manifold runner control valve motor.

ECM controls the intake manifold runner control valve motor, according to signals of engine speed, water temperature, etc. and stabilizes combustion by generating a strong tunmble flow.

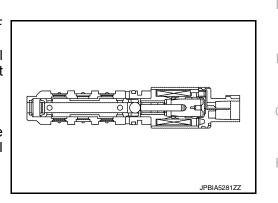
INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR

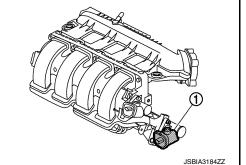
Intake manifold runner control valve motor is connected to the rear end of the valve shaft. The motor opens or closes the valve by the output signal of the ECM.

INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR

Intake manifold runner control valve position sensor is connected to the front end of the valve shaft. The sensor consists of valiable resister. It senses the valve shaft movement and feeds the voltage signals to the ECM.

EC-27





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< SYSTEM DESCRIPTION >

Intake Manifold Tuning Valve

Intake manifold tuning (IMT) valve ① is integrated to intake manifold. Intake manifold tuning valve consists of valve and motor. Intake manifold tuning valve is used to control the suction passage of the intake manifold tuning system.

INTAKE MANIFOLD TUNING VALVE MOTOR

Intake manifold tuning valve motor is connected to the front end of the valve shaft. The motor is operated by the ECM and it opens and closes the intake manifold tuning valve.

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.

Mass Air Flow Sensor (with Intake Air Temperature Sensor)

MASS AIR FLOW SENSOR

The mass air flow sensor ① is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the heater in sensing element to a certain amount.

The temperature distribution around the heater changes according to the increase in intake air volume. The change is detected by a thermistor and the air volume data is sent to ECM by the MAF sensor.



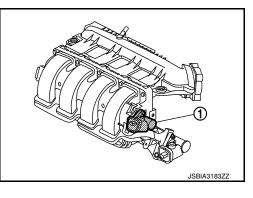
The intake air temperature sensor is built-into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.

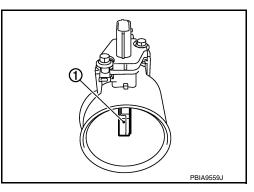
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature.

<Reference data>

Intake air temperature [°C (°F)]	Voltage [*] (V)
25 (77)	1.9 – 2.1
80 (176)	3.2 - 3.4

*: These data are reference values on the diagnosis tool.





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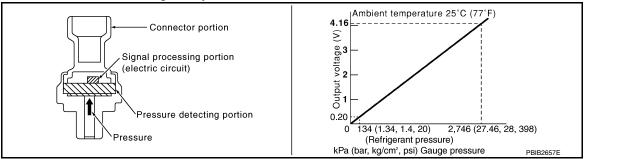
< SYSTEM DESCRIPTION >

Park/Neutral Position Switch

Park/Neutral Position Switch is installed to manual transaxle. The switch detects the neutral position and transmits a voltage signal.

Refrigerant Pressure Sensor

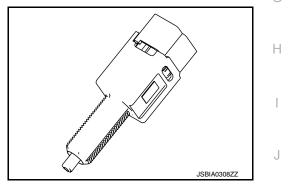
The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



Stop Lamp Switch & Brake Pedal Position Switch

Stop lamp switch and brake pedal position switch are installed to brake pedal bracket.

ECM detects the state of the brake pedal by those two types of input (ON/OFF signal).



			K
Brake pedal	Brake pedal position switch	Stop lamp switch	
Released	ON	OFF	
Depressed	OFF	ON	L

Transmission Range Switch

Transmittion Range Switch is installed to automatic transmission and CVT transaxle. The switch detects the state of the gear position (N range and P range) and transmits a voltage signal to ECM.

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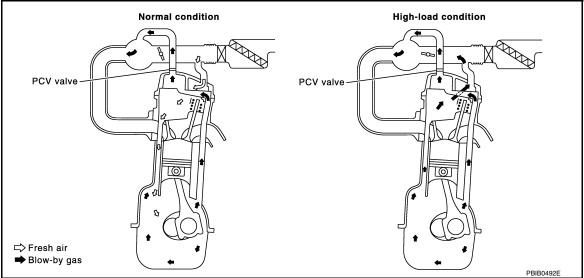
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STRUCTURE AND OPERATION

Positive Crankcase Ventilation

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[MRA8DE]



This system returns blow-by gas to the intake manifold.

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

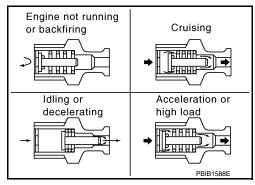
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.

The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.

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

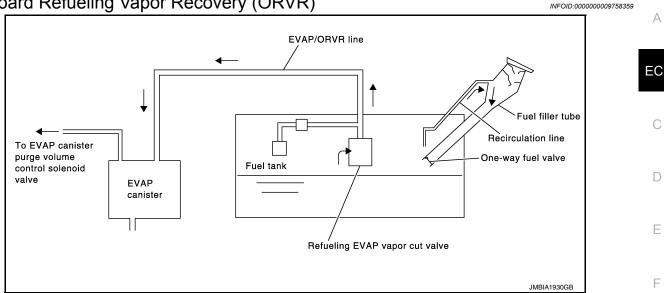
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



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. Н

WARNING:

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

- Put a "CAUTION: FLAMMABLE" sign in workshop.
- Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.
- Be sure to furnish the workshop with a 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-481, "Inspection".
- Disconnect battery ground cable.
- Always replace O-ring when the fuel gauge retainer is removed.
- Do not kink or twist hose and tube when they are installed.
- Do not tighten hose and clamps excessively to avoid damaging hoses.
- After installation, run engine and check for fuel leaks at connection.
- Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.

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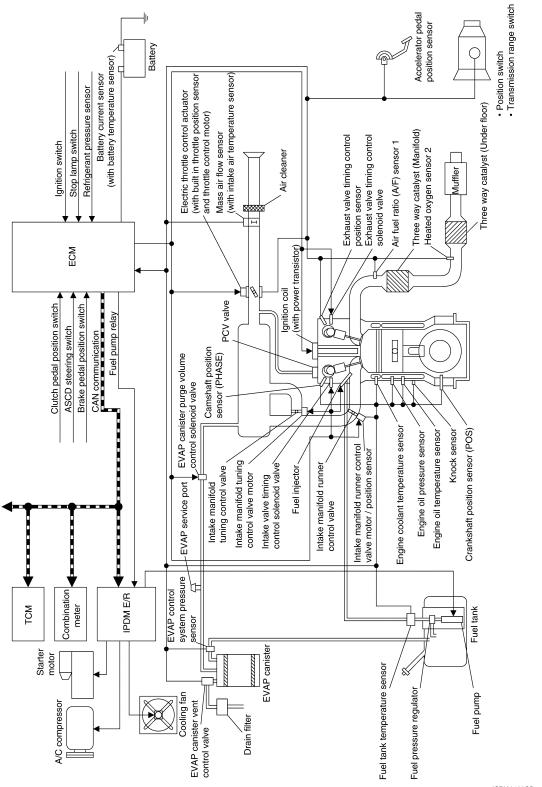
[MRA8DE]

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SYSTEM ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : System Description

SYSTEM DIAGRAM



NOTE:

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SYSTEM

< SYSTEM DESCRIPTION >

- · Position switch and clutch pedal position switch are not used in models with CVT.
- ASCD steering switch and brake pedal position switch are used in models with ASCD.
- TCM and transmission range switch are not used in models with M/T.

SYSTEM DESCRIPTION

ECM controls the engine by various functions.

Function	Reference
Fuel injection control	EC-35. "MULTIPORT FUEL INJECTION SYSTEM : System De- scription"
Electric ignition control	EC-38, "ELECTRIC IGNITION SYSTEM : System Description"
Intake valve timing control	EC-39, "INTAKE VALVE TIMING CONTROL : System Description"
Exhaust valve timing control	EC-41, "EXHAUST VALVE TIMING CONTROL : System Descrip- tion"
Intake manifold runner control	EC-43, "INTAKE MANIFOLD RUNNER CONTROL : System De- scription"
Intake manifold tuning control	EC-43, "INTAKE MANIFOLD TUNING SYSTEM : System Descrip- tion"
Engine protection control (Low engine oil pressure)	EC-44, "ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description"
Fuel filler cap warning system	EC-45, "FUEL FILLER CAP WARNING SYSTEM : System De- scription"
Air conditioning cut control	EC-46, "AIR CONDITIONING CUT CONTROL : System Descrip- tion"
Cooling fan control	EC-47, "COOLING FAN CONTROL : System Description"
Starter motor drive control	EC-48. "STARTER MOTOR DRIVE CONTROL : System Descrip- tion"
Evaporative emission	EC-49, "EVAPORATIVE EMISSION SYSTEM : System Descrip- tion"
Automatic speed control	EC-51, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : Sys- tem Description"
ECO mode control	 <u>DMS-6, "ECO MODE CONTROL : System Description"</u> (M/T models) <u>DMS-26, "ECO MODE CONTROL : System Description"</u> (CVT models)
SPORT mode control	 <u>DMS-6. "ECO MODE CONTROL : System Description"</u> (M/T models) <u>DMS-63. "SPORT MODE CONTROL : System Description"</u> (CVT models)
CAN communication <u>EC-52, "CAN COMMUNICATION : System Description"</u>	

ENGINE CONTROL SYSTEM : Fail Safe

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NON DTC RELATED ITEM

Detected items	Engine operating condition in fail-safe mode	Remarks	Reference page	0
Malfunction	Engine speed will not rise	When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system.	EC-467, "Compo-	Ρ
indicator	more than 2,500 rpm due	Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail safe function.	nent Function	
circuit	to the fuel cut	The fail safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.	Check"	

DTC RELATED ITEM



EC

SYSTEM

< SYSTEM DESCRIPTION >

When a DTC is detected, ECM executes a mode (in the Fail-safe mode) applicable to the DTC. The fail-safe mode has the preset traveling control mode (accelerator angle variation and engine output limit) and device fix mode.

Fail safe mode		Vehicle behavior	
Traveling con- trol mode	Accelerator an- gle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.	
Engine output control		ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction.	
Device fix mode		 This mode fixes the IVT control solenoid valve and the EVT control solenoid valve in the reference position. The intake manifold runner control valve motor is turned OFF (intake manifold runner control valve opens). 	

Fail Safe Pattern

Pattern	Fail safe mode	
А	 Traveling control mode 	Accelerator angle variation control
В		Engine output control
С	Device fix mode	

Fail Safe List

×:Applicable —: Not applicable

		Vehicle behavior					
DTC No.	Detected items	Pattern			Others		
		А	В	С	Oulers		
P0011	Intake valve timing control	_	_	×	ECM activates the IVT intermediate lock control solenoid valve to bring the cam sprocket into an intermediate lock condition.		
P0075	Intake valve timing control	_	_	×	ECM activates the IVT intermediate lock control solenoid valve to bring the cam sprocket into an intermediate lock condition.		
P0014 P0078	Exhaust valve timing control	_	_	×	_		
P0101 P0102 P0103	Mass air flow sensor circuit	×	×	×	_		
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	_	_		The ECM controls the electric throttle control actuator in reg- ulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.		
P0117 P0118	Engine coolant temperature sensor	×	×		_		
P0171 P0172	Fuel injection system	×	_	_	_		
P0196 P0197 P0198	Engine oil temperature sensor	_	_		Exhaust valve timing control does not function.		

SYSTEM

< SYSTEM DESCRIPTION >

[MRA8DE]

DTO		Vehicle behavior					
DTC No.	Detected items		Pattern		Others		
		A	В	С			
P0300 P0301 P0302 P0303 P0304	Misfire	×	_	_	_	-	
P0500	Vehicle speed sensor	×	—	—	-	-	
P0524	Engine oil pressure	_	_	_	 ECM illuminates oil pressure warning lamp on the combina tion meter. Engine speed will not rise more than 4,000rpm due to the fuel cut. Fail-safe is canceled when ignition switch OFF → ON. 		
P0603	ECM	×	×	_	_		
P0605	ECM	x	×		_		
P0643	Sensor power supply	—	_	_	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.		
P1078	Exhaust valve timing control position sensor circuit	×	_	×	_		
P1650 P1651	Starter relay	×	×	_			
P1805	Brake switch	_	_		ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor. Vehicle condition Driving condition When engine is idling Normal		
					When accelerating	Poor acceleration	
P2004	Intake manifold runner control valve	_	×	×			
P2100 P2103	Throttle control motor relay	_	_	_	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.		
P2101	Electric throttle control func- tion	_	_	_	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.		
P2118	Throttle control motor	_		_	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.		
P2119	Electric throttle control actua- tor	x	×	_	-		
P2122 P2123 P2127 P2128 P2128 P2138	Accelerator pedal position sensor	_	_	_	The ECM controls the electric throttle control actuator in reg- ulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.		

MULTIPORT FUEL INJECTION SYSTEM

MULTIPORT FUEL INJECTION SYSTEM : System Description

INFOID:000000009758362

SYSTEM DIAGRAM

< SYSTEM DESCRIPTION >

Crankshaft position sensor (POS)	Engine speed ^{*1} & Piston position	_ >	
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Intake air temperature sensor	Intake air temperature	-	Fuel injection & mixture ratio control Fuel injecto
Engine coolant temperature sensor	Engine coolant temperature		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas	→	
Throttle position sensor	Throttle position	-	
Accelerator pedal position sensor	Accelerator pedal position	→	
Park/neutral position (PNP) switch ^{*2}	Neutral position	ЕСМ	
Transmission range switch*3	Gear position	→	
Battery	Battery voltage ^{*1}	_	
Knock sensor	Engine knocking condition	_ _	
Heated oxygen sensor 2 ^{*4}	Density of oxygen in exhaust gas	>	
ABS actuator and electric unit (control unit)	VDC/TCS operation command	→	
Combination meter	Vehicle speed signal	→	
	Air conditioner operation signal	⇒	

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

SYSTEM DESCRIPTION

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

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

<Fuel increase>

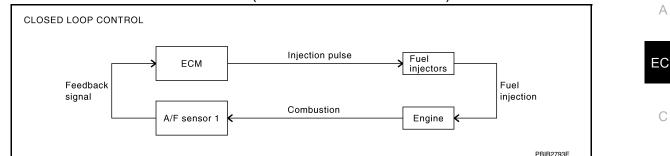
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (CVT models)
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- · During high engine speed operation

< SYSTEM DESCRIPTION >

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 then better reduce CO, HC and NOx emissions. This system uses A/F sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about A/F sensor 1, refer to EC-19. "Air Fuel Ratio (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 (CVT models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

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

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

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

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

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

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< SYSTEM DESCRIPTION >

Two types of systems are used.

 Sequential Multiport Fuel Injection System Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.

Simultaneous Multiport Fuel Injection System
 Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
 The four injectors will then receive the signals two times for each engine cycle.

This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

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

ELECTRIC IGNITION SYSTEM

ELECTRIC IGNITION SYSTEM : System Description

INFOID:000000009758363

SYSTEM DIAGRAM

Crankshaft position sensor (POS)			
Camshaft position sensor (PHASE)			
Mass air flow sensor		→	
Engine coolant temperature sensor			
Throttle position sensor		→	
Accelerator pedal position sensor		→ ECM	Ignition timing control Ignition coil (with power transist
Transmission range switch*1			
Park/neutral position (PNP) switch ^{*2}			
Battery			
Knock sensor			
Combination meter	Vehicle speed signal		

*1: CVT models

*2: M/T models

INPUT/OUTPUT SIGNAL CHART

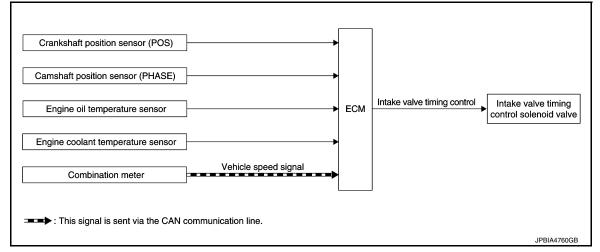
< SYSTEM DESCRIPTION >

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Sensor	1	Input Signal to ECM	ECM func- tion	Actuator
Crankshaft position sensor (POS)	Engine spee	ed ^{*3}		
Camshaft position sensor (PHASE)	Piston positi			
Mass air flow sensor	Amount of inta	Amount of intake air		
Engine coolant temperature sensor	Engine coolan	nt temperature		
Throttle position sensor	Throttle position	on		
Accelerator pedal position sensor	Accelerator pe	edal position	Ignition tim-	Ignition coil (with power tran-
Transmission range switch ^{*1}	0		ing control	sistor)
Park/neutral position (PNP) switch ^{*2}	- Gear position			
Battery	Battery voltage	e ^{*3}	_	
Knock sensor	Engine knocki	ing condition		
Combination meter	CAN commu- nication	Vehicle speed signal		
SYSTEM DESCRIPTION Firing order: 1 - 3 - 4 - 2				
	is stored in the such as the i	he ECM. injection pulse width and c als are transmitted to the p	camshaft posit	tion sensor (PHASE) sig- or.
Firing order: 1 - 3 - 4 - 2 The ignition timing is controlled engine. The ignition timing data The ECM receives information hal. Computing this information, During the following conditions, he ECM. At starting During warm-up At idle At low battery voltage	is stored in the such as the i	he ECM. injection pulse width and c als are transmitted to the p	camshaft posit	tion sensor (PHASE) sig- or.
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Firing order: 1 - 3 - 4 - 2 The ignition timing is controlled engine. The ignition timing data The ECM receives information hal. Computing this information, During the following conditions, he ECM. At starting During warm-up At idle At low battery voltage During acceleration The knock sensor retard system within the anti-knocking zone, if operate under normal driving co The signal is transmitted to the I NTAKE VALVE TIMING	is stored in the such as the ignition signation to the ignition to the ignition to the ignition to the ignition. If e ECM. The ECG CONTRO	he ECM. injection pulse width and o als are transmitted to the p iming is revised by the EC d only for emergencies. Th ed fuel is used under dry o engine knocking occurs, th CM retards the ignition timi OL	camshaft position ower transist M according t he basic igniti conditions. Th e knock sense ing to eliminat	tion sensor (PHASE) sig- or. o the other data stored in on timing is programmed e retard system does not or monitors the condition. e the knocking condition.
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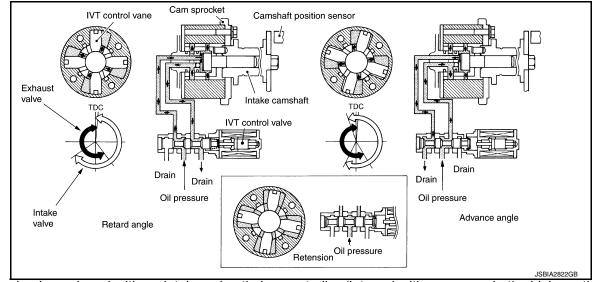
< SYSTEM DESCRIPTION >



INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM		ECM function	Actuator	
Crankshaft position sensor (POS)	Engine speed and piston position				
Camshaft position sensor (PHASE)	Engine speed and piston position				
Engine oil temperature sensor	Engine oil tem	perature	Intake valve tim-	Intake valve timing con-	
Engine coolant temperature sensor	Engine coolant temperature		ing control	trol solenoid valve	
Combination meter	CAN commu- nication Vehicle speed signal				

SYSTEM DESCRIPTION



This engine is equipped with an intake valve timing controller (integral with cam sprocket) which continuously adjusts the phase of intake valve according to driving conditions, improves both low/mid range engine torque and high-speed range engine output, and brings about low emission and low fuel consumption.

The intake valve timing control system continuously controls cam phases in constant intake valve operating angle conditions and adjusts an operating oil pressure to the intake valve timing controller via the control solenoid valve.

ECM receives crankshaft position signal, camshaft position signal, engine speed signal, engine oil temperature signal, and engine coolant temperature signal. And the ECM outputs ON/OFF pulse duty signals to the intake valve timing control solenoid valve depending on driving status.

Intake Valve Timing Controller Operation List

< SYSTEM DESCRIPTION >

Intake valve timing solenoid valve condition	Intake valve timing controller operation	A
Engine OFF	When starting the engine, the controller vane and sprocket are fixed in full retard position by the reaction force of return spring, improving the starting performance of the engine.	EC
Active (Advance angle)	When the energization rate to the control solenoid valve is increased, the oil pressure from the oil pump is conveyed to the advance angle chamber of the controller. And retard angle chamber oil is drained. Accordingly, the controller vane rotates rightward and the phase of camshaft becomes advance angle. This condition brings about the greater overlap with the exhaust valve, enabling the exhaust gas cleaning by the internal EGR effect and the fuel consumption improvement by the reduction in pumping loss.	C
Neutral (Maintained)	When it is the target valve timing, the energization rate to the control solenoid valve is adjusted to the intermediate state. The solenoid valve is positioned at the neutral position and the oil path is interrupted to maintain the cam shaft phase.	
Return (Retard angle)	When the energization rate to the control solenoid valve is decreased, the oil pressure from the oil pump is conveyed to the retard chamber of the controller. And advanced angle chamger oil is drained. Accordingly, the controller vane rotates leftward and the phase of camshaft becomes retard angle.	F

INTAKE VALVE TIMING CONTROL FEEDBACK CONTROL

Cam Position Detection

The camshaft position sensor mounted at the rear of the cylinder head detects a cam position, by using the groove on the plate located at the rear of the intake camshaft.

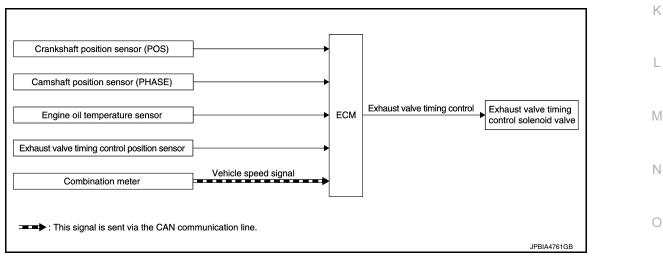
Feedback Control

The camshaft position sensor feeds back an actual cam position signal to ECM. Based on the signal, ECM controls the intake valve timing control solenoid valve to satisfy the optimum target valve opening/closing timing according to a driving condition.

EXHAUST VALVE TIMING CONTROL

EXHAUST VALVE TIMING CONTROL : System Description

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL CHART

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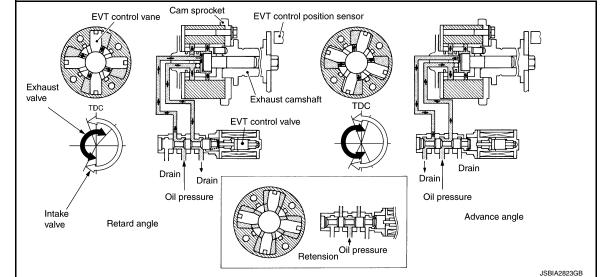
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< SYSTEM DESCRIPTION >

Sensor	Input signal to ECM		ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed and piston position			
Camshaft position sensor (PHASE)				Exhaust valve timing control
Engine oil temperature sensor	Engine oil temperature		Exhaust valve	
Exhaust valve timing control position sensor	Exhaust valve timing signal		timing control	solenoid valve
Combination meter	CAN commu- nication	CAN commu- nication Vehicle speed signal		

SYSTEM DESCRIPTION



This engine is equipped with an exhaust valve timing controller (integral with cam sprocket) which continuously adjusts the phase of intake valve according to driving conditions, improves both low/mid range engine torque and high-speed range engine output, and brings about low emission and low fuel consumption.

The exhaust valve timing control system continuously controls cam phases in constant exhaust valve operating angle conditions and adjusts an operating oil pressure to the exhaust valve timing controller via the control solenoid valve.

ECM receives exhaust valve timing control position signal, crankshaft position signal, engine speed signal, engine oil temperature signal, and engine coolant temperature signal. And the ECM outputs ON/OFF pulse duty signals to the exhaust valve timing control solenoid valve depending on driving status.

Exhaust Valve Timing Controller Operation List

Exhaust valve timing solenoid valve condition	Exhaust valve timing controller operation			
Engine OFF	When starting the engine, the controller vane and sprocket are fixed in full retard position by the reaction force of return spring, improving the starting performance of the engine.			
Active (Retard angle)	When the energization rate to the control solenoid valve is increased, the oil pressure from the oil pump is conveyed to the retard angle chamber of the controller. And advance angle chamber oil is drained. Accordingly, the controller vane rotates leftward and the phase of camshaft becomes retard angle. This condition brings about the greater overlap with the exhaust valve, enabling the exhaust gas cleaning by the internal EGR effect and the fuel consumption improvement by the reduction in pumping loss.			
Neutral (Maintained)	When it is the target valve timing, the energization rate to the control solenoid valve is adjusted to the intermediate state. The solenoid valve is positioned at the neutral position and the oil path is interrupted to maintain the cam shaft phase.			
Return (Advance angle)	When the energization rate to the control solenoid valve is decreased, the oil pressure from the oil pump is conveyed to the advance angle chamber of the controller. And retard angle chamber oil is drained. Accordingly, the controller vane rotates rightward and the phase of camshaft becomes advance angle.			

< SYSTEM DESCRIPTION >

EXHAUST VALVE TIMING CONTROL FEEDBACK CONTROL

Cam Position Detection

The exhaust valve control position sensor mounted at the rear of the cylinder head detects a cam position, by using the groove on the plate located at the rear of the intake camshaft.

Feedback Control

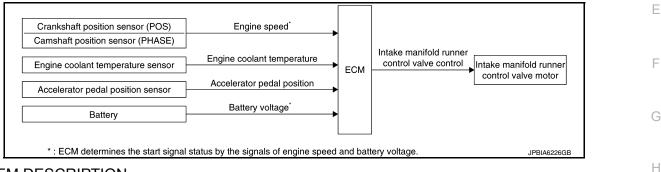
The exhaust valve control position sensor feeds back an actual cam position signal to ECM. Based on the signal, ECM controls the exhaust valve timing control solenoid valve to satisfy the optimum target valve opening/ closing timing according to a driving condition.

INTAKE MANIFOLD RUNNER CONTROL

INTAKE MANIFOLD RUNNER CONTROL : System Description

INFOID:000000009758366

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

Intake manifold runner control valve has a valve portion in the intake passage of each cylinder.

While idling and during low engine coolant temperature, the intake manifold runner control valve closes. Thus the velocity of the air in the intake passage increases, promoting the vaporization of the fuel and producing a intake manifold runner in the combustion chamber.

Because of this operation, this system tends to increase the burning speed of the gas mixture, improve exhaust emission, and increase the stability in running conditions.

Also, except when idling and during low engine coolant temperature, this system opens the intake manifold runner control valve.

In this condition, this system tends to increase power by improving intake efficiency via reduction of intake flow resistance.

The intake manifold runner control valve is operated by the ECM.

INTAKE MANIFOLD TUNING SYSTEM

INTAKE MANIFOLD TUNING SYSTEM : System Description

SYSTEM DIAGRAM

Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed				
Intake air temperature sensor	Intake air temperature	ECM	Intake manifold tuning valve control	Intake manifold tuning valve motor	
Battery	Battery voltage			JSB/A2817GB	

SYSTEM DESCRIPTION

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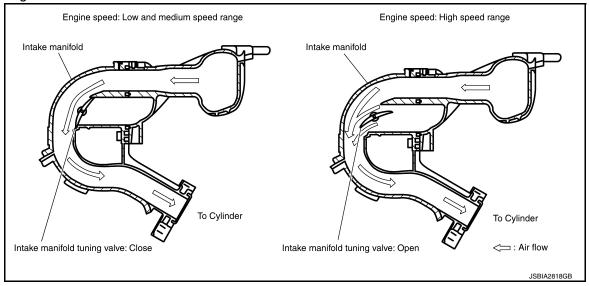
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< SYSTEM DESCRIPTION >

This system switches the length of intake air path according to the low-to-medium speed range or high speed range. Torque is increased in the low-to-medium speed range and the engine output is improved in the high speed range.



Engine speed: Low and medium speed range

Since the intake manifold tuning (IMT) valve is closed when the engine speed is less than 5,250 rpm, the length of the effective intake air path is from the mouth of intake manifold collector to the intake valve. This long path brings the inertia effect of intake air, contributing to the improvement in intake air efficiency and the generation of high torque.

Engine speed: High speed range

When engine speed is 5,250 rpm or more, ECM turns ON the intake manifold tuning valve motor to open the intake manifold tuning valve. The length of the effective intake air path at this time is from the intake manifold tuning valve to the intake valve. This short path brings the inertia effect of intake air in the high speed range, contributing to the torque improvement while the engine is running at high speeds. (The highest engine output is improved.)

Intake Manifold Tuning Valve Operating Condition

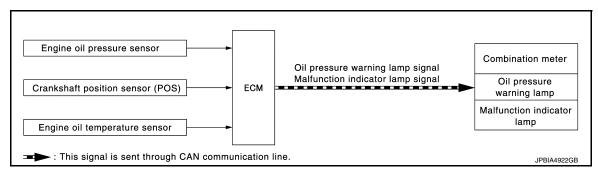
ECM opens the intake manifold tuning valve when all of the following conditions are satisfied.

- Engine speed: 5,250 rpm or more
- Engine coolant temperature: -30°C (-22°F) or more
- Battery voltage: between 11 V and 16 V

ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE

ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL CHART

< SYSTEM DESCRIPTION >

				-
Sensor	Input signal to ECM	ECM function	Actuator	А
Engine oil pressure sensor	Engine oil pressure	Engine protection control		
Crankshaft position sensor (POS)	Engine speed	Oil pressure warning lamp signal	Combination meter Oil pressure warning lamp 	EC
Engine oil temperature sensor	Engine oil temperature	Fuel cut control		

SYSTEM DESCRIPTION

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

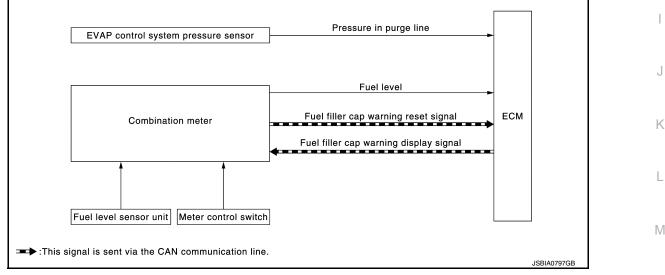
Decrease in engine oil	Engine speed	Combination meter	Fuel cut
pressure	sure Engine speed	Oil pressure warning lamp	
Detection	Less than 1,000 rpm	ON*	NO
Detection	1,000 rpm or more	ON	YES

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

FUEL FILLER CAP WARNING SYSTEM

FUEL FILLER CAP WARNING SYSTEM : System Description

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

The fuel filler cap warning system alerts the driver to the prevention of the fuel filler being left uncapped and malfunction occurrences after refueling, by turning ON the fuel filler cap warning display on the combination meter.

ECM judges a refueled state, based on a fuel level signal transmitted from the combination meter. When a very small leak is detected through the EVAP leak diagnosis performed after judging the refueled state, ECM transmits a fuel filler cap warning display signal (request for display ON) to the combination meter via CAN communication.

When receiving the signal, the combination meter turns ON the fuel filler cap warning display. CAUTION:

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

Reset Operation

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

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< SYSTEM DESCRIPTION >

- Reset operation is performed by operating the meter control switch on the combination meter. Refer to <u>MWI-16, "Description"</u>.
- When the reset operation is performed, the combination meter transmits a fuel filler cap warning reset signal to ECM via CAN communication. ECM transmits a fuel filler cap warning display signal (request for display OFF) to the combination meter via CAN communication. When receiving the signal, the combination meter turns OFF the fuel filler cap warning display.
- EVAP leak diagnosis result is normal.
- Fuel refilled.
- DTC erased by using CONSULT.

NOTE:

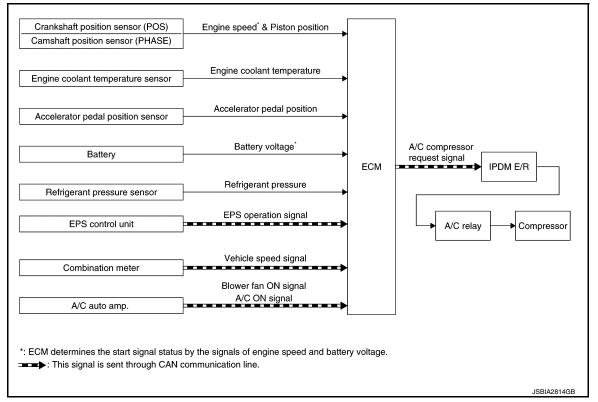
MIL turns ON if a malfunction is detected in leak diagnosis results again at the trip after the fuel filler cap warning display turns ON/OFF.

AIR CONDITIONING CUT CONTROL

AIR CONDITIONING CUT CONTROL : System Description

INFOID:000000009758370

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL CHART

< SYSTEM DESCRIPTION >

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Sensor	In	Input Signal to ECM		Actuator	A
Crankshaft position sensor (POS)		Engine speed [*]			
Camshaft position sensor (PHASE)	Piston position	ו			
Engine coolant temperature sensor	Engine coolan	t temperature			EC
Accelerator pedal position sensor	Accelerator pe	edal position			
Battery	Battery voltage	Battery voltage [*]		IPDM E/R	С
Refrigerant pressure sensor	Refrigerant pro	Refrigerant pressure		↓ Air conditioner relay	
EPS control unit	CAN commu- nication	EPS operation signal	cut control	↓ Compressor	D
Combination meter	CAN commu- nication	Vehicle speed signal			
A/C auto amp.	CAN commu- nication	 A/C ON signal Blower fan ON signal			E
*: ECM determines the start signal status	by the signals of e	ngine speed and battery volt	age.		-
SYSTEM DESCRIPTION					F

STSTEM DESCRIPTION

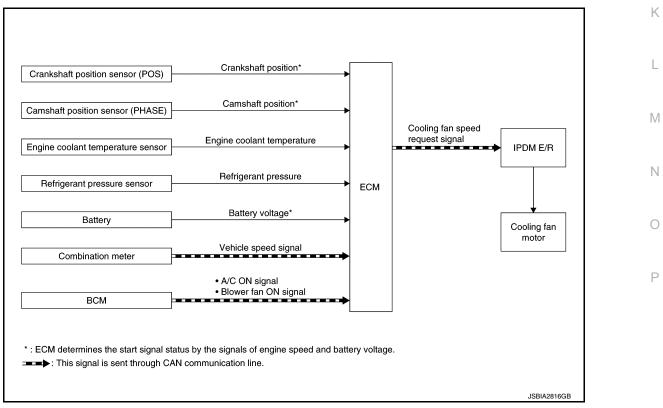
This system improves engine operation when the air conditioner is used. Under the following conditions, the air conditioner is turned off.

- 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.

COOLING FAN CONTROL

COOLING FAN CONTROL : System Description

SYSTEM DIAGRAM



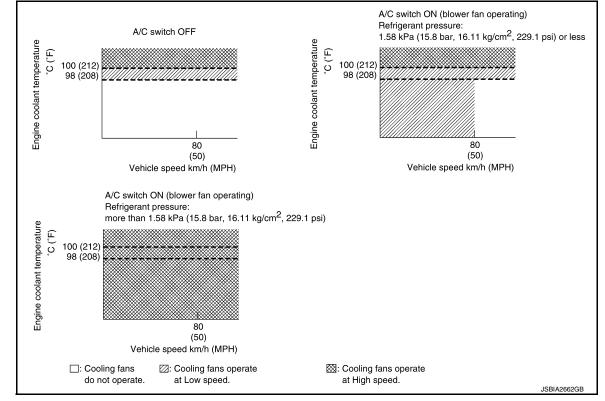
Revision: October 2013

2014 Sentra NAM

SYSTEM DESCRIPTION

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

Cooling Fan Operation



Cooling Fan Relay Operation

When IPDM E/R recieves a cooling fan speed request signal, IPDM E/R controls the cooling fan ralay 1, 2 and 3.

Cooling fan speed	Cooling fan relay					
Cooling fail speed	Cooling fan relay 1 Cooling fan relay 2 Cooling fan relay 3					
OFF	OFF	OFF	OFF			
LOW	ON	OFF	OFF			
HIGH	ON	ON	ON			

STARTER MOTOR DRIVE CONTROL

STARTER MOTOR DRIVE CONTROL : System Description

INFOID:000000009758372

SYSTEN DIAGRAM

< SYSTEM DESCRIPTION >

Crankshaft position sensor (POS)	}	•			
Camshaft position sensor (PHASE)]	•		[]	
Engine coolant temperature sensor]			→ BCM	
Accelerator pedal position sensor]	ECM			
Transmission range switch ^{*1}]		Starter motor	IPDM E/R	
Park/neutral position (PNP) switch ^{*2}]		drive control	(Starter relay & starter control relay)	Starter motor
Stop lamp switch]	•			
	Vehicle speed signal				
Combination meter					

*1: CVT models

*2: M/T models

INPUT/OUTPUT SIGNAL CHART

Sensor	In	put signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine spece	ed		
Camshaft position sensor (PHASE)	Piston positi	ion		
Engine coolant temperature sensor	Engine coolan	t temperature		
Accelerator pedal position sensor	Accelerator pe	edal position		• BCM
Transmission range switch (CVT)	Gear position		 Starter motor drive control 	 IPDM E/R (Starter relay & start-
Park/ Neutral position switch (M/T)	Gear position			er control relay)
Stop lamp switch	Brake pedal p	osition		
Combination meter	CAN commu- nication	CAN commu- nication Vehicle speed signal		

SYSTEM DESCRIPTION

When rapid deceleration occurs during engine runs or idle speed decreases due to heavy load conditions, ECM detects a decrease in idle speed and restarts the engine to secure reliability in handleability by transmitting a cranking request signal to IPDM E/R for activating the starter motor under the following conditions: • Selector lever: Other than P and N (CVT models)

Shifter lever: Other than neutral position (M/T models)

Idle switch: ON (Accelerator pedal not depressed)
 Prake switch: ON (Prake nodel depressed)

• Brake switch: ON (Brake pedal depressed)

ECM transmits a control signal to IPDM E/R via BCM by CAN communication.

IPDM E/R detects an operating state of the starter motor relay and the starter motor control relay and transmits a feed back signal to ECM via CAN Communication. EVAPORATIVE EMISSION SYSTEM

EVAPORATIVE EMISSION SYSTEM : System Description

INFOID:000000009758373

SYSTEM DIAGRAM

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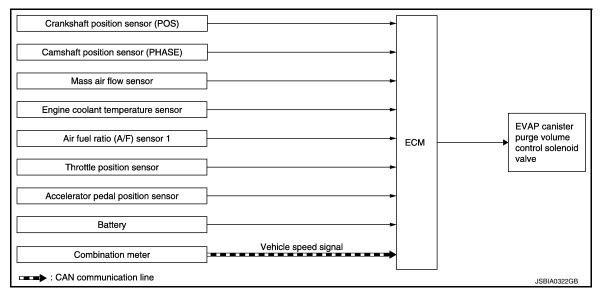
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< SYSTEM DESCRIPTION >

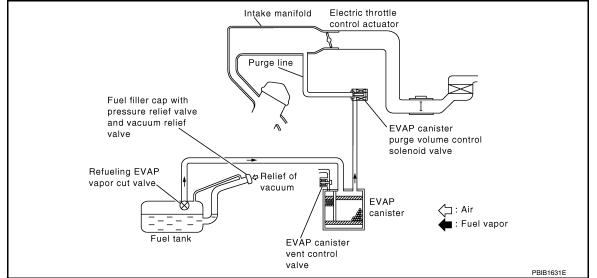


INPUT/OUTPUT SIGNAL CHART

Sensor	Input	signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS)	F				
Camshaft position sensor (PHASE)	 Engine speed[*] 				
Mass air flow sensor	Amount of inta	ke air			
Engine coolant temperature sensor	Engine coolant	temperature			
Air fuel ratio (A/F) sensor 1		gen in exhaust gas eedback signal)	EVAP canister	EVAP canister purge vol- ume control solenoid valve	
Throttle position sensor	Throttle positio	n	purge now control		
Accelerator pedal position sensor	Accelerator pe	dal position			
Battery	Battery voltage	Battery voltage*			
Combination meter	CAN commu- nication	Vehicle speed signal			

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

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.

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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

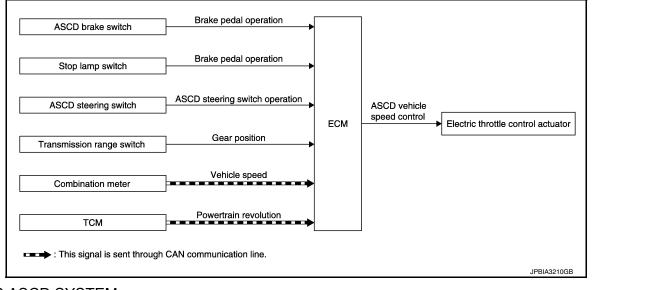
engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.

EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description

SYSTEM DIAGRAM



BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.

Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/ k (25 MPH) and 144 km/h (89 MPH).

ECM controls throttle angle of electric throttle control actuator to regulate engine speed.

The ASCD operation status is indicated on the combination meter. If any malfunction occurs in ASCD system, ECM automatically deactivates the ASCD control.

NOTE:

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

SET OPERATION

Press MAIN switch. (CRUISE is indicated on the combination meter.)

When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH), press SET/COAST switch.

ACCELERATE OPERATION

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

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.

- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Selector lever is changed to N, P, R position
- · Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- TCS system is operated

< SYSTEM DESCRIPTION >

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

• Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE indicator may blink slowly.

When the engine coolant temperature decreases to the normal operating temperature, CRUISE indicator will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ ACCELERATE switch.

If MAIN switch is turned to OFF during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

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

RESUME OPERATION

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

- Brake pedal is released
- · Selector lever is in other than P and N positions

• Vehicle speed is greater than 40 km/h (25 MPH) and less than 144 km/h (89 MPH)

CAN COMMUNICATION

CAN COMMUNICATION : System Description

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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.

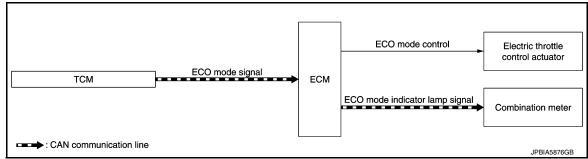
Refer to <u>LAN-30</u>, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart", about CAN communication for detail.

ECO MODE CONTROL

ECO MODE CONTROL : System Description

INFOID:000000009758376

SYSTEM DIAGRAM

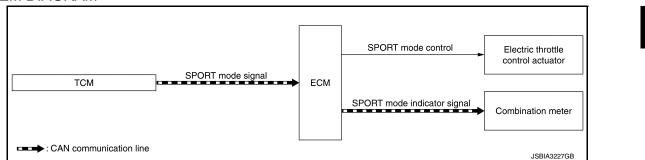


SYSTEM DESCRIPTION

- ECM receives an ECO mode signal from combination meter via CAN communication and improves the fuel economy by controlling the throttle movement to less than usual. Therefore, driving characteristic is controlled (reducing energy consumption by decreasing needless acceleration and deceleration), so that driving that improved operational fuel efficiency is assisted.
- ECM receives an ECO mode signal from TCM via CAN communication and improves the fuel economy by controlling the throttle movement to less than usual.
- ECM transmits an ECO mode indicator lamp signal to the combination meter via CAN communication. **NOTE:**

For the details of the ECO mode, refer to <u>DMS-26, "ECO MODE CONTROL : System Description"</u> (CVT models) or <u>DMS-6, "ECO MODE CONTROL : System Description"</u> (M/T models). SPORT MODE CONTROL

< SYSTEM DESCRIPTION >



SYSTEM DESCRIPTION

- SPORT mode that keeps high engine revolution and provides direct feel and acceleration performance suitable for driving on winding road.
- ECM receives an SPORT mode signal from TCM via CAN communication and improves drivability by controlling the throttle movement.
- ECM transmits an SPORT mode indicator lamp signal to the combination meter via CAN communication. NOTE:

EC-53

For the details of the SPORT mode, refer to DMS-63, "SPORT MODE CONTROL : System Description" (CVT models) or DMS-43, "SPORT MODE CONTROL : System Description" (M/T models).

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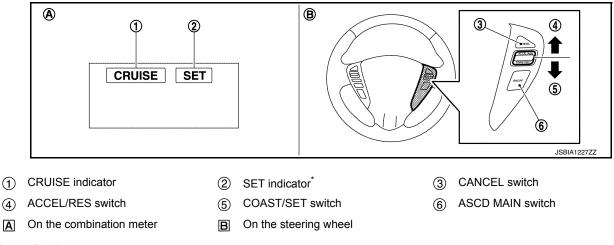
< SYSTEM DESCRIPTION >

OPERATION AUTOMATIC SPEED CONTROL DEVICE (ASCD)

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

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SWITCHES AND INDICATORS



*: Not applicable

SET SPEED RANGE

ASCD system can be set the following vehicle speed.

Minimum speed (Approx.)	Maximum speed (Approx.)
40 km/h (25 MPH)	144 km/h (90 MPH)

SWITCH OPERATION

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

Refer to <u>EC-51, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description"</u> for ASCD operating instructions.

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-47, "Descrip-</u><u>tion"</u>.

NOTE:

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

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DIAGNOSIS SYSTEM (ECM) DIAGNOSIS DESCRIPTION

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

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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	1st	t trip	2nc	l trip	1st trip	2nd trip	1st trip	2nd trip	
	Blinking	Illuminat- ed	Blinking	Illuminat- ed	displaying	displaying	displaying	display- ing	
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0304 is being detected	×	_	_	_	_	_	×	_	
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0304 is being detected	_	_	×	_	_	×	_	_	
One trip detection diagnoses (Re- fer to <u>EC-94, "DTC Index"</u> .)	_	×	_	_	×	_	_	_	
Except above	_	_	_	×	_	×	×	_	

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

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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 <u>EC-94, "DTC Index"</u>. These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT.

1st trip DTC is specified in Service \$07 of SAE J1979/ISO 15031-5. 1st trip DTC detection occurs without illuminating the MIL and therefore does not warn the driver of a malfunction.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to <u>EC-126</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 or GST. The 1st trip freeze frame data can only be displayed on the CONSULT 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 – P0304 Fuel Injection System Function — DTC: P0171, P0172	_		
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 will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

COUNTER SYSTEM CHART

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

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

For details about patterns A and B under Other, see "EXPLANATION FOR DRIVING PATTERNS FOR "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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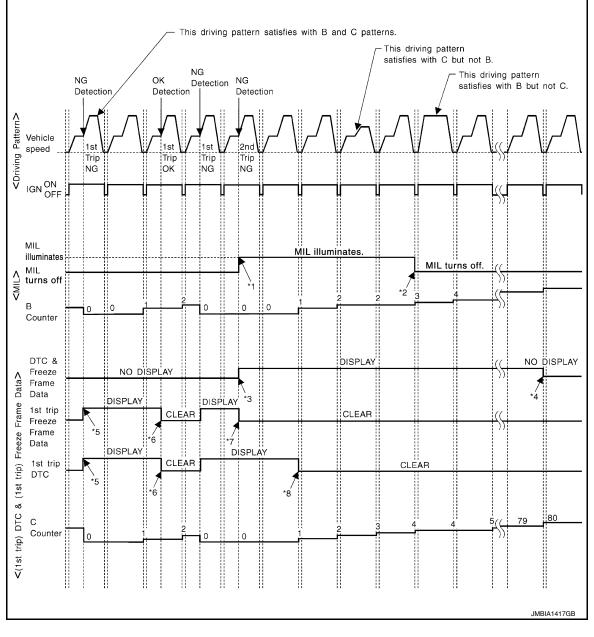
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- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and 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 Refer to EC-60, "DIAGNOSIS DESCRIPTION : Driving Pattern".

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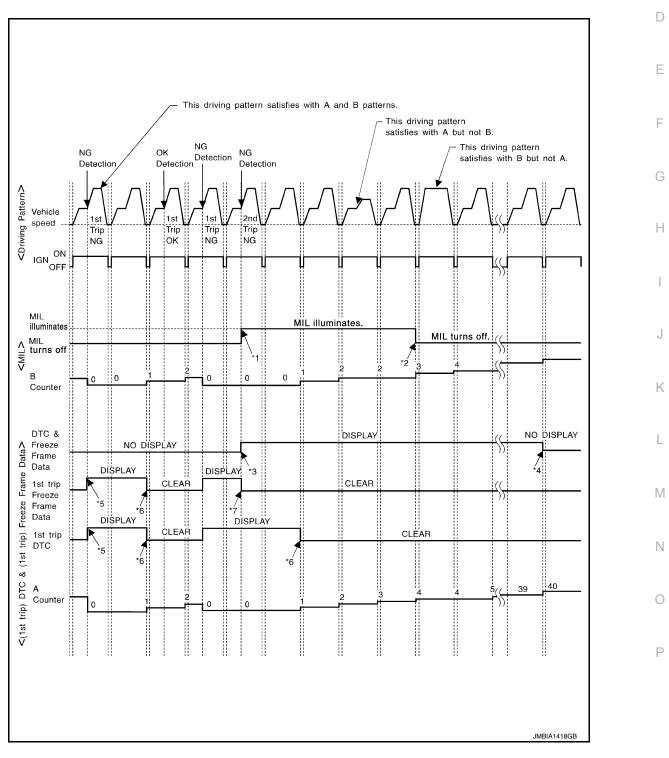
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Driving Pattern C Refer to EC-60, "DIAGNOSIS DESCRIPTION : Driving Pattern". Example: If the stored freeze frame data is as per the following: EC

Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F) To be satisfied with driving pattern C, the vehicle should run under the following conditions: Engine speed: 475 – 1,225 rpm, Calculated load value: 27 – 33%, Engine coolant temperature: more than

70°C (158°F)

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



< 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 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.

*2: MIL will turn OFF after vehicle is driv- *3: When the same malfunction is deen 3 times (pattern B) without any malfunctions.

DIAGNOSIS SYSTEM (ECM)

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

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

Driving Pattern A

Refer to EC-60. "DIAGNOSIS DESCRIPTION : Driving Pattern".

Driving Pattern B Refer to EC-60, "DIAGNOSIS DESCRIPTION : Driving Pattern".

DIAGNOSIS DESCRIPTION : Driving Pattern

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DRIVING PATTERN A

Driving pattern A means a trip satisfying the following conditions.

- Engine speed reaches 400 rpm or more.
- Engine coolant temperature rises by 20°C (36°F) or more after starting the engine.
- Engine coolant temperature reaches 70°C (158°F) or more.
- The ignition switch is turned from ON to OFF.

NOTE:

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

DRIVING PATTERN B

Driving pattern B means a trip satisfying the following conditions.

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

NOTE:

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

DRIVING PATTERN C

Driving pattern C means operating vehicle as per the following:

The following conditions should be satisfied at the same time:

Engine speed: (Engine speed in the freeze frame data) ± 375 rpm

Calculated load value: (Calculated load value in the freeze frame data) x (1 ± 0.1) [%] Engine coolant temperature condition:

EC-60

< SYSTEM DESCRIPTION >

- When the freeze frame data shows lower than 70°C (158°F), engine coolant temperature should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), engine coolant temperature should be higher than or equal to 70°C (158°F).

NOTE:

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

DRIVING PATTERN D

Driving pattern D means a trip satisfying the following conditions.

- The state of driving at 40 km/h (25 MPH) reaches 300 seconds or more in total.
- Idle speed lasts 30 seconds or more.
- A lapse of 600 seconds or more after engine start.

NOTE:

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

DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code

System Readiness Test (SRT) code is specified in Service \$01 of SAE J1979/ISO 15031-5.

As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.

If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating "INCMP", use the information in this Service Manual to set the SRT to "CMPLT".

In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate "CMPLT" for each application system. Once set as "CMPLT", the SRT status remains "CMPLT" until the self-diagnosis memory is erased.

Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate "INCMP" for these items.

NOTE:

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

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

NOTE:

If permanent DTC is stored or MIL illuminates during the state emissions inspection, the vehicle is alsoreturned to the customer untested even though the SRT indicates "CMPLT" for all test items. Therefore, it isimportant to check SRT ("CMPLT"), DTC (No DTCs) and permanent DTC (NO permanent DTCs) before theinspection.

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.

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	Self-diagnosis result			Example						
Self-diagno			$\begin{array}{rcl} \mbox{Ignition cycle} \\ \leftarrow \mbox{ON} \rightarrow & \mbox{OFF} & \leftarrow \mbox{ON} \rightarrow & \mbox{OFF} \rightarrow$							
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	ОК	—	—				
		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 "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".

DIAGNOSIS DESCRIPTION : Permanent Diagnostic Trouble Code (Permanent DTC)

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

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

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

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

NOTE:

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

< SYSTEM DESCRIPTION >

PERMANENT DTC SET TIMING

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

DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)

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

 The MIL illuminates when ignition switch is turned ON (engine is not running).
 NOTE:

Check the MIL circuit if MIL does not illuminate. Refer to <u>EC-</u> 467. "Component Function Check".

2. When the engine is started, the MIL should go off. **NOTE:**

If MIL continues to illuminate/blink, perform self-diagnoses and inspect/repair accordingly because an emission-related ECU has detected a malfunction in the emission control systems components and/or the powertrain control components (which affect vehicle emissions).

On Board Diagnosis Function

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-138. "Work Procedure".
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to EC-139, "Work Procedure".
Idle air volume learning	ECM can learn the idle air volume. Refer to EC-140. "Work Procedure".
Mixture ratio self-learning value clear	Mixture ratio self-learning value can be erased. Refer to EC-142, "Work Procedure".

BULB CHECK MODE

Description This function allows damage inspection in the MIL bulb (blown, open circuit, etc.).	M
Operation Procedure	N
1. Turn ignition switch ON.	IN
 The MIL on the instrument panel should stay ON. If it remains OFF, check MIL circuit. Refer to <u>EC-467, "Diagnosis Procedure"</u>. 	0
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-61, "DIAGNOSIS DESCRIPTION : 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.



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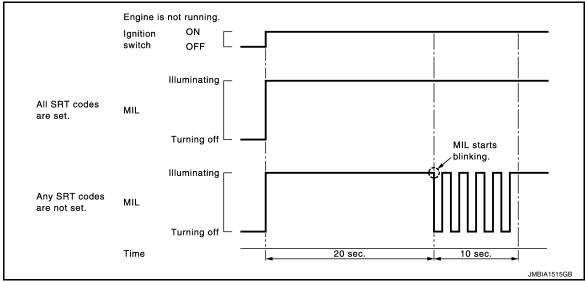
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• ECM blinks MIL for about 10 seconds if all SRT codes are not set.



MALFUNCTION WARNING MODE

Description

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

Operation Procedure

- 1. Turn ignition switch ON.
- 2. Check that MIL illuminates.
 - If it remains OFF, check MIL circuit. Refer to <u>EC-61</u>, "<u>DIAGNOSIS DESCRIPTION</u> : <u>System Readiness</u> <u>Test (SRT) Code</u>".
- 3. Start engine and let it idle.
 - For two trip detection logic diagnoses, ECM turns on MIL when it detects the same malfunction twice in the two consecutive driving cycles.
 - For 1st trip detection logic diagnoses, ECM turns on MIL when it detects a malfunction in one driving cycle.
 - ECM blinks MIL when it detects a malfunction that may damage the three way catalyst (misfire).

SELF-DIAGNOSTIC RESULTS MODE

Description

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

How to Set Self-diagnostic Results Mode

NOTE:

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
- After ignition switch is turned off, ECM is always released from the "self-diagnostic results" mode.
- 1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
- 2. Repeat the following procedure quickly five times within 5 seconds.
 - · Fully depress the accelerator pedal.
 - Fully release the accelerator pedal.
- 3. Wait 7 seconds, fully depress the accelerator pedal and keep it depressed for approx. 10 seconds until the MIL starts blinking.

NOTE:

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

4. Fully release the accelerator pedal.

< SYSTEM DESCRIPTION >

ECM has entered to "Self-diagnostic results" mode.

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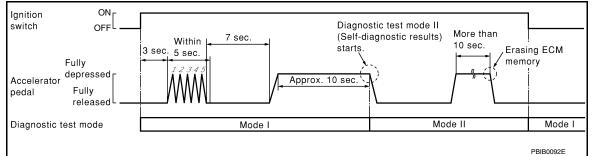


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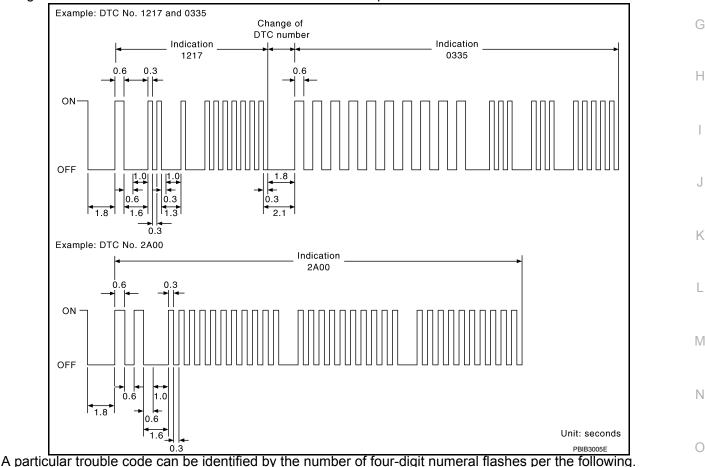
NOTE: Wait until the same DTC (or 1st trip DTC) appears to completely confirm all DTCs.



How to Read Self-diagnostic Results

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

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



Number	0	1	2	3	4	5	6	7	8	9	Α	В	С	D	E	F	P
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.

EC-65

< SYSTEM DESCRIPTION >

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. Refer to <u>EC-94, "DTC Index"</u>.

How to Erase Self-diagnostic Results

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

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

Test values

NOTE:

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

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

CONSULT Function

INFOID:000000009758389

[MRA8DE]

FUNCTION

Diagnostic test mode	Function
Self Diagnostic Results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data Monitor	Input/Output data in the ECM can be read.
Work Support	This mode enables a technician to adjust some devices faster and more accurately by following the in- dications on the CONSULT unit.
Active Test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Ecu Identification	ECM part number can be read.
DTC Work Support	The use of this mode enables quick and accurate performance of Confirmation Procedure.

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

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

SELF DIAGNOSTIC RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-94. "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.

< SYSTEM DESCRIPTION >

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 CVT related items (see EC-94, "DTC Index"), skip step 1.
- 1. Erase DTC in TCM. Refer to TM-105, "Description".
- 2. Select "ENGINE" using CONSULT.
- Select "SELF-DIAG RESULTS". 3.
- Touch "ERASE". (DTC in ECM will be erased.) 4.

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 EC-94. "DTC Index".)
FUEL SYS-B1	 "Fuel injection system status" at the moment a malfunction is detected is displayed. 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
CAL/LD VALUE [%]	The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	 "Long-term fuel trim" at the moment a malfunction is detected is displayed. The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
S-FUEL TRM-B1 [%]	 "Short-term fuel trim" at the moment a malfunction is detected is displayed. The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH·P/S [%]	The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed.
FUEL SYS-B2	
L-FUEL TRM-B2 [%]	
S-FUEL TRM-B2 [%]	These items are displayed but are not applicable to this model.
INT MANI PRES [kPa]	
CONBUST CONDITION	

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

DATA MONITOR MODE

- Monitored Item NOTE:
- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- For reference values of the following items, refer to <u>EC-77, "Reference Value"</u>.

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< SYSTEM DESCRIPTION >

[MRA8DE]

×: Applicable

		Monitor Item Selection		-		
Monitored item	Unit	ECU INPUT SIGNALS	MAIN SIGNALS	Description	Remarks	
ENG SPEED	rpm	×	×	Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	 Accuracy becomes poor if engine speed drops below the idle rpm. If the signal is interrupted while the engine is run- ning, an abnormal value may be indicated. 	
MAS A/F SE-B1	V	×	×	The signal voltage of the mass air flow sen- sor is displayed.	 When the engine is stopped, a certain value is indicated. When engine is running specification range is in- dicated in "SPEC". 	
B/FUEL SCHDL	msec	×	×	"Base fuel schedule" indicates the fuel injec- tion pulse width programmed into ECM, pri- or to any learned on board correction.	When engine is running specification range is indicated in "SPEC".	
A/F ALPHA-B1	%			The mean value of the air-fuel ratio feed- back correction factor per cycle is indicated.	 When the engine is stopped, a certain value is indicated. When engine is running specification range is in- dicated in "SPEC". This data also includes the data for the air-fuel ratio learning control. 	
COOLANT TEMP/S	°C or °F	×	x	The engine coolant temperature (deter- mined by the signal voltage of the engine coolant temperature sensor) is displayed.	When the engine coolant temperature sensor circuit is open or shorted, ECM enters fail-safe mode. The engine coolant tempera- ture determined by the ECM is displayed.	
A/F SEN1 (B1)	V	×	×	The A/F signal computed from the input sig- nal of the air fuel ratio (A/F) sensor 1 is dis- played.		
HO2S2 (B1)	V	×	×	The signal voltage of the heated oxygen sensor 2 is displayed.		
HO2S2 MNTR (B1)	LEAN/RICH			 Display of heated oxygen sensor 2 signal. RICH: means the amount of oxygen after three way catalyst is relatively small. LEAN: means the amount of oxygen after three way catalyst is relatively large. 	When the engine is stopped, a certain value is indicated.	
VHCL SPEED SE	km/h or mph	×	×	The vehicle speed computed from the vehi- cle 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 signal is	
ACCEL SEN 2	V			The accelerator pedal position sensor signal voltage is displayed.	converted by ECM internal- ly. Thus, it differs from ECM terminal voltage signal.	
TP SEN 1-B1		×	×		TP SEN 2-B1 signal is con-	
TP SEN 2-B1	V	×	×	The throttle position sensor signal voltage is displayed.	verted by ECM internally. Thus, it differs from ECM terminal voltage signal.	

< SYSTEM DESCRIPTION >

		Monitor Item	1 Selection			0
Monitored item	Unit	ECU INPUT SIGNALS	MAIN SIGNALS	Description	Remarks	A
FUEL T/TMP SE	°C or °F			• The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.		EC
EVAP SYS PRES	V			 The signal voltage of EVAP control sys- tem pressure sensor is displayed. 		С
FUEL LEVEL SE	V	×		 The signal voltage of the fuel level sensor is displayed. 		
START SIGNAL	ON/OFF			Indicates start signal status [ON/OFF] com- puted 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.	D
CLSD THL POS	ON/OFF	×	x	Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.		E
AIR COND SIG	ON/OFF	×	x	Indicates [ON/OFF] condition of the air con- ditioner switch as determined by the air con- ditioner signal.		F
PW/ST SIGNAL	ON/OFF	×	×	Indicates [ON/OFF] condition of the power steering system (determined by the signal sent from EPS control unit) is indicated.		G
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 lighting switch are OFF. 		H
IGNITION SW	ON/OFF	×	×	Indicates [ON/OFF] condition from ignition switch signal.		
HEATER FAN SW	ON/OFF			Indicates [ON/OFF] condition from the heat- er fan switch signal.		J
BRAKE SW	ON/OFF			Indicates [ON/OFF] condition from the stop lamp switch signal.		K
INJ PULSE-B1	msec		×	Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.		L
IGN TIMING	BTDC		×	Indicates the ignition timing computed by ECM according to the input signals.	When the engine is stopped, a certain value is indicated.	М
CAL/LD VALUE	%			"Calculated load value" indicates the value of the current airflow divided by peak airflow.		
MASS AIR FLOW	g/s			Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor.		Ν
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. 		O P
INT/V TIM (B1)	°CA			Indicates [°CA] of intake camshaft advance angle.		
EXH/V TIM B1	°CA			Indicates [°CA] of exhaust camshaft ad- vance angle.		

< SYSTEM DESCRIPTION >

		Monitor Item Selection			
Monitored item	Unit	ECU INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
INT/V SOL (B1)	%			 The control value of the intake valve tim- ing control solenoid valve (determined by ECM according to the input signals) is in- dicated. The advance angle becomes larger as the value increases. 	
SWRL CONT S/ V	On/Off			 The control condition of the intake manifold runner control valve (determined by ECM according to the input signals) is indicated. On: Closed Off: Open 	
VIAS S/V-1	On/Off				
AIR COND RLY	ON/OFF			The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY	ON/OFF			Indicates the fuel pump relay control condi- tion determined by ECM according to the in- put signals.	
VENT CONT/V	On/Off			 The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is 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.	
COOLING FAN	Hi/Mid/Low/ Off			 Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI: High speed operation MID: Middle speed operation LOW: Low speed operation Off: Stop 	
HO2S2 HTR (B1)	ON/OFF			Indicates [ON/OFF] condition of heated oxy- gen sensor 2 heater determined by ECM ac- cording 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 	
I/P PULLY SPD	rpm			Indicates the engine speed computed from the input speed sensor signal.	
VEHICLE SPEED	km/h or mph			The vehicle speed computed from the vehi- cle speed signal sent from TCM is dis- played.	
IDL A/V LEARN	YET/CMPLT			 Display the condition of Idle Air Volume Learning YET: Idle air volume learning has not been performed yet. CMPLT: Idle air volume learning has al- ready been performed successfully. 	

< SYSTEM DESCRIPTION >

		Monitor Item Selec				
Monitored item	Unit	ECU INPUT SIGNALS	MAIN SIGNALS	Description	Remarks	A
TRVL AFTER MIL	km/h or mph			Distance traveled while MIL is activated.		EC
ENG OIL TEMP	°C or °F			The engine oil temperature (determined by the signal voltage of the engine oil temperature sensor) is displayed.		С
A/F S1 HTR (B1)	%			 Air fuel ratio (A/F) sensor 1 heater control value computed by ECM according to the input signals. The current flow to the heater becomes larger as the value increases. 		D
VHCL SPEED SE	km/h or mph			The vehicle speed computed from the vehi- cle speed signal sent from combination meter is displayed.		Е
SET VHCL SPD	km/h or mph			The preset vehicle speed is displayed.		_
MAIN SW	On/Off			Indicates [ON/OFF] condition from MAIN switch signal.		F
CANCEL SW	On/Off			Indicates [ON/OFF] condition from CANCEL switch signal.		G
RESUME/ACC SW	On/Off			Indicates [ON/OFF] condition from RE- SUME/ACCELERATE switch signal.		
SET SW	On/Off			Indicates [ON/OFF] condition from SET/ COAST switch signal.		Η
BRAKE SW 1	On/Off			Indicates [ON/OFF] condition from ASCD brake switch signal.		I
BRAKE SW 2	On/Off			Indicates [ON/OFF] condition from stop lamp switch signal.		
VHCL SPD CUT	Non/Cut			 Indicates the vehicle cruise condition. Non: Vehicle speed is maintained at the ASCD set speed. Cut: Vehicle speed decreased to excessively low compared with ASCD set speed, and ASCD operation is cut off. 		J
LO SPEED CUT	Non/Cut			 Indicates the vehicle cruise condition. Non: Vehicle speed is maintained at the ASCD set speed. Cut: Vehicle speed decreased to excessively low, and ASCD operation is cut off. 		L
AT OD MONI- TOR	On/Off			Indicates [ON/OFF] condition of A/T O/D ac- cording to the input signal from the TCM.		IVI
AT OD CANCEL	On/Off			Indicates [ON/OFF] condition of A/T O/D cancel request signal.		Ν
CRUISE LAMP	On/Off			Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.		0
SET LAMP	On/Off			Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.		Р
ALT DUTY	%			Indicates the duty ratio of the power genera- tion command value. The ratio is calculated by ECM based on the battery current sensor signal.		
BAT CUR SEN	mV			The signal voltage of battery current sensor is displayed.		

< SYSTEM DESCRIPTION >

		Monitor Item Selection			
Monitored item	Unit	ECU INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
A/F ADJ-B1	_			Indicates the correction of a factor stored in ECM. The factor is calculated from the difference between the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 signal.	
TUMBLE POS SEN	V			 The intake manifold runner control valve position sensor signal voltage is dis- played. 	
P/N POSI SW	ON/OFF	×	×	Indicates [ON/OFF] condition from the park/ neutral position (PNP) signal.	
INT/A TEMP SE	°C or °F	×	×	The intake air temperature (determined by the signal voltage of the intake air tempera- ture sensor) is indicated.	
AC PRESS SEN	V			The signal voltage from the refrigerant pres- sure sensor is displayed.	
VTC DTY EX B1	%			 The control value of the exhaust valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. The advance angle becomes larger as the value increases. 	
EVAP LEAK DIAG	YET/CMPLT			 Indicates the condition of EVAP leak diagnosis. YET: EVAP leak diagnosis has not been performed yet. CMPLT: EVAP leak diagnosis has been performed successfully. 	
EVAP DIAG READY	ON/OFF			 Indicates the ready condition of EVAP leak diagnosis. ON: EVAP leak diagnosis has been ready condition. OFF: EVAP leak diagnosis has not been ready condition. 	
BAT TEMP SEN	V			The signal voltage of battery temperature sensor is displayed.	
THRTL STK CNT B1	_			_	
A/F SEN1 DIAG1(B1)	INCMP/CM- PLT			 Indicates DTC P015A or P015B self-diagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
A/F SEN1 DIAG2 (B1)	INCMP/CM- PLT			 Indicates DTC P014C or P014D self-diagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
A/F SEN1 DIAG3 (B1)	ABSNT/ PRSNT			 Indicates DTC P014C, P014D, P015A or P015B self-diagnosis condition. ABSNT: The vehicle condition is not within the diagnosis range. PRSNT: The vehicle condition is within the diagnosis range. 	
HO2 S2 DIAG1 (B1)	INCMP/CM- PLT			 Indicates DTC P0139 self-diagnosis (de- layed response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	

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		Monitor Item	Selection			
Monitored item	Unit	ECU INPUT SIGNALS	MAIN SIGNALS	Description	Remarks	A
HO2 S2 DIAG2 (B1)	INCMP/CM- PLT			 Indicates DTC P0139 self-diagnosis (slow response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 		EC
EOP SENSOR	mV			The signal voltage of EOP sensor is displayed.		С
SPORT MODE SWITCH	On/Off			Displays the reception status of the sport mode switch signal received through CAN communication.		D
ECO MODE SWITCH	ON/OFF	×		Displays the reception status of the ECO mode switch signal received through CAN communication.		E
A/F-S ATM- SPHRC CRCT B1	_			Displays a determined value of atmospheric correction factor necessary for correcting an A/F sensor signal input to ECM. The signal used for the correction is an A/F sensor signal transmitted while driving under atmospheric pressure.		F
A/F-S ATM- SPHRC CRCT UP B1	count			Displays the number of updates of the A/F sensor atmospheric correction factor.		G

WORK SUPPORT MODE

Work Item

Work item	Condition	Usage
IDLE AIR VOL LEARN	The idle air volume that keeps the engine within the specified range is memorized in ECM.	When learning the idle air volume
EVAP SYSTEM CLOSE	 Close the EVAP canister vent control valve in order to make EVAP system close under the following conditions. Ignition switch ON Engine not running Ambient temperature is above 0°C (32°F). No vacuum and no high pressure in EVAP system Fuel tank temp is more than 0°C (32°F). Within 10 minutes after starting "EVAP SYSTEM CLOSE" When trying to execute "EVAP SYSTEM CLOSE" under the condition except above, CONSULT will discontinue it and display appropriate instruction. NOTE: When starting engine, CONSULT may display "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", even in when using a charged battery. 	When detecting EVAP vapor leak in the EVAP system
FUEL PRESSURE RELEASE	Crank a few times after engine stalls.	When releasing fuel pressure from fuel line
TARGET IDLE RPM ADJ*	Idle condition	When setting target idle speed
VIN REGISTRATION	In this mode, VIN is registered in ECM.	When registering VIN in ECM
SELF-LEARNING CONT	The coefficient of self-learning control mixture ratio returns to the original coefficient.	When clearing mixture ratio self- learning value
TARGET IGN TIM ADJ*	Idle condition	When adjusting target ignition tim- ing
CLSD THL POS LEARN	Ignition on and engine stopped.	When learning the throttle valve closed position

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Work item	Condition	Usage
SAVING DATA FOR REPLC CPU	In this mode, save data that is in ECM.	When ECM is replaced.
WRITING DATA FOR REPLC CPU	In this mode, write data stored by "SAVE DATA FOR CPU REPLC" in work support mode to ECM.	When ECM is replaced.

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

ACTIVE TEST MODE

Test Item

Test item	Condition	Judgement	Check item (Remedy)
FUEL INJECTION	 Engine: Return to the original trouble condition Change the amount of fuel injec- tion using CONSULT. 	If trouble symptom disappears, see Check item.	 Harness and connectors Fuel injector Air fuel ratio (A/F) sensor 1
ENG COOLANT TEMP	 Engine: Return to the original trouble condition Change the engine coolant tem- perature using CONSULT. 	If trouble symptom disappears, see Check item.	 Harness and connectors Engine coolant temperature sensor Fuel injector
PURG VOL CONT/V	 Engine: After warming up, run engine at 1,500 rpm. Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT. 	Engine speed changes according to the opening percent.	Harness and connectorsSolenoid valve
FUEL/T TEMP SEN	Change the fuel tank temperature	e using CONSULT.	
COOLING FAN [*]	 Ignition switch: ON Select LOW or HIGH on CON- SULT screen. 	Cooling fan operates at low speed or high speed.	 Harness and connectors Cooling fan motor Cooling fan relay IPDM E/R
ALTERNATOR DUTY	 Ignition switch: ON Change duty ratio using CON- SULT. 	Battery voltage changes.	 Harness and connectors Alternator IPDM E/R
FUEL PUMP RELAY	 Ignition switch: ON (Engine stopped) Turn the fuel pump relay "ON" and "OFF" using CONSULT and listen to operating sound. 	Fuel pump relay makes the operat- ing sound.	 Harness and connectors Fuel pump relay
VIAS S/V-1	 Ignition switch: ON (Engine stopped) Turn Intake Manifold Tuning (IMT) Valve "ON" and "OFF" us- ing CONSULT and listen to oper- ating sound. 	IMT valve motor makes an operat- ing sound.	Harness and connectorsIMT valve motor
TUMBLE CONTROL VALVE	 Ignition switch: ON Turn intake manifold runner control valve "ON" and "OFF" using CONSULT and listen to operating sound. 	Intake Manifold Runner control valve motor makes an operating sound.	 Harness and connectors Intake Manifold Runner control valve motor
IGNITION TIMING	 Engine: Return to the original trouble condition Timing light: Set Retard the ignition timing using CONSULT. 	If trouble symptom disappears, see Check item.	Perform Idle Air Volume Learning.

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Test item	Condition	Judgement	Check item (Remedy)	٨
POWER BALANCE	 Engine: After warming up, idle the engine. A/C switch OFF Selector lever: P or N (CVT mod- els) Shifter lever: Neutral (M/T mod- els) Cut off each fuel injector signal one at a time using CONSULT. 	Engine runs rough or stops.	 Harness and connectors Compression Fuel injector Power transistor Spark plug Ignition coil 	EC C
VENT CONTROL/V	 Ignition switch: ON (Engine stopped) Turn solenoid valve "ON" and "OFF" using CONSULT and listen to operating sound. 	Solenoid valve makes an operating sound.	Harness and connectorsSolenoid valve	D
INT V/T ASSIGN AN- GLE	 Engine: Return to the original trouble condition Change intake valve timing us- ing CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	 Harness and connectors Intake valve timing control solenoid valve 	E
EXH V/T ASSIGN ANGLE	 Engine: Return to the original trouble condition Change exhaust valve timing using CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	 Harness and connectors Exhaust valve timing control solenoid valve 	G

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

DTC WORK SUPPORT MODE

Test mode	Test item	Corresponding DTC No.	Reference page	
A/F SEN1	A/F SEN1 (B1) P1276	P0130	<u>EC-210</u>	
EVAPORATIVE SYS-	PURG FLOW P0441	P0441	<u>EC-288</u>	
TEM	PURG VOL CN/V P1444	P0443	<u>EC-293</u>	
H02S2	HO2S2 (B1) P1146	P0138	<u>EC-225</u>	J
	HO2S2 (B1) P1147	P0137	<u>EC-220</u>	
	HO2S2 (B1) P0139	P0139	<u>EC-232</u>	K

SRT & P-DTC MODE

SRT STATUS Mode

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

PERMANENT DTC STATUS Mode

How to display permanent DTC status

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- Select "PERMANENT DTC STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT. NOTE:

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

< SYSTEM DESCRIPTION >

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

CAUTION: Turn ignition switch from O status screen.	Turn ignition switch from ON to OFF twice to update the information on the					
PERMANENT DTC	DRIVING PATTERN B	DRIVING PATTERN D				
xxxx	INCMP	INCMP				
хххх	CMPLT	INCMP				
XXXX	INCMP	CMPLT				
xxxx	CMPLT	INCMP				
XXXX	INCMP	INCMP				
XXXX	INCMP	INCMP				
The previous trip information is displayed.						

NOTE:

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

SRT WORK SUPPORT Mode

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

PERMANENT DTC WORK SUPPORT Mode

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

NOTE:

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

ECU DIAGNOSIS INFORMATION ECM

Reference Value

VALUES ON THE DIAGNOSIS TOOL

NOTE:

- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- Numerical values in the following table are reference values.
- These values are input/output values that ECM receives/transmits and may differ from actual operations. Example: The ignition timing shown by the timing light may differ from the ignition timing displayed on the data monitor. This occurs because the timing light shows a value calculated by ECM according to signals received from the cam shaft position sensor and other sensors related to ignition timing. Evangle for outlines of following items, refer to EC-66, "CONSULT Function".

Monitor Item		Condition	Values/Status
ENG SPEED	• Run engine and compare CONSULT value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-158, "Diagnosis Procedur	<u>e"</u> .	
B/FUEL SCHDL	See EC-158, "Diagnosis Procedur	<u>e"</u> .	
A/F ALPHA-B1	See EC-158, "Diagnosis Procedur	<u>e"</u> .	
COOLANT TEMP/S	Engine: After warming up		More than 70°C (158°F)
A/F SEN1 (B1)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
HO2S2 (B1)	are met. - Engine: After warming up	000 rpm quickly after the following conditions veen 3,500 and 4,000 rpm for 1 minute and at	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 		$LEAN \longleftrightarrow RICH$
VHCL SPEED SE	• Turn drive wheels and compare CONSULT value with the speedometer indi- cation.		Almost the same speed as speedometer indication
BATTERY VOLT	Ignition switch: ON (Engine stopped)		11 - 14 V
ACCEL SEN 1	Ignition switch: ON	Accelerator pedal: Fully released	0.5 - 1.0 V
ACCEL SEN I	(Engine stopped)	Accelerator pedal: Fully depressed	4.2 - 4.8 V
ACCEL SEN 2*1	Ignition switch: ON	Accelerator pedal: Fully released	0.5 - 1.0 V
AUGEL SEN 2	(Engine stopped)	Accelerator pedal: Fully depressed	4.2 - 4.8 V
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 1-B1	(Engine stopped)Selector lever: D (CVT)Shifter lever: 1st (M/T)	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: DShifter lever: 1st (M/T)	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

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< ECU DIAGNOSIS INFORMATION >

Monitor Item	C	ondition	Values/Status
START SIGNAL	• Ignition switch $ON \rightarrow START \rightarrow C$	N (start switch is released)	$Off\toOn\toOff$
	Ignition switch: ON	Accelerator pedal: Fully released	On
CLSD THL POS	(Engine stopped)	Accelerator pedal: Slightly depressed	Off
	- Engine: Afterwarming up idle the	Air conditioner switch: OFF	Off
AIR COND SIG	Engine: After warming up, idle the engine	Air conditioner switch: ON (A/C compressor operates)	On
	Engine: After warming up, idle the	Steering wheel: Not being turned	Off
PW/ST SIGNAL	engine	Steering wheel: Being turned	On
		Rear window defogger switch: ON and/or Lighting switch: 2nd position	On
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch and lighting switch: OFF	Off
IGNITION SW	• Ignition switch: $ON \rightarrow OFF \rightarrow ON$		$\text{On} \to \text{Off} \to \text{On}$
HEATER FAN SW	Engine: After warming up, idle the	Heater fan switch: ON	On
TEALER FAIN SW	engine	Heater fan switch: OFF	Off
BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	Off
JINANE OVV		Brake pedal: Slightly depressed	On
	Engine: After warming up	Idle	2.0 - 3.0 msec
INJ PULSE-B1	 Selector lever: P or N Air conditioner switch: OFF No load 	2,000 rpm	1.9 - 2.9 msec
	Engine: After warming up	Idle	3° - 13° BTDC
IGN TIMING	 Selector lever: P or N Air conditioner switch: OFF No load 	2,000 rpm	35° - 55° BTDC
	Engine: After warming up	Idle	10% - 35%
CAL/LD VALUE	 Selector lever: P or N Air conditioner switch: OFF No load 	2,500 rpm	10% - 35%
	Engine: After warming up	Idle	Approx. 2.9 g/s
MASS AIRFLOW	 Selector lever: P or N Air conditioner switch: OFF No load 	2,500 rpm	Approx. 5.5 g/s
PURG VOL C/V	 Engine: After warming up Selector lever: P or N Air conditioner switch: OFF 	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%
	No load	2,000 rpm	0% - 90%
	Engine: After warming up	Idle	-5°- 5° CA
INT/V TIM(B1)	 Selector lever: P or N Air conditioner switch: OFF No load 	2,000 rpm	Approx. 0° - 20° CA
	Engine: After warming up	ldle	–5° - 5° CA
EXH/V TIM B1	 Selector lever: P or N Air conditioner switch: OFF No load 	2,000 rpm	Approx. 0° - 40° CA
	Engine: After warming up	Idle	0%-2%
NT/V SOL (B1)	 Selector lever: P or N Air conditioner switch: OFF No load 	2,000 rpm	Approx. 0%– 90%
	Ignition switch: ON	Accelerator pedal: Fully released	On
SWRL CONT S/V	 Engine coolant temperature: Be- tween 0°C (32°F) and 45°C (113°F) 	Accelerator pedal: Fully depressed	Off

< ECU DIAGNOSIS INFORMATION >

Monitor Item	C	ondition	Values/Status
VIAS S/V-1	 Engine: After warming up Selector lever: P or N Air conditioner switch: OFF No load 	When revving engine up to 5,250 rpm quickly and release the accelerator pedal.	$Off\toOn\toOff$
	• Engine: Afterwarming up idle the	Air conditioner switch: OFF	Off
AIR COND RLY	Engine: After warming up, idle the engine	Air conditioner switch: ON (Compressor operates)	On
FUEL PUMP RLY	For 1 second after turning ignitionEngine running or cranking	switch: ON	On
	Except above		Off
VENT CONT/V	Ignition switch: ON		Off
THRTL RELAY	Ignition switch: ON		On
	Engine: After warming up, idle the	Engine coolant temperature is 97°C (207°F) or less	Off
	 engine Air conditioner switch: OFF 	Engine coolant temperature between 98°C (208°F) and 99°C (210°F) or more	Low
COOLING FAN		Engine coolant temperature between 100°C (212°F) or more	Hi
	 Engine: After warming up, idle the engine Air conditioner switch: ON Refrigerant pressure is less than 	Engine coolant temperature is 97°C (207°F) or less	Low
		Engine coolant temperature between 98°C (208°F) and 99°C (210°F) or more	Low
	1,280 kPa (12.80 bar, 13.05 kg/ cm ² , 185.6 psi)	Engine coolant temperature between 100°C (212°F) or more	Hi
HO2S2 HTR (B1)	- Engine: After warming up	fter the following conditions are met. In 3,500 and 4,000 rpm for 1 minute and at	On
	Engine speed: Above 3,600 rpm	Off	
	Power generation voltage variable	e control: Operating	On
ALT DUTY SIG	Power generation voltage variable	e control: Not operating	Off
/P PULLY SPD	Vehicle speed: More than 20 km/h	n (12 MPH)	Almost the same speed as the tachometer indication
VEHICLE SPEED	• Turn drive wheels and compare C cation.	ONSULT value with the speedometer indi-	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
		Idle air volume learning has already been performed successfully.	CMPLT
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has turned ON.	0 - 65,535 km (0 - 40,723 miles)
ENG OIL TEMP	Engine: After warming up		More than 70°C (158°F)
A/F S1 HTR(B1)	Engine: After warming up, idle the (More than 260 seconds after star		4 - 100%
VHCL SPEED SE	• Turn drive wheels and compare C cation.	ONSULT value with the speedometer indi-	Almost the same speed as the speedometer indication
SET VHCL SPD	Engine: Running	ASCD: Operating	The preset vehicle speed is displayed
MAIN SW	Ignition switch: ON	MAIN switch: Pressed	On
		MAIN switch: Released	Off

< ECU DIAGNOSIS INFORMATION >

Monitor Item	C	Condition	Values/Status
CANCEL OW	- Ignition quitable ON	CANCEL switch: Pressed	On
CANCEL SW	Ignition switch: ON	CANCEL switch: Released	Off
		RESUME/ACCELERATE switch: Pressed	On
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Re- leased	Off
SET SW	Ignition switch: ON	SET/COAST switch: Pressed	On
321 300	Ignition switch: ON	SET/COAST switch: Released	Off
BRAKE SW1	Ignition switch: ON	Brake pedal: Fully released	On
		Brake pedal: Slightly depressed	Off
BRAKE SW2	Ignition switch: ON	Brake pedal: Fully released	Off
BIVILE OWZ		Brake pedal: Slightly depressed	On
VHCL SPD CUT	 Ignition switch: ON 		Non
LO SPEED CUT	Ignition switch: ON		Non
AT OD MONITOR	Ignition switch: ON		Off
AT OD CANCEL	 Ignition switch: ON 		Off
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time \rightarrow at the 2nd time	$On\toOff$
SET LAMP	NOTE: The item is indicated, but not used.		_
ALT DUTY	Engine speed: Idle		0 - 80%
BAT CUR SEN	 Engine speed: Idle Battery: Fully charged^{*2} Selector lever: P or N (CVT) Shifter lever: Neutral (M/T) Air conditioner switch: OFF No load 		Approx. 2,600 - 3,500 mV
A/F ADJ-B1	Engine: running		-0.450 - 0.330
	Ignition switch: ON	Accelerator pedal: Fully released	Less than 2.4 V
TUMBLE POS SEN	 Engine coolant temperature: Be- tween 0°C (32°F) and 45°C (113°F) 	Accelerator pedal: Fully depressed	More than 3.5 V
P/N POSI SW	Ignition switch: ON	Selector lever: P or N (CVT) Shifter lever: Neutral (M/T)	On
		Selector lever: Except above	Off
INT/A TEMP SE	Ignition switch: ON	1	Indicates intake air tempera- ture
AC PRESS SEN	Engine speed: IdleBoth A/C switch and blower fan switch and blower fan	witch: ON (Compressor operates)	1.0 - 4.0 V
	Engine: After warming up	Idle	0 - 2%
VTC DTY EX B1	 Selector lever: P or N Air conditioner switch: OFF No load 	2,000 rpm	Approx. 0- 90%
EVAP LEAK DIAG	Ignition switch: ON		Indicates the condition of EVAP leak diagnosis.
EVAP DIAG READY	Ignition switch: ON		Indicates the ready condition of EVAP leak diagnosis.
BAT TEMP SEN	 Engine: After warming up, idle the Selector lever: P or N Air conditioner switch: OFF No load 	engine	Indicates the temperature around the battery.

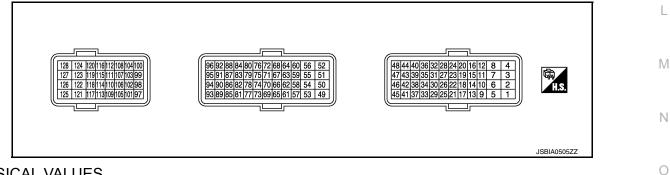
< ECU DIAGNOSIS INFORMATION >

Monitor Item		Condition	Values/Status	
THRTL STK CNT B1	NOTE: The item is indicated, but not used	_	A	
A/F SEN1 DIAG1	DTC P015A and P015B self-diagn	osis is incomplete.	INCMP	EC
(B1)	DTC P015A and P015B self-diagn	osis is complete.	CMPLT	EC
A/F SEN1 DIAG2	DTC P014C and P014D self-diagn	osis is incomplete.	INCMP	
(B1)	DTC P014C and P014D self-diagn	osis is complete.	CMPLT	С
A/F SEN1 DIAG3	The vehicle condition is not within P015A or P015B.	the diagnosis range of DTC P014C, P014D,	ABSNT	
(B1)	The vehicle condition is within the diagnosis range of DTC P014C, P014D, P015A or P015B.		PRSNT	D
	DTC P0139 self-diagnosis (delaye	INCMP		
HO2 S2 DIAG1 (B1)	DTC P0139 self-diagnosis (delaye	CMPLT	E	
HO2 S2 DIAG2 (B1)	DTC P0139 self-diagnosis (slow re	INCMP		
HOZ 32 DIAGZ (BT)	DTC P0139 self-diagnosis (slow re	CMPLT	F	
	Engine: After warming up	Idle	Approx. 1,450 mV	
EOP SENSOR	 Selector lever: P or N (CVT) Shifter lever: Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	Approx. 2,850 mV	G
SPORT MODE	ignition quitch: ON	Press the sport mode switch	On	
SWITCH	ignition switch: ON	Release the sport mode switch	Off	Н
ECO MODE	ignition switch: ON	Press the ECO mode switch	On	
SWITCH	Ignition Switch. ON	Release the ECO mode switch	Off	1
A/F-S ATMSPHRC CRCT B1	Engine: After warming up, idle the engine		Varies depending on vehicle environment.	
A/F-S ATMSPHRC CRCT UP B1	Engine: Running		Varies depending on the number of updates.	J

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

*2: Before measuring the voltage, confirm that the battery is fully charged. Refer to <u>PG-4</u>, "How to Handle Battery".

TERMINAL LAYOUT



PHYSICAL VALUES

NOTE:

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

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< ECU DIAGNOSIS INFORMATION >

Terminal No. (Wire color)

+

1

(P)

2

(G)

3

(W)

al No. olor)	Description		Condition	Value
_	Signal name	Input/ Output	Condition	(Approx.)
128 (B/Y)	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D (CVT) • Shifter lever: 1st (M/T) • Accelerator pedal: Fully released	1.8 V★ 5mSec/div
128 (B/Y)	Throttle control motor power supply	Input	[Ignition switch: ON]	Battery voltage (11 - 14 V)
128 (B/Y)	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D (CVT) • Shifter lever: 1st (M/T) • Accelerator pedal: Fully depressed	3.2 V★ 1mSec/div 5V/div JMBIA0324GB
8 (B)	Knock sensor	Input	[Engine is running] • Idle speed	2.5 V
128 (B/Y)	Intake manifold tuning valve motor (Close)	Output	 [Ignition switch ON] Engine coolant temperature: Normal operating condition Accelerator pedal: Depressed → fully released 	Battery voltage appears for about 1 second.
128 (B/Y)	Intake manifold tuning valve motor power supply	Input	[Ignition switch: ON]	Battery voltage (11 - 14 V)
128 (B/Y)	Intake manifold tuning valve motor (Open)	Output	 [Ignition switch ON] Engine coolant temperature: normal operating condition Accelerator pedal: Fully released → depressed 	Battery voltage appears for about 1 second.
_	Sensor ground (Knock sensor)	_	_	_
			[Engine is running] • Warm-up condition • Idle speed NOTE-	Battery voltage (11 - 14 V)★ 50mSec/div

					JMBIA0324GB
4 (W)	8 (B)	Knock sensor	Input	[Engine is running] • Idle speed	2.5 V
5 (G)	128 (B/Y)	Intake manifold tuning valve motor (Close)	Output	 [Ignition switch ON] Engine coolant temperature: Normal operating condition Accelerator pedal: Depressed → fully released 	Battery voltage appears for about 1 second.
6 (R)	128 (B/Y)	Intake manifold tuning valve motor power supply	Input	[Ignition switch: ON]	Battery voltage (11 - 14 V)
7 (R)	128 (B/Y)	Intake manifold tuning valve motor (Open)	Output	 [Ignition switch ON] Engine coolant temperature: normal operating condition Accelerator pedal: Fully released → depressed 	Battery voltage appears for about 1 second.
8 (B)	_	Sensor ground (Knock sensor)		_	_
9 (BR) 10 (SB)	128	Fuel injector No. 4 Fuel injector No. 3	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
13 (O) 14 (V)	(B/Y)	Fuel injector No. 1 Fuel injector No. 2	Cuput	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	Battery voltage (11 - 14 V)★ 50mSec/div 10V/div JMBIA0090GB
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< ECU DIAGNOSIS INFORMATION >

Terminal No. (Wire color)		Description		Condition	Value	
+	_	Signal name Input/ Output		Condition	(Approx.)	
12 (B)		ECM ground	_	_	_	E
16 (B)	—	ECM ground	—	_	_	
17	17 128 (L) (B/Y) EVAP canister purge vol- ume control solenoid valve		Output	 [Engine is running] Idle speed Accelerator pedal: Not depressed even slightly, after engine starting 	Battery voltage (11 - 14 V)★ 50mSec/div ↓ ↓ ↓ ↓ 20V/div JMBIA0087GB	
		valve	Gutput	 [Engine is running] Engine speed: About 2,000 rpm (More than 100 seconds after start- ing engine.) 	10 V★ 50mSec/div ↓↓↓↓↓↓ ↓↓↓↓↓ ↓↓↓↓↓ ↓↓↓↓↓↓ ↓↓↓↓↓↓ ↓ 10V/div	
18 (GR)	128 (B/Y)	Fuel pump relay	Output	 [Ignition switch: ON] For 1 second after turning ignition switch ON [Engine is running] [Ignition switch: ON] More than 1 second after turning ig- 	0 - 1.0 V Battery voltage	
21	128	Throttle control motor re-	Output	nition switch ON [Ignition switch: OFF]	(11 - 14 V) Battery voltage (11 - 14 V)	
(Y)	(B/Y)	lay	Output	[Ignition switch: ON]	0 - 1.0 V	
22 (W)	23 (BR)	Heated oxygen sensor 2	Input	 [Engine is running] Revving engine from idle to 3,000 rpm quickly after the following conditions are met Engine: after warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	0 - 1.0 V	
23 (BR)	_	Sensor ground (Heated oxygen sensor 2)	_			
25 (Y)	26 (P)	Engine oil temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine oil temperature.	
26 (P)		Sensor ground (Engine oil temperature sensor)				
27 (LG)		Sensor ground (Engine coolant tempera- ture sensor)			_	
28 (V)	27 (LG)	Engine coolant tempera- ture sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.	

< ECU DIAGNOSIS INFORMATION >

	nal No. color)	Description		Condition	Value (Approx.)	
+	_	Signal name Input/ Output		Condition		
30 (L)	_	Sensor ground [Camshaft position sen- sor (PHASE)]	_	_	_	
31	30	30 Camshaft position sensor		 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	1.0 - 2.0★ 10mSec/div	
(BR)	(L)	(PHASE)	Input	[Engine is running] • Engine speed is 2,000 rpm	1.0 - 2.0★ 10mSec/div	
32 (GR)	_	Sensor power supply [Camshaft position sen- sor (PHASE)]		[Ignition switch: ON]	5.0 V	
33 (GR)	34 (W)	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.	
34 (W)	_	Sensor ground (Mass air flow sensor, in- take air temperature sen- sor)	_		_	
				[Ignition switch: ON] • Engine stopped	1.27 V	
35 (G)	34 (W)	Mass air flow sensor	Input	[Engine is running]Warm-up conditionIdle speed	1.3 – 1.6 V	
	()			[Engine is running]Warm-up conditionEngine is revving from idle to about 4,000 rpm	$1.3 - 1.6 \rightarrow 2.6$ V (Check for lin- ear voltage rise in response to engine being increased to about 4,000 rpm.)	
36 (R)		Sensor power supply (Mass air flow sensor, in- take air temperature sen- sor)		[Ignition switch: ON]	5.0 V	
37 (B)	_	Shield	—	_	_	
38 (W)	_	Sensor ground (Engine oil pressure sen- sor)	_	_	_	

< ECU DIAGNOSIS INFORMATION >

	nal No. e color)	Description		Condition	Value	
+	_	Signal name	Input/ Output	Condition	(Approx.)	
39	38	Engine oil pressure sen-	Input	[Engine is running]Warm-up conditionIdle speed	1.3 V★ 5mSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	
(G)	(G) (W) sor		[Engine is running]Warm-up conditionEngine speed is 2,000 rpm	2.7 V★ 5mSec/div		
40 (R)	38 (W)	Sensor power supply (Engine oil pressure sen- sor)		[Ignition switch: ON]	5.0 V	
41 (Y)	128 (B/Y)	A/F sensor 1	Input	Engine running] • Warm-up condition • Engine speed: 2,000 rpm	2.2 V (Output voltage varies with air- fuel ratio)	
42 (W)	_	Sensor ground [Exhaust valve timing control position sensor]				
43	42	Exhaust valve timing con-	lanut	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	1.0★ 50mSec/div	
(P)	(W) trol position sensor	Input	[Engine is running] • Engine speed is 2,500 rpm	1.0★ 50mSec/div		
44 (R)	_	Sensor power supply [Exhaust valve timing control position sensor]	_	[Ignition switch: ON]	5 V	
45 (BR)	128 (B/Y)	A/F sensor 1	Input	[Engine is running] • Engine speed is 2,000 rpm	2.2 V Output voltage varies with air fuel ratio.	
49 (G)	128 (B/Y)	Intake manifold runner control valve motor (Close)	Output	 [Ignition switch ON] Engine coolant temperature: More than 60°C (140°F) Accelerator pedal: Depressed → fully released 	Battery voltage appears for about 1 second.	

< ECU DIAGNOSIS INFORMATION >

	Terminal No. (Wire color) Description			Condition	Value
+	_	Signal name Input/ Output		(Approx.)	
50 (R)	128 (B/Y)	Intake manifold runner control valve motor power supply	Input	[Ignition switch: ON]	Battery voltage (11 - 14 V)
51 (R)	128 (B/Y)	Intake manifold runner control valve motor (Open)	Output	 [Ignition switch ON] Engine coolant temperature: More than 60°C (140°F) Accelerator pedal: Fully released → depressed 	Battery voltage appears for about 1 second.
52 (B)	_	ECM ground		_	_
53 (G)	128 (B/Y)	A/F sensor 1 heater	Input	 [Engine is running] Warm-up condition Idle speed (More than 260 seconds after start- ing engine) 	10 V★ 100mSec/div
54 (G)	128 (B/Y)	Heated oxygen sensor 2 heater	Output	 [Engine is running] Engine speed: Below 3,600 rpm after the following conditions are met Engine: after warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	8 V★ 50mSec/div € 10V/div JMBIA0325GB
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	Battery voltage (11 - 14 V)
61 (BG)	62 (BR)	Battery temperature sen- sor	Input	[Engine is running] • Battery temperature: 25°C (°F) • Idle speed	3.3 V
62 (BR)	_	Sensor ground (Battery current sensor, battery temperature sen- sor)	_	_	_
63 (G)	62 (BR)	Battery current sensor	Input	 [Engine is running] Battery: Fully charged[*] Idle speed 	2.6 - 3.5 V
64 (Y)	_	Sensor power supply (Battery current sensor)		[Ignition switch: ON]	5.0 V
70 (W)	_	Sensor ground [Crankshaft position sen- sor (POS)]	_	_	_

< ECU DIAGNOSIS INFORMATION >

	nal No. e color)	Description		Condition	Value	
+	_	Signal name	Input/ Output	Condition	(Approx.)	
71	70	Crankshaft position sen-	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	1.0 V★ 5mSec/div € 2V/div	C
(R)	(W)	sor (POS)	mpor	[Engine is running] • Engine speed: 2,000 rpm	1.0 V★ 5mSec/div	F
72 (G)	_	Sensor power supply [Crankshaft position sen- sor (POS)]	_	[Ignition switch: ON]	5.0 V	G
73 (GR)	_	Shield	_	_	_	Н
77 (W)	78 (R)	Throttle position sensor 2	Input	 [Ignition switch: ON] Engine stopped Selector lever: D (CVT), 1st (M/T) Accelerator pedal: Fully released [Ignition switch: ON] 	Less than 4.75 V	 -
78 (R)		Sensor ground (Throttle position sensor)		 Engine stopped Selector lever: D (CVT), 1st (M/T) Accelerator pedal: Fully depressed 	More than 0.36 V	J K
79	78	Throttle position sensor 1	Input	 [Ignition switch: ON] Engine stopped Selector lever: D (CVT), 1st (M/T) Accelerator pedal: Fully released 	More than 0.36 V	L
(G)	(R)		P · · ·	 [Ignition switch: ON] Engine stopped Selector lever: D (CVT), 1st (M/T) Accelerator pedal: Fully depressed 	Less than 4.75 V	N
80 (B)	_	Sensor power supply (Throttle position sensor)	_	[Ignition switch: ON]	5.0 V	Ν
81 (Y)	128 (B/Y)	Power supply for ECM (Backup)	Input	[Ignition switch: OFF]	Battery voltage (11 - 14 V)	
83	92	Intake manifold runner		 [Ignition switch ON] Engine coolant temperature: Be- tween 0°C (32°F) and 45°C (113°F) Accelerator pedal: Fully released 	Less than 2.4 V	F
(LG)	(V)	control valve position sen- sor	Input	 [Ignition switch ON] Engine coolant temperature: Be- tween 0°C (32°F) and 45°C (113°F) Accelerator pedal: Slightly de- pressed 	More than 3.5 V	<u>.</u>

< ECU DIAGNOSIS INFORMATION >

	nal No. color)	Description		Condition	Value
+	_	Signal name	Input/ Output	Condition	(Approx.)
84 (W)	_	Sensor power supply (Intake manifold runner control valve position sen- sor)	_	[Ignition switch: ON]	More than 4.98 V
86 (R) 87 (LG)		Ignition signal No. 1 Ignition signal No. 2		 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	0 - 0.1 V★ 100mSec/div
90 (P) 91 (SB)	128 (B/Y)	Ignition signal No. 3 Ignition signal No. 4	Output	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0 - 0.2 V★ 100mSec/div 2V/div JPBIA4733ZZ
89 (GR)	128 (B/Y)	ECM relay (Self shut-off)	Output	 [Engine is running] [Ignition switch: OFF] A few seconds after turning ignition switch OFF [Ignition switch: OFF] 	0 - 1.0 V Battery voltage
				More than a few seconds after turn- ing ignition switch OFF	(11 - 14 V)
92 (LG)	_	Sensor ground (Intake manifold runner control valve position sen- sor)	_	_	_
				[Engine is running]Warm-up conditionIdle speed	0 V
93 (LG)	128 (B/Y)	Intake valve timing control solenoid valve	Output	[Engine is running]Warm-up conditionWhen revving engine up to 2,000 rpm quickly	11 – 14 V ★
94 (G)	128 (B/Y)	Exhaust valve timing con- trol solenoid valve	Output	[Engine is running] Warm-up condition Idle speed 	0 V
				[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	Battery voltage (11 - 14 V)
97 (BR)	128 (GR)	EVAP canister vent con- trol valve	Output	[Ignition switch: ON]	Battery voltage (11 - 14 V)
99 (P)		CAN communication line (CAN-L)	Input/ Output	_	_

< ECU DIAGNOSIS INFORMATION >

Terminal No. (Wire color)		Description		Condition	Value											
+	_	Signal name	Input/ Output	Condition	(Approx.)											
100 (L)		CAN communication line (CAN-H)	Input/ Output	_	_											
101 (G)	128 (B/Y)	Starter relay cut off signal	Input/ Output	[Ignition switch: ON] [Engine is running] • Warm-up condition • Idle speed	0 V Battery voltage (11 - 14 V)											
103 (P)	124 (Y)	Refrigerant pressure sen- sor	Input	 [Engine is running] Warm-up condition Both A/C switch and blower fan motor switch: ON (Compressor operates) 	1.0 - 4.0 V											
104 (L)		Sensor power supply (Refrigerant pressure sensor)		[Ignition switch: ON]	5.0 V											
105 (V)	128 (B/Y)	Starter motor relay control signal	Output	 [Engine is running] Warm-up condition Idle speed Selector lever: D (CVT) Shift lever: 1st (M/T) Engine speed: Less than 1,500 rpm NOTE: To decrease engine speed, perform the DTC confirmation procedure B in P1650. Refer to EC-399. "DTC Logic". 	0 V (While operating the starter mo- tor)											
			[Engine is running]Warm-up conditionIdle speed	Battery voltage (11 - 14 V)												
109 (O)	128 (B/Y)	Ignition switch	Input	[Ignition switch: OFF]	0 V Battery voltage											
(0)	(6/1)			[Ignition switch: ON]	(11 - 14 V)											
				[Ignition switch: ON] ASCD steering switch: OFF 	4 V											
				[Ignition switch: ON] MAIN switch: Pressed 	0 V											
110 (P)	111 (B)	ASCD steering switch	ASCD steering switch	ASCD steering switch	ASCD steering switch	ASCD steering switch	ASCD steering switch	ASCD steering switch	ASCD steering switch	ASCD steering switch	ASCD steering switch	ASCD steering switch	ASCD steering switch	Input	[Ignition switch: ON] CANCEL switch: Pressed 	1 V
				[Ignition switch: ON] • ACCEL/RES switch: Pressed	3 V											
				[Ignition switch: ON] • COAST/SET switch: Pressed	2 V											
111 (B)	_	Sensor ground (ASCD steering switch)	_	_	_											
113 (G)		Sensor power supply (EVAP control system pressure sensor)		[Ignition switch: ON]	5.0 V											
114 (P)	124 (SB)	EVAP control system pressure sensor	Input	[Ignition switch: ON]	0.5 - 4.6 V											
115 (SB)	128 (B/Y)	Stop lamp switch	Input	[Ignition switch: OFF]Brake pedal: Fully released	0 V											
(00)	(1,1)			[Ignition switch: OFF]Brake pedal: Slightly depressed	Battery voltage (11 - 14 V)											

< ECU DIAGNOSIS INFORMATION >

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Terminal No. (Wire color)		Description		Condition	Value	
+	_	Signal name Input/ Output		Condition	(Approx.)	
116	128	Brake pedal position	Innut	[Ignition switch: OFF] • Brake pedal: Fully released	Battery voltage (11 - 14 V)	
(G)	(B/Y)	switch	Input	[Ignition switch: OFF] • Brake pedal: Slightly depressed	0 V	
117 (BR)	128 (B/Y)	 PNP signal (CVT) Neutral switch (M/T) 	Input	[Ignition switch: ON] • Selector lever: P or N (CVT) • Shifter lever: Neutral (M/T)	Battery voltage (11 - 14 V)	
(DK)	(b/ f)			[Ignition switch: ON] • Except above	0 V	
118 (O)	_	Sensor power supply (Accelerator pedal posi- tion sensor 2)	_	[Ignition switch: ON]	5.0 V	
119	120	Accelerator pedal posi-		[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.3 – 0.6 V	
(W)	(Y)	tion sensor 2	Input	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully depressed	1.95 – 2.4 V	
120 (Y)	_	Sensor ground (Accelerator pedal posi- tion sensor 2)	_	_	_	
121 (G)	128 (B/Y)	Power supply for ECM	Input	[Ignition switch: ON]	Battery voltage (11 - 14 V)	
122 (V)	_	Sensor power supply (Accelerator pedal posi- tion sensor 1)	_	[Ignition switch: ON]	5.0 V	
123 (B/Y)	_	ECM ground	_	_	—	
124 (V)	_	Sensor ground (EVAP control system pressure sensor, refriger- ant pressure sensor)	_	_	_	
126	127	Accelerator pedal posi-	Innut	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.6 – 0.9 V	
(R)	(GR)	tion sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 – 4.7 V	
127 (GR)		Sensor ground (Accelerator pedal posi- tion sensor 1)		_	_	
128 (B/Y)		ECM ground		_	_	

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.) *: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to <u>PG-4</u>. "How to Han-<u>dle Battery"</u>.

Fail Safe

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NON DTC RELATED ITEM

Detected items	Engine operating condition in fail-safe mode	Remarks	Reference page	А
Malfunction indicator circuit	Engine speed will not rise more than 2,500 rpm due to the fuel cut	When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system.		EC
		Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail safe function. The fail safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.	EC-467, "Compo- nent Function Check"	С

DTC RELATED ITEM

Description

When a DTC is detected, ECM executes a mode (in the Fail-safe mode) applicable to the DTC. The fail-safe mode has the preset traveling control mode (accelerator angle variation and engine output limit) and device fix mode.

Fail sa	fe mode	Vehicle behavior
Traveling con- trol mode	Accelerator an- gle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
	Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction.
Device fix mode		 This mode fixes the IVT control solenoid valve and the EVT control solenoid valve in the reference position. The intake manifold runner control valve motor is turned OFF (intake manifold runner control valve opens).

Fail Safe Pattern

Pattern		Fail safe mode				
A	Travaling central mode	Accelerator angle variation control				
В	Traveling control mode	Engine output control	— K			
С	Device fix mode					

Fail Safe List

×:Applicable —: Not applicable

J

L

		Vehicle behavior				
DTC No.	Detected items	Pattern			Others	
		A	В	С	Others	
P0075	Intake valve timing control	_	_	×	ECM activates the IVT intermediate lock control solenoid valve to bring the cam sprocket into an intermediate lock condition.	
P0078	Exhaust valve timing control	_	_	×	_	
P0101 P0102 P0103	Mass air flow sensor circuit	×	×	×	_	
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	_	_	_	The ECM controls the electric throttle control actuator in reg- ulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.	

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					Vehicle behavior			
DTC No.	Detected items	Pattern			Others			
		А	В	С				
P0117 P0118	Engine coolant temperature sensor	×	×	_	_			
P0171 P0172	Fuel injection system	×	_		_	-		
P0197 P0198	Engine oil temperature sensor	_	_	_	Exhaust valve timing control do	es not function.		
P0300 P0301 P0302 P0303 P0304	Misfire	×	_	_				
P0500	Vehicle speed sensor	×	—	—		-		
P0524	Engine oil pressure	_	_	_	 ECM illuminates oil pressure warning lamp on the comb tion meter. Engine speed will not rise more than 4,000rpm due to t fuel cut. Fail-safe is canceled when ignition switch OFF → ON. 			
P0603	ECM	×	×	—	_	-		
P0605	ECM	×	×	—		-		
P0643	Sensor power supply	_	_	_	ECM stops the electric throttle converse valve is maintained at a fixed op the return spring.			
P1078	Exhaust valve timing control position sensor circuit	×	_	×	_	-		
P1650 P1651	Starter relay	×	×					
P1805	Brake switch				ECM controls the electric throttl ing the throttle opening to a sma Therefore, acceleration will be p	all range.		
		—	—	_	Vehicle condition	Driving condition		
					When engine is idling	Normal		
					When accelerating	Poor acceleration		
P2100	Throttle control motor relay	_	_		ECM stops the electric throttle concerning the valve is maintained at a fixed op the return spring.			
P2101	Electric throttle control func- tion	_	_	_	ECM stops the electric throttle converse valve is maintained at a fixed op the return spring.			
P2118	Throttle control motor	_	_	_	ECM stops the electric throttle converse valve is maintained at a fixed op the return spring.			
P2119	Electric throttle control actua- tor	×	×	_		-		
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	_			The ECM controls the electric the ulating the throttle opening in or within +10 degrees. The ECM regulates the opening be slower than the normal cond So, the acceleration will be poor	rder for the idle position to be speed of the throttle valve to lition.		

DTC Inspection Priority Chart

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

Priority	DTC	Detected items			
	U0101, U1001	CAN communication line			
	P0101, P0102, P0103	Mass air flow sensor			
	P0112, P0113	Intake air temperature sensor 1			
	P0117, P0118	Engine coolant temperature sensor			
	P0122, P0123, P0222, P0223, P1225, P2135	Throttle position sensor			
	P0197, P0198	Engine oil temperature sensor			
	P0327, P0328	Knock sensor			
	P0335	Crankshaft position sensor (POS)			
	P0340	Camshaft position sensor (PHASE)			
1	P0500	Vehicle speed sensor			
	P0520	Engine oil pressure sensor			
	P0603, P0604, P0605, P0606, P0607, P060A, P060B	ECM			
	P0643	Sensor power supply			
	P0705	Transmission range switch			
	P0850	Park/neutral position (PNP) switch			
	P1550, P1551, P1552, P1553, P1554	Battery current sensor			
	P1556, P1557	Battery temperature sensor			
	P1610 - P1615	NATS			
	P2122, P2123, P2127, P2128, P2138	Accelerator pedal position sensor			
	P0011	Intake valve timing control			
	P0014	Exhaust valve timing control			
	P0031, P0032	Air fuel ratio (A/F) sensor 1 heater			
	P0037, P0038	Heated oxygen sensor 2 heater			
	P0075	Intake valve timing control solenoid valve			
	P0078	Exhaust valve timing control solenoid valve			
	P0130, P0131, P0132, P014C, P014D	Air fuel ratio (A/F) sensor 1			
	P0137, P0138, P0139	Heated oxygen sensor 2			
	P0444	EVAP canister purge volume control solenoid valve			
2	P0710	CVT related sensors, solenoid valves and switches			
	P1078	Exhaust valve timing position sensor			
	P1217	Engine over temperature (OVERHEAT)			
	P1650, P1651, P1652	Starter motor relay			
	P1715	CVT related sensors, solenoid valves and switches			
	P1800	Intake manifold tuning valve			
	P1805	Brake switch			
	P2100, P2103	Throttle control motor relay			
	P2101	Electric throttle control function			
	P2118	Throttle control motor			

[MRA8DE]

А

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Priority	DTC	Detected items		
	P0171, P0172	Fuel injection system function		
	P0201 - P0204	Injector		
	P0234	Turbocharger system		
	P0300 - P0304	Misfire		
3	P0420	Three way catalyst function		
	P0506, P0507	Idle speed control system		
	P0524	Engine oil pressure		
	P1212	TCS communication line		
	P2119	Electric throttle control actuator		

DTC Index

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×:Applicable —: Not applicable

D	۲C ^{*1}						
CON- SULT GST ^{*2}	ECM ^{*3}	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group ^{*4}	Reference page
U0101	0101 ^{*5}	LOST COMM (TCM)	_	2	_	В	<u>EC-168</u>
U1001	1001 ^{*5}	CAN COMM CIRCUIT	_	1 or 2	—	_	<u>EC-169</u>
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	_	_	Flashing ^{*6}	_	_
P0011	0011	INT/V TIM CONT-B1	×	2	×	В	<u>EC-170</u>
P0014	0014	EXH/V TIM CONT-B1	_	2	×	В	<u>EC-173</u>
P0031	0031	A/F SEN1 HTR (B1)	_	2	×	В	<u>EC-176</u>
P0032	0032	A/F SEN1 HTR (B1)	_	2	×	В	<u>EC-176</u>
P0037	0037	HO2 HTR (B1)	_	2	×	В	<u>EC-178</u>
P0038	0038	HO2 HTR (B1)	_	2	×	В	<u>EC-178</u>
P0075	0075	INT/V TIM V/CIR-B1	_	2	×	В	<u>EC-180</u>
P0078	0078	EX V/T ACT/CIRC-B1	_	2	×	В	<u>EC-183</u>
P0101	0101	MAF SEN/CIRCUIT-B1	_	2	×	В	<u>EC-186</u>
P0102	0102	MAF SEN/CIRCUIT-B1	_	1	×	В	<u>EC-186</u>
P0103	0103	MAF SEN/CIRCUIT-B1	_	1	×	В	<u>EC-186</u>
P0111	0111	IAT SENSOR 1 B1	_	2	×	А	<u>EC-192</u>
P0112	0112	IAT SEN/CIRCUIT-B1	_	2	×	В	<u>EC-194</u>
P0113	0113	IAT SEN/CIRCUIT-B1	_	2	×	В	<u>EC-194</u>
P0116	0116	ECT SEN/CIRC	_	2	×	А	<u>EC-196</u>
P0117	0117	ECT SEN/CIRC	_	1	×	В	<u>EC-198</u>
P0118	0118	ECT SEN/CIRC	_	1	×	В	<u>EC-198</u>
P0122	0122	TP SEN 2/CIRC-B1	-	1	×	В	<u>EC-200</u>
P0123	0123	TP SEN 2/CIRC-B1	-	1	×	В	<u>EC-200</u>
P0125	0125	ECT SENSOR	_	2	×	В	<u>EC-203</u>
P0127	0127	IAT SENSOR-B1	-	2	×	В	<u>EC-205</u>
P0128	0128	THERMSTAT FNCTN	_	2	×	А	<u>EC-207</u>
P0130	0130	A/F SENSOR1 (B1)	-	2	×	А	<u>EC-210</u>
P0131	0131	A/F SENSOR1 (B1)	_	2	×	В	<u>EC-214</u>

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[MRA8DE]

DTC ^{*1}								
CON- SULT GST ^{*2}	ECM ^{*3}	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group ^{*4}	Reference page	A
P0132	0132	A/F SENSOR1 (B1)	_	2	×	В	EC-217	EC
P0137	0137	HO2S2 (B1)	×	2	×	A	EC-220	
P0138	0138	HO2S2 (B1)	×	2	×	A	EC-225	С
P0139	0139	HO2S2 (B1)	×	2	×	A	EC-232	
P014C	014C	A/F SENSOR1 (B1)	×	2	×	A	EC-238	
P014D	014D	A/F SENSOR1 (B1)	×	2	×	A	EC-238	D
P015A	015A	A/F SENSOR1 (B1)	×	2	×	A	EC-238	
P015B	015B	A/F SENSOR1 (B1)	×	2	×	A	<u>EC-238</u>	Е
P0171	0171	FUEL SYS-LEAN-B1	-	2	×	В	<u>EC-246</u>	
P0172	0172	FUEL SYS-RICH-B1	_	2	×	В	<u>EC-250</u>	
P0181	0181	FTT SENSOR	_	2	×	A and B	<u>EC-254</u>	F
P0182	0182	FTT SEN/CIRCUIT	_	2	×	В	<u>EC-258</u>	
P0183	0183	FTT SEN/CIRCUIT	_	2	×	В	EC-258	G
P0196	0196	EOT SENSOR	_	2	×	A and B	EC-261	0
P0197	0197	EOT SEN/CIRC	_	2	×	В	<u>EC-264</u>	
P0198	0198	EOT SEN/CIRC	—	2	×	В	<u>EC-264</u>	Н
P0222	0222	TP SEN 1/CIRC-B1	—	1	×	В	<u>EC-266</u>	
P0223	0223	TP SEN 1/CIRC-B1		1	×	В	<u>EC-266</u>	1
P0300	0300	MULTI CYL MISFIRE	—	1 or 2	— or \times	В	<u>EC-269</u>	1
P0301	0301	CYL 1 MISFIRE		1 or 2	— or \times	В	<u>EC-269</u>	
P0302	0302	CYL 2 MISFIRE	—	1 or 2	— or \times	В	<u>EC-269</u>	J
P0303	0303	CYL 3 MISFIRE	—	1 or 2	— or ×	В	<u>EC-269</u>	
P0304	0304	CYL 4 MISFIRE	_	1 or 2	— or \times	В	<u>EC-269</u>	K
P0327	0327	KNOCK SEN/CIRC-B1	—	2	—	—	<u>EC-275</u>	K
P0328	0328	KNOCK SEN/CIRC-B1	—	2	—	—	<u>EC-275</u>	
P0335	0335	CKP SEN/CIRCUIT	—	2	×	В	<u>EC-277</u>	L
P0340	0340	CMP SEN/CIRC-B1	_	2	×	В	<u>EC-280</u>	
P0420	0420	TW CATALYST SYS-B1	×	2	×	A	<u>EC-283</u>	В. Л
P0441	0441	EVAP PURG FLOW/MON	×	2	×	A	<u>EC-288</u>	Μ
P0443	0443	PURG VOLUME CONT/V		2	×	A	<u>EC-293</u>	
P0444	0444	PURG VOLUME CONT/V		2	×	В	<u>EC-298</u>	Ν
P0445	0445	PURG VOLUME CONT/V	—	2	×	В	<u>EC-298</u>	
P0447	0447	VENT CONTROL VALVE	—	2	×	В	<u>EC-301</u>	
P0448	0448	VENT CONTROL VALVE		2	×	В	<u>EC-305</u>	0
P0451	0451	EVAP SYS PRES SEN	<u> </u>	2	×	A	<u>EC-309</u>	
P0452	0452	EVAP SYS PRES SEN		2	×	В	<u>EC-313</u>	Р
P0453	0453	EVAP SYS PRES SEN	<u> </u>	2	×	В	EC-316	
P0456	0456	EVAP VERY SML LEAK	×*7	2	×	A	<u>EC-320</u>	
P0460	0460	FUEL LEV SEN SLOSH	_	2	×	А	<u>EC-326</u>	
P0461	0461	FUEL LEVEL SENSOR	-	2	×	В	<u>EC-327</u>	
P0462	0462	FUEL LEVL SEN/CIRC	_	2	×	В	<u>EC-329</u>	

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D1	۲C ^{*1}						
CON- SULT GST ^{*2}	ECM ^{*3}	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group ^{*4}	Reference page
P0463	0463	FUEL LEVL SEN/CIRC		2	×	В	EC-329
P0500	0500	VEHICLE SPEED SEN A* ⁸	_	2	×	В	<u>EC-330</u> (CVT models) <u>EC-331</u> (M/T models)
P0506	0506	ISC SYSTEM	_	2	×	В	<u>EC-334</u>
P0507	0507	ISC SYSTEM	_	2	×	В	<u>EC-336</u>
P050A	050A	COLD START CONTROL	_	2	×	А	<u>EC-338</u>
P050B ^{*9}	050B ^{*9}	COLD START CONTROL	_	2	×	А	<u>EC-338</u>
P050E	050E	COLD START CONTROL	_	2	×	А	EC-338
P0520	0520	EOP SENSOR/SWITCH		2	_		EC-340
P0524	0524	ENGINE OIL PRESSURE	_	1	_		<u>EC-343</u>
P0603	0603	ECM BACK UP/CIRCUIT ^{*10}	_	2	\times or —	В	<u>EC-346</u>
P0604	0604	ECM		1	×	В	<u>EC-347</u>
P0605	0605	ECM		1 or 2	× or —	В	<u>EC-348</u>
P0606	0606	CONTROL MODULE	_	1	× or —	В	EC-349
P0607	0607	ECM	_	1 or 2	\times or —	В	EC-350
P060A	060A	CONTROL MODULE	_	1 or 2	×	В	EC-351
P060B	060B	CONTROL MODULE	_	1	×	В	EC-352
P0643	0643	SENSOR POWER/CIRC	_	1	×	В	EC-353
P0850	0850	P-N POS SW/CIRCUIT		2	×	В	EC-355
P1078	1078	EXH TIM SEN/CIRC-B1	_	2	×	В	<u>EC-359</u>
P1148	1148	CLOSED LOOP-B1	_	1	×	А	<u>EC-362</u>
P117A	117A	AIR FUEL RATIO B1	_	2	×	A	<u>EC-363</u>
P1212	1212	TCS/CIRC	_	2	—		<u>EC-368</u>
P1217	1217	ENG OVER TEMP	_	1	×	В	<u>EC-369</u>
P1225	1225	CTP LEARNING-B1	_	2	—	—	<u>EC-372</u>
P1226	1226	CTP LEARNING-B1	_	2	_	—	<u>EC-373</u>
P1550	1550	BAT CURRENT SENSOR	_	2	_	—	<u>EC-374</u>
P1551	1551	BAT CURRENT SENSOR	_	2	_	—	<u>EC-377</u>
P1552	1552	BAT CURRENT SENSOR	_	2	_		<u>EC-377</u>
P1553	1553	BAT CURRENT SENSOR	_	2	_		<u>EC-380</u>
P1554	1554	BAT CURRENT SENSOR	_	2	_		<u>EC-383</u>
P1556	1556	BAT TMP SEN/CIRC		2	—		<u>EC-386</u>
P1557	1557	BAT TMP SEN/CIRC		2	_		<u>EC-386</u>
P1564	1564	ASCD SW	—	1	—		<u>EC-388</u>
P1572	1572	ASCD BRAKE SW	—	1	—		<u>EC-391</u>
P1574	1574	ASCD VHL SPD SEN	—	1	—	—	<u>EC-397</u>
P1610	1610	LOCK MODE	_	2	_	_	<u>SEC-63</u> (With intelligent key system), <u>SEC-</u> <u>178</u> (Without in- telligent key system)

< ECU DIAGNOSIS INFORMATION >

DTC ^{*1}								А
CON- SULT GST ^{*2}	ECM ^{*3}	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group ^{*4}	Reference page	
P1611	1611	ID DISCORD, IMMU-ECM		2			<u>SEC-64</u>	EC
P1612	1612	CHAIN OF ECM-IMMU		2	_		<u>SEC-65</u>	
P1650	1650	STR MTR RELAY 2	_	2	× or —	В	<u>EC-399</u>	С
P1651	1651	STR MTR RELAY		2	×	В	EC-402	
P1652	1652	STR MTR SYS COMM		1	×	В	<u>EC-404</u>	
P1715	1715	IN PULY SPEED		2	_		<u>EC-406</u>	D
P1800	1800	VIAS S/V-1		2			<u>EC-408</u>	
P1805	1805	BRAKE SW/CIRCUIT		2		—	<u>EC-410</u>	Е
P2004	2004	TUMBLE CONT/V	_	2	×	В	<u>EC-413</u>	
P2014	2014	IN/MANIFOLD RUNNER POS SEN B1		2	×	В	<u>EC-416</u>	F
P2016	2016	IN/MANIFOLD RUNNER POS SEN B1		2	×	В	<u>EC-416</u>	
P2017	2017	IN/MANIFOLD RUNNER POS SEN B1		2	×	В	<u>EC-416</u>	G
P2018	2018	IN/MANIFOLD RUNNER POS SEN B1		2	×	В	<u>EC-416</u>	Н
P2096	2096	POST CAT FUEL TRIM SYS B1	_	2	×	А	<u>EC-419</u>	
P2097	2097	POST CAT FUEL TRIM SYS B1	—	2	×	A	<u>EC-419</u>	
P2100	2100	ETC MOT PWR-B1	—	1	×	В	<u>EC-423</u>	
P2101	2101	ETC FNCTN/CIRC-B1	_	1	×	В	<u>EC-425</u>	
P2103	2103	ETC MOT PWR	—	1	×	В	<u>EC-423</u>	J
P2118	2118	ETC MOT-B1	_	1	×	В	<u>EC-428</u>	0
P2119	2119	ETC ACTR-B1		1	×	В	<u>EC-430</u>	
P2122	2122	APP SEN 1/CIRC	—	1	×	В	<u>EC-432</u>	Κ
P2123	2123	APP SEN 1/CIRC	—	1	×	В	<u>EC-432</u>	
P2127	2127	APP SEN 2/CIRC	—	1	×	В	<u>EC-435</u>	I
P2128	2128	APP SEN 2/CIRC	—	1	×	В	<u>EC-435</u>	
P2135	2135	TP SENSOR-B1	—	1	×	В	<u>EC-438</u>	
P2138	2138	APP SENSOR	—	1	×	В	<u>EC-441</u>	M

*2: This number is prescribed by SAE J1979/ ISO 15031-5.

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

*4: Refer to EC-151, "Description".

*5: The trouble diagnosis for this DTC needs CONSULT.

*6: When the ECM is in the mode that displays SRT status, MIL may blink. For details, Refer to EC-63, "On Board Diagnosis Function". 0

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

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

*9: For CALIFORNIA

*10: This self-diagnosis is not for ECM power supply circuit, even though "ECM BACK UP/CIRCUIT" is displayed on CONSULT screen.

Test Value and Test Limit

The following is the information specified in Service \$06 of SAE J1979/ISO 15031-5.

INFOID:000000010290195

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< ECU DIAGNOSIS INFORMATION >

The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

These data (test value and test limit) are specified by On Board Monitor ID (OBDMID), Test ID (TID), Unit and Scaling ID and can be displayed on the GST screen.

The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (e.g., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

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

< ECU DIAGNOSIS INFORMATION >

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

< ECU DIAGNOSIS INFORMATION >

			DTC -	lii	e and Test mit	
Item	OBD-	Self-diagnostic test item		(GST display)		Description
	MID			TID	Unitand Scaling ID	
-			P015D	94H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1
	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P0153	95H	04H	Response rate: Response ratio (lean to rich)
			P0153	96H	84H	Response rate: Response ratio (rich to lean)
			P0158	07H	0CH	Minimum sensor output voltage for test cycle
	0011	Heated oxygen sensor 2	P0157	08H	0CH	Maximum sensor output voltage for test cycle
HO2S	06H	(Bank 2)	P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
			P0159	82H	11H	Rear O2 sensor delay response diag- nosis
	07H	Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for test cycle
			P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage
			P0165	81H	0CH	Difference in sensor output voltage
	21H	Three way catalyst function (Bank1)	P0420	80H	01H	O2 storage index
			P0420	82H	01H	Switching time lag engine exhaust in- dex value
			P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
CATA-			P2423	84H	84H	O2 storage index in HC trap catalyst
LYST	22H	22H Three way catalyst function (Bank2)	P0430	80H	01H	O2 storage index
			P0430	82H	01H	Switching time lag engine exhaust in- dex value
			P2424	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst
	31H	H 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)
EGR SYSTEM			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

< ECU DIAGNOSIS INFORMATION >

	OBD-	Self-diagnostic test item		Test value and Test limit (GST display)			А
Item	MID		DTC -	TID	Unit and Scaling ID	Description	EC
			P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)	С
			P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)	0
			P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)	D
	35H	VVT Monitor (Bank1)	P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)	E
	0011		P100A	84H	10H	VEL slow response diagnosis	
			P1090	85H	10H	VEL servo system diagnosis	
			P0011	86H	9DH	VTC intake intermediate lock function diagnosis (VTC intermediate position alignment check diagnosis)	F
VVT			Advanced: P052A Retarded: P052B	87H	9DH	VTC intake intermediate lock system diagnosis (VTC intermediate lock posi- tion check diagnosis)	G
SYSTEM	36H	H VVT Monitor (Bank2)	P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)	Н
			P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)	
			P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)	I
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)	J
			P100B	84H	10H	VEL slow response diagnosis	
			P1093	85H	10H	VEL servo system diagnosis	K
			P0021	86H	9DH	VTC intake intermediate lock function diagnosis (VTC intermediate position alignment check diagnosis)	
			Advanced: P052C Retarded: P052D	87H	9DH	VTC intake intermediate lock system diagnosis (VTC intermediate lock posi- tion check diagnosis)	L
	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down	Μ
EVAP SYSTEM	3BH	EVAP control system leak (Small leak) EVAP control system leak (Very small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)	Ν
	ЗСН		P0456	80H	05H	Leak area index (for more than 0.02 inch)	
			P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring	0
			P0456	82H	FDH	Internal pressure of EVAP system at the end of monitoring	Р
	3DH	Purge flow system	P0441	83H	осн	Difference in pressure sensor output voltage before and after vent control valve close	

< ECU DIAGNOSIS INFORMATION >

		Self-diagnostic test item	DTC -	Test value and Test limit		
Item	OBD- MID			(GST o	display)	Description
				TID	Unitand Scaling ID	
	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
	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
O2 SEN- SOR	43H	Heated oxygen sensor 3 heat- er (Bank 1)	P0043	80H	0CH	Converted value of heater electric cur- rent to voltage
HEATER	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
		H Secondary air system	P0411	80H	01H	Secondary air injection system incor- rect flow detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary air injection system insufficient flow
050			P2445	82H	01H	Secondary air injection system pump stuck off
SEC- OND- ARY AIR	71H		P2448	83H	01H	Secondary air injection system high airflow
			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
			P2444	86H	01H	Secondary air injection system pump stuck on
		1H Fuel injection system function (Bank 1)	P0171 or P0172	80H	2FH	Long term fuel trim
	81H		P0171 or P0172	81H	24H	The number of lambda control clamped
FUEL			P117A	82H	03H	Cylinder A/F imbalance monitoring
SYSTEM	82H	82H Fuel injection system function (Bank 2)	P0174 or P0175	80H	2FH	Long term fuel trim
			P0174 or P0175	81H	24H	The number of lambda control clamped
			P117B	82H	03H	Cylinder A/F imbalance monitoring

< ECU DIAGNOSIS INFORMATION >

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		Self-diagnostic test item		Test value and Test limit (GST display)				
Item	OBD- MID		DTC -			Description		
	WILD			TID	Unitand Scaling ID			
			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		
		Multiple cylinder misfires	P0306	85H	24H	Misfiring counter at 1000 revolution of the sixth cylinder		
	A1H		P0307	86H	24H	Misfiring counter at 1000 revolution of the seventh cylinder		
MISFIRE			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 >

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

< WIRING DIAGRAM >

WIRING DIAGRAM

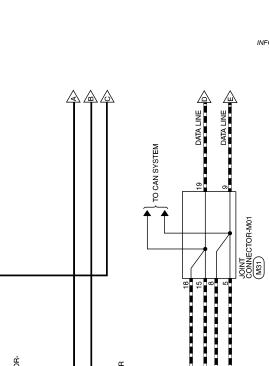
ENGINE CONTROL SYSTEM

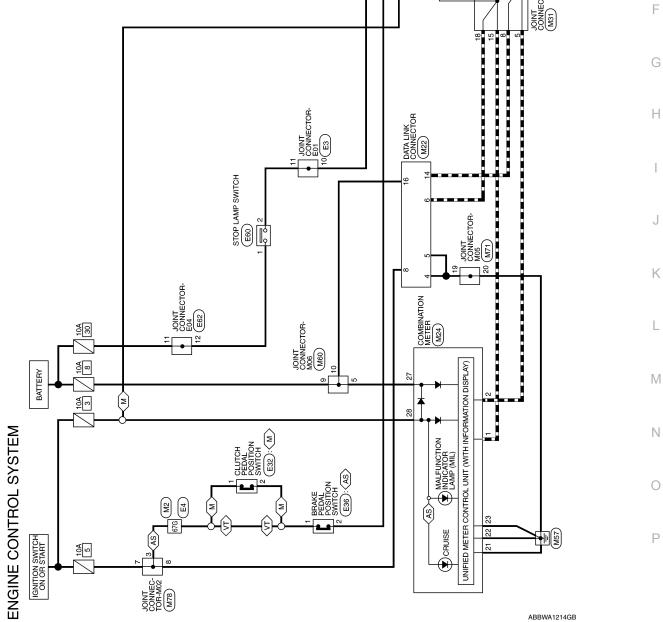
Wiring Diagram

AS : WITH ASCD M : WITH MT VT : WITH CVT



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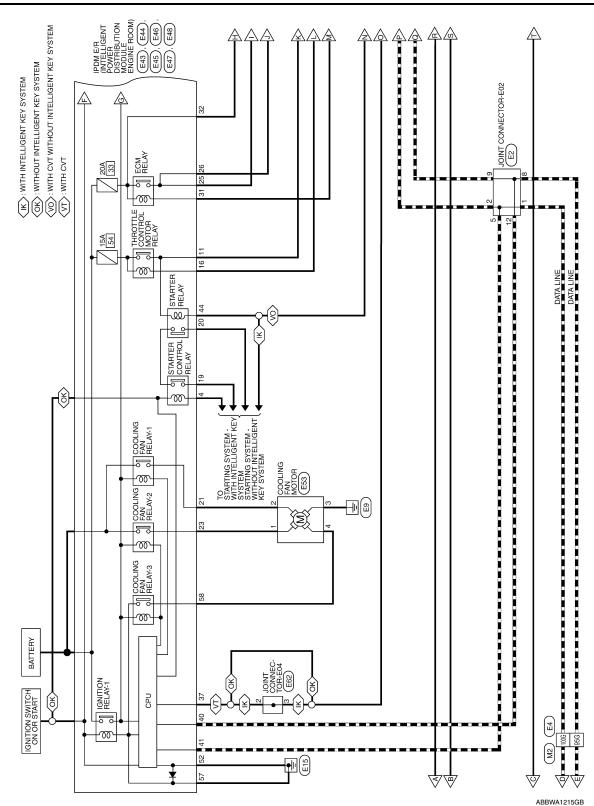




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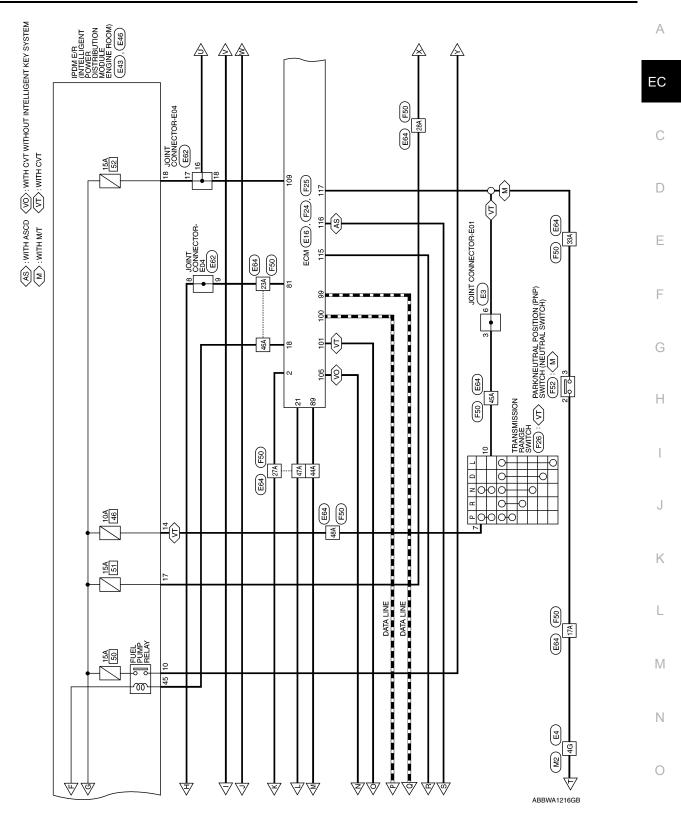
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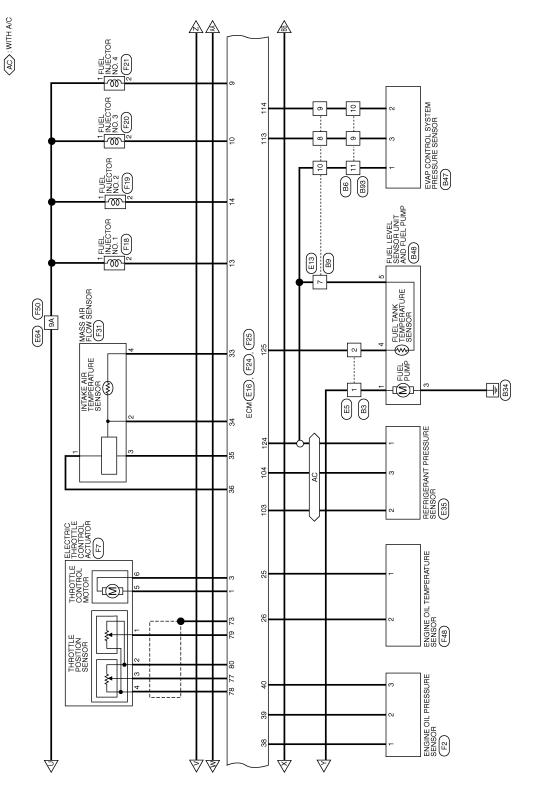




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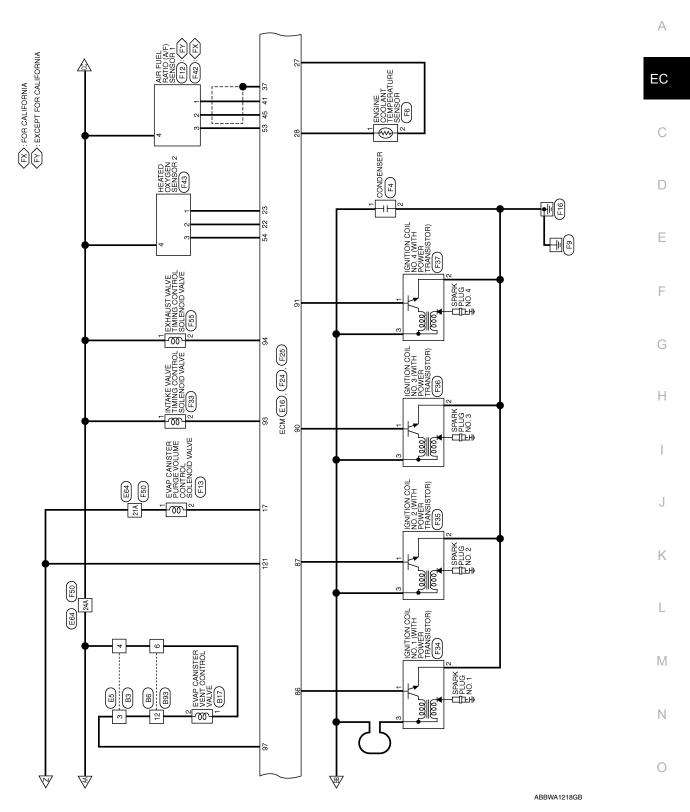
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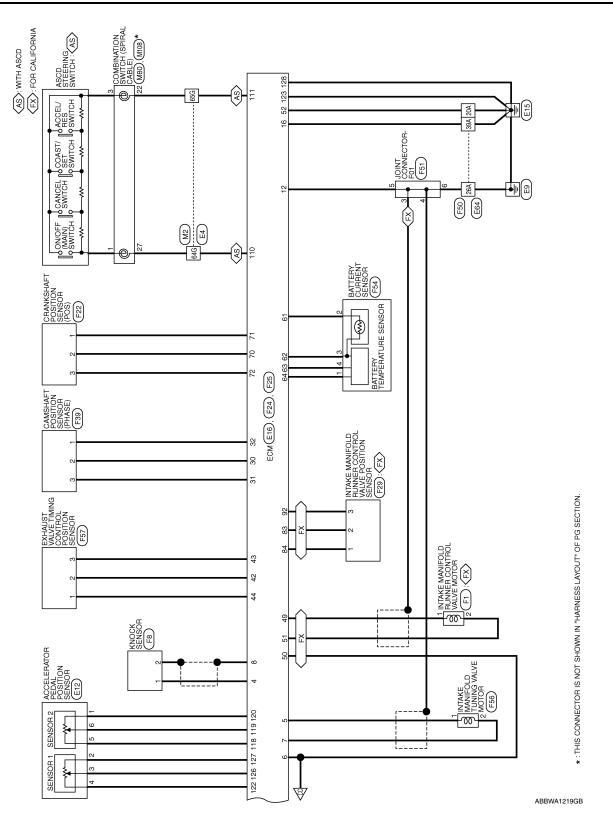


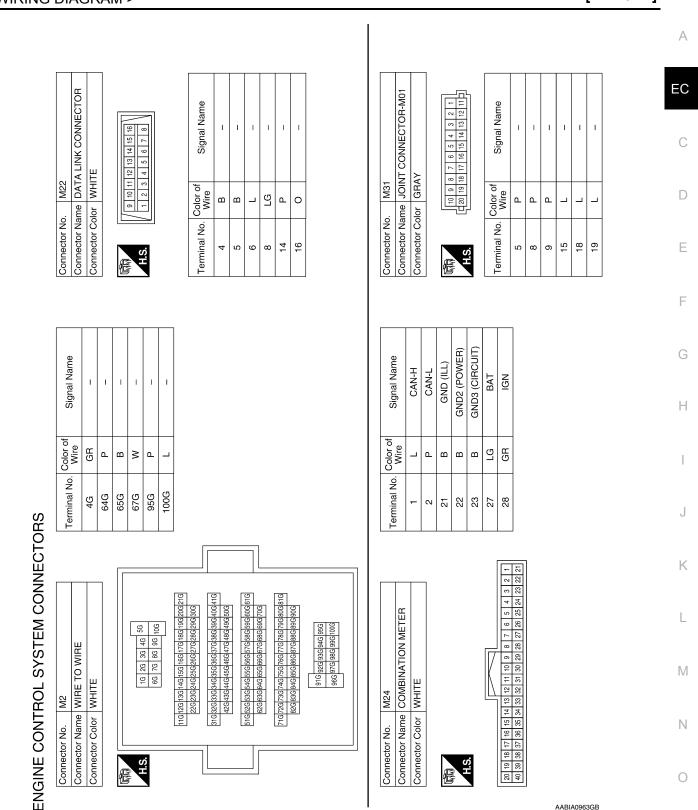
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Revision: October 2013

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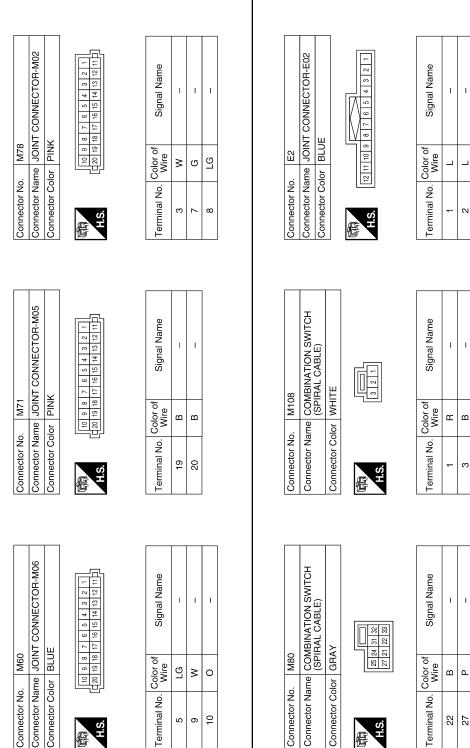
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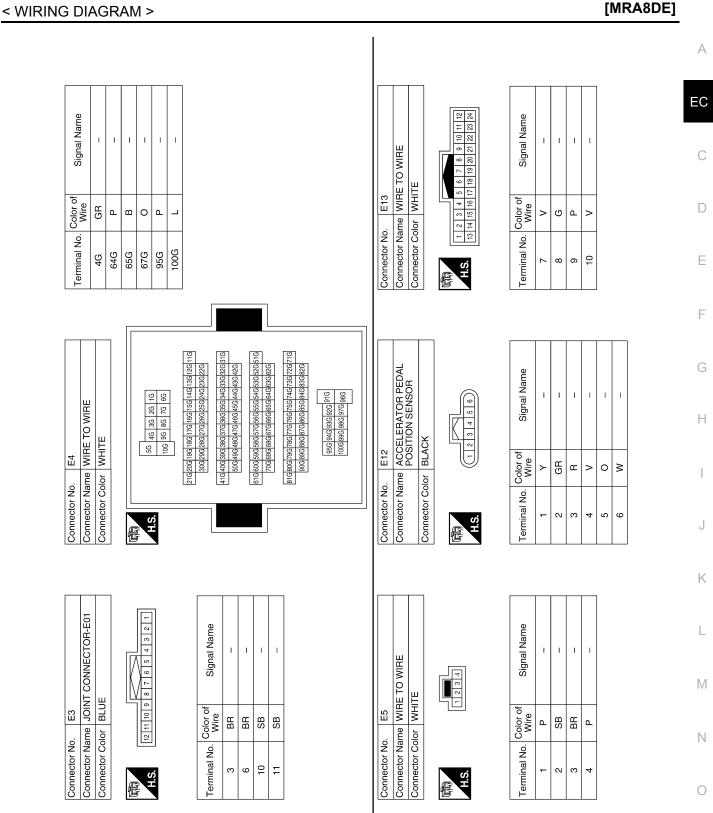
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Signal Name	STARTER RELAY CUT OFF SIGNAL	I	REFRIGERANT PRESSURE SENSOR	SENSOR POWER SUPPLY	STARTER MOTOR RELAY CONTROL SIGNAL	I	I	I	IGNITION SWITCH	ASCD STEERING SWITCH	SENSOR GROUND	I	SENSOR POWER SUPPLY
Color of Wire	SB	I	٩	Г	>	I	I	I	0	٩	в	I	U
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ACCELERATOR PEDAL POSITION SENSOR 2

SENSOR POWER SUPPLY

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PNP SIGNAL

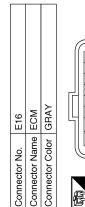
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SENSOR GROUND

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POWER SUPPLY FOR ECM



Revision: October 2013

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101



Signal Name	EVAP CANISTER VENT CONTROL VALV	I	CAN-L	CAN-H	
Color of Wire	BR	I	Ч	_	
Terminal No.	67	98	66	100	

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ENGINE CONTROL SYSTEM

ACCELERATOR PEDAL POSITION SENSOR 1

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126 127 128

SENSOR GROUND

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EVAP CONTROL SYSTEM PRESSURE SENSOR

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E35

Connector No.

ECM GROUND

SENSOR GROUND

ECM GROUND

B∖

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FUEL TANK TEMPERATURE SENSOR

SB

SENSOR POWER SUPPLY

> 122 123 125 125

121

< WIRING DIAGRAM >

STOP LAMP SWITCH BRAKE PEDAL POSITION SWITCH

SB

Signal Name

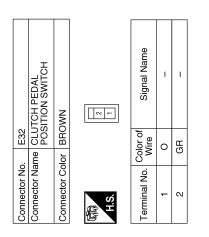
Color of Wire

eminal No. 115 116 117 118 119 120

ABBIA2059GB

		BRAKE PEDAL POSITION SWITCH	BROWN		Signal Name	– (WITH CVT)	(T/M HTIW) –
	. E36	me BR/ POS	or BRC		Color of Wire	0	GR
	Connector No.	Connector Name BRAKE PEDAL POSITION SWI	Connector Color	品 H.S.	Terminal No. Color of Wire	1	1
		LERANT JRE SENSOR			Signal Name	I	I

Connector Na	ame REF PRE	Connector Name REFRIGERANT PRESSURE SENSOR
Connector Color	olor BLACK	CK
雨 H.S.		
Terminal No. Color of Wire	Color of Wire	Signal Name
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2	Ч	I
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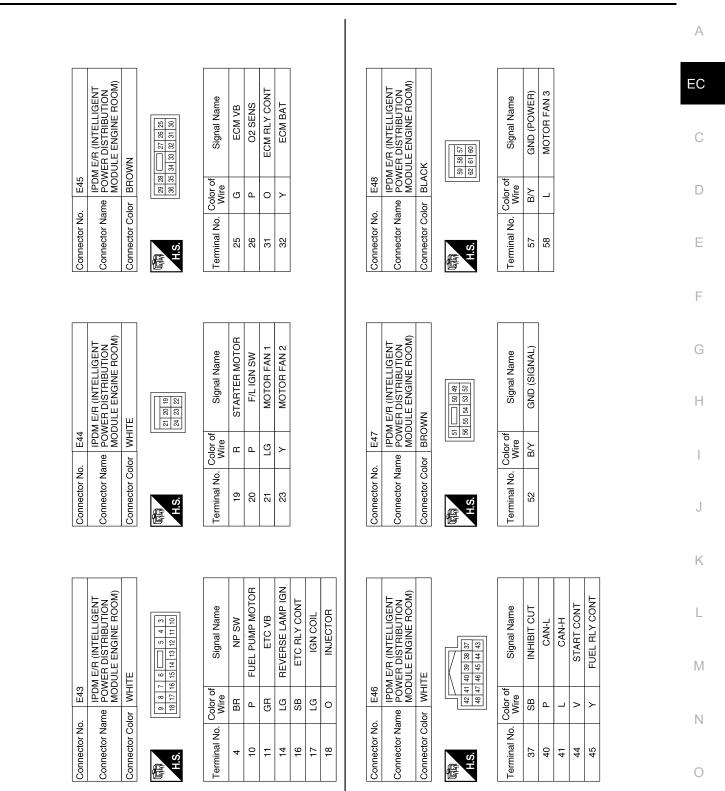
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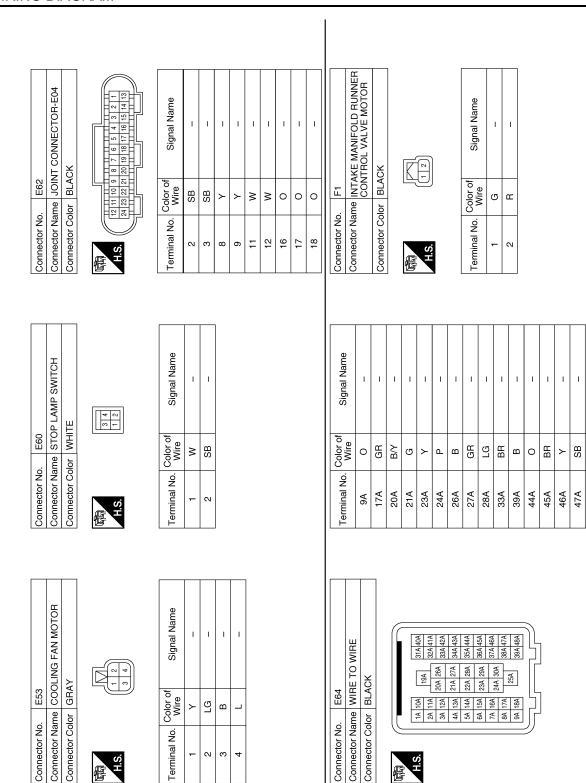
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Revision: October 2013

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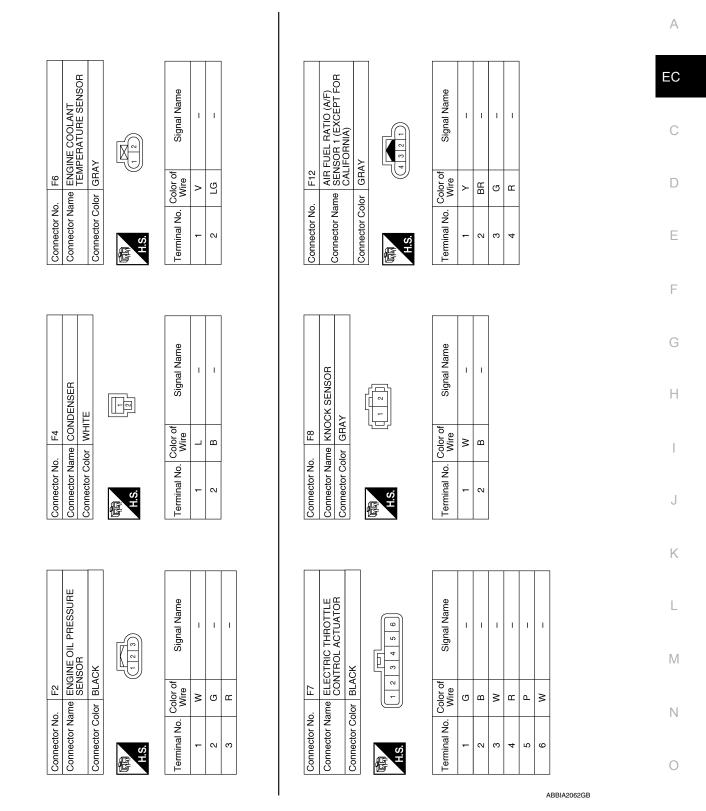
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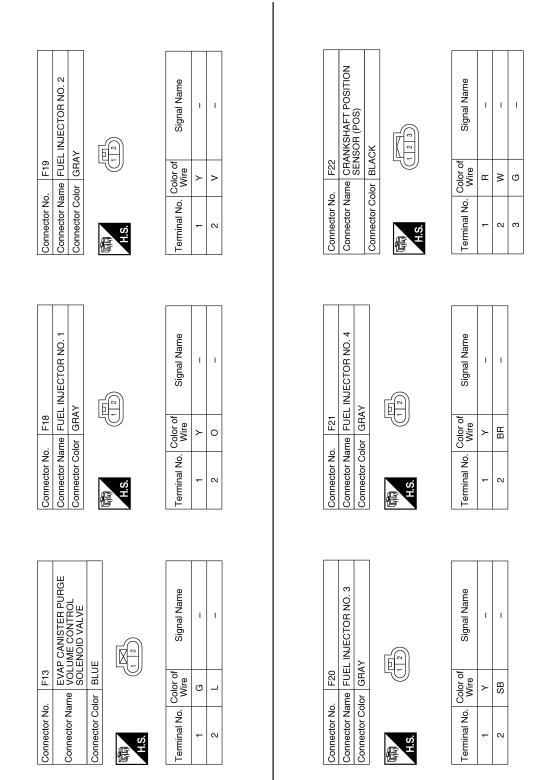
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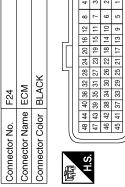
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Signal Name	THROTTLE CONTROL MOTOR (CLOSE)	THROTTLE CONTROL MOTOR POWER SUPPLY	THROTTLE CONTROL MOTOR (OPEN)	KNOCK SENSOR	INTAKE MANIFOLD TUNING VALVE MOTOR (CLOSE)	INTAKE MANIFOLD TUNING VALVE MOTOR POWER SUPPLY	INTAKE MANIFOLD TUNING VALVE MOTOR (OPEN)	SENSOR GROUND	FUEL INJECTOR NO. 4	FUEL INJECTOR NO. 3
Color of Wire	٩	G	Μ	M	G	ж	В	В	BR	SB
Terminal No.	-	2	ю	4	5	Q	7	8	6	10

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Revision: October 2013

ENGINE CONTROL SYSTEM

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Cianol Nomo	olgi lai ivalile	SENSOR GROUND	CAMSHAFT POSITION SENSOR (PHASE)	SENSOR POWER SUPPLY	INTAKE AIR TEMPERATURE SENSOR	SENSOR GROUND	MASS AIR FLOW SENSOR	SENSOR POWER SUPPLY	SHIELD	SENSOR GROUND	ENGINE OIL PRESSURE SENSOR	SENSOR POWER SUPPLY	A/F SENSOR 1	SENSOR GROUND	EXHAUST VALVE TIMING CONTROL POSITION SENSOR	SENSOR POWER SUPPLY	A/F SENSOR 1	I	I	I
Color of	Wire	Γ	ВВ	GR	GR	8	J	æ	ш	×	g	æ	≻	Μ	Ъ	В	BR	Ι	I	I
Torminal No		30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48

Signal Name	1	ECM GROUND	FUEL INJECTOR NO. 1	FUEL INJECTOR NO. 2	I	ECM GROUND	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	FUEL PUMP RELAY	1	I	THROTTLE CONTROL MOTOR RELAY	HEATED OXYGEN SENSOR 2	SENSOR GROUND	Ι	ENGINE OIL TEMPERATURE SENSOR	SENSOR GROUND	SENSOR GROUND	ENGINE COOLANT TEMPERATURE SENSOR	1
Color of Wire	ı	в	0	>	I	в	Г	GR	I	I	≻	W	BR	-	≻	₽	ГG	>	I
Terminal No.	1	12	13	14	15	16	17	18	19	20	21	22	23	54	25	26	27	28	29

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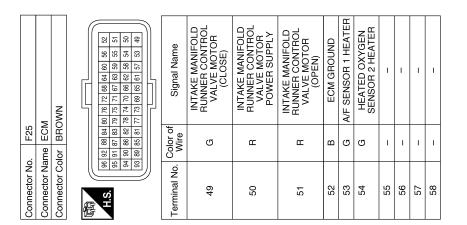
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Terminal No.	Color of Wire	Signal Name
80	ш	SENSOR POWER SUPPLY
81	Y	POWER SUPPLY FOR ECM (BACKUP)
82	I	I
83	ГG	INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR
84	Μ	SENSOR POWER SUPPLY
85	Ι	I
86	ш	IGNITION SIGNAL NO. 1
87	LG	IGNITION SIGNAL NO. 2
88	Ι	I
89	GR	ECM RELAY (SELF SHUT-OFF)
06	Ч	IGNITION SIGNAL NO. 3
91	SB	IGNITION SIGNAL NO. 4
92	^	SENSOR GROUND
93	ГG	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
94	ß	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE
95	I	I
96	I	I

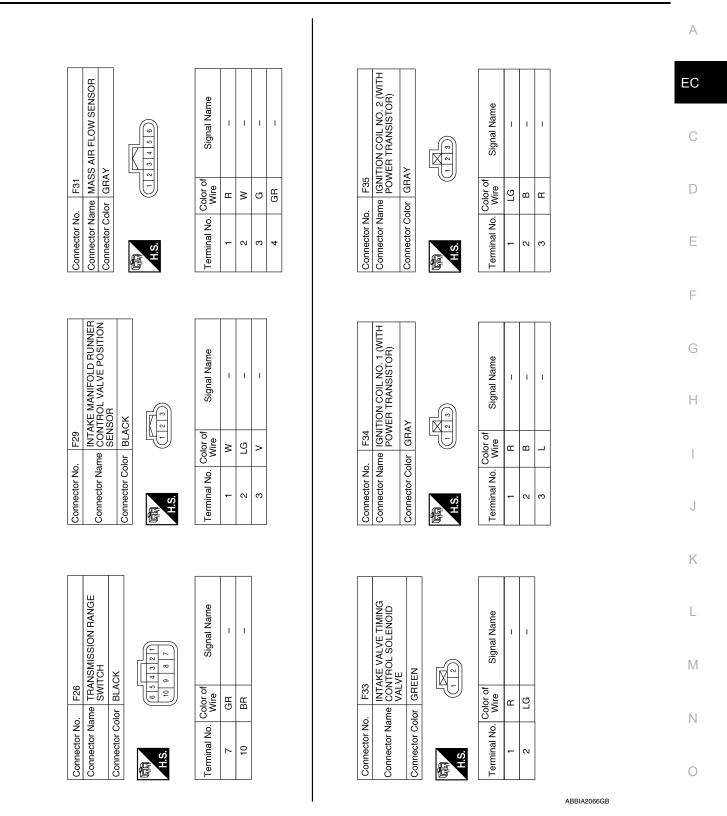
Signal Name	1	1	BATTERY TEMPERATURE SENSOR	SENSOR GROUND	BATTERY CURRENT SENSOR	SENSOR POWER SUPPLY	I	I	I	I	I	SENSOR GROUND	CRANKSHAFT POSITION SENSOR (POS)	SENSOR POWER SUPPLY	SHIELD	I	I	I	THROTTLE POSITION SENSOR 2	SENSOR GROUND	THROTTLE POSITION SENSOR 1
Color of Wire	I	I	0	BR	U	¥	I	I	I	I	Ι	M	Н	ъ	GR	I	I	I	Μ	н	ъ
Terminal No.	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	62



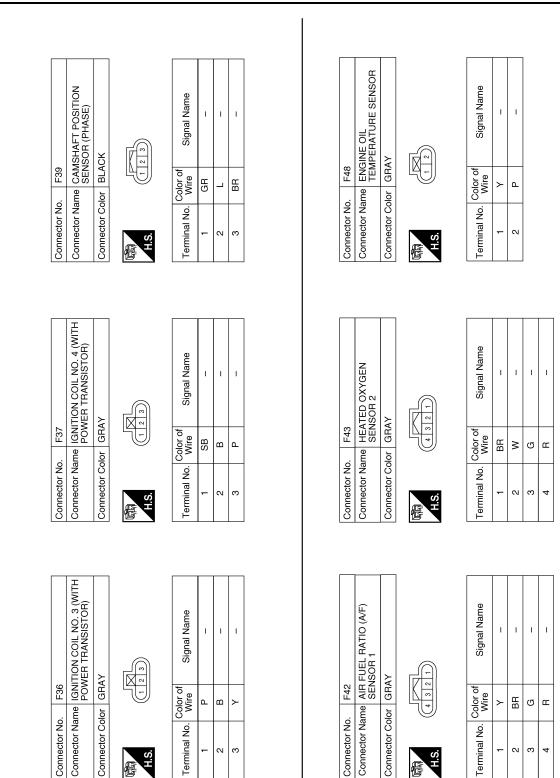
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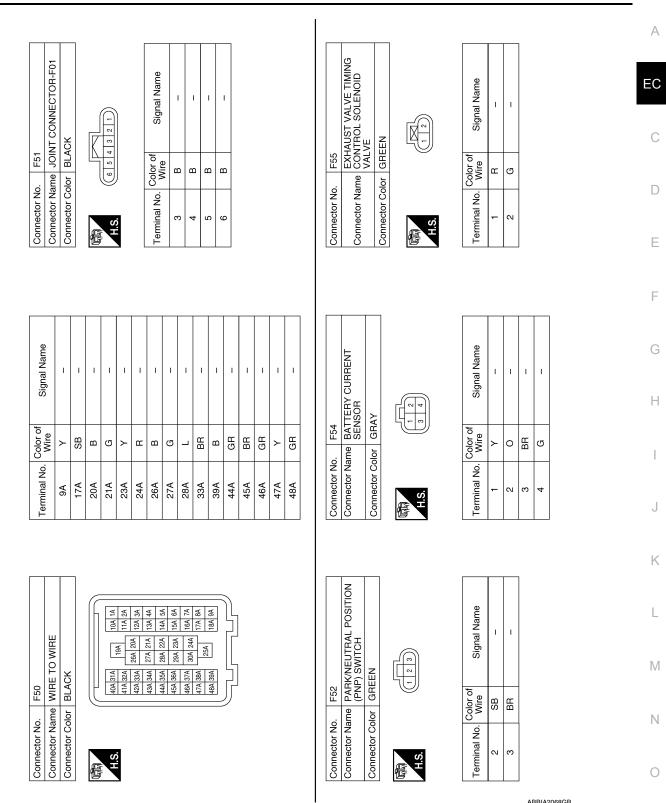
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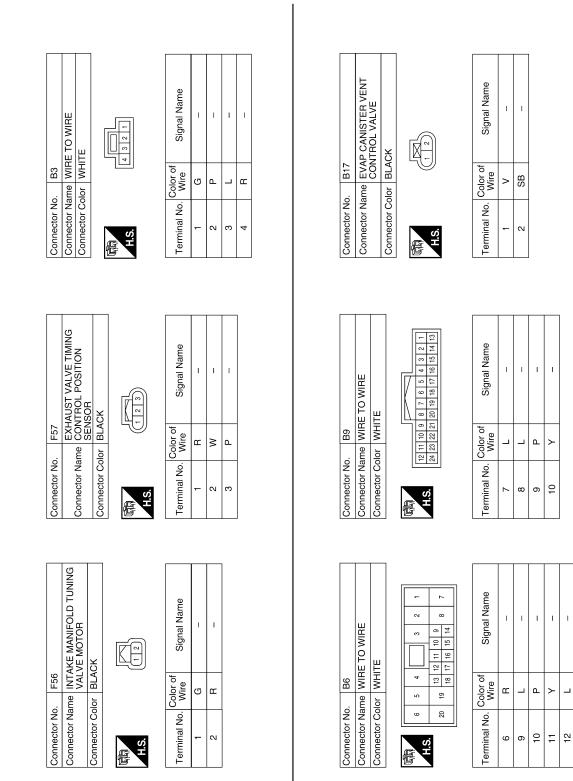
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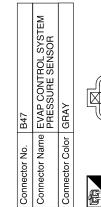
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Connector No. B93 Connector Name WIRE TO WIRE Connector Color WHITE

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50 6	ame					
3 4 5 9 10 11 12 14 15 16 17 18	Signal Name	Ι	I	I	I	
1 2 3 7 8 9 10 14 15	Color of Wire	٨	~	۵.	BR	g
H.S.	Terminal No. Color of Wire	9	6	10	£	ç
	me					
4 5	Signal Name	I	I	I	I	
1 2 3	Color of Wire	G	в	٩.		
H.S.	Terminal No.	1	e	4	5	
Ŧ	<u> </u>					ļ
	Vame					
	Signal Name	I	1	1		
	, Color of Wire	BR	٩.	≻		
HS	Terminal No.	۲	2	e		
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Connector Name FUEL LEVEL SENSOR

Connector No. B48

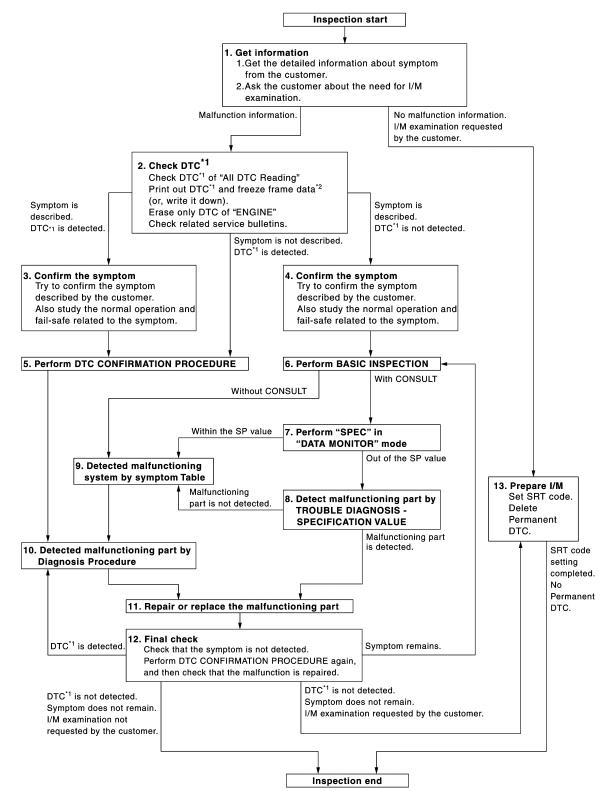
Connector Color GRAY



BASIC INSPECTION DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

OVERALL SEQUENCE



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[MRA8DE]

INFOID:000000009758396

*1: Include 1st trip DTC. *2: Include 1st trip freeze frame data.	
DETAILED FLOW	
1.GET INFORMATION FOR SYMPTOM	B
Get the detailed information from the customer about the symptom (the condition and the environment whe incident/malfunction occurred) using the "Diagnostic Work Sheet". (Refer to <u>EC-129. "Diagnostic W</u> Sheet".)	
>> GO TO 2.	
2. СНЕСК ДТС	
 Check DTC. Perform the following procedure if DTC is displayed. Record DTC and freeze frame data. (Print them out using CONSULT or GST.) Erase DTC. 	
With CONSULT: "How to Erase DTC and 1st Trip DTC" in <u>EC-66, "CONSULT Function"</u> .	
 Without CONSULT: "How to Erase Self-diagnostic Results" in <u>EC-63, "On Board Diagnosis Function"</u>. Study the relationship between the cause detected by DTC and the symptom described by the custom (Symptom Table is useful. Refer to <u>EC-473, "Symptom Table"</u>.) Check related service bulletins for information. 	ıer.
s any symptom described and is any DTC detected?	
Symptom is described, DTC is detected>>GO TO 3. Symptom is described, DTC is not detected>>GO TO 4. Symptom is not described, DTC is detected>>GO TO 5.	
3.CONFIRM THE SYMPTOM	
Try to confirm the symptom described by the customer (except MIL ON). Also study the normal operation and fail safe related to the symptom. Refer to <u>EC-478, "Description"</u> and <u>E</u> <u>90, "Fail Safe"</u> . Diagnosis Work Sheet is useful to verify the incident. Verify relation between the symptom and the condition when the symptom is detected.	<u>-C-</u>
>> 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-478. "Description"</u> and <u>E</u> 90, "Fail_Safe".	<u></u>
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 make sure that DTC	; is
detected again. If two or more DTCs are detected, refer to <u>EC-93, "DTC Inspection Priority Chart"</u> and determine trou diagnosis order. NOTE:	ble
 Freeze frame data is useful if the DTC is not detected. Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Serv Manual. This simplified check procedure is an effective alternative though DTC cannot be detected dur this check. If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONF 	ing
MATION PROCEDURE.	

Is DTC detected?

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

YES >> GO TO 10. NO >> Check according to <u>EC-94, "DTC Index"</u>.

6.PERFORM BASIC INSPECTION

Perform EC-131, "Work Procedure".

Do you have CONSULT?

YES >> GO TO 7.

NO >> GO TO 9.

7.PERFORM SPEC IN DATA MONITOR MODE

With CONSULT

Make sure that "MAS A/F SE-B1", "B/FUEL SCHDL" and "A/F ALPHA-B1" are within the SP value using CON-SULT in "SPEC" of "DATA MONITOR" mode. Refer to <u>EC-157, "Component Function Check"</u>.

Is the measurement value within the SP value?

YES >> GO TO 9.

NO >> GO TO 8.

f B. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-158, "Diagnosis Procedure".

Is malfunctioning part detected?

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

NU >> GU 10 9.

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to <u>EC-473, "Symptom Table"</u> based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

NOTE:

The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure. For details, refer to Circuit Inspection in <u>GI-42. "Circuit Inspection"</u>.

Is malfunctioning part detected?

YES >> GO TO 11.

NO >> Monitor input data from related sensors or check the voltage of related ECM terminals using CON-SULT. Refer to <u>EC-77, "Reference Value"</u>.

11.REPAIR OR REPLACE THE MALFUNCTIONING PART

- 1. Repair or replace the malfunctioning part.
- 2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
- Check DTC. If DTC is displayed, erase it. Refer to the following.
 (P)With CONSULT: "How to Erase DTC and 1st Trip DTC" in <u>EC-66</u>, "CONSULT Function".

Without CONSULT: "How to Erase Self-diagnostic Results" in EC-63, "On Board Diagnosis Function".

>> GO TO 12.

12.FINAL CHECK

When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then 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.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 10.

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

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- YES-2 >> Symptom remains: GO TO 6.
- NO-1 >> No request for I/M examination from the customer: Before returning the vehicle to the customer, always erase unnecessary DTC in ECM and TCM ((P)With CONSULT: Refer to "How to Erase DTC and 1st Trip DTC" in EC-66, "CONSULT Function", RWithout CONSULT: Refer to "How to Erase Self-diagnostic Results" in EC-63, "On Board Diagnosis Function"). If the completion of EC SRT is needed, drive vehicle under the specific driving pattern. Refer to EC-146, "SRT Set Driving Pattern".
- NO-2 >> I/M examination, requested from the customer: GO TO 13.
- 13. PREPARE FOR I/M EXAMINATION
- Set SRT codes, Refer to EC-145, "Description", 1.
- Erase permanent DTCs. Refer to EC-151, "Description". 2.

>> INSPECTION END

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 a incident. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

Vehicle ran out of fuel, which caused the engine to misfire.

KEY POINTS

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

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DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

Customer nar	ne 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 occurrence		Just after delivery In the morning At night	☐ In the daytime				
Frequency		All the time Under certain cond	ditions 🗌 Sometimes				
Weather conditions		Not affected					
	Weather	🗌 Fine 🗌 Raining 🗌 Snowing	Others []				
	Temperature	🗌 Hot 🗌 Warm 🗌 Cool 🗌] Cold 🔲 Humid °F				
Engine conditions		Cold During warm-up	After warm-up				
Road conditio	ns	🗌 In town 🗌 In suburbs 🗌 Hig	hway 🗌 Off road (up/down)				
Driving conditions		Not affected At starting While idling While accelerating While cruis While decelerating While turning Vehicle speed 1 0 10 20	0				

Not turned on

Turned on

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Malfunction indicator lamp

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BASIC INSPECTION

Work Procedure

1.

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1.INSPECTION START

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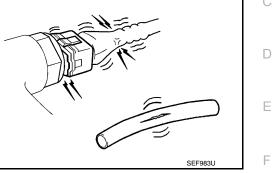
INFOID:000000009758398 Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance. 2. Open engine hood and check the following: Harness connectors for improper connections Wiring harness for improper connections, pinches and cut Vacuum hoses for splits, kinks and improper connections Hoses and ducts for leaks 3. Confirm that electrical or mechanical loads are not applied.

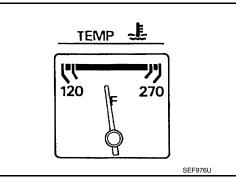
Headlamp switch is OFF.

Air cleaner clogging

Gasket

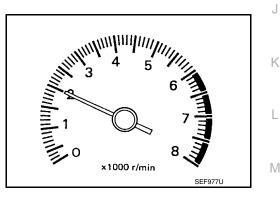
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
- 4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge. Ensure engine stays below 1,000 rpm.





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

<u>is any i</u>	<u>JIC delected?</u>
YES	>> GO TO 2.
NO	>> GO TO 3.



2. REPAIR OR REPLACE

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

>> GO TO 3.

3.CHECK TARGET IDLE SPEED

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

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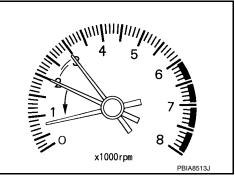
BASIC INSPECTION

< BASIC INSPECTION >

- 2. Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
- Check idle speed.
 For procedure, refer to <u>EC-479</u>, "Inspection".
 For specification, refer to <u>EC-486</u>, "Idle Speed".

Is the inspection result normal?

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



4.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- 1. Stop engine.
- 2. Perform EC-138, "Work Procedure".

>> GO TO 5.

5.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform <u>EC-139, "Work Procedure"</u>.

>> GO TO 6.

6.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-140, "Work Procedure".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 7.

NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

7.CHECK TARGET IDLE SPEED AGAIN

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

 Check idle speed. For procedure, refer to <u>EC-479, "Inspection"</u>. For specification, refer to <u>EC-486, "Idle Speed"</u>.

Is the inspection result normal?

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

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8.DETECT MALFUNCTIONING PART

Check the Following.

- Check camshaft position sensor (PHASE) and circuit. Refer to <u>EC-280, "DTC Logic"</u>.
- Check crankshaft position sensor (POS) and circuit. Refer to EC-277, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace. Then GO TO 4

9.CHECK ECM FUNCTION

- 1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
- Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to <u>SEC-61</u>, <u>"ECM : Work Procedure"</u> for the one with INTELLIGENT KEY SYSTEM, or <u>SEC-174</u>, <u>"ECM : Work Procedure"</u> for the one without INTELLIGENT KEY SYSTEM.

>> GO TO 4.

10.CHECK IGNITION TIMING

1. Run engine at idle.

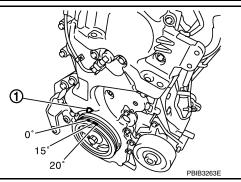
BASIC INSPECTION

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- Check ignition timing with a timing light. For procedure, refer to <u>EC-480, "Inspection"</u> For specification, refer to <u>EC-486, "Ignition Timing"</u>.
 - 1 : Timing indicator

Is the inspection result normal?

- YES >> INSPECTION END.
- NO >> GO TO 11.



11.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- 1. Stop engine.
- 2. Perform <u>EC-138, "Work Procedure"</u>.

>> GO TO 12.

12.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-139, "Work Procedure".

>> GO TO 13.

13.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-140, "Work Procedure".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 14.

NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

14.CHECK TARGET IDLE SPEED AGAIN

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

 Check idle speed. For procedure, refer to <u>EC-479, "Inspection"</u>. For specification, refer to <u>EC-486, "Idle Speed"</u>.

Is the inspection result normal?

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

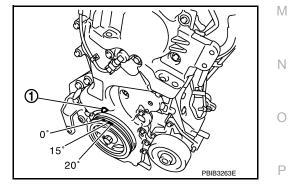
15. CHECK IGNITION TIMING AGAIN

- 1. Run engine at idle.
- Check ignition timing with a timing light. For procedure, refer to <u>EC-480, "Inspection"</u>. For specification, refer to <u>EC-486, "Ignition Timing"</u>.

1 : Timing indicator

Is the inspection result normal?

- YES >> INSPECTION END.
- NO >> GO TO 16.



16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-58, "Inspection".

Is the inspection result normal?

YES >> GO TO 17.

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

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17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-280, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-277. "DTC Logic".

Is the inspection result normal?

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

18. CHECK ECM FUNCTION

- 1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
- Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to <u>SEC-61</u>. <u>"ECM : Work Procedure"</u> for the one with INTELLIGENT KEY SYSTEM, or <u>SEC-174</u>. "ECM : Work Proce-<u>dure"</u> for the one without INTELLIGENT KEY SYSTEM.

>> GO TO 4.

ADDITIONAL SERVICE WHEN REPLACING ECM

< BASIC INSPECTION > [MRA8DE]	
ADDITIONAL SERVICE WHEN REPLACING ECM	А
Description INFOID:000000009758399	7.
When replacing ECM, the following procedure must be performed. (For details, refer to <u>EC-135, "Work Proce-dure"</u> .)	EC
PROGRAMMING OPERATION NOTE:	
After replacing with a blank ECM, programming is required to write ECM information. Be sure to follow the pro- cedure to perform the programming.	С
Work Procedure	D
1.SAVE ECM DATA	_
With CONSULT I. Turn ignition switch OFF.	E
 Reconnect all harness connectors disconnected. Turn ignition switch ON. Select "SAVING DATA FOR REPLC CPU" in "WORK SUPPORT" mode of "ENGINE" using CONSULT. Follow the instruction of CONSULT display. 	F
 NOTE: Necessary data in ECM is copied and saved to CONSULT. Go to Step 2 regardless of with or without success in saving data. 	G
>> GO TO 2.	Н
2. CHECK ECM PART NUMBER	
Check ECM part number to see whether it is blank ECM or not. NOTE:	
 Part number of blank ECM is 23703 - xxxxx. Check part number when ordering ECM or the one included in the label on the container box. Is the ECM a blank ECM? 	J
YES >> GO TO 3. NO >> GO TO 5.	K
3.SAVE ECM PART NUMBER	
Read out the part number from the old ECM and save the number, following the programming instructions. Refer to CONSULT Operation Manual. NOTE:	L
 The ECM part number is saved in CONSULT. Even when ECM part number is not saved in CONSULT, go to 4. 	M
>> GO TO 4.	
4.PERFORM ECM PROGRAMMING	Ν
After replacing ECM, perform the ECM programming. Refer to CONSULT Operation Manual. NOTE:	
 Refer to <u>EC-485</u>, "<u>Removal and Installation</u>" for replacement of ECM. During programming, maintain the following conditions: Ignition switch: ON 	0
- Electric load: OFF - Brake pedal: Not depressed	Ρ
 Battery voltage: 12 – 13.5 V (Be sure to check the value of battery voltage by selecting "BATTERY VOLT" in "Data monitor" of CONSULT.) 	

>> GO TO 6.

5.REPLACE ECM

ADDITIONAL SERVICE WHEN REPLACING ECM

< BASIC INSPECTION >

Replace ECM. Refer to EC-485, "Removal and Installation".

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>> GO TO 6.

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

Refer to <u>SEC-61, "ECM : Work Procedure"</u> (With Intelligent Key System) or <u>SEC-174, "ECM : Work Proce-dure"</u> (Without Intelligent Key System).

>> GO TO 7.

7. CHECK ECM DATA STATUS

Check if the data is successfully copied from the ECM at Step 1 (before replacement) and saved in CONSULT. Is the data saved successfully?

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

8.WRITE ECM DATA

With CONSULT

1. Select "WRITING DATA FOR REPLC CPU" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.

2. Follow the instruction of CONSULT display.

NOTE:

The data saved by "SAVING DATA FOR REPLC CPU" is written to ECM.

>> GO TO 10.

9.PERFORM VIN REGISTRATION

Refer to EC-137, "Work Procedure".

>> GO TO 10.

10.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Perform Accelerator Pedal Released Position Learning. Refer to EC-138, "Work Procedure".

>> GO TO 11.

11.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform Throttle Valve Closed Position Learning. Refer to EC-139. "Work Procedure".

>> GO TO 12.

12.PERFORM IDLE AIR VOLUME LEARNING

Perform Idle Air Volume Learning. Refer to EC-140, "Work Procedure".

>> END

VIN REGISTRATION

< BASIC INSPECTION > [MRA8DE]	
VIN REGISTRATION	А
Description	A
VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced. NOTE:	EC
Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M).	
Work Procedure	С
1.CHECK VIN	
Check the VIN of the vehicle and note it. Refer to GI-23, "Identification Number".	D
>> GO TO 2.	Е
2.PERFORM VIN REGISTRATION	
 With CONSULT 1. Turn ignition switch ON and engine stopped. 2. Select "VIN REGISTRATION" in "WORK SUPPORT" mode of "ENGINE" using CONSULT. 3. Follow the instruction of CONSULT display. 	F
>> END	G
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ACCELERATOR PEDAL RELEASED POSITION LEARNING

< BASIC INSPECTION >

ACCELERATOR PEDAL RELEASED POSITION LEARNING

Description

INFOID:000000009758403

[MRA8DE]

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

Work Procedure

INFOID:000000009758404

1.START

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

>> END

THROTTLE VALVE CLOSED POSITION LEARNING

< 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

INFOID:000000009758406

1.start	D
With CONSULT	
 Turn ignition switch ON. Select "CLSD THL POS LEARN" in "WORK SUPPORT" mode of "ENGINE" using CONSULT. 	_
3. Follow the instructions on the CONSULT display.	E
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.	F
Without CONSULT	I
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: Dates angles contact temperature until it reaches $65^{\circ}C$ (110°E) or more	
 Raise engine coolant temperature until it reaches 65°C (149°F) or more. Turn ignition switch OFF and wait at least 10 seconds. 	Н
Check that throttle valve moves during the above 10 seconds by confirming the operating sound.	
>> END	I
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INFOID:000000009758405

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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 each engine idle speed within the specific range. It must be performed under any of the following conditions:

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

Work Procedure

1.PRECONDITIONING

Make sure that all of the following conditions are satisfied.

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

- Battery voltage: More than 11.6 V (At idle)
- Engine coolant temperature: 70 100°C (158 212°F)
- Selector lever: P or N (CVT), Neutral (M/T)
- Electric load switch: OFF

 (Air conditioner, headlamp, rear window defogger)
 On vehicles equipped with daytime running light systems, set lighting switch to the 1st position to light only small lamps.
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
- CVT models
- With CONSULT: Drive vehicle until "ATF TENP SEN" in "DATA MONITOR" mode of "CVT" system indicates less than 0.9 V.
- Without CONSULT: Drive vehicle for 10 minutes.
- M/T models
- Drive vehicle for 10 minutes.

Do you have CONSULT?

YES	>> GO	TO 2.

NO >> GO TO 3.

2. IDLE AIR VOLUME LEARNING

With CONSULT

- 1. Perform Accelerator Pedal Released Position Learning. Refer to EC-138, "Work Procedure".
- 2. Perform Throttle Valve Closed Position Learning. Refer to EC-139, "Work Procedure".
- 3. Start engine and warm it up to normal operating temperature.
- 4. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode of "ENGINE".
- 5. Touch "START" and wait 20 seconds.

Is "CMPLT" displayed on CONSULT screen?

YES >> GO TO 4.

NO >> GO TO 5.

3. IDLE AIR VOLUME LEARNING

Without CONSULT

NOTE:

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
- 1. Perform Accelerator Pedal Released Position Learning. Refer to EC-138, "Work Procedure".
- Perform Throttle Valve Closed Position Learning. Refer to <u>EC-139, "Work Procedure"</u>.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
- 6. Repeat the following procedure quickly five times within 5 seconds.
- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.

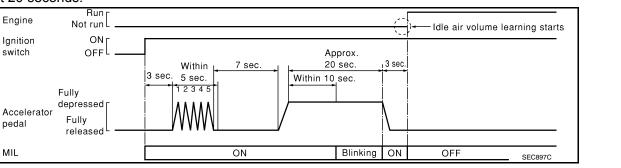
INFOID:000000009758407

INFOID:000000009758408

IDLE AIR VOLUME LEARNING

< BASIC INSPECTION >

- Wait 7 seconds, fully depress the accelerator pedal and keep it for approximately 20 seconds until the MIL stops blinking and turned ON.
- 8. Fully release the accelerator pedal within 3 seconds after the MIL turned ON.
- 9. Start engine and let it idle.
- 10. Wait 20 seconds.



>> GO TO 4

4.CHECK IDLE SPEED AND IGNITION TIMING Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications. For specification, refer to EC-486, "Idle Speed" and EC-486, "Ignition Timing". Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 5. 5. DETECT MALFUNCTIONING PART Check the following · Check that throttle valve is fully closed. Check PCV valve operation. • Check that downstream of throttle valve is free from air leakage. Is the inspection result normal? YES >> GO TO 6. NO >> Repair or replace malfunctioning part.

6.DETECT MALFUNCTIONING PART

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

It is useful to perform "TROUBLE DIAGNOSIS - SPECIFICATION VALUE". Refer to <u>EC-157</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 all over again:

Engine stalls.

Erroneous idle.

>> 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

INFOID:000000009758410

INFOID:000000009758409

[MRA8DE]

1.START

With CONSULT

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

With GST

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

>> END

FUEL PRESSURE

< BASIC INSPECTION >

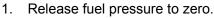
FUEL PRESSURE	А			
Work Procedure				
FUEL PRESSURE RELEASE	EC			
1.FUEL PRESSURE RELEASE				
With CONSULT Turn ignition switch ON.	С			
 Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode of "ENGINE" using CONSULT. Start engine. After engine stalls, crank it two or three times to release all fuel pressure. 	D			
 Turn ignition switch OFF. Without CONSULT Remove fuel pump fuse located in IPDM E/R. 	E			
 Start engine. After engine stalls, crank it two or three times to release all fuel pressure. Turn ignition switch OFF. Reinstall fuel pump fuse after servicing fuel system. 	F			
>> END	G			
FUEL PRESSURE CHECK CAUTION: • Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.	Н			
 The fuel hose connection method used when taking fuel pressure check must not be used for oth purposes. Be careful not to scratch or put debris around connection area when servicing so that the qui 				

- Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains sealability with O-rings inside.
- Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.

NOTE:

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

1.FUEL PRESSURE CHECK



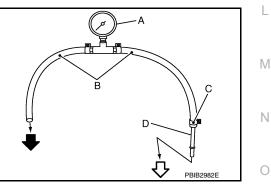
- 2. Prepare fuel hose for fuel pressure check (B) and fuel tube adapter [SST: KV1011840] (D), then connect fuel pressure gauge (A).
 - \triangleleft : To quick connector
 - : To fuel tube
 - С : Clamp

CAUTION:

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

CAUTION:

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



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FUEL PRESSURE

< BASIC INSPECTION >

[MRA8DE]

4. Connect fuel hose for fuel pressure check ① to fuel tube ③ 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 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.

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

- Install hose clamp to the position within 1 2 mm (0.04 0.08 in).
- Make sure that clamp screw does not contact adjacent parts.
- 5. Connect fuel tube adapter to quick connector.
 - A :Fuel pressure gauge
 - B :Fuel hose for fuel pressure check

After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm high pressure fuel pump does not come off.

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

At idling : Approximately 350 kPa (3.5 bar, 3.57 kg/cm², 51 psi)

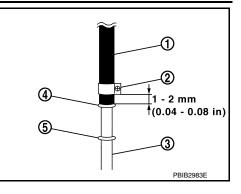
Is the inspection result normal?

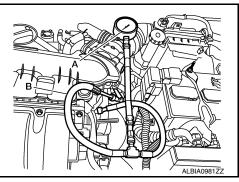
YES >> INSPECTION END NO >> GO TO 2.

2.CHECK FUEL HOSES

Check the following.

- Fuel hoses for clogging
- Fuel filter for clogging
- Fuel pump
- Fuel pressure regulator for clogging
- Is the inspection result normal?
- YES >> Replace fuel pressure regulator.
- NO >> Repair or replace error-detected parts.





< BASIC INSPECTION >

HOW TO SET SRT CODE

Description

INFOID:000000009758412

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 indication)	Performance Pri- ority ^{*2}	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	1	Three way catalyst function	P0420
EVAP SYSTEM	1	EVAP control system purge flow monitoring	P0441
	1	EVAP control system	P0456
HO2S	1	Air fuel ratio (A/F) sensor 1	P0130
		Air fuel ratio (A/F) sensor 1	P014C, P014D
		Heated oxygen sensor 2	P0137
		Heated oxygen sensor 2	P0138
		Heated oxygen sensor 2	P0139
EGR/VVT SYSTEM	2	Intake value timing control function	P0011

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

*2: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT.

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.

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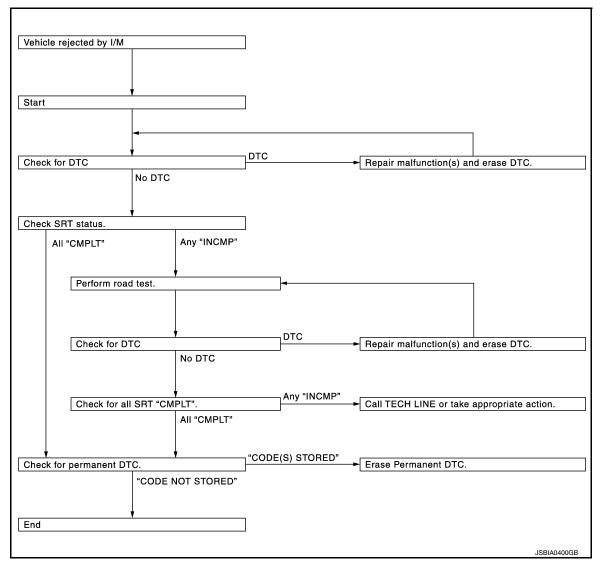
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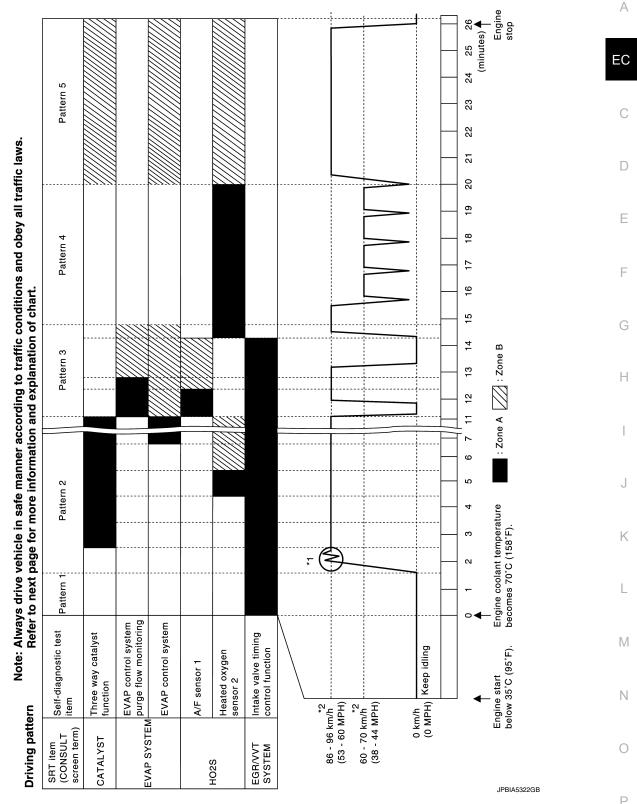
SRT Set Driving Pattern

INFOID:000000009758413

CAUTION:

< BASIC INSPECTION >

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



NOTE:

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

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

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

< BASIC INSPECTION >

[MRA8DE]

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
- 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°F)], diagnosis may also be performed.
- "EGR/VVT SYSTEM" written in the figure is not applicable to the vehicle.

Work Procedure

INFOID:000000009758414

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-94, "DTC Index".

NO >> GO TO 2.

2. CHECK SRT STATUS

With CONSULT

Select "SRT STATUS" in "DTC & SRT CONFIRMATION" using CONSULT.

Without CONSULT

Perform "SRT status" mode with EC-63, "On Board Diagnosis Function".

With GST

Select Service \$01 with GST.

Is SRT code(s) set?

- YES >> END
- NO-1 >> (i) With CONSULT: GO TO 3.
- NO-2 >> Without CONSULT: GO TO 4.

3. DTC CONFIRMATION PROCEDURE

- 1. Select "SRT WORK SUPPORT" in "DTC & SRT CONFIRMATION" using CONSULT.
- For SRT(s) that is not set, perform the corresponding "DTC CONFIRMATION PROCEDURE" according to the "Performance Priority" in the "SRT ITEM" table. Refer to <u>EC-145</u>, "<u>Description</u>".
- 3. Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to <u>EC-94, "DTC Index"</u>.

NO >> GO TO 9.

4.PERFORM ROAD TEST

• Check the "Performance Priority" in the "SRT ITEM" table. Refer to EC-145. "Description".

• Perform the most efficient SRT set driving pattern to set the SRT properly. Refer to <u>EC-146</u>, "<u>SRT Set Driv-ing Pattern</u>".

In order to set all SRTs, the SRT set driving pattern must be performed at least once.

>> GO TO 5.

5.PATTERN 1

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

NOTE:

ECM terminal voltage is follows;

2. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again

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6.PATTERN 2

- 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.

release the accelerator pedal and keep it released for more than 10 seconds.

Drive the vehicle. And depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then

>> GO TO 7.

< BASIC INSPECTION >
• Engine coolant temperature

- 70°(158°F): Less than 1.4 V

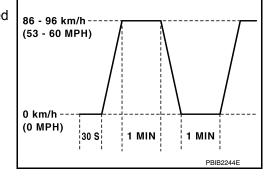
>> GO TO 6.

- -10 to 35°C (14 to 95°F): 3.0 - 4.3 V

7.PATTERN 3

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

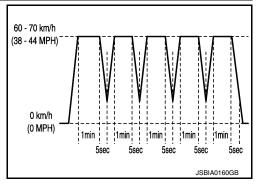
>> GO TO 8.



8.PATTERN 4

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

>> GO TO 9.



9.PATTERN 5

• The accelerator pedal must be held very steady during steady-state driving.

• If the accelerator pedal is moved, the test must be conducted again.

>> GO TO 10.

10.CHECK SRT STATUS

()With CONSULT	
Select "SRT STATUS" in "DTC & SRT CONFIRMATION" using CONSULT.	
®WITHOUT CONSULT	
Perform "SRT status" mode with EC-63, "On Board Diagnosis Function".	
With GST	
Select Service \$01 with GST.	
<u>Is SRT(s) set?</u>	
YES >> END	

YES >> END

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NO >> Perform this procedure again.

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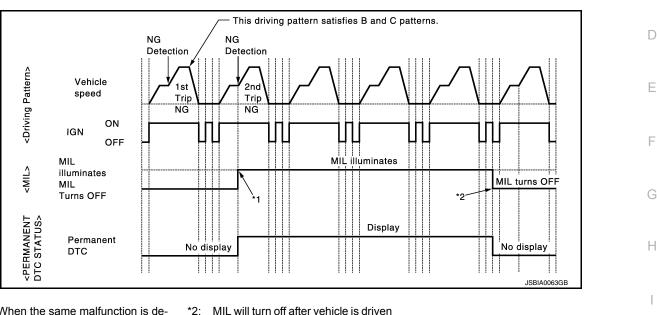
HOW TO ERASE PERMANENT DTC

Description

OUTLINE

When a DTC is stored in ECM

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



*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate. MIL will turn off after vehicle is driven 3 times (driving pattern B) without any malfunctions.

When a DTC is not stored in ECM

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

If the applicable permanent DTC includes multiple groups, perform the procedure of Group B first. If the per-

_				~. Abbi		
-	Group [*]	Perform "DTC CONFIRMATION PROCE-	Driving	ng pattern Reference		L
	Gloup	DURE" for applicable DTCs.	В	D	Reference	
-	А	×	_	—	<u>EC-152</u>	М
-	В	_	×	×	<u>EC-154</u>	1 V I

*: For group, refer to EC-94, "DTC Index".

PERMANENT DTC ITEM

For permanent DTC items, MIL turns ON. Refer to EC-94. "DTC Index".

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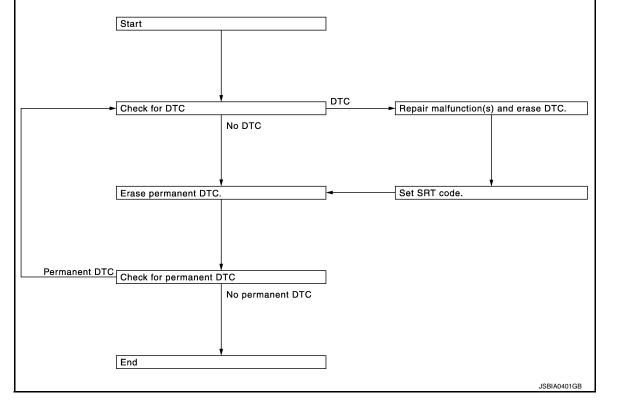
[MRA8DE]

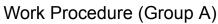
Y. Applicable —: Not applicable

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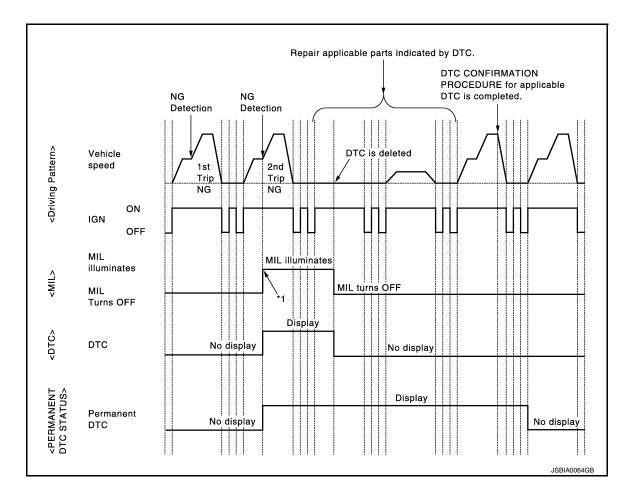
[MRA8DE]

PERMANENT DTC SERVICE PROCEDURE





INFOID:000000009758416



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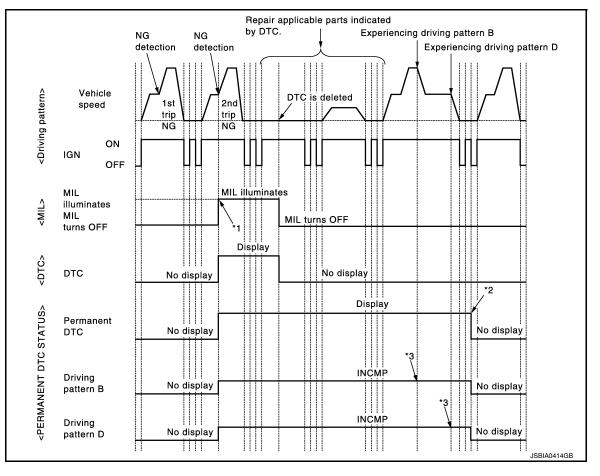
*1: When the same malfunction is de-А tected in two consecutive trips, MIL will illuminate. 1.CHECK DTC EC Check DTC. Is any DTC detected? YES >> Repair malfunction(s) and erase DTC. Refer to EC-63, "On Board Diagnosis Function", EC-66, "CONSULT Function". NO >> GO TO 2. D 2.CHECK PERMANENT DTC (P)With CONSULT Ε 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. Select "PERMANENT DTC STATUS" mode with CONSULT. 5. With GST Turn ignition switch OFF and wait at least 10 seconds. 1. 2. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. 3. 4. Turn ignition switch ON. 5. Select Service \$0A with GST. Н Is any permanent DTC detected? YES >> GO TO 3. NO >> END **3.** PERFORM DTC CONFIRMATION PROCEDURE Perform "DTC CONFIRMATION PROCEDURE" for DTCs which are the same as permanent DTCs stored in J ECM. Refer to EC-94, "DTC Index". >> GO TO 4. Κ 4.CHECK PERMANENT DTC With CONSULT **1**. L Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. 3. 4. Turn ignition switch ON. M 5. Select "PERMANENT DTC STATUS" mode with CONSULT. With GST Turn ignition switch OFF and wait at least 10 seconds. 1. Ν 2. Turn ignition switch ON. 3. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. 4. 5. Select Service \$0A with GST. Ο Is any permanent DTC detected? YES >> GO TO 1. NO Ρ >> END

[MRA8DE]

< BASIC INSPECTION >

Work Procedure (Group B)





- *1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.
- *2: After experiencing driving pattern B *3: and D, permanent DTC is erased.

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

NOTE:

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

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to <u>EC-63</u>. "<u>On Board Diagnosis Function</u>", <u>EC-66</u>. "<u>CONSULT Function</u>".

NO >> GO TO 2.

2. CHECK PERMANENT DTC

With CONSULT

- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Select "PERMANENT DTC STATUS" mode with CONSULT.

With GST

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

YES NO	
3. df	RIVE DRIVING PATTERN B
CAUT • Alw • Nev • If so patt 1. S 2. U ir	TION: vays drive at a safe speed. ver erase self-diagnosis results. elf-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving tern B and D is reset. th CONSULT Start engine and warm it up to normal operating temperature. Jse "PERMANENT DTC WORK SUPPORT" mode with CONSULT to drive the vehicle according to driv- ng pattern B. Refer to <u>EC-66, "CONSULT Function", EC-60, "DIAGNOSIS DESCRIPTION : Driving Pat-</u> ern".
<pre></pre>	th GST Start engine and warm it up to normal operating temperature. Drive the vehicle according to driving pattern B. Refer to <u>EC-60, "DIAGNOSIS DESCRIPTION : Driving</u> Pattern".
4. c⊦	>> GO TO 4. HECK PERMANENT DTC
1. T 2. T 3. T 4. T 5. S Wit 1. T 2. T 3. T 4. T 5. S <u>Is any</u> YES NO 5.DF	>> END RIVE DRIVING PATTERN D
 Nev If so path 	vays drive at a safe speed. ver erase self-diagnosis results. elf-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving tern B and D is reset. the vehicle according to driving pattern D. Refer to <u>EC-60, "DIAGNOSIS DESCRIPTION : Driving Pat-</u>
6 ~	>> GO TO 6. HECK PERMANENT DTC
U. CF	

(B)With CONSULT 1. Turn ignition s

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

< BASIC INSPECTION >

Turn ignition switch ON.

Is any permanent DTC detected?

Select Service \$0A with GST.

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

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< BASIC INSPECTION >

- Select "PERMANENT DTC STATUS" mode with CONSULT. 5.
- With GST1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds. 3.
- 4. Turn ignition switch ON.
- 5. Select Service \$0A with GST.
- Is any permanent DTC detected?
- YES >> GO TO 1.
- NO >> END

Revision: October 2013

< DTC/CIRCUIT DIAGNOSIS >
DTC/CIRCUIT DIAGNOSIS
TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

< D1

The specification (SP) value indicates the tolerance of the value that is displayed in "SPEC" of "DATA MONI-TOR" mode of CONSULT during normal operation of the Engine Control System. When the value in "SPEC" of "DATA MONITOR" mode is within the SP value, the Engine Control System is confirmed OK. When the value in "SPEC" of "DATA MONITOR" mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.

The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Component Function Check

1.START

Make sure that all of the following conditions are satisfied.

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 104.3 kPa (1.003 1.064 kg/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

- CVT models: After the engine is warmed up to normal operating temperature, drive vehicle until "FLUID TEMP SE" (CVT fluid temperature sensor signal) indicates more than 60°C (140°F).

- M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied
- Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.
- · Engine speed: Idle

>> GO TO 2.

2.Perform "Spec" of "data monitor" mode

With CONSULT

NOTE:

Perform "SPEC" in "DATA MONITOR" mode in maximum scale display.

- 1. Perform EC-131, "Work Procedure".
- Select "B/FUEL SCHDL", "A/F ALPHA-B1" and "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode 2. of "ENGINE" using CONSULT.

EC-157

- 3. Make sure that monitor items are within the SP value.
- Is the inspection result normal?
- YES >> END
- NO >> Proceed to EC-158, "Diagnosis Procedure".

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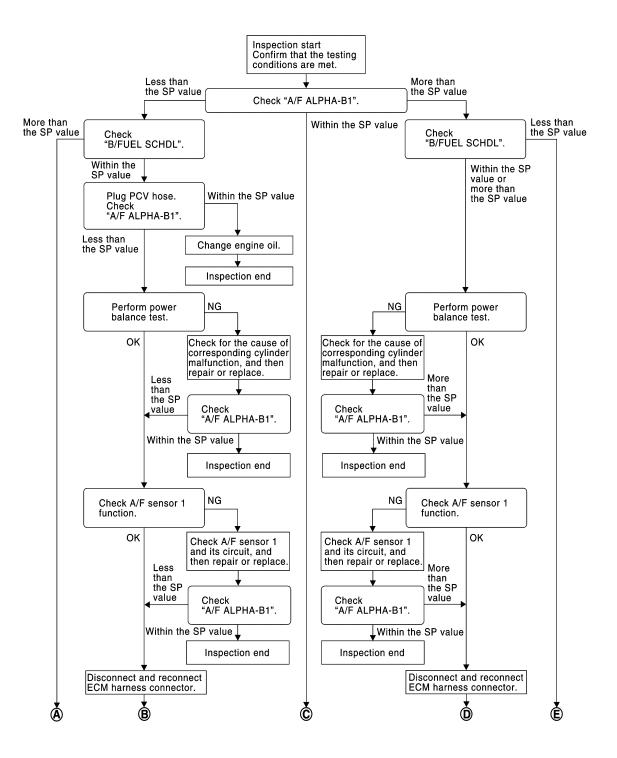
Ν

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< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

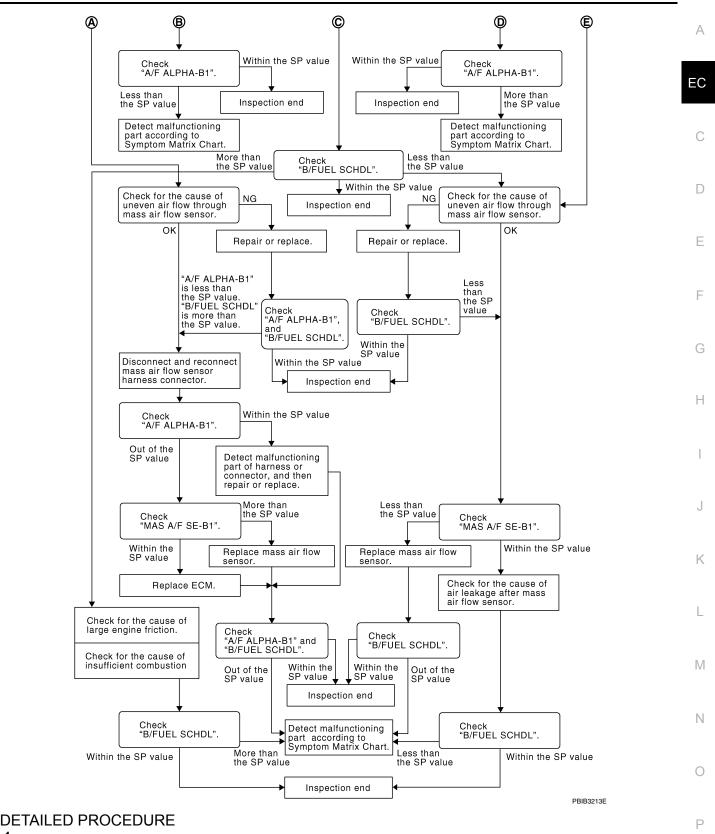
OVERALL SEQUENCE



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< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]



1.CHECK "A/F ALPHA-B1"

With CONSULT

- 1. Start engine.
- 2. Confirm that the testing conditions are met. Refer to EC-157, "Component Function Check".
- 3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

NOTE:

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

Is the measurement value within the SP value?

- YES >> GO TO 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 make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 4.

NO >> More than the SP value: GO TO 16.

3.CHECK "B/FUEL SCHDL"

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

Is the measurement value within the SP value?

YES >> GO TO 6.

NO-1 >> More than the SP value: GO TO 6.

NO-2 >> Less than the SP value: GO TO 22.

4.CHECK "A/F ALPHA-B1"

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

Is the measurement value within the SP value?

YES >> GO TO 5.

NO >> GO TO 6.

5.CHANGE ENGINE OIL

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

NOTE:

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

>> INSPECTION END

6.PERFORM POWER BALANCE TEST

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

Is the inspection result normal?

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

NU >> GUTU7.

I.DETECT MALFUNCTIONING PART

Check the following.

- 1. Ignition coil and its circuit (Refer to EC-456, "Component Function Check".)
- 2. Fuel injector and its circuit (Refer to EC-450, "Component Function Check".)
- 3. Intake air leakage
- 4. Low compression pressure (Refer to EM-23, "Inspection".)

Is the inspection result normal?

TROUBLE DIAGNOSIS - SPECIFICATION VALUE	
< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]
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"	
 Start engine. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indica the SP value. 	ation is within EC
Is the measurement value within the SP value? YES >> INSPECTION END	С
NO >> GO TO 9. 9.CHECK A/F SENSOR 1 FUNCTION	_
Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1.	D
 For DTC P0130, refer to <u>EC-210, "DTC Logic"</u>. 	
 For DTC P0131, refer to <u>EC-214, "DTC Logic"</u>. 	E
 For DTC P0132, refer to <u>EC-217, "DTC Logic"</u>. For DTC P014C and P014D, refer to <u>EC-238, "DTC Logic"</u>. 	
• For DTC P2096 and P2097, refer to $\underline{\text{EC-238}}$, $\underline{\text{DTC Logic}}$.	
Is any DTC detected?	F
YES >> GO TO 10.	
NO >> GO TO 12.	G
10.CHECK A/F SENSOR 1 CIRCUIT	G
Perform DIAGNOSTIC PROCEDURE according to corresponding DTC.	
	Н
>> GO TO 11.	
11.CHECK "A/F ALPHA-B1"	1
 Start engine. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indica the SP value. 	ation is within
Is the measurement value within the SP value?	J
YES >> INSPECTION END NO >> GO TO 12.	V
12. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR	K
1. Stop the engine.	
 Disconnect ECM harness connector. Check pin terminal and connector for damage, and then reconnect it. 	L
>> GO TO 13.	Μ
13.check "A/F Alpha-b1"	
 Start engine. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indica 	ation is within \mathbb{N}
the SP value.	
Is the measurement value within the SP value?	0
YES >> INSPECTION END	0
NO >> Detect malfunctioning part according to <u>EC-473</u> , "Symptom Table".	
14.CHECK "B/FUEL SCHDL"	Р
Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication SP value.	ı is within the
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.	

< DTC/CIRCUIT DIAGNOSIS >

15. DETECT MALFUNCTIONING PART

- 1. Check for the cause of large engine friction. Refer to the following.
- Engine oil level is too high
- Engine oil viscosity
- Belt tension of power steering, alternator, A/C compressor, etc. is excessive
- Noise from engine
- Noise from transmission, etc.
- Check for the cause of insufficient combustion. Refer to the following. 2.
- 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 21.

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

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

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

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> "B/FUEL SCHDL" is more, "A/F ALPHA-B1" is less than the SP value: GO TO 18.

18.disconnect and reconnect mass air flow sensor harness connector

1. Stop the engine.

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

>> GO TO 19.

19.CHECK "A/F ALPHA-B1"

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

Is the measurement value within the SP value?

YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-186, "DTC Logic". Then GO TO 26.

NO

20.check "Mas A/F se-B1"

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

Is the measurement value within the SP value?

YES >> GO TO 21.

- NO >> More than the SP value: Replace mass air flow sensor, and then GO TO 26.
- 21.REPLACE ECM
- 1. Replace ECM.
- Perform EC-135, "Work Procedure". 2.

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

>> GO TO 26.	А
22. CHECK INTAKE SYSTEM	
Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.	EC
Crushed air ductsMalfunctioning seal of air cleaner element	
 Uneven dirt of air cleaner element Improper specification of intake air system 	С
Is the inspection result normal?	
YES >> GO TO 24. NO >> Repair or replace malfunctioning part, and then GO TO 23.	D
23. CHECK "B/FUEL SCHDL"	
Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the	Е
SP value. Is the measurement value within the SP value?	
YES >> INSPECTION END	F
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 make sure that the indication is within the	G
SP value.	
Is the measurement value within the SP value?	Н
YES >> GO TO 25. NO >> Less than the SP value: Replace mass air flow sensor, and then GO TO 27.	
25.CHECK INTAKE SYSTEM	I
Check for the cause of air leak after the mass air flow sensor. Refer to the following.	
 Disconnection, looseness, and cracks in air duct Looseness of oil filler cap 	J
 Disconnection of oil level gauge Open stuck, breakage, hose disconnection, or cracks of PCV valve 	
• Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid	K
valveMalfunctioning seal of rocker cover gasket	
 Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts Malfunctioning seal of intake air system, etc. 	
>> GO TO 27.	в. Л
26.CHECK "A/F ALPHA-B1" AND "B/FUEL SCHDL"	M
Select "A/F ALPHA-B1" and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value.	
Is the measurement value within the SP value?	Ν
YES >> INSPECTION END NO >> Detect malfunctioning part according to EC-473, "Symptom Table".	
27.CHECK "B/FUEL SCHDL"	0
Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and then make sure that the indication is within the SP value.	Р
Is the measurement value within the SP value?	í
YES >> INSPECTION END NO >> Detect malfunctioning part according to <u>EC-473, "Symptom Table"</u> .	
$\Box = \Box =$	

< DTC/CIRCUIT DIAGNOSIS >

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

1.CHECK FUSE

Check that the following fuse is not fusing.

Location	Fuse No.	Capacity
IPDM E/R	#33	20A
	#52	15A

Is the fuse fusing?

YES >> Replace the fuse after repairing the applicable circuit.

NO >> GO TO 2.

2. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9 and E15. Refer to GI-42, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3.CHECK ECM GROUND CIRCUIT

1. Disconnect ECM harness connectors.

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

	+		
E	СМ	_	Continuity
Connector	Terminal		
F24	12		
1 24	16		
F25	52	Ground	Existed
E16	123		
L 10	128		

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK ECM POWER SUPPLY (MAIN)-1

1. Reconnect ECM harness connector.

- 2. Turn ignition switch ON.
- 3. Check the voltage between ECM harness connector terminals.

ECM						
+	_	Voltage				
Terr	ninal					
121	Battery voltage					
	+ Terr	+ – Terminal				

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 6.

5. CHECK ECM POWER SUPPLY (MAIN)-2

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

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< DTC/CIRCUIT DIAGNOSIS >

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

	ECM							_
Connector	+	-	Condition After turning ignition switch OFF, battery voltage will ex- ist for a few seconds		Voltage (Approx.)			
Connector	Ter	minal			√ FF - 7			
E16	121	128			Drop to 0 V	,		
s the inspec	tion result r	ormal?		L				
	GO TO 9.							
•	GO TO 7.							
		R SUPPLY (I	MAIN) CIRC					
	ition switch ect ECM ha	OFF.	ctors.					
B. Disconn	ect IPDM E	/R harness co	onnector.					
. Check th	ne continuity	/ between EC	CM harness	connector an	d IPDM E/R	harness conne	ector.	
	÷	-	_					
	CM		/I E/R	Continuity				
Connector	Terminal	Connector	Terminal					
E16	121	E45	25	Existed				
. Also che	eck harness	for short to g	around.					
YES >> I	<u>tion result r</u> Perform the	ormal?	nosis for po	wer supply cir ts.	cuit.			
NO >> I .CHECK E	tion result r Perform the Repair or re CM RELAY	ormal? trouble diagr place error-d CONTROL	nosis for po letected par SIGNAL	wer supply cir ts. ctor terminals		ollowing.		
YES >> I NO >> I CHECK E	<u>etion result r</u> Perform the Repair or re ECM RELAY	ormal? trouble diagr place error-d CONTROL	nosis for po letected par SIGNAL	ts.		ollowing.	-	
YES >> I NO >> I CHECK E	tion result r Perform the Repair or re CM RELAY	ormal? trouble diagr place error-d CONTROL een ECM har	nosis for po letected par SIGNAL	ts. ctor terminals	as per the f	Voltage		
YES >> I NO >> I CHECK E Check the vo	tion result n Perform the Repair or re CM RELAY Ditage betwe	trouble diagr place error-d CONTROL een ECM har	nosis for po letected par SIGNAL ness conne	ts.	as per the f			
YES >> I NO >> I CHECK E	tion result r Perform the Repair or re CM RELAY	ormal? trouble diagr place error-d CONTROL een ECM har	nosis for po letected par SIGNAL	ts. ctor terminals Cond	as per the f	Voltage (Approx.)	-	
YES >> I NO >> I CHECK E Check the vo	tion result r Perform the Repair or re CM RELAY oltage betwe + E Terminal	iormal? trouble diagr place error-d CONTROL een ECM har CM Connector	nosis for po letected par SIGNAL ness conne - Terminal	ts. ctor terminals	as per the f lition	Voltage	- -	
YES >> I NO >> I CHECK E Check the vo	tion result n Perform the Repair or re CM RELAY Ditage betwe	trouble diagr place error-d CONTROL een ECM har	nosis for po letected par SIGNAL ness conne	ts. ctor terminals Cond Ignition switch Turn ignition sv and wait at lea	as per the f lition ON witch OFF	Voltage (Approx.)	• • •	
YES >> I NO >> I CHECK E Check the vo	tion result r Perform the Repair or re CM RELAY oltage betwe + E Terminal	iormal? trouble diagr place error-d CONTROL een ECM har CM COnnector E16	nosis for po letected par SIGNAL ness conne - Terminal	ts. ctor terminals Cond Ignition switch Turn ignition s	as per the f lition ON witch OFF	Voltage (Approx.) 0 V	- - -	
YES >> I NO >> I CHECK E Check the vo Connector F25 s the inspec	tion result r Perform the Repair or re CM RELAY oltage betwe t Terminal 89	trouble diagr place error-d CONTROL een ECM har CM Connector E16 oormal?	nosis for po letected par SIGNAL ness conne - Terminal 128	ts. ctor terminals Cond Ignition switch Turn ignition s and wait at lea onds.	as per the f lition ON witch OFF list 10 sec-	Voltage (Approx.) 0 V Battery voltage	- -	
YES >> I NO >> I CHECK E Check the vo Connector F25 S the inspector YES >> 0	tion result r Perform the Repair or re CM RELAY oltage betwe t Terminal 89	trouble diagr place error-d CONTROL een ECM har CM Connector E16 oormal?	nosis for po letected par SIGNAL ness conne - Terminal 128	ts. ctor terminals Cond Ignition switch Turn ignition sv and wait at lea	as per the f lition ON witch OFF list 10 sec-	Voltage (Approx.) 0 V Battery voltage	- - -	
YES >> I NO >> I CHECK E Check the vo F25 Sthe inspec YES >> 0 NO >> 0	tion result r Perform the Repair or re CM RELAY oltage betwe t Terminal 89 tion result r Check Inter GO TO 8.	trouble diagr place error-d CONTROL een ECM har CM Connector E16 cormal? mittent incide	nosis for po letected par SIGNAL mess conne - Terminal 128 ent. Refer to	ts. ctor terminals Cond Ignition switch Turn ignition s and wait at lea onds. GI-39, "Interr	as per the f lition ON witch OFF list 10 sec-	Voltage (Approx.) 0 V Battery voltage	- - -	
YES >> I NO >> I CHECK E Check the vo F25 Sthe inspective YES >> 0 NO >> 0 CHECK E	tion result r Perform the Repair or re CM RELAY oltage betwe t Terminal 89 tion result r Check Intern GO TO 8. ECM RELAY	trouble diagr place error-d CONTROL een ECM har CM COnnector E16 cormal? mittent incide	nosis for po letected par SIGNAL mess conne - Terminal 128 ent. Refer to	ts. ctor terminals Cond Ignition switch Turn ignition s and wait at lea onds. GI-39, "Interr	as per the f lition ON witch OFF list 10 sec-	Voltage (Approx.) 0 V Battery voltage	- -	
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YES >> I NO >> I CHECK E Check the vo f Connector F25 S the inspec YES >> 0 NO >> 0 S.CHECK E Disconne S. Disconne	tion result r Perform the Repair or re CM RELAY oltage between t Terminal 89 tion result r Check Intern GO TO 8. CM RELAY ition switch ect ECM ha ect IPDM E	iormal? trouble diagr place error-d CONTROL een ECM har CM Connector E16 iormal? mittent incide CONTROL OFF. rness connector (R harness connector)	nosis for po letected par SIGNAL ness conne - Terminal 128 ent. Refer to SIGNAL CII ctor. onnector.	ts. ctor terminals Cond Ignition switch Turn ignition sv and wait at lea onds. GI-39, "Interr RCUIT	as per the f	Voltage (Approx.) 0 V Battery voltage	- - -	
YES >> I NO >> I CHECK E Check the vo f Connector F25 S the inspec YES >> 0 NO >> 0 S.CHECK E Disconne S. Disconne	tion result r Perform the Repair or re CM RELAY oltage between t Terminal 89 tion result r Check Intern GO TO 8. CM RELAY ition switch ect ECM ha ect IPDM E	iormal? trouble diagr place error-d CONTROL een ECM har CM Connector E16 iormal? mittent incide CONTROL OFF. rness connector (R harness connector)	nosis for po letected par SIGNAL ness conne - Terminal 128 ent. Refer to SIGNAL CII ctor. onnector.	ts. ctor terminals Cond Ignition switch Turn ignition sv and wait at lea onds. GI-39, "Interr RCUIT	as per the f	Voltage (Approx.) 0 V Battery voltage	ector.	
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YES >> I NO >> I CHECK E Check the vo the check the vo for the connector F25 Sthe inspector YES >> 0 NO >> 0 CHECK E Disconne Disconne Check the the connector Check t	tion result r Perform the Repair or re CM RELAY oltage betwee + E Terminal 89 tion result r Check Intern GO TO 8. ECM RELAY ition switch ect ECM ha ect IPDM E he continuity	trouble diagr place error-d CONTROL een ECM har CM Connector E16 CM Connector E16 CM CONTROL CONTROL CONTROL CONTROL CONTROL	nosis for po letected par SIGNAL ness conne - Terminal 128 ent. Refer to SIGNAL CII ctor. Onnector. CM harness	ts. ctor terminals Cond Ignition switch Turn ignition sv and wait at lea onds. GI-39, "Interr RCUIT	as per the f	Voltage (Approx.) 0 V Battery voltage	ector.	

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

E45

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89

F25

Existed

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to <u>PCS-58, "Removal and Installation"</u> (with intelligent key), <u>PCS-58,</u> <u>"Removal and Installation"</u> (without intelligent key).

NO >> Repair or replace error-detected parts.

9.CHECK IGNITION SWITCH SIGNAL

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals.

	ECM			Valtaga
Connector	+	l	Condition	Voltage (Approx.)
Connector	Terminal			(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
E16	109	128	Ignition switch OFF	0 V
	109	120	Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 10.

10. CHECK IGNITION SWITCH SIGNAL CIRCUIT

1. Turn ignition switch OFF.

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

	+		_	
E	CM	IPDN	/IE/R	Continuity
Connector	Terminal	Connector	Terminal	
E16	109	E43	18	Existed

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

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

11.CHECK ECM POWER SUPPLY (BACK-UP)

Check the voltage between ECM harness connector terminals.

	+		_	
	E	СМ		Voltage (Approx.)
Connector	Terminal	Connector	Terminal	(FF - 7
F25	81	E16	128	Battery voltage

Is the inspection result normal?

YES >> Check Intermittent Incident. Refer to GI-39. "Intermittent Incident".

NO >> GO TO 12.

12. CHECK ECM POWER SUPPLY (BACK-UP) CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Disconnect IPDM E/R harness connector.

4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

[MRA8DE]

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

+			-	Operative it
EC			I E/R	Continuity
Connector F25	Terminal 81	Connector E45	Terminal 32	Existed
5. Also che				LVISIGN
Is the inspect			jiounu.	
YES >> F	Perform the	trouble diagi	nosis for pov	ver supply circu
NO >> F	kepair or re	place error-d	etected part	S.

U0101 CAN COMM CIRCUIT

Description

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

DTC Logic

INFOID:000000009758423

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

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

Diagnosis Procedure

INFOID:000000009758424

Perform the trouble diagnosis for CAN communication system. Refer to <u>LAN-16</u>, "Trouble Diagnosis Flow <u>Chart"</u>.

INFOID:000000009758422

< DTC/CIRCUIT DIAGNOSIS >

U1001 CAN COMM CIRCUIT

Description

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

DTC Logic

INFOID:000000009758426 D

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
U1001	CAN COMM CIRCUIT (CAN communication cir- cuit)	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 CO	NFIRMATION PROCE	DURE	
1.PERFO	ORM DTC CONFIRMATI	ON PROCEDURE	
2. Chec	ignition switch ON and w k 1st trip DTC. DTC detected?	ait at least 3 seconds.	
YES >	>> Proceed to <u>EC-169, "I</u> >> INSPECTION END	<u>Diagnosis Procedure"</u> .	
Diagnos	sis Procedure		INFOID:00000009758427
Perform t <u>Chart"</u> .	he trouble diagnosis for	CAN communication system. Refer to	LAN-16. "Trouble Diagnosis Flow

INFOID:000000009758425

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P0011 IVT CONTROL

< DTC/CIRCUIT DIAGNOSIS > P0011 IVT CONTROL

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0011 is displayed with DTC P0075, first perform the trouble diagnosis for <u>EC-180, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0011	INT/V TIM CONT-B1 ("A" Camshaft position - tim- ing over-advanced or system performance bank 1)	There is a gap between angle of target and phase-control angle degree.	 Crankshaft position sensor (POS) Camshaft position sensor (PHASE) Intake valve control solenoid valve Accumulation of debris to the signal pick-up portion of the camshaft Timing chain installation Foreign matter caught in the oil groove for intake valve timing control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 11 V and 16 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

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

ENG SPEED	1,200 - 2,000 rpm
COOLANT TEMP/S	More than 60°C (140°F)
Selector lever	P or N position

4. Stop vehicle with engine running and let engine idle for 10 seconds.

5. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Proceed to <u>EC-171, "Diagnosis Procedure"</u>.

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

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

INFOID:000000009758428

P0011 IVT CONTROL

ENG SPEED	1,200 - 3,175 rpm (A constant rotation is maintained.)		A
COOLANT TEMP/ S	More than 60°C (140°F)		
Selector lever	D position		EC
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)		С
CAUTION: Always drive 2. Check 1st trip	e at a safe speed. o DTC.		D
With GST Follow the proced Is 1st trip DTC de	dure "With CONSULT" above.		E
	eed to <u>EC-171, "Diagnosis Procedure"</u> . ECTION END		
Diagnosis Pro	ocedure	INFOID:00000009758429	F
	RESSURE WARNING LAMP		G
nated.	essure warning lamp and confirm it is not ill	umi-	H
•	k the engine oil level. Refer to <u>LU-7, "Inspectio</u>		I
			J
2.CHECK INTAK	KE VALVE TIMING CONTROL SOLENOID VAL	VE	k
Check the intake	valve timing control solenoid valve. Refer to \underline{EC}	C-172. "Component Inspection".	
Is the inspection of YES >> GO T NO >> Repla		Refer to FM-48 "Exploded View"	L
· ·	IKSHAFT POSITION SENSOR (POS)		
	haft position sensor (POS). Refer to <u>EC-279</u> , "	Component Inspection [CKP Sensor (POS)]".	N
Is the inspection YES >> GO T	result normal?		N
NO >> Repla	ace crankshaft position sensor (POS). Refer to	EM-33, "Exploded View".	
Check the cams	SHAFT POSITION SENSOR (PHASE) haft position sensor (PHASE). Refer to <u>EC</u> -	282, "Component Inspection [CMP Sensor	С
(PHASE)]". Is the inspection i	result normal?		_
YES >> GO T		o <u>EM-60, "Exploded View"</u> .	F
5.CHECK CAME			
Check the followi	ng.		

Check the following.

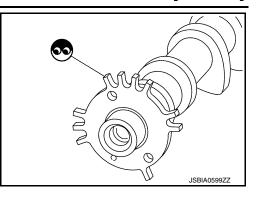
P0011 IVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

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

Is the inspection result normal?

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



[MRA8DE]

INFOID:000000009758430

6. CHECK TIMING CHAIN INSTALLATION

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

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

YES >> Check timing chain installation. Refer to <u>EM-49</u>, "<u>Removal and Installation</u>".

NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to LU-7, "Inspection", "INSPECTION AFTER INSTALLATION".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-39, "Intermittent Incident".
- NO >> Clean lubrication line.

Component Inspection

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-1

- 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.

Intake valve timing o	control solenoid valve	
+	_	Resistance
Terr	ninal	
1	2	6.7 - 7.7 Ω [at 20°C (68°F)]
1	Ground	$\Omega \propto$
2	Ground	(Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace intake valve timing control solenoid valve. Refer to EM-48, "Exploded View".

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-2

1. Remove intake valve timing control solenoid valve. Refer to EM-48. "Exploded View".

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

CAUTION:

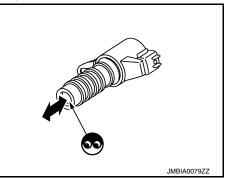
Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve. NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake valve timing control solenoid valve. Refer to EM-48, "Exploded View".



P0014 EVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

P0014 EVT CONTROL

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P0014 is displayed with DTC P0078, first perform trouble diagnosis for DTC P0078. Refer to <u>EC-183, "DTC Logic"</u>.
- If DTC P0014 is displayed with P1078, first perform trouble diagnosis for P1078. Refer to <u>EC-359</u>, <u>"DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	D
P0014	EXH/V TIM CONT-B1 ("B" Camshaft position - tim- ing over-advanced or system performance bank 1)	There is a gap between angle of target and phase-control angle degree.	 Crankshaft position sensor (POS) Camshaft position sensor (PHASE) Exhaust valve timing control position sensor Exhaust valve control solenoid valve Accumulation of debris to the signal pickup portion of the camshaft Timing chain installation Foreign matter caught in the oil groove for exhaust valve timing control 	E F G

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

- Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 2. Start engine and warm it up to the normal operating temperature.
- Maintain the following conditions for at least 6 consecutive seconds. Hold the accelerator pedal as steady as possible.

ENG SPEED	1 200 - 2 000 rpm (A constant rotation is maintained)
	1,200 - 2,000 rpm (A constant rotation is maintained.)
COOLANT TEMP/S	More than 60°C (140°F)
Selector lever	P or N position
5. Check 1st trip With GST	e for 10 seconds. DTC. ure "With CONSULT" above.
<u>Is 1st trip DTC de</u>	
YES >> Proce NO >> GO T	ed to <u>EC-174, "Diagnosis Procedure"</u> O 3.
3.PERFORM DT	C CONFIRMATION PROCEDURE-2
	-

With CONSULT

INFOID:000000009758431

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P0014 EVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

- 1. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 2. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,700 - 2,950 rpm (A constant rotation is maintained.)
COOLANT TEMP/S	More than 70°C (158°F)
Selector lever	D position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:

Always drive at a safe speed.

3. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

- YES >> Proceed to <u>EC-174, "Diagnosis Procedure"</u>
- NO >> INSPECTION END

Diagnosis Procedure

1. CHECK OIL PRESSURE WARNING LAMP

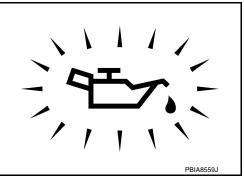
1. Start engine.

 Check oil pressure warning lamp and confirm it is not illuminated.

Is oil pressure warning lamp illuminated?

YES >> Check the engine oil level. Refer to <u>LU-7</u>, "Inspection".

NO >> GO TO 2.



2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE

Check the exhaust valve timing control solenoid valve. Refer to <u>EC-172, "Component Inspection"</u>. Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-48, "Exploded View".

3. CHECK CRANKSHAFT POSITION SENSOR (POS)

Check the crankshaft position sensor (POS). Refer to <u>EC-279, "Component Inspection [CKP Sensor (POS)]"</u>. <u>Is the inspection result normal?</u>

YES >> GO TO 4.

NO >> Replace crankshaft position sensor (POS). Refer to <u>EM-33</u>, "Exploded View".

4.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR

Check the exhaust valve timing control position sensor. Refer to <u>EC-282, "Component Inspection [CMP Sen-</u> sor (PHASE)]".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace exhaust valve timing control position sensor. Refer to <u>EM-48</u>, "Exploded View".

5.CHECK CAMSHAFT (EXH)

Check the following.

INFOID:000000009758432

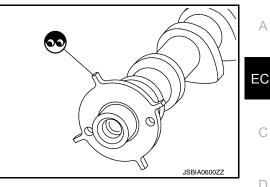
P0014 EVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

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

Is the inspection result normal?

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



[MRA8DE]

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b .CHECK TIMING	GCHAIN INSTALLA	TION		D	
Check service reco	ords for any recent	repairs that may cause timin	g chain misaligned.		
Are there any servi	ce records that ma	<u>y cause timing chain misalig</u>	ned?	Е	
YES >> Check NO >> GO TC		ation. Refer to <u>EM-49, "Rem</u>	oval and Installation".		
7.CHECK LUBRIG	CATION CIRCUIT			F	
Refer to <u>LU-7</u> , "Ins Is the inspection re	sult normal?			G	
	YES >> Check intermittent incident. Refer to <u>GI-39, "Intermittent Incident"</u> .				
Component Ins	spection		INFOID:000000009758433	Н	
1. СНЕСК ЕХНАЦ	IST VALVE TIMING	G CONTROL SOLENOID VA	LVE-1		
	naust valve timing o	control solenoid valve harne st valve timing control solen	as connector. Did valve terminals as per the following.		
Exhaust valve timing of	control solenoid valve			J	
+	_	Resistance			
Term	ninal			K	
1	2	7.0 - 7.8 Ω [at 20°C (68°F)]			
1	Ground	$\infty \Omega$		L	
2		(Continuity should not exist)			

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-48. "Exploded View".

2. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-2



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

CAUTION:

Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in exhaust valve timing control solenoid valve. NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-48, "Exploded View".

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< DTC/CIRCUIT DIAGNOSIS >

P0031, P0032 A/F SENSOR 1 HEATER

DTC Logic

INFOID:000000009758434

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0031	A/F SEN 1 HTR (B1) (HO2S heater control cir- cuit low bank 1 sensor 1)	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 (A/F sensor 1 heater circuit is open or shorted.) A/F sensor 1 heater
P0032	A/F SEN 1 HTR (B1) (HO2S heater control cir- cuit high bank 1 sensor 1)	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 (A/F sensor 1 heater circuit is short- ed.) A/F sensor 1 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 10 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-176, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758435

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.

	+		
A/F se	ensor 1	_	Voltage
Connector	Terminal		
F12 ^{*1} F42 ^{*2}	4	Ground	Battery voltage

*1: Except California

*2: For California

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

P0031, P0032 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

1. Turn igr 2. Disconr	nition switch nect ECM ha	OFF. rness connec	tor.	IGNAL CIRCU		Α
3. Check t	he continuity	between A/F	- sensor 1 h	arness connec	tor and ECM harness connector.	EC
	+	_	-			
A/F s	sensor 1 ECM Continuity		С			
Connector	Terminal	Connector	Terminal			
F12 ^{*1} F42 ^{*2}	3	F25	53	Existed	-	D
*2: For 4. Also ch	ept California California eck harness ction result n	for short to g	round and s	hort to power.	- -	E
YES >> NO >>	GO TO 3. Repair open		to ground c	or short to powe	er in harness or connectors.	F
	VF sensor 1 ction result n		to <u>EC-177.</u>	"Component Ir	spection (A/F Sensor 1 Heater)".	G
NO >>	Replace ma	Ifunctioning a	ir fuel ratio		<u>tent Incident"</u> . Refer to <u>EM-30, "Exploded View"</u>	. н
Compone	ent inspec	tion (A/F S	Sensor 1 I	Heater)	INF	OID:000000009758436
1. CHECK	AIR FUEL R	ATIO (A/F) SI	ENSOR 1			
2. Disconr	nition switch nect A/F sens resistance be	sor 1 harness	connector. ensor 1 term	inals as per the	e following.	J
+	_					К
A/F s	ensor 1	R	esistance			IX.
Ter	minal					
	4	1.8 - 2.44 9	ດ [at 20°C (68°	F)]		L
3	1					
	2		$\Omega \propto$			M
4	1	(Continuity	should not exi	ist)		
	2					
	ction result n					Ν
	INSPECTIO Replace air) sensor 1.	Refer to <u>EM-30</u>), "Exploded View".	0
						0

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< DTC/CIRCUIT DIAGNOSIS >

P0037, P0038 HO2S2 HEATER

DTC Logic

INFOID:000000009758437

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0037	HO2 HTR (B1) (HO2S heater control cir- cuit low bank 1 sensor 2)	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	 Harness or connectors (Heated oxygen sensor 2 heater cir- cuit is open or shorted.) Heated oxygen sensor 2 heater
P0038	HO2 HTR (B1) (HO2S heater control cir- cuit high bank 1 sensor 2)	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	 Harness or connectors (Heated oxygen sensor 2 heater cir- cuit is shorted.) Heated oxygen sensor 2 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

(I) With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- 6. Check 1st trip DTC.
- (a) With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

- YES >> Proceed to EC-178, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758438

1.CHECK HO2S2 POWER SUPPLY CIRCUIT

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

+			
HO2S2		-	Voltage
Connector	Terminal		
F43	4	Ground	Battery voltage

P0037, P0038 HO2S2 HEATER

	CUIT DIAGN			[MRA8DE]
•	tion result n	ormal?		
	GO TO 2. Donair ar rai	alaaa arrar d	staatad parta	
		place error-de	•	<i>.</i>
	ition switch (OFF. mess connec	tor	
				s connector and ECM harness connector.
	,			
-	ł	-		
HO	2S2	EC	М	Continuity
Connector	Terminal	Connector	Terminal	
F43	3	F25	54	Existed
Also che	eck harness	for short to a	round and sh	nort to power.
	tion result n	-		
/ES >> (GO TO 3.			
10 >>	Repair or rep	place error-de	etected parts).
.CHECK F	HEATED OX	YGEN SENS	OR 2 HEAT	ER
heck the he	eated oxvae	n sensor 2 he	eater. Refer t	to EC-179, "Component Inspection (HO2S Heater)".
	tion result n			
			nt. Refer to 🤇	GI-39, "Intermittent Incident".
				fer to <u>EX-5, "Exploded View"</u> .
ompone	nt Inspect	tion (HO28	S Heater)	INFOID:00000009758439
	•			
.CHECK H	IEATED OX	YGEN SENS	OR 2 HEAT	ER
	ition switch (
				harness connector. as per the following.
CHECKI				as per the following.
+	_			
Heated oxyç				
	gen sensor 2	Re	esistance	
Tern	gen sensor 2 ninal	R	esistance	
Tern 3			esistance 2 [at 25°C (77°F	
	ninal			
	ninal 4			
3	ninal 4 2		2 [at 25°C (77°F	
3	ninal 4 2 3	5.4 – 7.3 s		
3	ninal 4 2 3 4 1	5.4 – 7.3 s	Ω [at 25°C (77°F ∞ Ω	
3	ninal 4 2 3 4 1 3	5.4 – 7.3 s	Ω [at 25°C (77°F ∞ Ω	
3 1 2	ninal 4 2 3 4 1 3 4 4	5.4 – 7.3 c	Ω [at 25°C (77°F ∞ Ω	
3 1 2 the inspec	ninal 4 2 3 4 1 3 4 2 5 4 2 tion result n	5.4 – 7.3 ⊆ (Continuity <u>ormal?</u>	Ω [at 25°C (77°F ∞ Ω	
3 1 2 the inspec YES >>	ninal 4 2 3 4 1 3 4 2 tion result n INSPECTIO	5.4 – 7.3 ⊆ (Continuity ormal? N END	Ω [at 25°C (77°F) $\infty \Omega$ should not exist	

P0075 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

P0075 IVT CONTROL SOLENOID VALVE

DTC Logic

[MRA8DE]

INFOID:000000009758440

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0075	INT/V TIM V/CIR-B1 (Intake valve control sole- noid circuit bank 1)	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	 Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) Intake valve timing control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

- YES >> Proceed to EC-180, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758441

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY

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

	+		
IVT control s	olenoid valve	-	Voltage
Connector Terminal			
F33	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

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

1. Turn ignition switch OFF.

- 2. Disconnect IPDM E/R harness connector.
- Check the continuity between IVT control solenoid valve harness connector and IPDM E/R harness connector.

P0075 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

	+	+			
IVT control s	olenoid valve	IPDM	E/R	Continuity	
Connector	Terminal	Connector	Terminal		
F33	1	E45	26	Existed	
		for short to g	round.		
	ction result n				
				ver supply circuit	
_		place error-de	•		
			JUNTRUL S	OLENOID VALV	GROUND CIRCUIT
2. Disconn		rness connec		enoid valve harn	ss connector and ECM harness connector.
	+	+	•		
IVT control s	olenoid valve	EC	M	Continuity	
Connector	Terminal	Connector	Terminal		
F33	2	F25	93	Existed	
1. Also che	eck harness	for short to g	round and to	power.	
•	<u>ction result n</u>	ormal?			
-	GO TO 4.		otootod north		
	•	place error-de	•		
+.CHECK I	NIAKE VAL	VE HMING C	CONTROL S	OLENOID VALV	
		iming contro	l solenoid va	alve. Refer to <u>E</u>	181, "Component Inspection (IVT Control
<u>Solenoid Va</u>		ormal2			
	<u>ction result n</u>		nt Referto (GI-39, "Intermitte	t Incident"
					er to EM-48, "Exploded View".
Compone	ent Inspect	tion (IVT C	Control So	lenoid Valve	INFOID:000000009758442
4					IN 012.00000003730442
I.CHECK I	NTAKE VAL	VE TIMING C	CONTROL S	OLENOID VALV	-1
1. Turn ign	nition switch	OFF.			
				id valve harness	
3. Check r	esistance be	tween intake	valve timing	control solenol	valve terminals as per the following.
Intake valve	timing control				
	id valve				
+	_	Re	esistance		
Terr	ninal				
	2	6.7 - 7.7 Ω	2 [at 20°C (68°F	F)]	
1			 ∞Ω		
1	Ground	(Continuity	should not exi	st)	
1 2	ction result n	ormal?			
1 2 Is the inspec	<u>ction result n</u> GO TO 2.	ormal?			
1 2 s the inspec YES >>	GO TO 2.		ng control so	olenoid valve. Re	er to <u>EM-48, "Exploded View"</u> .
1 2 Is the inspec YES >> NO >>	GO TO 2. Replace inta	ke valve timi	•	olenoid valve. Re OLENOID VALV	

P0075 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

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

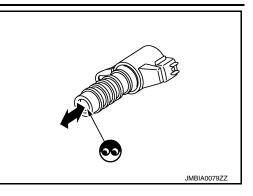
Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve. NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake valve timing control solenoid valve. Refer to <u>EM-48</u>, "<u>Exploded View</u>".



P0078 EVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

P0078 EVT CONTROL SOLENOID VALVE

DTC Logic

А

EC

INFOID:000000009758443

[MRA8DE]

DTC DETECTION LOGIC

	CONSULT	screen terms		Dessible source
DTC No.	(Trouble dia	gnosis content)	DTC detecting condition	Possible cause
P0078	EX V/T ACT/CIR (Exhaust valve c cuit bank 1)		An improper voltage is sent to the ECM through exhaust valve timing control solenoid valve.	 Harness or connectors (Exhaust valve timing control solenoid valve circuit is open or shorted.) Exhaust valve timing control solenoid valve
отс со	FIRMATION	PROCEDUR	RE	
1.PREC	ONDITIONING			
before con 1. Turn i 2. Turn i	nducting the ne gnition switch gnition switch	ext test. OFF and wait ON.	been previously conducted, always at least 10 seconds. at least 10 seconds.	s perform the following procedure
>	•> GO TO2.			
-	ORM DTC CON	FIRMATION	PROCEDURE	
	engine and let			
	< 1st trip DTC.			
•	DTC detected?	_		
	Proceed to INSPECTIO		nosis Procedure".	
	sis Procedu			INFOID:000000009758444
I.CHEC	K EXHAUST V	ALVE TIMING	CONTROL SOLENOID VALVE PO	WER SUPPLY
	gnition switch		EVT) control solenoid valve harness	connector
	gnition switch			connector.
4. Chec	k the voltage b	etween exhau	st valve timing control solenoid valve	e harness connector and ground.
	+ ol solenoid valve		Veltage	
Connecto		_	Voltage	
F55	1	Ground	Battery voltage	
	ection result n		Ballory Voltage	
	> GO TO 3.			
	> GO TO 2.			
2.CHEC	K EXHAUST V	ALVE TIMING	CONTROL SOLENOID VALVE PO	WER SUPPLY CIRCUIT
	gnition switch			
2. Disco	nnect IPDM E/	R harness cor	nnector. control solenoid valve harness con	nector and IPDM E/R harness con-

P0078 EVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

	+		+		
-	EVT control s	solenoid valve	IPDM E/R		Continuity
	Connector	Terminal	Connector	Terminal	
-	F55	1	E45	26	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

$\mathbf{3}$. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between EVT control solenoid valve harness connector and ECM harness connector.

+		-		
EVT control sc	olenoid valve	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F55	2	F25	94	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE

Check the exhaust valve timing control solenoid valve. Refer to <u>EC-181, "Component Inspection (IVT Control</u> <u>Solenoid Valve)"</u>.

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-39, "Intermittent Incident"</u>.
- NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-49, "Removal and Installation".

Component Inspection (EVT Control Solenoid Valve)

INFOID:000000009758445

1. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-1

1. Turn ignition switch OFF.

2. Disconnect exhaust valve timing control solenoid valve harness connector.

3. Check resistance between exhaust valve timing control solenoid valve terminals as per the following.

	timing control id valve			
+	_	Resistance		
Terr	ninal			
1	2	7.0 - 7.8 Ω [at 20°C (68°F)]		
1	Ground	$\Omega \propto$		
2	Gibunu	(Continuity should not exist)		

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace exhaust valve timing control solenoid valve. Refer to <u>EM-49, "Removal and Installation"</u>. 2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-2

1. Remove exhaust valve timing control solenoid valve. Refer to EM-48, "Exploded View".

P0078 EVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

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

Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in exhaust valve timing control solenoid valve. NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-49, "Removal and Installation".



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< DTC/CIRCUIT DIAGNOSIS >

P0101, P0102, P0103 MAF SENSOR

DTC Logic

INFOID:000000009758446

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0101	MAF SEN/CIRCUIT-B1 (Mass or volume air flow "A" circuit range/performance)	An excessively high voltage from the mass air flow sensor is sent to ECM.	 Harness or connectors (Mass air flow sensor circuit is open or shorted.) Mass air flow sensor Sensor power supply 2 circuit
P0102	MAF SEN/CIRCUIT-B1 (Mass or volume air flow "A" circuit low input)	An excessively low voltage from the mass air flow sensor is sent to ECM.	 Harness or connectors (Mass air flow sensor circuit is open or shorted.) Intake air leaks Mass air flow sensor Sensor power supply 2 circuit
P0103	MAF SEN/CIRCUIT-B1 (Mass or volume air flow "A" circuit high input)	An excessively high voltage from the mass air flow sensor is sent to ECM.	 Harness or connectors (Mass air flow sensor circuit is open or shorted.) Mass air flow sensor Sensor power supply 2 circuit

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

Which DTC is detected?

P0102 >> GO TO 2.

P0101 or P0103>>GO TO 3.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

- 1. Start engine and wait at least 5 seconds.
- 2. Check DTC.

Is DTC detected?

- YES >> Proceed to EC-187, "Diagnosis Procedure".
- NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0101 AND P0103-1

1. Turn ignition switch ON and wait at least 5 seconds.

2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-187, "Diagnosis Procedure".

NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0101 AND P0103-2

1. Start engine and wait at least 5 seconds.

2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-187, "Diagnosis Procedure".

NO >> INSPECTION END

< DTC/CIRC			1, P0102	, P0103 MAF	SENSOR	[MRA8DE]
Diagnosis						INFOID:000000009758447
1.INSPECT						A
Confirm the	detected DT	C.				EC
<u>Which DTC i</u>						
P0102 >> (P0101 and	GO TO 2. P0103>>G(O TO 3				
2.CHECK II						С
Check the fo	llowing for c	connection.				
 Air duct Vacuum ho	2000					D
 Intake air p 		ween air duo	t to intake m	nanifold		
Is the inspec						E
	GO TO 3.					
•		or replace er		•		
3. CHECK M	ASS AIR F	LOW (MAF)	SENSOR P	OWER SUPPLY		F
	ition switch					
	ect MAF ser	nsor harness ∩N	connector.			G
0			sensor harr	ness connector ar	nd ground.	
_						
+	ł					H
MAF s	sensor	_	Voltage (Approx.)			
Connector	Terminal		, II <i>,</i>			
F31	1	Ground	5 V			,
Is the inspec		ormal?				
	GO TO 4. GO TO 7.					J
4.CHECK M						
						ĸ
	ition switch ect ECM ha	OFF. rness conne	ctor			
				arness connector	and ECM harness co	onnector.
+	÷		_	_		
MAF s	sensor	E	CM	Continuity		N
Connector	Terminal	Connector	Terminal			
F31	2	F24	34	Existed		_
		for short to p	ower.			Ν
Is the inspec		ormal?				
	GO TO 5. Repair or re	place error-c	letected part	S.		С
5.CHECK N						
					and ECM harness co	
						P
+	ł		_			
MAFS	sensor	F	CM	Continuity		

	+			
 MAF	sensor	E	Continuity	
 Connector	Terminal	Connector	Terminal	
F31	3	F24	35	Existed

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

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts

6.CHECK MAF SENSOR

Check the MAF sensor. Refer to EC-188. "Component Inspection (MAF Sensor)".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-39, "Intermittent Incident"</u>.
- NO >> Replace MAF sensor (with intake air temperature sensor). Refer to EM-25. "Exploded View".

7. CHECK MAF SENSOR POWER CIRCUIT

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

	+		_		
MAF	sensor	ECM		Continuity	
Connector	Terminal	Connector	Terminal		
F31	1	F24	36	Existed	

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

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Check sensor power supply 2 circuit. Refer to EC-444. "Diagnosis Procedure".

Is inspection result normal?

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

Component Inspection (MAF Sensor)

1.CHECK MASS AIR FLOW SENSOR-1

With CONSULT

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT and select "DATA MONITOR" mode of "ENGINE".
- 5. Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	Value
	Ignition switch ON (Engine stopped.)	Approx. 1.3 V
	Idle (Engine is warmed-up to normal oper- ating temperature.)	1.3 - 1.6 V
MAS A/F SE-B1	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.8 - 2.2 V
	Idle to about 4,000 rpm	1.3 - 1.6 V to Ap- prox. 2.5 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm. (R)Without CONSULT

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

[MRA8DE]

INFOID:000000009758448

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

	ECM				
Connector	+	_	Condition	Voltage	
Connector	Terr	minal		gine Approx 1.3.1/	
F24		-	nition switch ON (Engine opped.)	Approx. 1.3 V	
	35		le (Engine is warmed-up to normal berating temperature.)	1.3 - 1.6 V	
Γ24		2.	500 rpm (Engine is warmed-up to prmal operating temperature.)	1.8 - 2.2 V	
		Id	le to about 4,000 rpm	1.3 - 1.6 V to Ap- prox. 2.5 V*	
	-		eing increased to about 4,000 rpm.		
	on result normal				
	SPECTION ENI O TO 2.	ر			
			FLOW THROUGH MASS A		SOR
	on switch OFF. the cause of une	even air flow throu	gh mass air flow sensor. Re	fer to the follow	ing.
Crushed a	ir ducts				3-
	ning seal of air of air of air of air of air cleaner of air cleane				
	/e deposits	element			
Intake van					
		ntake air system p	arts		
Improper s		• •	arts		
Improper s the inspection YES >> Get the section of	specification of ir on result normal' O TO 4.	• •	arts		
Improper s the inspection YES >> Go NO >> Go	specification of ir <u>on result normal</u> O TO 4. O TO 3.	?	arts		
Improper s the inspection YES >> Go NO >> Go	specification of ir on result normal' O TO 4.	?	arts		
Improper s the inspection YES >> GO NO >> GO CHECK MA	specification of ir on result normal O TO 4. O TO 3. NSS AIR FLOW S	? SENSOR-2	arts		
Improper s the inspection YES >> GO NO >> GO CHECK MA With CONS . Repair or	specification of ir on result normal O TO 4. O TO 3. ASS AIR FLOW 3 ULT replace malfunct	? SENSOR-2 tioning part.			
Improper s the inspection YES >> GO NO >> GO CHECK MA With CONS Repair or for Start engin	specification of ir on result normal O TO 4. O TO 3. ASS AIR FLOW 3 ULT replace malfunct ne and warm it u	? SENSOR-2 tioning part. p to normal opera	ing temperature.		
Improper s the inspection YES >> GO NO >> GO .CHECK MA With CONS . Repair or 1 . Start engir . Connect O	specification of ir on result normal O TO 4. O TO 3. ASS AIR FLOW S ULT replace malfunct ne and warm it u CONSULT and se	? SENSOR-2 tioning part. p to normal opera	ing temperature. TOR" mode of "ENGINE".		
Improper s the inspection YES >> GO NO >> GO .CHECK MA With CONS . Repair or 1 . Start engir . Connect O	specification of ir on result normal O TO 4. O TO 3. ASS AIR FLOW S ULT replace malfunct ne and warm it u CONSULT and se	? SENSOR-2 tioning part. p to normal opera elect "DATA MONI	ing temperature. TOR" mode of "ENGINE".		
Improper s the inspection YES >> GO NO >> GO .CHECK MA With CONS . Repair or 1 . Start engir . Connect O	specification of ir on result normal O TO 4. O TO 3. ASS AIR FLOW 3 ULT replace malfunct ne and warm it u CONSULT and se AS A/F SE-B1" a	? SENSOR-2 tioning part. p to normal opera elect "DATA MONI	ing temperature. TOR" mode of "ENGINE".		
Improper s the inspection YES >> GO NO >> GO CHECK MA With CONS Repair or 1 Start engir Connect C Select "MA	specification of ir on result normal? O TO 4. O TO 3. ASS AIR FLOW S ULT replace malfunct ne and warm it u CONSULT and se AS A/F SE-B1" a	? SENSOR-2 tioning part. p to normal opera elect "DATA MONI and check indicatic	ing temperature. TOR" mode of "ENGINE". n.		
Improper s the inspection YES >> GO NO >> GO CHECK MA With CONS Repair or Start engir Connect C Select "MA Monitor item	specification of ir on result normal O TO 4. O TO 3. ASS AIR FLOW S ULT replace malfunct ne and warm it u CONSULT and se AS A/F SE-B1" a	SENSOR-2 tioning part. p to normal operatelect "DATA MONI and check indication Condition N (Engine stopped.) armed-up to normal op	ting temperature. TOR" mode of "ENGINE". n. Value Approx. 1.3 V		
Improper s the inspection YES >> GO NO >> GO CHECK MA With CONS Repair or 1 Start engir Connect C Select "MA	specification of ir on result normal O TO 4. O TO 3. ASS AIR FLOW S ULT replace malfunct ne and warm it u CONSULT and se AS A/F SE-B1" a Ignition switch Of Idle (Engine is wa ating temperature	SENSOR-2 tioning part. p to normal opera elect "DATA MONI and check indicatio Condition V (Engine stopped.) armed-up to normal op e.) e is warmed-up to norm	ting temperature. TOR" mode of "ENGINE". n. Value Approx. 1.3 V er- 1.3 - 1.6 V		
Improper s the inspection YES >> GO NO >> GO CHECK MA With CONS Repair or Start engir Connect C Select "MA Monitor item	specification of ir on result normal' O TO 4. O TO 3. ASS AIR FLOW S ULT replace malfunct ne and warm it u CONSULT and se AS A/F SE-B1" a Ignition switch Of Idle (Engine is wa ating temperature 2,500 rpm (Engin	SENSOR-2 tioning part. p to normal opera elect "DATA MONI and check indicatio Condition N (Engine stopped.) armed-up to normal op e.) e is warmed-up to norr ature.)	ting temperature. TOR" mode of "ENGINE". n. Value Approx. 1.3 V er- 1.3 - 1.6 V		
Improper s the inspection YES >> GO NO >> GO CHECK MA With CONS Repair or Start engin Connect C Select "MA Monitor item	specification of ir on result normal O TO 4. O TO 3. ASS AIR FLOW S ULT replace malfunct ne and warm it u CONSULT and se AS A/F SE-B1" a (Ignition switch ON Idle (Engine is wa ating temperature 2,500 rpm (Engin operating temperature Idle to about 4,00	SENSOR-2 tioning part. p to normal opera elect "DATA MONI and check indication Condition N (Engine stopped.) armed-up to normal op e.) e is warmed-up to norm ature.)	ting temperature. TOR" mode of "ENGINE". n. Value Approx. 1.3 V er- 1.3 - 1.6 V nal 1.8 - 2.2 V 1.3 - 1.6 V to Ap-		
Improper s the inspection YES >> GO NO >> GO CHECK MA With CONS Repair or 1 Start engir Connect C Select "MA Monitor item	specification of ir on result normal O TO 4. O TO 3. ASS AIR FLOW S ULT replace malfunct replace malfunct replace malfunct and warm it u CONSULT and se AS A/F SE-B1" a (Ignition switch ON Idle (Engine is wa ating temperature 2,500 rpm (Engin operating temperature 2,500 rpm (Engin operating temperature Idle to about 4,00 linear voltage rise in NSULT	SENSOR-2 tioning part. p to normal operate elect "DATA MONI and check indication Condition N (Engine stopped.) armed-up to normal op e.) e is warmed-up to norm ature.) 00 rpm	ting temperature. TOR" mode of "ENGINE". n. Value Approx. 1.3 V er- 1.3 - 1.6 V nal 1.8 - 2.2 V 1.3 - 1.6 V to Ap- prox. 2.5 V*		
Improper s the inspection YES >> GO NO >> GO CHECK MA With CONS Repair or 1 Start engir Connect CO Select "MA Monitor item	specification of ir on result normal O TO 4. O TO 3. ASS AIR FLOW S ULT replace malfunct the and warm it u CONSULT and se AS A/F SE-B1" a Ignition switch ON Idle (Engine is wa ating temperature 2,500 rpm (Engin operating temperature 1dle to about 4,00 linear voltage rise in NSULT replace malfunct	SENSOR-2 tioning part. p to normal operate elect "DATA MONI and check indication Condition N (Engine stopped.) armed-up to normal op e.) e is warmed-up to norm ature.) 00 rpm	ting temperature. TOR" mode of "ENGINE". n. Value Approx. 1.3 V er- 1.3 - 1.6 V nal 1.8 - 2.2 V 1.3 - 1.6 V to Ap- prox. 2.5 V* eing increased to about 4,000 rpm.		

< DTC/CIRCUIT DIAGNOSIS >

	ECM			
Connector	+	_	Condition	Voltage
Connector	Terminal			
	35		Ignition switch ON (Engine stopped.)	Approx. 1.3 V
F24		34	Idle (Engine is warmed-up to normal operating temperature.)	1.3 - 1.6 V
1 24			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.8 - 2.2 V
			Idle to about 4,000 rpm	1.3 - 1.6 V to Ap- prox. 2.5 V*

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4.CHECK MASS AIR FLOW SENSOR-3

(I) With CONSULT

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT and select "DATA MONITOR" mode of "ENGINE".
- 5. Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	Value
	Ignition switch ON (Engine stopped.)	Approx. 1.3 V
	Idle (Engine is warmed-up to normal oper- ating temperature.)	1.3 - 1.6 V
MAS A/F SE-B1	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.8 - 2.2 V
	Idle to about 4,000 rpm	1.3 - 1.6 V to Ap- prox. 2.5 V*

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

Without CONSULT

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Check the voltage between ECM harness connector and ground.

	ECM			
Connector	onnector + – Terminal		Condition	Voltage
Connector				
			Ignition switch ON (Engine stopped.)	Approx. 1.3 V
F24	35	34	Idle (Engine is warmed-up to normal operating temperature.)	1.3 - 1.6 V
Γ24	35	54	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.8 - 2.2 V
			Idle to about 4,000 rpm	1.3 - 1.6 V to Ap- prox. 2.5 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm. Is the inspection result normal?

YES NO	>> INSPECTION END >> Clean or replace mass air flow sensor. Refer to <u>EM-25, "Exploded View"</u> .							

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P0111 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0111 IAT SENSOR

DTC Logic

INFOID:000000009758449

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0111	IAT SENSOR 1 B1 (Intake air temperature sensor 1 circuit range/performance bank 1)	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, FTT sensor, and EOT sensor) shows that the voltage signal of the IAT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	 Harness or connectors (High or low resistance in the IAT sensor circuit) IAT sensor

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

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

2. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-193. "Component Function Check".

NOTE:

Use the component function check to check the overall function of the IAT sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-193, "Diagnosis Procedure".

3.PRECONDITIONING

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

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

TESTING CONDITION:

- Before performing the following procedure, do not add fuel.
- Before performing the following procedure, check that fuel level is between 1/4 and 4/4.
- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Move the vehicle to a cool place. **NOTE:**

Cool the vehicle in an environment of ambient air temperature between -10°C (14°F) and 35°C (95°F).

2. Turn ignition switch OFF and leave the vehicle for 12 hours. CAUTION:

Never turn ignition switch ON during this procedure. NOTE:

The vehicle must be cooled with the food open.

- 3. Start engine and let it idle for 5 minutes or more. CAUTION:
 - Never turn ignition switch OFF during idling.
- 4. Check 1st trip DTC.

P0111 IAT SENSOR

< DTC/CIRCUIT	DIAGNOSIS >				[MRA8DE]
Is 1st trip DTC de					
	eed to <u>EC-193, "Diag</u> ı ECTION END	nosis Pro	ocedure".		/
	unction Check				NFOID:000000009758450
				"	E
		RE (IAT)	SENSOR		
 Turn ignition Select "DATA" 	nass air flow sensor h	th CONS	SULT.	-	(
5. Check that i	NTA TEMP SEN IN	illales as	s per tollowing c		
Monitor item	Condition		Value		I
INT/A TEMP SEN	Temperature [°C (°F)]	25 (77)	(Approx.) 1.9 - 2.1 (V)		I
Is the inspection		20 (11)	1.0 - 2.1 (V)		
YES >> Chec	k intermittent incident			<u>ittent Incident"</u> .	I
Diagnosis Pro	ocedure			I.	NFOID:000000009758451
1.CHECK INTAK	E AIR TEMPERATU	RE (IAT)	SENSOR		
	emperature sensor. F			nent Inspection".	
Is the inspection	result normal?				
				<u>ittent Incident"</u> . pperature sensor). Refer to <u>EM-2</u>	5, "Exploded
Component Ir	spection			l.	NFOID:000000009758452
	' (E AIR TEMPERATU		200		
		RE SEN	SUR		
2. Disconnect n	nass air flow sensor h	arness c	onnector and re	connect it again.	ł
 Turn ignition Select "DATA" 	switch ON. MONITOR" mode wi	th CONS	SULT.		
5. Check that th	e indicated value of			most the same as intake air tempe	erature.
Is the inspection YES >> INSP	<u>result normal?</u> ECTION END				
	ace mass air flow se	nsor (wit	h intake air ten	nperature sensor). Refer to <u>EM-2</u>	5, "Exploded
					1
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P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0112, P0113 IAT SENSOR

DTC Logic

INFOID:000000009758453

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0112	IAT SEN/CIRCUIT- B1 (Intake air temperature sensor 1 circuit low bank 1)	An excessively low voltage from the intake air temperature sensor is sent to ECM.	Harness or connectors (Intake air temperature sensor circuit is
P0113	IAT SEN/CIRCUIT- B1 (Intake air temperature sensor 1 circuit high bank 1)	An excessively high voltage from the intake air temperature sensor is sent to ECM.	 • Intake air temperature sensor • Intake air temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

- YES >> Proceed to EC-194, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758454

1. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor (with intake air temperature sensor) harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between mass air flow sensor harness connector and ground.

	+		
MAF sensor		-	Voltage (Approx.)
Connector	Connector Terminal		
F31	4	Ground	5.0 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- 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.

P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

	sensor	EC	<i>۲</i> ۸ <i>۸</i>	Continuity	
				Continuity	
Connector	Terminal	Connector	Terminal	Eviated	
F31	4	F24	33	Existed	
		for short to g	round.		
	ction result n		ania far na	vor our ok oirou	
		blace error-d		wer supply circu s.	
	•		•	OR GROUND C	RCUIT
	nition switch				
. Disconr	ect ECM ha	rness conne	ctor.		
6. Check t	he continuity	between ma	ass air flow s	sensor harness	onnector and ECM harness connector.
	+	-	-		
	sensor	EC		Continuity	
Connector F31	Terminal 2	Connector F24	Terminal 34	Existed	
-	_		-	Existed	
		for short to p	ower.		
s the inspec	<u>ction result n</u>	ormal?			
	GO TO 4.				
NO >>	Repair or re	place error-d	etected part	S.	
.CHECK I	NTAKE AIR	TEMPERAT	URE SENS	OR	
Check the ir	ntake air tem	berature sen	sor. Refer to	EC-195. "Com	onent Inspection (IAT Sensor)".
			sor. Refer to	EC-195, "Com	onent Inspection (IAT Sensor)".
s the inspec	ction result n	ormal?			
<u>s the inspec</u> YES >>	<u>ction result n</u> Check interr	<u>ormal?</u> nittent incide	nt. Refer to	<u>GI-39, "Intermit</u>	ent Incident".
<u>s the inspec</u> YES >>	<u>ction result n</u> Check interr	<u>ormal?</u> nittent incide	nt. Refer to	<u>GI-39, "Intermit</u>	
s the inspec YES >> NO >>	<u>ction result n</u> Check interr Replace ma <u>View"</u> .	ormal? nittent incide ss air flow s	nt. Refer to ensor (with	<u>GI-39, "Intermit</u>	ent Incident".
s the inspec YES >> NO >> Compone	ction result n Check interr Replace ma <u>View"</u> . ent Inspec	ormal? nittent incide ss air flow s tion (IAT S	nt. Refer to ensor (with Sensor)	<u>GI-39, "Intermit</u> intake air temp	ent Incident". Frature sensor). Refer to EM-25, "Explode
s the inspec YES >> NO >> Compone	ction result n Check interr Replace ma <u>View"</u> . ent Inspec	ormal? nittent incide ss air flow s	nt. Refer to ensor (with Sensor)	<u>GI-39, "Intermit</u> intake air temp	ent Incident". Frature sensor). Refer to EM-25, "Explode
s the inspect YES >> NO >> Compone .CHECK I	ction result n Check interr Replace ma <u>View"</u> . ent Inspec NTAKE AIR nition switch	ormal? nittent incide ss air flow s tion (IAT S TEMPERAT OFF.	nt. Refer to ensor (with Sensor) URE SENSO	<u>GI-39, "Intermit</u> intake air temp OR	ent Incident". erature sensor). Refer to <u>EM-25. "Explode</u>
s the inspec YES >> NO >> Compone .CHECK I	ction result n Check interr Replace ma <u>View"</u> . ent Inspec NTAKE AIR nition switch nect mass air	ormal? nittent incide ss air flow s tion (IAT S TEMPERAT OFF. flow sensor	nt. Refer to ensor (with Sensor) URE SENSO	<u>GI-39, "Intermit</u> intake air temp	ent Incident". erature sensor). Refer to <u>EM-25. "Explode</u>
s the inspec YES >> NO >> Compone .CHECK I . Turn igr . Disconr 5. Turn igr	ction result n Check interr Replace ma <u>View"</u> . ent Inspec NTAKE AIR nition switch nect mass air nition switch	ormal? nittent incide ss air flow s tion (IAT S TEMPERAT OFF. flow sensor ON.	nt. Refer to ensor (with Sensor) URE SENS(harness cor	<u>GI-39, "Intermit</u> intake air temp DR nnector and rec	ent Incident". erature sensor). Refer to <u>EM-25. "Explode</u> INFOID:0000000097584
s the inspec YES >> NO >> Compone .CHECK I . Turn igr . Disconr . Turn igr . On CON	ction result n Check interr Replace ma <u>View"</u> . ent Inspec NTAKE AIR nition switch nect mass air nition switch SULT scree	ormal? nittent incide ss air flow s tion (IAT S TEMPERAT OFF. flow sensor ON. on, select "EN	nt. Refer to ensor (with Sensor) URE SENS(harness cor IGINE" >> "	<u>GI-39, "Intermit</u> intake air temp DR nnector and rec DATA MONITO	ent Incident". erature sensor). Refer to <u>EM-25. "Explode</u> INFOID:0000000097584 nnect it again. " >> "INT/A TEMP SEN".
s the inspect YES >> NO >> Compone .CHECK I . Turn igr . Disconr . Turn igr . On CON . Check t	ction result n Check interr Replace ma <u>View"</u> . ent Inspec NTAKE AIR NTAKE AIR NTAKE AIR NTAKE AIR NTAKE AIR NTAKE AIR NTAKE AIR NTAKE AIR NTAKE AIR	ormal? nittent incide ss air flow s tion (IAT S TEMPERAT OFF. flow sensor ON. on, select "EN ated value of	nt. Refer to ensor (with Sensor) URE SENS(harness cor IGINE" >> "	<u>GI-39, "Intermit</u> intake air temp DR nnector and rec DATA MONITO	ent Incident". erature sensor). Refer to <u>EM-25. "Explode</u> INFOID:0000000097584
s the inspect YES >> NO >> Compone .CHECK I . Turn igr . Disconr . Turn igr . On CON . Check t s the inspect	ction result n Check interr Replace ma <u>View"</u> . ent Inspec NTAKE AIR nition switch ect mass ain nition switch SULT scree hat the indica	ormal? nittent incide ss air flow s tion (IAT S TEMPERAT OFF. flow sensor ON. n, select "EN ated value of ormal?	nt. Refer to ensor (with Sensor) URE SENS(harness cor IGINE" >> "	<u>GI-39, "Intermit</u> intake air temp DR nnector and rec DATA MONITO	ent Incident". erature sensor). Refer to <u>EM-25. "Explode</u> INFOID:0000000097584 nnect it again. " >> "INT/A TEMP SEN".
s the inspec YES >> NO >> Compone .CHECK I . Turn igr . Disconr . Turn igr . Disconr . Turn igr . On CON . Check t s the inspec YES >> NO >>	ction result n Check interr Replace ma <u>View"</u> . ent Inspec NTAKE AIR nition switch nect mass air nition switch SULT scree hat the indica ction result n INSPECTIO	ormal? nittent incide ss air flow s tion (IAT S TEMPERAT OFF. flow sensor OF. orn, select "EN ated value of ormal? N END	nt. Refer to ensor (with Sensor) URE SENS(harness cor MGINE" >> " "INT/A TEI	GI-39, "Intermit intake air temp OR nnector and rec DATA MONITO MP SEN" is alm	ent Incident". erature sensor). Refer to <u>EM-25. "Explode</u> INFOID:0000000097584 nnect it again. " >> "INT/A TEMP SEN".

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P0116 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0116 ECT SENSOR

DTC Logic

INFOID:000000009758456

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0116	ECT SEN/CIRC (Engine coolant temperature sensor 1 circuit range/perfor- mance)	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, FTT sensor, and EOT sensor) shows that the voltage signal of the ECT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	 Harness or connectors (High or low resistance in the ECT sensor circuit) ECT sensor

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 3.

NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-197, "Component Function Check".

NOTE:

Use the component function check to check the overall function of the ECT sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

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

3.PRECONDITIONING

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

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

TESTING CONDITION:

- Before performing the following procedure, do not add fuel.
- Before performing the following procedure, check that fuel level is between 1/4 and 4/4.
- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Move the vehicle to a cool place.
- NOTE:

Cool the vehicle in an environment of ambient air temperature between –10°C (14°F) and 35°C (95°F). Turn ignition switch OFF and leave the vehicle for 12 hours.

CAUTION: Never turn ignition switch ON during this procedure. NOTE:

The vehicle must be cooled with the food open.

3. Start engine and let it idle for 5 minutes or more. CAUTION:

Never turn ignition switch OFF during idling.

4. Check 1st trip DTC.

			FUIIO		
C DTC	C/CIRCUIT	DIAGNOSIS >			[MRA8DE]
s 1st	t trip DTC de	tected?			
YES		ed to EC-197, "Dia	<u>gnosis Proc</u>	<u>edure"</u> .	
NO	>> INSP	ECTION END			-
com	nponent F	unction Check			INFOID:000000009758457
		NE COOLANT TEM			
			PERAIURE	E (ECT) SENSOR	
	Furn ignition s Disconnect F	CT sensor harness	connector		
. R	Remove ECT	sensor. Refer to C	<u> </u>		
		ance between EC1 r as shown in the fig		rminals by heating	
vv	with hot wate		juie.		
E	ECT sensor				
+		 Conditio	n	Resistance (kΩ)	
	Terminal	_			
			20 (68)	2.37 – 2.63	
1	1 2	Temperature [°C	50 (122)	0.68 – 1.00	
		(°F)]	90 (194)	0.236 - 0.260	JMBIA0080ZZ
YES NO		k intermittent incide eed to <u>EC-197, "Dia</u>		<u>GI-39, "Intermittent</u> edure".	Incident".
YES NO)iag	S >> Chec >> Proce	k intermittent incide eed to <u>EC-197, "Dia</u>	<u>gnosis Proc</u>	edure".	
YES NO Diag	S >> Chec >> Proce gnosis Pro	k intermittent incide eed to <u>EC-197, "Dia</u> ocedure	<u>gnosis Proc</u> PERATURE	<u>edure"</u> . E (ECT) SENSOR	
YES NO)iag .CH	S >> Chec >> Proce gnosis Pro HECK ENGII	k intermittent incide eed to <u>EC-197. "Dia</u> p cedure NE COOLANT TEM	<u>gnosis Proc</u> PERATURE	<u>edure"</u> . E (ECT) SENSOR	
YES NO Iag .CH heck the YES	S >> Chec >> Proce gnosis Pro HECK ENGI k ECT senso inspection r S >> Chec	k intermittent incide eed to <u>EC-197, "Dia</u> ocedure NE COOLANT TEM or. Refer to <u>EC-197,</u> result normal? k intermittent incide	perature PERATURE "Componer nt. Refer to	edure". E (ECT) SENSOR <u>nt Inspection"</u> . <u>GI-39, "Intermittent</u>	INFOID:000000009758458
YES NO iag .CH heck the YES NO	S >> Chec >> Proce gnosis Pro HECK ENGI K ECT senso inspection r S >> Chec >> Repla	k intermittent incide eed to <u>EC-197, "Dia</u> ocedure NE COOLANT TEM or. Refer to <u>EC-197,</u> result normal? k intermittent incide ace ECT sensor. Re	perature PERATURE "Componer nt. Refer to	edure". E (ECT) SENSOR <u>nt Inspection"</u> . <u>GI-39, "Intermittent</u>	INFOID:000000009758458
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YES NO iag .CH heck the YES NO	S >> Chec >> Proce DINOSIS Pro HECK ENGIN k ECT senso inspection r S >> Chec >> Repla	k intermittent incide eed to <u>EC-197, "Dia</u> ocedure NE COOLANT TEM or. Refer to <u>EC-197, result normal?</u> k intermittent incide ace ECT sensor. Re	PERATURE "Componer nt. Refer to fer to <u>CO-24</u>	edure". E (ECT) SENSOR <u>nt Inspection"</u> . <u>GI-39, "Intermittent</u> 4, "Exploded View".	INFOID:00000009758458
YES NO iag .CH heck the YES NO CH	S >> Chec >> Proce gnosis Pro HECK ENGI k ECT senso inspection r >> Chec >> Repla nponent In HECK ENGI	k intermittent incide eed to <u>EC-197, "Dia</u> ocedure NE COOLANT TEM or. Refer to <u>EC-197, result normal?</u> k intermittent incide ace ECT sensor. Re ispection	PERATURE "Componer nt. Refer to fer to <u>CO-24</u>	edure". E (ECT) SENSOR <u>nt Inspection"</u> . <u>GI-39, "Intermittent</u> 4, "Exploded View".	INFOID:00000009758458
YES NO .CH heck the YES NO .CH	S >> Chec >> Proce gnosis Pro HECK ENGIT k ECT sense inspection r S >> Chec >> Repla Donent In HECK ENGIT	k intermittent incide eed to <u>EC-197, "Dia</u> ocedure NE COOLANT TEM or. Refer to <u>EC-197, result normal?</u> k intermittent incide ace ECT sensor. Re ispection	PERATURE "Componer nt. Refer to fer to <u>CO-24</u> PERATURE	edure". E (ECT) SENSOR <u>nt Inspection"</u> . <u>GI-39, "Intermittent</u> 4, "Exploded View".	INFOID:00000009758458
YES NO Jiag .CH heck the YES NO CH . Ti . D . R	S >> Chec >> Proce gnosis Pro HECK ENGI k ECT senso inspection r >> Chec >> Repla Disconnect E Remove ECT	k intermittent incide eed to <u>EC-197, "Dia</u> ocedure NE COOLANT TEM or. Refer to <u>EC-197,</u> result normal? k intermittent incide ace ECT sensor. Re ispection NE COOLANT TEM switch OFF. CT sensor harness sensor.	PERATURE "Componer nt. Refer to fer to <u>CO-24</u> PERATURE connector.	edure". E (ECT) SENSOR <u>nt Inspection"</u> . <u>GI-39, "Intermittent</u> 4, "Exploded View". E (ECT) SENSOR	INFOID:00000009758458
YES NO iag .CH heck the YES NO CH .CH . Ti . D R C	S >> Chec >> Proce gnosis Pro HECK ENGI K ECT senso inspection r >> Chec >> Repla Disconnect E Remove ECT Check resista	k intermittent incide eed to <u>EC-197, "Dia</u> ocedure NE COOLANT TEM or. Refer to <u>EC-197,</u> result normal? k intermittent incide ace ECT sensor. Re ispection NE COOLANT TEM switch OFF. CT sensor harness sensor. ance between ECT	PERATURE "Componer nt. Refer to fer to <u>CO-24</u> PERATURE connector.	edure". E (ECT) SENSOR <u>nt Inspection"</u> . <u>GI-39, "Intermittent</u> 4, "Exploded View".	INFOID:00000009758458
YES NO iag .CH heck the YES NO CH .CH . Ti . D R C	S >> Chec >> Proce gnosis Pro HECK ENGI K ECT senso inspection r >> Chec >> Repla Disconnect E Remove ECT Check resista	k intermittent incide eed to <u>EC-197, "Dia</u> ocedure NE COOLANT TEM or. Refer to <u>EC-197,</u> result normal? k intermittent incide ace ECT sensor. Re ispection NE COOLANT TEM switch OFF. CT sensor harness sensor.	PERATURE "Componer nt. Refer to fer to <u>CO-24</u> PERATURE connector.	edure". E (ECT) SENSOR <u>nt Inspection"</u> . <u>GI-39, "Intermittent</u> 4, "Exploded View". E (ECT) SENSOR	INFOID:00000009758458
YES NO .CH heck the YES NO OM .CH Ti D R C W	S >> Chec >> Proce gnosis Pro HECK ENGI K ECT senso inspection r >> Chec >> Repla Disconnect E Remove ECT Check resista	k intermittent incide eed to <u>EC-197, "Dia</u> ocedure NE COOLANT TEM or. Refer to <u>EC-197,</u> result normal? k intermittent incide ace ECT sensor. Re ispection NE COOLANT TEM switch OFF. CT sensor harness sensor. ance between ECT	PERATURE "Componer nt. Refer to fer to <u>CO-24</u> PERATURE connector.	edure". E (ECT) SENSOR <u>nt Inspection"</u> . <u>GI-39, "Intermittent</u> 4, "Exploded View". E (ECT) SENSOR	INFOID:00000009758458
YES NO Iag CH heck the YES NO COM CH TI D R C W	S >> Chec >> Proce gnosis Pro HECK ENGI k ECT senso inspection r >> Chec >> Repla Disconnect E Remove ECT Check resista with hot wate	k intermittent incide eed to <u>EC-197, "Dia</u> ocedure NE COOLANT TEM or. Refer to <u>EC-197,</u> result normal? k intermittent incide ace ECT sensor. Re ispection NE COOLANT TEM switch OFF. CT sensor harness sensor. ance between ECT	PERATURE "Componer nt. Refer to fer to <u>CO-24</u> PERATURE connector. - sensor te jure.	edure". E (ECT) SENSOR <u>Int Inspection"</u> . <u>GI-39, "Intermittent</u> <u>4, "Exploded View"</u> . E (ECT) SENSOR rminals by heating Resistance	INFOID:00000009758458
YES NO iag .CH heck the YES NO COM .CH . D R .CH . C W .CH .CH .CH .CH .CH .CH .CH .CH .CH .CH .CH .CH 	S >> Chec >> Proce gnosis Pro HECK ENGI k ECT senso inspection r >> Chec >> Repla Disconnect E Remove ECT Check resista with hot wate	k intermittent incide eed to <u>EC-197, "Dia</u> Cedure NE COOLANT TEM or. Refer to <u>EC-197, result normal?</u> k intermittent incide ace ECT sensor. Re ASPECTION NE COOLANT TEM switch OFF. CT sensor harness sensor. ance between ECT r as shown in the fig	PERATURE "Componer nt. Refer to fer to <u>CO-24</u> PERATURE connector. - sensor te jure.	edure". E (ECT) SENSOR <u>nt Inspection"</u> . <u>GI-39, "Intermittent</u> <u>4, "Exploded View"</u> . E (ECT) SENSOR rminals by heating	INFOID:00000009758458
YES NO Diag .CH theck the YES NO COM .CH . Ti . D . R . C . W . Ti . C . Ti . C . C	S >> Chec >> Proce gnosis Pro HECK ENGI Ex ECT senso inspection r S >> Chec >> Repla nponent In HECK ENGI Furn ignition s Disconnect E Remove ECT Check resista with hot wate	k intermittent incide eed to <u>EC-197, "Dia</u> Cedure NE COOLANT TEM or. Refer to <u>EC-197, result normal?</u> k intermittent incide ace ECT sensor. Re ASPECTION NE COOLANT TEM switch OFF. CT sensor harness sensor. ance between ECT r as shown in the fig	PERATURE "Componer nt. Refer to fer to <u>CO-24</u> PERATURE connector. - sensor te jure.	edure". E (ECT) SENSOR <u>Int Inspection"</u> . <u>GI-39, "Intermittent</u> <u>4, "Exploded View"</u> . E (ECT) SENSOR rminals by heating Resistance	INFOID:00000009758458
YES NO Diag .CH Check Sthe YES NO Com .CH . Th . D . CH . Th . CH . Th . CH . CH	S >> Chec >> Proce gnosis Pro HECK ENGI Ex ECT senso inspection r S >> Chec >> Repla nponent In HECK ENGI Furn ignition s Disconnect E Remove ECT Check resista with hot wate	k intermittent incide eed to <u>EC-197, "Dia</u> Cedure NE COOLANT TEM or. Refer to <u>EC-197, result normal?</u> k intermittent incide ace ECT sensor. Re ASPECTION NE COOLANT TEM switch OFF. CT sensor harness sensor. ance between ECT r as shown in the fig	PERATURE "Componer nt. Refer to fer to <u>CO-22</u> PERATURE connector. - sensor te jure. ion 20 (68)	edure". E (ECT) SENSOR <u>ht Inspection"</u> . <u>GI-39, "Intermittent</u> <u>4, "Exploded View"</u> . E (ECT) SENSOR rminals by heating Resistance (kΩ)	INFOID:00000009758458

P0116 ECT SENSOR

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor. Refer to <u>CO-24, "Exploded View"</u>.

P0117, P0118 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0117, P0118 ECT SENSOR

DTC Logic

INFOID:000000009758460

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0117	ECT SEN/CIRC (Engine coolant tempera- ture sensor 1 circuit low)	An excessively low voltage from the engine coolant temperature sensor is sent to ECM.	Harness or connectors (Engine coolant temperature sensor cir-
P0118	ECT SEN/CIRC (Engine coolant tempera- ture sensor 1 circuit high)	An excessively high voltage from the engine coolant temperature sensor is sent to ECM.	cuit is open or shorted.) Engine coolant temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

- YES >> Proceed to EC-198, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758461

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature (ECT) sensor harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ECT sensor harness connector and ground.

	+		N / 1/	
ECT	ECT sensor		Voltage (Approx.)	
Connector	Terminal			
F6	1	Ground	5.0 V	

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.check engine coolant temperature sensor power supply circuit

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between ECT sensor harness connector and ECM harness connector.

P0117, P0118 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

	+	-	-		
-	sensor	EC		Continuity	
Connector F6	Terminal 1	Connector F24	Terminal 28	Existed	
	-	for short to g	-	Existed	
	ction result	-	iounu.		
-			nosis for pov	ver supply circuit.	
NO >>	Repair or re	eplace error-d	etected part	S.	
3. CHECK	ENGINE CO	OLANT TEM	PERATURE	SENSOR GROUN	ID CIRCUIT
	nition switch				
		arness connec		arness connector ar	nd ECM harness connector.
J. CHECK					lu Low namess connector.
	+	-	-		
ECT	sensor	EC	СМ	Continuity	
Connector	Terminal	Connector	Terminal		
F6	2	F24	27	Existed	
. Also ch	eck harness	for short to g	round to po	wer.	
-	ction result i	normal?			
	GO TO 4.	eplace error-d	otoctod part	6	
	-	OLANT TEM	-		
					magnet Inspection (ECT Separar)"
	ction result i			elei lo <u>EC-199, CO</u>	mponent Inspection (ECT Sensor)".
			nt. Refer to	GI-39, "Intermittent	Incident".
					D-24, "Exploded View".
compone	ent Inspec	tion (ECT	Sensor)		INFOID:000000009758462
			, 		
		OLANT TEM	PERATURE	SENSOR	
	nition switch		aratura sons	or harness connect	or
		plant tempera			
				emperature sensor	
termina	is by heating	g with hot wat	er as shown	i in the figure.	
ECT sen	sor				
+	_	Condit	ion	Resistance	
Termina	al	Condit			
			20 (6	8) 2.37 - 2.63 kΩ	
	1		== (•	,	
1	2 Temp	perature [°C (°F)]	50 (12	22) 0.68 - 1.00 kΩ	
1	2 Temp	perature [°C (°F)]	50 (12 90 (19		JMBIA0080ZZ

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor. Refer to <u>CO-24, "Exploded View"</u>.

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, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-353</u>, "<u>DTC Logic</u>".

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0122	TP SEN 2/CIRC-B1 (Throttle/Pedal position sensor/switch "A" circuit low)	An excessively low voltage from the TP sensor 2 is sent to ECM.	 Harness or connectors (TP sensor 2 circuit is open or shorted.)
P0123	TP SEN 2/CIRC-B1 (Throttle/Pedal position sensor/switch "A" circuit high)	An excessively high voltage from the TP sensor 2 is sent to ECM.	 Electric throttle control actuator (TP sensor 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:000000009758464

1. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect electric throttle control actuator harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actu- ator		_	Voltage (Approx.)	
Connector	Terminal			
F7	2	Ground	5.0 V	
le the ineper	tion result n	ormal?		

Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 2. INFOID:000000009758463

P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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$\overline{2}$. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

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

	+	-	_	
	le control actu- tor	EC	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F7	2	F25	80	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

3.CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

	+		_	
	e control actu- tor	EC	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F7	4	F25	78	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT

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

	+	-	_	
	e control actu- tor	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	
F7	3	F25	77	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to EC-202, "Component Inspection (TP Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-39, "Intermittent Incident"</u>.

NO >> Replace electric throttle control actuator. Refer to EM-27, "Removal and Installation".

P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection (TP Sensor)

INFOID:000000009758465

[MRA8DE]

1. CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform "Throttle Valve Closed Position Learning". Refer to EC-139, "Work Procedure".
- 4. Turn ignition switch ON.
- 5. Set selector lever to D (CVT) or 1st (M/T) position.
- 6. Check the voltage between ECM harness connector terminals as per the following conditions.

	ECM				
Connec-	+	-	Condition Volt		Voltage
tor	Terr	ninal			
	77			Fully released	Less than 4.75 V
F25		78	Accelerator Fully depressed		More than 0.36 V
F2J	79	70	pedal	Fully released	More than 0.36 V
	19			Fully depressed	Less than 4.75 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to <u>EM-27, "Removal and Installation"</u>.

P0125 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0125 ECT SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P0125 is displayed with P0116, first perform the trouble diagnosis for DTC P0116. Refer to <u>EC-</u> <u>196, "DTC Logic"</u>.
- If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to <u>EC-198, "DTC Logic"</u>.

	CONSULT screen terms		Describe service
DTC No.	(Trouble diagnosis content)	DTC detecting condition	Possible cause
P0125	ECT SENSOR (Insufficient coolant tempera- ture 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
•	FIRMATION PROCEDUR	RE	
1 .PRECO	NDITIONING		
before cond 1. Turn ig 2. Turn ig	nfirmation Procedure has ducting the next test. nition switch OFF and wait nition switch ON. nition switch OFF and wait		perform the following procedure
>>	• GO TO 2.		
2. CHECK	ENGINE COOLANT TEMP	ERATURE SENSOR FUNCTION	
2. Select 3. Check With GS Follow the Is it above YES >> NO >>	nition switch ON. "DATA MONITOR" mode of that "COOLANT TEMP/S" i	" above.	
2. Check If "COOLA because th	ngine and run it for 65 minu 1st tip DTC.	tes at idle speed. ncreases to more than 10°C (50°F) v	vithin 65 minutes, stop engine
With GS			
<u>Is 1st trip D</u> YES >>	procedure "With CONSULT <u>TC detected?</u> • Proceed to <u>EC-203, "Diag</u> • INSPECTION END		
Diagnosi	s Procedure		INFOID:00000009758467
1. CHECK	ENGINE COOLANT TEMP	ERATURE SENSOR	

[MRA8DE]

INFOID:000000009758466

Revision: October 2013

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P0125 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Check the engine coolant temperature sensor. Refer to EC-197. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace engine coolant temperature sensor. Refer to <u>CO-24, "Exploded View"</u>.

2. CHECK THERMOSTAT OPERATION

When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.

Is the inspection result normal?

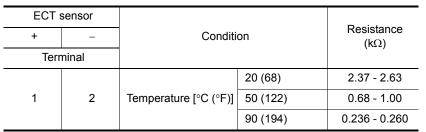
- YES >> Check intermittent incident. Refer to <u>GI-39, "Intermittent Incident"</u>.
- NO >> Repair or replace thermostat. Refer to CO-21. "Removal and Installation of Thermostat".

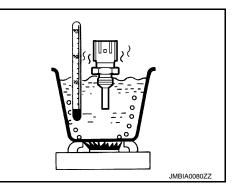
Component Inspection

INFOID:000000009758468

1. CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

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





Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor. Refer to <u>CO-24, "Exploded View"</u>.

P0127 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0127 IAT SENSOR

DTC Logic

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INFOID:000000009758469

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0127	IAT SENSOR-B1 (Intake air temperature too high)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	 Harness or connectors (Intake air temperature sensor circuit is open or shorted) Intake air temperature sensor
TC CON	FIRMATION PROCEDUR	E	
.PRECO	NDITIONING		
efore con . Turn ig . Turn ig . Turn ig ESTING (This test n	ducting the next test. Inition switch OFF and wait a Inition switch ON. Inition switch OFF and wait a CONDITION: nay be conducted with the		
	> GO TO 2.		
PERFO	RM DTC CONFIRMATION F	PROCEDURE	
With CO		r_{2} is less than $06^{\circ}C$ (205°C)	
Turn ig	inition switch ON.	ure is less than 96°C (205°F)	
	"DATA MONITOR" mode of the engine coolant temperat		
		is not less than 96°C (205°F), turn igniti	ion awitab OFF and agal down
engine	•		
engine NOTE: Perform t	the following steps before en	gine coolant temperature is above 96°C	
engine NOTE: Perform t . Turn ig	the following steps before en Inition switch ON.	gine coolant temperature is above 96°C	
engine NOTE: Perform t . Turn ig . Select . Start e	the following steps before en nition switch ON. "DATA MONITOR" mode of ngine.	gine coolant temperature is above 96°C "ENGINE" using CONSULT	5 (205°F).
engine NOTE: Perform to . Turn ig . Select . Start e . Hold ve CAUT	the following steps before en inition switch ON. "DATA MONITOR" mode of ngine. ehicle speed at more than 70	gine coolant temperature is above 96°C "ENGINE" using CONSULT D km/h (43 MPH) for 100 consecutive se	5 (205°F).
engine NOTE: Perform f . Turn ig . Select . Start e . Hold v CAUT Alway	the following steps before en inition switch ON. "DATA MONITOR" mode of ngine. ehicle speed at more than 70 I <mark>ON: s drive vehicle at a safe sp</mark>	gine coolant temperature is above 96°C "ENGINE" using CONSULT D km/h (43 MPH) for 100 consecutive se	5 (205°F).
engine NOTE: Perform f . Turn ig . Select . Start e . Hold ve CAUT Alway . Check With GS	the following steps before en mition switch ON. "DATA MONITOR" mode of ngine. ehicle speed at more than 70 ION: s drive vehicle at a safe sp 1st trip DTC. ST	gine coolant temperature is above 96°C "ENGINE" using CONSULT 0 km/h (43 MPH) for 100 consecutive se	5 (205°F).
engine NOTE: Perform f . Turn ig . Select . Start e . Hold v CAUT Alway . Check With GS ollow the	the following steps before en inition switch ON. "DATA MONITOR" mode of ngine. ehicle speed at more than 70 ION: s drive vehicle at a safe sp 1st trip DTC. ST procedure "With CONSULT"	gine coolant temperature is above 96°C "ENGINE" using CONSULT 0 km/h (43 MPH) for 100 consecutive se	5 (205°F).
engine Perform f . Turn ig . Select . Start e . Hold ve CAUT Alway . Check With GS ollow the <u>s 1st trip E</u> YES >>	the following steps before en mition switch ON. "DATA MONITOR" mode of ngine. ehicle speed at more than 70 ION: s drive vehicle at a safe sp 1st trip DTC. ST	gine coolant temperature is above 96°C "ENGINE" using CONSULT 0 km/h (43 MPH) for 100 consecutive se need. above.	5 (205°F).
engine NOTE: Perform f Select Start e Hold v CAUT Alway Check With GS follow the Salst trip D YES	the following steps before en mition switch ON. "DATA MONITOR" mode of ngine. ehicle speed at more than 70 ON: s drive vehicle at a safe sp 1st trip DTC. ST procedure "With CONSULT" <u>OTC detected?</u> > Proceed to <u>EC-205. "Diagn</u>	gine coolant temperature is above 96°C "ENGINE" using CONSULT 0 km/h (43 MPH) for 100 consecutive se need. above.	5 (205°F).

YES

>> Check intermittent incident. Refer to <u>GI-39, "Intermittent Incident"</u>.
>> Replace mass air flow sensor (with intake air temperature sensor). Refer to <u>EM-25, "Exploded</u> NO View"



< DTC/CIRCUIT DIAGNOSIS >

Component Inspection

INFOID:000000009758471

1. CHECK INTAKE AIR TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Turn ignition switch ON.
- 4. Select "DATA MONITOR" mode with CONSULT.
- 5. Check that the indicated value of "INT/A TEMP SEN" is almost the same as intake air temperature.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to <u>EM-25</u>, "<u>Exploded</u> <u>View</u>".

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 or P0304, first perform the trouble diagnosis for P0300, P0301, P0302, P0303 or P0304. Refer to <u>EC-269, "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 leak in the seal or the thermostat being stuck open.

DTC No.	CONSULT screen terms (Trouble diagnosis content	DTC detecting condition	Possible cause
P0128	THERMSTAT FNCTN [Coolant thermostat (coolant temperature below thermosta regulating temperature)]	t 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
отс со	NFIRMATION PROCE	DURE	
IOTE:			
	uel before and during the ONDITIONING-1	tollowing procedure.	
	nducting the next test.	as been previously conducted, always	s perform the following procedure
. Turn	ignition switch OFF and v	vait at least 10 seconds.	
	ignition switch ON. ignition switch OFF and v	vait at least 10 seconds.	
	0		
	>> GO TO 2.		
.PREC	ONDITIONING-2		
· ·	ONSULT		
	ignition switch ON. k the following conditions		
Ambient te	emperature	-10°C (14°F) or more	
A/C switch	1	OFF	
Blower far	n switch	OFF	
		e of "ENGINE" using CONSULT.	
. Chec	k the following conditions		
COOLAN	TEMP/S	–10°C – 58°C (14 – 136°F)	
the cor	dition satisfied?	,	
	>> GO TO 3.		
NO >	>> 1. Satisfy the conditi	on.	
	2. GO TO 3. ORM DTC CONFIRMATI		
~	ONSULT engine.		
. Drive	the vehicle until the follo	wing condition is satisfied.	
	TION: ve drive vehicle at cafe	speed	
AIWa	ys drive vehicle at safe	speeu.	

- STEP 1

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P0128 THERMOSTAT FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Drive the vehicle under the conditions instructed below until the difference between "COOLANT TEMP/S" and "FUEL T/TMP SE" becomes at least 26°C (47°F).

COOLANT TEMP/S	66°C (151°F) or less
FUEL T/TMP SE	Less than the value calculated by sub- tracting 26°C (47°F) from "COOLANT TEMP/S".*

*: Example

COOLANT TEMP/S	FUEL T/TMP SE
70°C (158°F)	44°C (111°F) or less
65°C (149°F)	39°C (102°F) or less
60°C (140°F)	34°C (93°F) or less

STEP 2

Drive the vehicle at 50 km/h (32 MPH) or more with the difference between "COOLANT TEMP/S" and "FUEL T/TMP SE" maintained at 26°C (47°F) or more.

NOTE:

Keep the accelerator pedal as steady as possible during cruising.

STEP 3

Drive the vehicle at 50 km/h (32 MPH) or more until "COOLANT TEMP/S" increases by 6°C (11°F). **NOTE:**

Keep the accelerator pedal as steady as possible during cruising.

Is the condition satisfied?

YES >> GO TO 4.

NO >> GO TO 1.

4.PERFORM DTC CONFIRMATION PROCEDURE-2

(I) With CONSULT

T. Drive the vehicle until the following condition is satisfied.

COOLANT TEMP/S

67°C (153°F) or more

CAUTION:

Always drive vehicle at safe speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-208, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758473

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check the engine coolant temperature sensor. Refer to EC-208, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace engine coolant temperature sensor. Refer to <u>CO-24</u>, "Exploded View".

2. CHECK THERMOSTAT

Check the thermostat. Refer to CO-21, "Removal and Installation of Thermostat".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace thermostat.

Component Inspection

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Revision: October 2013

INFOID:000000009758474

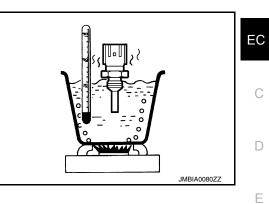
P0128 THERMOSTAT FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

- 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.

-	olant tem- e sensor	Condition			
+	-			Resistance (k Ω)	
Terr	ninal				
		T (100	20 (68)	2.37 - 2.63	
1	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 <u>CO-24, "Exploded View"</u>.



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P0130 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

P0130 A/F SENSOR 1

DTC Logic

INFOID:000000009758475

[MRA8DE]

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 fluctuates according to fuel feedback control.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0130	A/F SENSOR1 (B1) (O2 sensor circuit bank 1	A) The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in the range other than approx. 2.2 V.	Harness or connectors (A/F sensor 1 circuit is open or shorted.)
	sensor 1)	B) The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.	A/F sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

(I) With CONSULT

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

Is 1st trip DTC detected?

YES >> Proceed to EC-211, "Diagnosis Procedure".

NO-1 (())With CONSULT)>>GO TO 3.

NO-2 (Without CONSULT)>>GO TO 7.

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

1. Select "A/F SEN1 (B1)" in "DATA MONITOR" mode of "ENGINE" using CONSULT.

2. Check "A/F SEN1 (B1)" indication.

Does the indication fluctuates around 2.2 V?

YES >> GO TO 4.

NO >> Proceed to <u>EC-211, "Diagnosis Procedure"</u>.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-1

 Select "A/F SEN1 (B1) P1276" of "A/F SEN1" in "DTC WORK SUPPORT" mode of "ENGINE" using CON-SULT.

2. Touch "START".

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

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 64 km/h (40 mph)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	D position (CVT) 5th position (6MT)

P0130 A/F SENSOR 1	
--------------------	--

DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]
If "TESTING" is not displayed after 20 seconds, retry from step 2. CAUTION:	
Always drive vehicle at a safe speed. s "TESTING" displayed on CONSULT screen?	
YES >> GO TO 5.	
NO >> 1. Check A/F sensor 1 function again. 2. GO TO 3.	
PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-2	
Release accelerator pedal fully.	
lever apply brake during releasing the accelerator pedal.	
Vhich does "TESTING" change to?	
COMPLETED>>GO TO 6.	
OUT OF CONDITION>>1.Retry DTC CONFIRMATION PROCEDURE. 2. GO TO 4.	
D.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-3	
ouch "SELF-DIAG RESULT"	
Vhich is displayed on CONSULT screen?	
YES >> INSPECTION END NO >> Proceed to EC-211, "Diagnosis Procedure".	
.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B	
Perform Component Function Check. Refer to <u>EC-211, "Component Function Check"</u> .	
Jse component function check to check the overall function of the A/F sensor 1 circuit.	During this check. a
st trip DTC might not be confirmed.	5
s the inspection result normal?	
YES >> INSPECTION END NO >> Proceed to <u>EC-211, "Diagnosis Procedure"</u> .	
Component Function Check	INFOID:000000009758476
.PERFORM COMPONENT FUNCTION CHECK	
動With GST	
. Start engine and warm it up to normal operating temperature.	
 Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable ge Shift the selector lever to the D position (CVT) or 5th position (M/T), then release t 	
fully until the vehicle speed decreases to 50 km/h (31 MPH).	
CAUTION:	
Always drive vehicle at a safe speed. NOTE:	
Never apply brake during releasing the accelerator pedal.	
. Repeat steps 2 to 3 for five times.	
5. Stop the vehicle and turn ignition switch OFF.	
 Wait at least 10 seconds and restart engine. Repeat steps 2 to 3 for five times. 	
Stop the vehicle.	
. Check 1st trip DTC.	
s 1st trip DTC detected?	
YES >> Proceed to <u>EC-211, "Diagnosis Procedure"</u> . NO >> INSPECTION END	
Diagnosis Procedure	INFOID:000000009758477
CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY	
. Turn ignition switch OFF.	
	2014 Contro NAM

P0130 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

- 3. Turn ignition switch ON.
- 4. Check the voltage between A/F sensor 1 harness connector and ground.

	ł		
A/F se	ensor 1	_	Voltage
Connector	Terminal		
F12 ^{*1} F42 ^{*2}	4	Ground	Battery voltage
*1: Exce	pt California	l	

*2: For California

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

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

1. Turn ignition switch OFF.

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

	+		_	
A/F se	ensor 1	IPD	/IE/R	Continuity
Connector	Terminal	Connector	Terminal	
F12 ^{*1} F42 ^{*2}	4	E45	26	Existed

*1: Except California

- *2: For California
- 4. Also check harness for short to ground.

Is the inspection result normal?

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

${\it 3.}$ CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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

	+		_	
A/F se	ensor 1	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12 ^{*1}	1	F24	41	Existed
F42 ^{*2}	2	124	45	LAISted

*1: Except California

*2: For California

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

P0130 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

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LIM		OL	ᆮ

	+			
A/F se	ensor 1	_	Continuity	
Connector	Terminal	-	y	
F12 ^{*1} F42 ^{*2}	1	Ground	Not existed	
	ept California	3		
*2: For (California	-		
	+			
E	CM	-	Continuity	
Connector	Terminal			
F24	41	Ground	Not existed	
	45			
		for short to p	oower.	
	ction result n	ormal?		
	GO TO 4. Repair or re	place error-c	letected parts.	
	-	ENT INCIDE		
			GI-39, "Intermit	ent Incident"
	ction result n		GI-59, Internit	
•			F) sensor 1 Re	fer to <u>EM-30, "Exploded View"</u> .
10 >>	Repair or re	place error-c	letected parts.	

< DTC/CIRCUIT DIAGNOSIS >

P0131 A/F SENSOR 1

DTC Logic

INFOID:000000009758478

[MRA8DE]

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0131	A/F SENSOR1 (B1) (O2 sensor circuit low volt- age bank 1 sensor 1)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0 V.	 Harness or connectors (A/F sensor 1 circuit is open or shorted.) A/F sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

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

>> GO TO 2.

2. CHECK A/F SENSOR FUNCTION

With CONSULT

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

With GST

Follow the procedure "With CONSULT" above.

Is the indication constantly approx. 0 V?

YES >> Proceed to EC-215, "Diagnosis Procedure".

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

()With CONSULT

- 1. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
- Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
 CAUTION:

Always drive vehicle at a safe speed.

3. Maintain the following conditions for about 20 consecutive seconds.

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

NOTE:

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

If this procedure is not completed within 1 minute after restarting engine at step 1, return to step

1. 4. Check 1st trip DTC.

With GST

P0131 A/F SENSOR 1

			PU131	A/F SENSUR 1	
< DTC/CIRC	CUIT DIAGN	IOSIS >		[MRA8DE]	
Follow the p	rocedure "W	ith CONSUL	T" above.		
Is 1st trip DT	C detected?	<u> </u>		A	Ą
		<u> EC-215, "Dia</u>	<u>gnosis Proc</u>	edure".	
NO >>	INSPECTIO	N END		E	\sim
Diagnosis	Procedu	re		INFOID:00000009758479	C
1. CHECK <i>A</i>	AIR FUEL RA	ATIO (A/F) S	ENSOR 1 P	POWER SUPPLY	С
1. Turn ign	ition switch	OFF.			,
		sor 1 harnes	s connector.		
	ition switch (sensor 1 har	rness connector and ground.	D
	le renage s				
	+				E
A/F se	ensor 1	_	Voltage	L	_
Connector	Terminal				
F12 ^{*1}	4	Oracial	Dettemuselte		F
F42 ^{*2}	4	Ground	Battery volta	ige	
	ept California	1			G
	California				J
<u>Is the inspec</u> YES >>	<u>ction result n</u> GO TO 3.	ormal?			
	GO TO 3. GO TO 2.			ŀ	-
•		ATIO (A/F) S	ENSOR 1 P	POWER SUPPLY CIRCUIT	
	ition switch				I
		R harness c	onnector.		1
3. Check th	ne continuity	between A/	F sensor 1 h	narness connector and IPDM E/R harness connector.	
					J
	+		-		
A/F se			/I E/R	Continuity	K
Connector	Terminal	Connector	Terminal		
F12 ^{*1} F42 ^{*2}	4	E45	26	Existed	
	unt California				Ĺ
	ept California California				
		for short to g	round.	Ν	M
Is the inspec					VI
				wer supply circuit.	
•	• •	place error-d	•		Ν
3.CHECK A			IGNAL CIRC		
	ition switch (OFF. rness conne	ctor		С
				narness connector and ECM harness connector.	5
-	+	-	_	F	Ρ
A/F se	ensor 1	EC	CM	Continuity	

A/F se	A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal		
F12 ^{*1}	1	F24	41	Existed	
F42 ^{*2}	2	127	45	Existed	

*1: Except California

< DTC/CIRCUIT DIAGNOSIS >

*2: For California

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

	+		
A/F se	ensor 1	-	Continuity
Connector	Terminal		
F12 ^{*1}	1	Ground	Not existed
F42 ^{*2}	2	Ground	NOL EXISTED

*1: Except California

*2: For California

	+		
E	CM	-	Continuity
Connector	Terminal		
F24	41	Ground	Not existed
1 27	45	Ground	

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace air fuel ratio (A/F) sensor 1. Refer to <u>EM-30, "Exploded View"</u>.
- NO >> Repair or replace error-detected parts.

P0132 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

P0132 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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0132	A/F SENSOR1 (B1) (O2 sensor circuit high volt- age bank 1 sensor 1)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5 V.	 Harness or connectors (A/F sensor 1 circuit is open or short- ed.) A/F sensor 1
DTC CON	FIRMATION PROCED	URE	
1.PRECC	NDITIONING		
before con 1. Turn ig 2. Turn ig 3. Turn ig TESTING Before pe	ducting the next test. gnition switch OFF and wa gnition switch ON. gnition switch OFF and wa CONDITION:		
^	A/F SENSOR FUNCTIC	N	
With CC			
2. Select 3. Check With GS Follow the Is the indic YES > NO >	: "Ā/F SEN1 (B1)" in "DAT : "A/F SEN1 (B1)" indicati ST procedure "With CONSU <u>cation constantly approx.</u> > Proceed to <u>EC-218, "Di</u> > GO TO 3.	LT" above. <u>5 V?</u> agnosis Procedure".	CONSULT.
2. Select 3. Check With GS Follow the Is the indic YES > NO >	: "Ā/F SEN1 (B1)" in "DAT : "A/F SEN1 (B1)" indicati ST procedure "With CONSU cation constantly approx. > Proceed to <u>EC-218, "Di</u> > GO TO 3. PRM DTC CONFIRMATIC	A MONITOR" mode of "ENGINE" using C on. LT" above. <u>5 V?</u> agnosis Procedure".	CONSULT.

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

NOTE:

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

• If this procedure is not completed within 1 minute after restarting engine at step 1, return to step

1.

4. Check 1st trip DTC.

INFOID:000000009758480

EC

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P0132 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

Follow the procedure "With CONSULT" above.

Is 1st trip DTC is detected?

YES >> Proceed to <u>EC-218</u>, "Diagnosis Procedure". NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758481

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

- 1. Turn ignition switch OFF.
- 2. Disconnect A/F sensor 1 harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between A/F sensor 1 harness connector and ground.

	+		
A/F sensor 1		-	Voltage
Connector	Terminal		
F12 ^{*1} F42 ^{*2}	4	Ground	Battery voltage
		•	

*1: Except California

*2: For California

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

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

1. Turn ignition switch OFF.

2. Disconnect IPDM E/R harness connector.

3. Check the continuity between A/F sensor 1 harness connector and IPDM E/R harness connector.

+		_		
A/F sensor 1		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F12 ^{*1} F42 ^{*2}	4	E45	26	Existed

*1: Except California

*2: For California

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

+		_		
A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12 ^{*1}	1	F24	41	Existed
F42 ^{*2}	2	124	45	LAISted

*1: Except California

P0132 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

*2: For California

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

	+		
A/F sensor 1		– Continuity	
Connector	Terminal		
F12 ^{*1}	1	Ground	Not existed
F42 ^{*2}	2	Ground	NOT EXISTED
*2: For (ept California California	1	
	+		Orationity
	CM	—	Continuity
Connector	Terminal 41		
F24	41	Ground Not existed	
5. Also che	-	for short to p	ower.
Is the inspec		•	
YES >>	GO TO 4.		
-	-		etected parts.
4.CHECKI	NTERMITTE	ENT INCIDE	NT
			GI-39, "Intermit
Is the inspec			
YES >> NO >>	Replace air	fuel ratio (A/l	F) sensor 1. Re letected parts.
110			elected parts.

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Ρ

< DTC/CIRCUIT DIAGNOSIS >

P0137 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 the various driving condition such as fuelcut.

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)		Possible cause
P0137	HO2S2 (B1) (O2 sensor circuit low voltage bank 1 sensor 2)	The maximum voltage from the heated oxygen sensor 2 is not reached to the specified voltage.	 Harness or connectors (Heated oxygen sensor 2 circuit is open or shorted) Heated oxygen sensor 2 Fuel pressure Fuel injector Intake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT? YES >> GO TO 2.

NO >> GO TO 5.

2. PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- 6. Make sure that "COOLANT TEMP/S" indicates more than 70°C (158°F).
- If not, warm up engine and go to next step when "COOLANT TEMP/S" indication reaches 70°C (158°F). 7. Open engine hood.
- 8. Select "HO2S2 (B1) P1147" of "HO2S2" in "DTC WORK SUPPORT" mode of "ENGINE" using CONSULT.

EC-220

2014 Sentra NAM

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1V

٥v

0.73V

DTC/CIRCL	JIT DIAGNOSI	S >		[MRA8DE]		
. Follow the	instruction of	CONSULT.				
NOTE:						
It will take at most 10 minutes until "COMPLETED" is displayed. 0. Touch "SELF-DIAG RESULT".						
	ayed on CONS					
	ISPECTION EN		- Due e e dune ll			
	oceed to <u>EC-2</u> E DIAGNOSED		<u>s Procedure"</u> .			
			CEDURE AGAIN			
.PERFORM	DIC CONFIR	MATION PRO	JCEDURE AGAIN			
			e vehicle in a cool place (soak the	vehicle).		
Perform D	TC CONFIRM	ATION PROC	EDURE again.			
-						
	О ТО 3.					
.PERFORM	COMPONENT	FUNCTION	CHECK			
erform comp	onent function	check. Refer	to EC-221, "Component Function	Check".		
OTE:						
			e overall function of the heated ox	ygen sensor 2 circuit. During this		
	ip DTC might n		eu.			
	on result norma					
	SPECTION EN roceed to <u>EC-2</u>		s Procedure"			
			<u>s Flocedule</u> .			
omponen	t Function C	check		INFOID:00000009758483		
	COMPONENT					
		TUNCTION	CHECK-1			
Without CO						
			operating temperature. east 10 seconds.			
			d between 3,500 and 4,000 rpm fo	r at least 1 minute under no load.		
	e idle for 1 minu					
Check the	voltage betwe	en ECM harn	ess connector and ground as per t	he following condition.		
	ECM					
			Condition) (oltago		
Connector	+	-	Condition	Voltage		
	lerr	minal				
F24	22	23	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.72 V at least once during this procedure.		
the increation			at least 10 times	least once during this procedure.		
	on result norma					
	ISPECTION EN O TO 2.					
	COMPONENT					
			connector and ground as per the fe	allowing condition		
	age between E	CIM narness	connector and ground do per the h			
	-					
	ECM					
	ECM +	_	Condition	Voltage		
heck the volt	ECM +	- ninal				
	ECM +	_				

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-3

< DTC/CIRCUIT DIAGNOSIS >

Check the voltage between ECM harness connector and ground as per the following condition.

ECM						
Connector	+	_	Condition	Voltage		
	Terminal					
F24	22 23		Coasting from 80 km/h (50 MPH) in D position (CVT), 5th gear position (6MT)	The voltage should be above 0.72 V at least once during this procedure.		
Le fle e lie e e e effe						

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-222, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000009758484

1. Clear the mixture ratio self-learning value. Refer to EC-142, "Work Procedure".

2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171. Refer to <u>EC-246, "DTC Logic"</u>.

NO >> GO TO 2.

2.CHECK HO2S2 GROUND CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between HO2S2 harness connector and ECM harness connector.

+		-		
HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F43	1	F24	23	Existed

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK HO2S2 INPUT SIGNAL CIRCUIT

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

+		-		
HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F43	2	F24	22	Existed

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

	+		
HO	2S2	_	Continuity
Connector Terminal			
F43	2	Ground	Not existed

+			
ECM		Continuity	
Connector Terminal	-		
F24 22	Ground	Not existed	
Also check harness	for short to	power.	
the inspection result r	ormal?		
YES >> GO TO 4. NO >> Repair or re	nlaco orror (datastad parts	
CHECK HEATED O	•	•	
			"Component Inspection (HO262)"
the inspection result r		Refer to $EC-22$, "Component Inspection (HO2S2)".
		ent. Refer to GI-	39, "Intermittent Incident".
			to EX-5, "Exploded View".
omponent Inspec	tion (HO2	.S2)	INFOID:00000009758485
.INSPECTION STAR	Г		
o you have CONSULT	?		
o you have CONSULT			
(ES >> GO TO 2.			
NO >> GO TO 3.			
.CHECK HEATED O>	YGEN SEN	SOR 2	
 Let engine idle for 1 Select "FUEL INJE (B1)" as the monitor 	minute. CTION" in "A r item with Co	ACTIVE TEST" ONSULT.	n 3,500 and 4,000 rpm for at least 1 minute under no load. mode of "ENGINE" using CONSULT, and select "HO2S2 ng "FUEL INJECTION" to \pm 25%.
v ≈	,	j	(Reference data)
1.28 -			
0.64 -		/>	The voltage should be above 0.73V at least one time.
	÷	•	The voltage should be below 0.18V
0.00			J at least one time.
			t once when the "FUEL INJECTION" is + 25%.
· · /		v 0.18 V at leas	t once when the "FUEL INJECTION" is – 25%.
the inspection result r 'ES >> INSPECTIO			
		sensor 2. Refe	to EX-5, "Exploded View".
CHECK HEATED O		-	
CHECK HEATED O			
Without CONSULT	irm it up to n	ormal operating	temperature.
Without CONSULT Start engine and wa Turn ignition switch	OFF and wa	it at least 10 se	conds.
Without CONSULT Start engine and wa Turn ignition switch	OFF and wa	it at least 10 se	

EC-223

< DTC/CIRCUIT DIAGNOSIS >

	ECM			
Connector	+	-	Condition	Voltage
Connector	Terr	ninal		
F24	22	23	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4.CHECK HEATED OXYGEN SENSOR 2-2

Check the voltage between ECM harness connector and ground as per the following condition.

	ECM			
Connector	+	-	Condition	Voltage
Connector	Terr	ninal		
F24	22	23	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-3

Check the voltage between ECM harness connector and ground as per the following condition.

	ECM			
Connector	+	_	Condition	Voltage
Connector	Terr	ninal		
F24	22	23	Coasting from 80 km/h (50 MPH) in D position (CVT), 5th position (6MT)	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

P0138 H02S2

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.

MALFUNCTION A

MALFUNCTION B

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the

CONSULT screen terms DTC No. DTC detecting condition (Trouble diagnosis con-Possible cause tent) Harness or connectors An excessively high voltage from the A) (The sensor circuit is open or shorted) sensor is sent to ECM. · Heated oxygen sensor 2 HO2S2 (B1) · Harness or connectors P0138 (O2 sensor circuit high (The sensor circuit is open or shorted) voltage bank 1 sensor 2) The minimum voltage from the sensor is B) Heated oxygen sensor 2 not reached to the specified voltage. Fuel pressure · Fuel injector

DTC CONFIRMATION PROCEDURE

various driving condition such as fuel-cut.

1.PRECONDITIONING

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

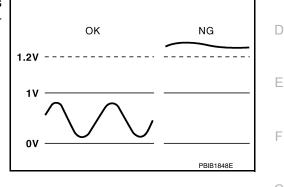
EC-225

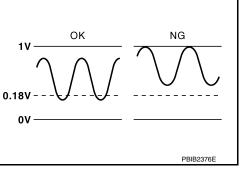
Turn ignition switch OFF and wait at least 10 seconds. 1.

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



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< DTC/CIRCUIT DIAGNOSIS >

$\overline{2}$. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 2 minutes.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-227, "Diagnosis Procedure".

NO-1 (With CONSULT) >> GO TO 3.

NO-2 (Without CONSULT)>>GO TO 5.

${\it 3.}$ PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

NOTE:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

- 1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- 6. Make sure that "COOLANT TEMP/S" indication is more than 70°C (158°F).
- If not, warm up engine and go to next step when "COOLANT TEMP/S" indication reaches 70°C (158°F).
- 7. Open engine hood.
- 8. Select "HO2S2 (B1) P1146" of "HO2S2" in "DTC WORK SUPPORT" mode of "ENGINE" using CONSULT.
- 9. Follow the instruction of CONSULT.
- NOTE: It will take at most 10 minu

It will take at most 10 minutes until "COMPLETED" is displayed.

10. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT

OK >> INSPECTION END

NG >> Proceed to EC-227, "Diagnosis Procedure".

CAN NOT BE DIAGNOSED>>GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B AGAIN

- 1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- 2. Perform DTC confirmation procedure again.

>> GO TO 3.

5.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to EC-226, "Component Function Check".

NOTE:

Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

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

Component Function Check

INFOID:000000009758487

1.PERFORM COMPONENT FUNCTION CHECK-1

Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector and ground as per the following condition.

- ~ / ~

ECM					
Connector	+	_	Condition	Voltage	
Connector	Tern	ninal			
F24	22	23	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be below 0.18 V at least once during this procedure.	
/ES >> INS NO >> GO .PERFORM	n result norma SPECTION EN D TO 2. COMPONENT age between E		CHECK-2 connector and ground as per the fe	bllowing condition.	
	ECM			0	
Connector	+ –		Condition	Voltage	
Connector	Tern	ninal			
	1				
F24	22	23	Keeping engine speed at idle for 10 minutes	The voltage should be below 0.18 V at least once during this procedure.	
s the inspection YES >> IN NO >> GO PERFORM	on result norma SPECTION EN D TO 3. COMPONENT age between E	<u>I?</u> ID FUNCTION	minutes	least once during this procedure.	
s the inspection YES >> IN NO >> GO PERFORM	on result norma SPECTION EN D TO 3. COMPONENT age between E ECM	<u>I?</u> ID FUNCTION	CHECK-3 connector and ground as per the fe	least once during this procedure.	
<u>s the inspectio</u> YES >> IN NO >> GO PERFORM	on result norma SPECTION EN D TO 3. COMPONENT age between E ECM +	I? ID FUNCTION CM harness –	minutes CHECK-3	least once during this procedure.	
the inspection YES >> IN NO >> GO PERFORM heck the volta	on result norma SPECTION EN D TO 3. COMPONENT age between E ECM	I? ID FUNCTION CM harness –	CHECK-3 connector and ground as per the fe	least once during this procedure.	

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

Diagnosis Procedure	INFOID:000000009758488	L
1.INSPECTION START		
Confirm the detected malfunction (A or B). Refer to EC-225, "DTC Logic".		M
Which malfunction is detected?		
A >> GO TO 2. B >> GO TO 6.		Ν
2.CHECK H02S2 CONNECTOR FOR WATER		
 Turn ignition switch OFF. Disconnect heated oxygen sensor 2 harness connector. Check connectors for water. 		0
Water should not exist.		Ρ
Is the inspection result normal? YES >> GO TO 3.		
NO >> Repair or replace error-detected parts.		
3. CHECK HO2S2 GROUND CIRCUIT		
1. Disconnect ECM harness connector.		

< DTC/CIRCUIT DIAGNOSIS >

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

	+		_	
 HO	2S2	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F43	1	F24	23	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT

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

+		_		
НО	2S2	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F43	2	F24	22	Existed

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

	+			
HO	HO2S2		Continuity	
Connector	Connector Terminal			
F43	2	Ground	Not existed	

	+		
E	ECM		Continuity
Connector	Connector Terminal		
F24	22	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

b.CHECK HEATED OXYGEN SENSOR 2

Check the heated oxygen sensor 2. Refer to EC-229. "Component Inspection (HO2S2)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-39</u>, "Intermittent Incident".

NO >> Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

6.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-142, "Work Procedure".

2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0172. Refer to EC-250, "DTC Logic".

NO >> GO TO 7.

1.CHECK HO2S2 GROUND CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect heated oxygen sensor 2 harness connector.

3. Disconnect ECM harness connector.

Revision: October 2013



< DTC/CIRCUIT DIAGNOSIS >

Check the continuity between HO2S2 harness connector and ECM harness connector. 4.

	+		_	
HO	282	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F43	1	F24	23	Existed

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

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

 ${f 8}.$ CHECK HO2S2 INPUT SIGNAL CIRCUIT

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

+			_	
HO	2S2	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F43	2	F24	22	Existed

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

		+		
-	HO	2S2	_	Continuity
-	Connector	Terminal		
•	F43	2	Ground	Not existed

	+		
E	CM	_	Continuity
Connector	Terminal		
F24	22	Ground	Not existed

Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

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

9. CHECK HEATED OXYGEN SENSOR 2

Check the heated oxygen sensor 2. Refer to EC-229, "Component Inspection (HO2S2)". Is the inspection result normal? >> Check intermittent incident. Refer to GI-39, "Intermittent Incident". YES >> Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View". NO INFOID:000000009758489

Component Inspection (HO2S2)

1.INSPECTION START

Do you have CONSULT? Do you have CONSULT?

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

2.CHECK HEATED OXYGEN SENSOR 2

(P)With CONSULT

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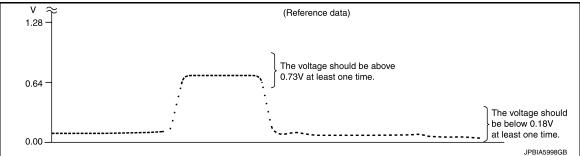
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< DTC/CIRCUIT DIAGNOSIS >

- 1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- 6. Select "FUEL INJECTION" in "ACTIVE TEST" mode of "ENGINE" using CONSULT, and select "HO2S2 (B1)" as the monitor item with CONSULT.
- 7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to \pm 25%.



"HO2S2 (B1)" should be above 0.72 V at least once when the "FUEL INJECTION" is + 25%. "HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is – 25%.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace heated oxygen sensor 2. Refer to EX-5. "Exploded View".

3.CHECK HEATED OXYGEN SENSOR 2-1

Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.

3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.

- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector and ground as per the following condition.

	ECM			
Connector	+	_	Condition	Voltage
Connector	Terr	ninal		
F24	22	23	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4.CHECK HEATED OXYGEN SENSOR 2-2

Check the voltage between ECM harness connector and ground as per the following condition.

	ECM			
Connector	+	_	Condition	Voltage
Connector	Terr	ninal		
F24	22	23	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

5.CHECK HEATED OXYGEN SENSOR 2-3

Check the voltage between ECM harness connector and ground as per the following condition.

	ECM				С
Connector	+	-	Condition	Voltage	
Connector	Terr	minal			
F24	22	23	Coasting from 80 km/h (50 MPH) in D position (CVT), 5th position (6MT)	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.	E

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace heated oxygen sensor 2. Refer to EX-5. "Exploded View".

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< DTC/CIRCUIT DIAGNOSIS >

P0139 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 1 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.

ger sor	ок 1V	NG
ger sor or's uch	\sim \sim /	$\overline{\frown}$
	\bigvee \bigvee	\bigvee
	0V	
		SEF302U

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0139	HO2S2 (B1) (O2 sensor circuit slow response bank 1 sensor 2)	The switching time between rich and lean of a heated oxygen sensor 2 signal delays more than the specified time computed by ECM.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 Fuel system Intake air system

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

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

2.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- T. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 6. Let engine idle for 1 minute.
- 7. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- Make sure that "COOLANT TEMP/S" indicates more than 70°C (158°F). If not, warm up engine and go to next step when "COOLANT TEMP/S" indication reaches to 70°C (158°F).
- 9. Open éngine hood.

Revision: October 2013

EC-232

INFOID:000000009758490

			P0139 H0252	
< DTC/CIRCU	IT DIAGNOSIS	S >		[MRA8DE]
			VORK SUPPORT" mode of "ENGI of CONSULT display.	NE" using CONSULT.
	at most 10 min	utes until "Co	OMPLETED" is displayed.	
<u>Is "COMPLETE</u>	<u>ED" displayed o</u>	on CONSULT	screen?	
	O TO 5.			
	O TO 4.			
			DCEDURE AGAIN	
	TC confirmatior		e vehicle in a cool place (soak the again.	vehicle).
_	O TO 3.			
D. PERFORM	SELF-DIAGNC	DSIS		
With CONSU				
Perform ECM : Is DTC "P0139	•			
	oceed to <u>EC-23</u>	34 "Diagnosi	s Procedure"	
	SPECTION EN		<u>.</u>	
6.PERFORM	COMPONENT	FUNCTION	CHECK	
			to EC-233, "Component Function	Check".
NOTE:			-	
	p DTC might no		e overall function of the heated ox ed.	sygen sensor 2 circuit. During this
-	on result normal			
-	SPECTION EN			
NO >> Pr	oceed to EC-2	<u>34, "Diagnos</u>	<u>is Procedure"</u> .	
Component	Function C	heck		INFOID:00000009758491
1 .perform	COMPONENT	FUNCTION	CHECK-1	
 Turn ignition Start engine Let engine 	he and warm it u on switch OFF a he and keep the bidle for 1 minut	and wait at le engine spee te.	operating temperature. east 10 seconds. ed between 3,500 and 4,000 rpm fo ess connector and ground as per t	
	ECM			
Connector	+	-	Condition	Voltage
0011100101	Term	ninal		
	22	23	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.96 V at least once during this procedure.
F24				iedet eritee daning the proceduler

< DTC/CIRCUIT DIAGNOSIS >

	ECM			
Connector	+	_	Condition	Voltage
Connector	Terr	minal		
F24	22	23	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.96 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-3

Check the voltage between ECM harness connector and ground as per the following condition.

	ECM			
Connector	+	_	Condition	Voltage
Connector	Terr	minal		
F24	22	23	Coasting from 80 km/h (50 MPH) in D position (CVT), 5th gear position (6MT)	0

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-234, "Diagnosis Procedure".

Diagnosis Procedure

1.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- 1. Clear the mixture ratio self-learning value. Refer to <u>EC-142. "Work Procedure"</u>.
- 2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

- YES >> Perform trouble diagnosis for DTC P0171. Refer to EC-246, "DTC Logic".
 - Perform trouble diagnosis for DTC P0172. Refer to EC-250, "DTC Logic".
- NO >> GO TO 2.

2.CHECK HO2S2 GROUND CIRCUIT

1. Turn ignition switch OFF.

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

	+		_	
НО	2S2	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F43	1	F24	23	Existed

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK HO2S2 INPUT SIGNAL CIRCUIT

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

INFOID:000000009758492

< DTC/CIRCUIT DIAGNOSIS >

-	÷	-	_				
HO	282	EC	СМ	Continuity			_
Connector	Terminal	Connector	Terminal				E
F43	2	F24	22	Existed			
Check th ground.	ne continuit	y between H	IO2S2 harne	ess connector	and ground, or EC	M harness connector and	d
		y between H	IO2S2 harne	ess connector	and ground, or EC	M harness connector and	d
ground.	-	y between H	IO2S2 harne Continuity	ess connector	and ground, or EC	M harness connector and	d
ground.	-	y between H		ess connector	and ground, or EC	M harness connector and	d

	+		
E	СМ	-	Continuity
Connector	Terminal		
F24	22	Ground	Not existed

3. Also check harness for short to power.

<u>ls t</u>	he ir	nspection	result	normal?

NO >> Repair or replace error-detected parts.

4.CHECK HEATED OXYGEN SENSOR 2

- Check the heated oxygen sensor 2. Refer to <u>EC-235, "Component Inspection (HO2S2)"</u>. Is the inspection result normal?
- YES >> Check intermittent incident. Refer to <u>GI-39</u>, "Intermittent Incident". NO >> Replace heated oxygen sensor 2. Refer to <u>EX-5</u>, "Exploded View".

Component Inspection (HO2S2)

1 .INSPECTION START	
----------------------------	--

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- Select "FUEL INJECTION" in "ACTIVE TEST" mode of "ENGINE" using CONSULT, and select "HO2S2 (B1)" as the monitor item with CONSULT.

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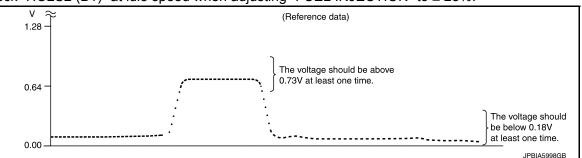
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INFOID:000000009758493

< DTC/CIRCUIT DIAGNOSIS >





"HO2S2 (B1)" should be above 0.72 V at least once when the "FUEL INJECTION" is + 25%. "HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is – 25%.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

3.CHECK HEATED OXYGEN SENSOR 2-1

Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector and ground as per the following condition.

	ECM			
Connector	+	-	Condition	Voltage
Connector	Terr	ninal		
F24	22	23	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4.CHECK HEATED OXYGEN SENSOR 2-2

Check the voltage between ECM harness connector and ground as per the following condition.

	ECM			
Connector	+	-	Condition	Voltage
Connector	Terr	ninal		
F24	22	23	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
Is the inspec	ction result n	ormal?		

YES >> INSPECTION END

NO >> GO TO 5.

5.CHECK HEATED OXYGEN SENSOR 2-3

Check the voltage between ECM harness connector and ground as per the following condition.

< DTC/CIRCUIT DIAGNOSIS >

	ECM				A
	+	_	Condition	Voltage	
Connector	Terr	minal			EC
F24	22	23	Coasting from 80 km/h (50 MPH) in D position (CVT), 5th position (6MT)	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.	C
Is the inspec	ction result n	ormal?			D
YES >>	INSPECTIO	N END			
NO >>	Replace hea	ated oxygen	sensor 2. Refer to EX-5, "E	xploded View".	
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< DTC/CIRCUIT DIAGNOSIS >

P014C, P014D, P015A, P015B 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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P014C	A/F SENSOR1 (B1) (O2 sensor slow response - rich to lean bank 1 sensor 1)		 Harness or connectors (A/F sensor 1 circuit is open or shorted.) A/F sensor 1
P014D	A/F SENSOR1 (B1) (O2 sensor slow response - lean to rich bank 1 sensor 1)	The response time of a A/F sensor 1 signal delays more than the specified time computed by ECM.	 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

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle. Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 6.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. 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. Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds.
- 8. Fully release accelerator pedal and then let engine idle for about 1 minute.
- 9. On CONSULT screen, select "ENGINE" >> "DATA MONITOR" >> "A/F SEN1 DIAG3 (B1)".
- 10. Check that the data monitor indicates "PRSNT". **NOTE:**

If "PRSNT" changed to "ABSNT", refer to EC-211, "Component Function Check".

Is "PRSNT" displayed on CONSULT screen?

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

3.PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

Perform DTC confirmation procedure-1 again.

INFOID:000000009758494

P014C, P014D, P015A, P015B A/F SENSOR 1	
< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]
Is "PRSNT" displayed on CONSULT screen?	
YES >> GO TO 4. NO >> Proceed to <u>EC-211, "Component Function Check"</u> .	A
4. PERFORM DTC CONFIRMATION PROCEDURE-3	
	EC
 With CONSULT 1. Wait for about 20 seconds at idle. 2. On CONSULT screen, select "ENGINE" >> "DATA MONITOR" >> "A/F SEN1 DIAG2 (B1)". 	С
 Check that the data monitor indicates "CMPLT". NOTE: 	0
If "CMPLT" changed to "INCMP", refer to <u>EC-211, "Component Function Check"</u> .	_
Is "CMPLT" displayed on CONSULT screen?	D
YES >> GO TO 5. NO >> Refer to <u>EC-211, "Component Function Check"</u> .	
5. PERFORM SELF-DIAGNOSIS	E
(P)With CONSULT	
Check the "SELF-DIAG RESULT".	F
Is any DTC detected?	
YES >> Proceed to <u>EC-240, "Diagnosis Procedure"</u> . NO >> INSPECTION END	
6. CHECK AIR-FUEL RATIO SELF-LEARNING VALUE	G
With GST	
1. Start engine and warm it up to normal operating temperature.	Н
 Select Service \$01 with GST. Calculate the total value of "Short term fuel trim" and "Long term fuel trim" indications. 	
Is the total percentage within $\pm 15\%$?	I
YES >> GO TO 8.	
NO >> GO TO 7.	J
I.DETECT MALFUNCTIONING PART	0
Check the following.	
 Intake air leaks Exhaust gas leaks 	K
Incorrect fuel pressure	
Lack of fuelFuel injector	L
Incorrect PCV hose connection	
 PCV valve Mass air flow sensor 	Μ
	IVI
>> Repair or replace malfunctioning part.	
8. PERFORM DTC CONFIRMATION PROCEDURE	Ν
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. 	0
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute u	under no load.
 Let engine idle for 1 minute. Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds. 	Р
7. Fully release accelerator pedal and then let engine idle for about 1 minute.	P
8. Check 1st trip DTC.	
Is 1st trip DTC detected?	

YES >> Proceed to <u>EC-240, "Diagnosis Procedure"</u>. NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

INFOID:000000009758495

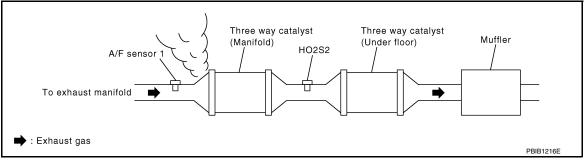
1.RETIGHTEN A/F SENSOR 1

Loosen and retighten the A/F sensor 1. Refer to EM-30, "Exploded View".

>> GO TO 2.

2.CHECK EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- 2. Listen for an exhaust gas leak before three way catalyst 1.



Is exhaust gas leak detected?

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

3.CHECK FOR INTAKE AIR LEAK

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

Is intake air leak detected?

YES >> Repair or replace error-detected parts.

NO >> GO TO 4.

4.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- 1. Clear the mixture ratio self-learning value. Refer to EC-142, "Work Procedure".
- 2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

- YES >> Perform trouble diagnosis for DTC P0171. Refer to <u>EC-246, "DTC Logic"</u>.
 - Perform trouble diagnosis for DTC P0172. Refer to <u>EC-250, "DTC Logic"</u>.

NO >> GO TO 5.

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

1. Turn ignition switch OFF.

- 2. Disconnect A/F sensor 1 harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between A/F sensor 1 harness connector and ground.

	+		
A/F se	ensor 1	_	Voltage
Connector	Terminal		
F12 ^{*1} F42 ^{*2}	4	Ground	Battery voltage

*1: Except California

*2: For California

Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 11.

< DTC/CIRCUIT DIAGNOSIS >

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6.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT 1. Turn ignition switch OFF. Disconnect ECM harness connector. 2. 3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector. + -ECM A/F sensor 1 Continuity Connector Terminal Connector Terminal F12^{*1} 1 41 F24 Existed F42^{*2} 2 45 *1: Except California *2: For California 4. Check the continuity between A/F sensor 1 harness connector and ground or ECM harness connector and ground. + A/F sensor 1 Continuity Connector Terminal F12^{*1} 1 Ground Not existed F42^{*2} 2 *1: Except California *2: For California + ECM Continuity Connector Terminal 41 F24 Ground Not existed 45 5. Also check harness for short to power. Is the inspection result normal? YES >> GO TO 7. NO >> Repair or replace error-detected parts. **7.**CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER Check the air fuel ratio (A/F) sensor 1 heater. Refer to EC-242, "Component Inspection (A/F Sensor 1 Heater)". Is the inspection result normal? YES >> GO TO 8. NO >> Replace air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View". 8.CHECK MASS AIR FLOW SENSOR Check the mass air flow sensor. Refer to EC-242. "Component Inspection (MAF Sensor)". Is the inspection result normal? YES >> GO TO 9. NO >> Replace mass air flow sensor. Refer to EM-25, "Exploded View". **9.**CHECK PCV VALVE Check the PCV valve. Refer to EC-484, "Inspection". Is the inspection result normal? YES >> GO TO 10. EC-241

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace PCV valve. Refer to <u>EC-15. "ENGINE CONTROL SYSTEM :</u> <u>Component Parts Location"</u>.

10. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-39. "Intermittent Incident".

Is the inspection result normal?

YES >> Replace air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View".

NO >> Repair or replace error-detected parts.

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

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

	+		_	
A/F se	ensor 1	IPDN	/IE/R	Continuity
Connector	Terminal	Connector	Terminal	
F12 ^{*1} F42 ^{*2}	4	E45	26	Existed

*1: Except California

- *2: For California
- 4. Also check harness for short to ground.

Is the inspection result normal?

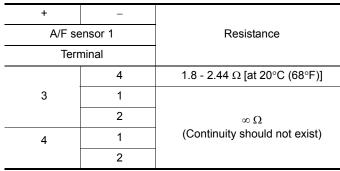
YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

Component Inspection (A/F Sensor 1 Heater)

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

- 1. Turn ignition switch OFF.
- 2. Disconnect A/F sensor 1 harness connector.
- 3. Check resistance between A/F sensor 1 terminals as per the following.



Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace air fuel ratio (A/F) sensor 1. Refer to <u>EM-30. "Exploded View"</u>.

Component Inspection (MAF Sensor)

1.CHECK MASS AIR FLOW SENSOR-1

() With CONSULT

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT and select "DATA MONITOR" mode of "ENGINE".

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EC-242

INFOID:000000009758496

[MRA8DE]

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< DTC/CIRCUIT DIAGNOSIS >

5. Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	Value
	Ignition switch ON (Engine stopped.)	Approx. 1.3 V
	Idle (Engine is warmed-up to normal oper- ating temperature.)	1.3 - 1.6 V
MAS A/F SE-B1	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.8 - 2.2 V
	Idle to about 4,000 rpm	1.3 - 1.6 V to Ap- prox. 2.5 V*

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

Without CONSULT

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.

4. Check the voltage between ECM harness connector and ground.

	ECM				
Connector	+	-	Condition	Voltage	
Johnector	Terr	ninal			
			Ignition switch ON (Engine stopped.)	Approx. 1.3 V	
524	25	24	Idle (Engine is warmed-up to normal operating temperature.)	1.3 - 1.6 V	
F24	35	34	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.8 - 2.2 V	
			Idle to about 4,000 rpm	1.3 - 1.6 V to Ap- prox. 2.5 V*	

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH MASS AIR FLOW SENSOR

1. Turn ignition switch OFF.

2. Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Intake valve deposits

- Improper specification of intake air system parts

Is the inspection result normal?

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

3.CHECK MASS AIR FLOW SENSOR-2

(B)With CONSULT

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

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Monitor item	Condition	Value
	Ignition switch ON (Engine stopped.)	Approx. 1.3 V
	Idle (Engine is warmed-up to normal oper- ating temperature.)	1.3 - 1.6 V
MAS A/F SE-B1	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.8 - 2.2 V
	Idle to about 4,000 rpm	1.3 - 1.6 V to Ap- prox. 2.5 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm. (R)Without CONSULT

- 1. Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Check the voltage between ECM harness connector and ground.

	ECM			
Connector	+	_	Condition Voltage	
Connector	Terr	minal		
			Ignition switch ON (Engine stopped.)	Approx. 1.3 V
F24	35	34	Idle (Engine is warmed-up to normal operating temperature.)	1.3 - 1.6 V
1 24	35	54	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.8 - 2.2 V
			Idle to about 4,000 rpm	1.3 - 1.6 V to Ap- prox. 2.5 V*

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4.CHECK MASS AIR FLOW SENSOR-3

With CONSULT

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT and select "DATA MONITOR" mode of "ENGINE".
- 5. Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	Value
	Ignition switch ON (Engine stopped.)	Approx. 1.3 V
	Idle (Engine is warmed-up to normal oper- ating temperature.)	1.3 - 1.6 V
MAS A/F SE-B1	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.8 - 2.2 V
	Idle to about 4,000 rpm	1.3 - 1.6 V to Ap- prox. 2.5 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm. (R)Without CONSULT

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Check the voltage between ECM harness connector and ground.

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

	ECM				
Connector	+	_	Condition	Voltage	
	Tern	ninal			
			Ignition switch ON (Engine stopped.)	Approx. 1.3 V	
F24	35	34	Idle (Engine is warmed-up to normal operating temperature.)	1.3 - 1.6 V	
121		01	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.8 - 2.2 V	
			Idle to about 4,000 rpm	1.3 - 1.6 V to Ap- prox. 2.5 V*	
			ne being increased to about 4,000 rpm.		
the inspection					
	PECTION ENE an or replace m		ensor. Refer to <u>EM-25, "Explode</u>	ed View".	

P0171 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:000000009758498

[MRA8DE]

DTC DETECTION LOGIC

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

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

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0171	FUEL SYS-LEAN-B1 (System too lean bank 1)	 Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.) 	 Intake air leaks A/F sensor 1 Fuel injector Exhaust gas leaks Incorrect fuel pressure Lack of fuel Mass air flow sensor Incorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Clear the mixture ratio self-learning value. Refer to EC-142, "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. Do not depress accelerator pedal too much.

Does engine start?

YES >> Proceed to EC-247, "Diagnosis Procedure".

>> Check exhaust and intake air leak visually. NO

 ${f 4}_{ ext{-}}$ PERFORM DTC CONFIRMATION PROCEDURE-2

1. Start engine and let it idle for at least 5 minutes.

2. Check 1st trip DTC.

DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]
s 1st trip DTC detected?	
YES >> Proceed to <u>EC-247, "Diagnosis Procedure"</u> . NO >> GO TO 5.	
D.PERFORM DTC CONFIRMATION PROCEDURE-3	
. Turn ignition switch OFF and wait at least 10 seconds.	
 Start engine. Maintain the following conditions for at least 10 consecutive minutes. Hold the accelerator pedal as steady as possible. 	
VHCL SPEED SE 50 - 120 km/h (31 - 75 MPH)	
CAUTION: Always drive vehicle at a safe speed.	
Check 1st trip DTC. s 1st trip DTC detected?	
YES >> Proceed to EC-247, "Diagnosis Procedure".	
NO >> INSPECTION END	
Diagnosis Procedure	INFOID:000000009758499
.CHECK EXHAUST GAS LEAK	
. Start engine and run it at idle. 2. Listen for an exhaust gas leak before three way catalyst (manifold).	
A/F sensor 1 To exhaust manifold	_
➡ : Exhaust gas	
s exhaust gas leak detected?	PBIB1216E
YES >> Repair or replace error-detected parts.	
NO >> GO TO 2. CHECK FOR INTAKE AIR LEAK	
. Listen for an intake air leak after the mass air flow sensor.	
2. Check PCV hose connection.	
ntake air leak detected?	
YES >> Repair or replace error-detected parts. NO >> GO TO 3.	
CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT	
 CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT Turn ignition switch OFF. Disconnect corresponding A/F sensor 1 harness connector. Disconnect ECM harness connector. 	

+		_		
A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12 ^{*1}	1	E24	41	Existed
F42 ^{*2}	2	F24 45		Existed

*1: Except California

< DTC/CIRCUIT DIAGNOSIS >

*2: For California

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

	+		
A/F se	A/F sensor 1		Continuity
Connector	Terminal		
F12 ^{*1}	1	Ground	Not existed
F42 ^{*2}	2	Ground	NOI EXISIEU

*1: Except California

*2: For California

	+		
ECM		-	Continuity
Connector	Terminal		
F24	41	Ground	Not existed
1 24	45	Ground	NOT EXISTED

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK FUEL PRESSURE

Check fuel pressure. Refer to EC-143. "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. Refer to EM-40, "Exploded View".

Is the inspection result normal?

- YES >> Replace "fuel filter and fuel pump assembly". Refer to <u>FL-6, "Exploded View"</u>.
- NO >> Repair or replace error-detected parts.

6.CHECK MASS AIR FLOW SENSOR

With CONSULT

- 1. Install all removed parts.
- 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 3. For specification, refer to EC-486, "Mass Air Flow Sensor".

With GST

- 1. Install all removed parts.
- 2. Check mass air flow sensor signal in Service \$01 with GST.
- 3. For specification, refer to EC-486, "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-186, "DTC Logic"</u>.

7.CHECK FUNCTION OF FUEL INJECTOR

() With CONSULT

- 1. Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 3. Make sure that each circuit produces a momentary engine speed drop.

P0171 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

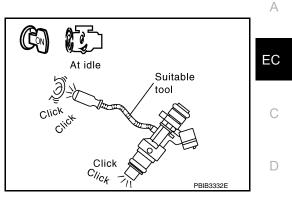
Without CONSULT

- 1. Let engine idle.
- 2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Perform trouble diagnosis for "FUEL INJECTOR". Refer to <u>EC-450</u>, "Component Function Check".



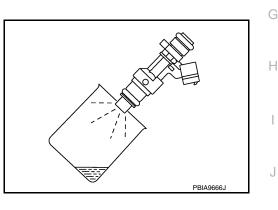
8. CHECK FUEL INJECTOR

- 1. Turn ignition switch OFF.
- 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- 3. Disconnect all fuel injector harness connectors.
- Remove fuel tube assembly. Refer to <u>EM-40, "Removal and Installation"</u>. Keep fuel hose and all fuel injectors connected to fuel tube.
- 5. Disconnect all ignition coil harness connectors.
- 6. Prepare pans or saucers under each fuel injector.
- 7. Crank engine for about 3 seconds.

Fuel should be sprayed evenly for each fuel injector.

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-39</u>, "Intermittent <u>Incident"</u>.
- NO >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones. Refer to EM-40, "Removal and Installation".



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Revision: October 2013

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P0172 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:000000009758500

[MRA8DE]

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the 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.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause	
P0172	FUEL SYS-RICH-B1 (System too rich bank 1)	 Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.) 	-	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

- 1. Clear the mixture ratio self-learning value. Refer to EC-142, "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. Do not depress accelerator pedal too much.

Does engine start?

- YES >> Proceed to EC-251, "Diagnosis Procedure".
- NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-2

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

Is 1st trip DTC detected?

YES >> Proceed to <u>EC-251, "Diagnosis Procedure"</u>. NO >> GO TO 5.

P0172 FUEL INJECTION SYSTEM FUNCTION

[MRA8DE] < DTC/CIRCUIT DIAGNOSIS > 5.PERFORM DTC CONFIRMATION PROCEDURE-3 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Start engine. 3. Maintain the following conditions for at least 10 consecutive minutes. Hold the accelerator pedal as steady as possible. VHCL SPEED SE 50 - 120 km/h (31 - 75 MPH) **CAUTION:** Always drive vehicle at a safe speed. 4. Check 1st trip DTC. Is 1st trip DTC detected? YES >> Proceed to EC-251, "Diagnosis Procedure". >> INSPECTION END NO **Diagnosis** Procedure INFOID:000000009758501 1.CHECK EXHAUST GAS LEAK 1. Start engine and run it at idle. 2. Listen for an exhaust gas leak before three way catalyst (manifold). Three way catalyst Three way catalyst Muffler (Manifold) (Under floor) HO2S2 A/F sensor П

	➡ : Exhaust gas	PBIB1216E		
<u>ls exha</u>	ust gas leak detected?			
YES NO	>> Repair or replace error-detected parts. >> GO TO 2.			
2.сне	ECK FOR INTAKE AIR LEAK			
Listen f	or an intake air leak after the mass air flow sensor.			
Intake a	air leak detected?			
YES NO	>> Repair or replace error-detected parts. >> GO TO 3.			
3. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT				

1. Turn ignition switch OFF.

2. Disconnect corresponding A/F sensor 1 harness connector.

3. Disconnect ECM harness connector.

To exhaust manifold

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

+			_	
A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12 ^{*1}	1	F24	41	Existed
F42 ^{*2}	2	Γ24	45	Existed

*1: Except California

- *2: For California
- 5. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

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P0172 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

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ININAO	DEI

+				
A/F se	ensor 1	_	Continuity	
Connector	Terminal			
F12 ^{*1}	1	Ground	Not existed	
F42 ^{*2}	2	Ground	Not existed	

*1: Except California

*2: For California

+				
E	CM	-	Continuity	
Connector	Terminal			
F24	41	Ground	Not existed	
	45			

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK FUEL PRESSURE

Check fuel pressure. Refer to EC-143, "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. Refer to EM-40, "Exploded View".

Is the inspection result normal?

- YES >> Replace "fuel filter and fuel pump assembly". Refer to <u>FL-6</u>, "Exploded View".
- NO >> Repair or replace error-detected parts.

6.CHECK MASS AIR FLOW SENSOR

With CONSULT

- 1. Install all removed parts.
- 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
- For specification, refer to <u>EC-486. "Mass Air Flow Sensor"</u>.

With GST

- 1. Install all removed parts.
- 2. Check mass air flow sensor signal in Service \$01 with GST.
- 3. For specification, refer to <u>EC-486, "Mass Air Flow Sensor"</u>.

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-186, "DTC Logic"</u>.

7. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT

- 1. Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT

1. Let engine idle.

P0172 FUEL INJECTION SYSTEM FUNCTION

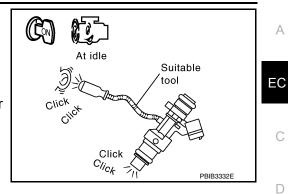
< DTC/CIRCUIT DIAGNOSIS >

2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Perform trouble diagnosis for "FUEL INJECTOR". Refer to <u>EC-450</u>, "Component Function Check".



[MRA8DE]

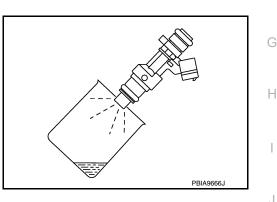
8.CHECK FUEL INJECTOR

- 1. Turn ignition switch OFF.
- 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- 3. Disconnect all fuel injector harness connectors.
- Remove fuel tube assembly. Refer to <u>EM-40, "Removal and Installation"</u>. Keep fuel hose and all fuel injectors connected to fuel tube.
- 5. Disconnect all ignition coil harness connectors.
- 6. Prepare pans or saucers under each fuel injector.
- 7. Crank engine for about 3 seconds.

Fuel should be sprayed evenly for each fuel injector.

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-39, "Intermittent</u> <u>Incident"</u>.
- NO >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones. Refer to <u>EM-40, "Removal and Installation"</u>.



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P0181 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0181 FTT SENSOR

DTC Logic

INFOID:000000009758502

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition		Possible cause
		A)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from ECT sensor and intake air temperature sensor.	 Harness or connectors (FTT sensor circuit is open or shorted) FTT sensor Combination meter
P0181	FTT SENSOR (Fuel temperature sensor "A" circuit range/performance)	B)	The comparison result of signals trans- mitted to ECM from each temperature sensor (IAT sensor, ECT sensor, EOT sensor, and FTT sensor) shows that the voltage signal of the FTT sensor is higher/lower than that of other temper- ature sensors when the engine is start- ed with its cold state.	 Harness or connectors (High or low resistance in the FTT sensor circuit) FTT sensor

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 7. NO >> GO TO 2.

2. PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-1

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

Is 1st trip DTC detected?

- YES >> Proceed to EC-256, "Diagnosis Procedure".
- NO >> GO TO 4.
- **4.**CHECK ENGINE COOLANT TEMPERATURE

With CONSULT

1. Select "COOLANT TEMP/S" in "DATA MONITOR" of "ENGINE" using CONSULT.

2. Check "COOLANT TEMP/S" value.

With GST

Follow the procedure "With CONSULT" above.

"COOLANT TEMP/S" less than 60°C (140°F)?

YES >> INSPECTION END

NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-2

With CONSULT

1. Cool engine down until "COOLANT TEMP/S" is less than 60°C (140°F).

P0181 FTT SENSOR

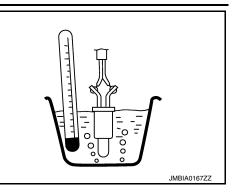
< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]
2. Wait at least 10 seconds.	
3. Check 1st trip DTC.	A
Follow the procedure "With CONSULT" above.	_
Is 1st trip DTC detected?	EC
YES >> Proceed to <u>EC-256, "Diagnosis Procedure"</u> . NO >> GO TO 6.	
6. PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)	C
Perform component function check. Refer to <u>EC-255. "Component Function Check"</u> . NOTE:	
Use the component function check to check the overall function of the FTT sensor circuit. During 1st trip DTC might not be confirmed.	this check, a \Box
Is the inspection result normal?	
YES >> INSPECTION END NO >> Proceed to EC-256, "Diagnosis Procedure".	E
7.PRECONDITIONING	r
If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the foll	owing proce-
dure before conducting the next test. Turn ignition switch OFF and wait at least 10 seconds. 	
2. Turn ignition switch ON.	0
 Turn ignition switch OFF and wait at least 10 seconds. TESTING CONDITION: 	
 Before performing the following procedure, do not add fuel. 	F
 Before performing the following procedure, check that fuel level is between 1/4 and 4/4. Before performing the following procedure, confirm that battery voltage is 11 V or more and the second se	at idla
• Before performing the following procedure, comministrational pattery voltage is 11 v or more a	at luie.
>> GO TO 8.	1
8. PERFORM DTC CONFIRMATION PROCEDURE B	
1. Move the vehicle to a cool place.	
NOTE: Cool the vehicle in an environment of ambient air temperature between –10°C (14°F) and 35	ö°C (95°F).
2. Turn ignition switch OFF and leave the vehicle for 12 hours.	k (
CAUTION: Never turn ignition switch ON during this procedure.	
NOTE:	1
The vehicle must be cooled with the food open.	_
 Start engine and let it idle for 5 minutes or more. CAUTION: 	
Never turn ignition switch OFF during idling.4. Check 1st trip DTC.	N
Is 1st trip DTC detected?	
YES >> Proceed to <u>EC-256, "Diagnosis Procedure"</u> . NO >> INSPECTION END	Ν
Component Function Check	NFOID:000000009758503
1. CHECK FUEL TANK TEMPERATURE (FTT) SENSOR	
 Turn ignition switch OFF. Disconnect fuel level sensor unit and fuel pump harness connector. 	F
3. Remove fuel level sensor unit. Refer to FL-6, "Removal and Installation".	

P0181 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

4. Check resistance between fuel level sensor unit and fuel pump terminals by heating with hot water as shown in the figure.

	sensor unit el pump			Resistance (kΩ)
+	-	Condi		
Terr	ninal			
4	5	Temperature [°C	20 (68)	2.3 – 2.7
4	5	(°F)]	50 (122)	0.79 – 0.90



Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-39, "Intermittent Incident"</u>.

NO >> Proceed to EC-256, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000009758504

[MRA8DE]

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-254, "DTC Logic".

Which malfunction is detected?

A >> GO TO 2.

B >> GO TO 6.

2. CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to MWI-17, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Proceed to <u>MWI-58, "Diagnosis Procedure"</u>.

3.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR POWER

- 1. Turn ignition switch OFF.
- 2. Disconnect fuel level sensor unit and fuel pump harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between fuel level sensor unit and fuel pump harness connector and ground.

	+		
Fuel level sensor	unit and fuel pump	-	Voltage (Approx.)
Connector	Terminal		V FF - 7
B48	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

${f 4}$. CHECK FUEL TANK TEMPERATURE (FTT) SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

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

	+			
	ensor unit and pump	E	Continuity	
Connector	Terminal	Connector	Terminal	
B48	4	E16	125	Existed

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

P0181 FTT SENSOR [MRA8DE] < DTC/CIRCUIT DIAGNOSIS > Is the inspection result normal? А YES >> Perform the trouble diagnosis for power supply circuit. >> Repair or replace error-detected parts. NO 5. CHECK FTT SENSOR GROUND CIRCUIT EC 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. Check the continuity between fuel level sensor unit and fuel pump harness connector and ECM harness 3. connector. + D Fuel level sensor unit and ECM Continuity fuel pump Connector Terminal Connector Terminal Ε B48 5 E16 124 Existed 4. Also check harness for short to power. Is the inspection result normal? YES >> GO TO 6. NO >> Repair or replace error-detected parts. ${f 0}.$ CHECK FUEL TANK TEMPERATURE (FTT) SENSOR Check the FTT sensor. Refer to EC-257, "Component Inspection". Is the inspection result normal? Н YES >> Check intermittent incident. Refer to GI-39, "Intermittent Incident". NO >> Replace fuel level sensor unit and fuel pump. Refer to FL-6, "Removal and Installation". Component Inspection INFOID:000000009758505 1.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR 1. Turn ignition switch OFF. 2. Disconnect fuel level sensor unit and fuel pump harness connector. 3. Remove fuel level sensor unit. Refer to FL-6, "Removal and Installation". 4. Check resistance between fuel level sensor unit and fuel pump Κ terminals by heating with hot water as shown in the figure. Fuel level sensor unit L and fuel pump Condition Resistance $(k\Omega)$ + _ M Terminal 20 (68) 2.3 - 2.7Temperature

Is the inspection result normal?

5

[°C (°F)]

4

YES >> INSPECTION END

NO >> Replace fuel level sensor unit and fuel pump. Refer to FL-6, "Removal and Installation".

0.79 - 0.90

50 (122)

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< DTC/CIRCUIT DIAGNOSIS >

P0182, P0183 FTT SENSOR

DTC Logic

INFOID:000000009758506

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0182	FTT SEN/CIRCUIT (Fuel temperature sensor "A" circuit low)	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 temperature sensor "A" circuit high)	An excessively high voltage from the sensor is sent to ECM.	 Fuel tank temperature sensor Combination meter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

- YES >> Proceed to EC-258, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK DTC WITH COMBINATION METER

Refer to MWI-17, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to <u>MWI-58, "Diagnosis Procedure"</u>.

2.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect fuel level sensor unit and fuel pump harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between fuel level sensor unit and fuel pump harness connector and ground.

	+		
	or unit and fuel	-	Voltage (Approx.)
Connector Terminal			
B48	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3. INFOID:000000009758507

P0182, P0183 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

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3. CHECK FUEL TANK TEMPERATURE (FTT) SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between fuel level sensor unit and fuel pump harness connector and ECM harness connector.

+		-	-	
Fuel level sensor unit and fuel pump		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B48	4	E16	125	Existed

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

Is the inspection result normal?

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

4.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM connector.
- Check the continuity between fuel level sensor unit and fuel pump harness connector and ECM harness connector.

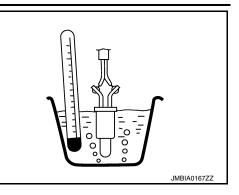
					_	
+		-	-			
Fuel level ser fuel p		EC	ECM			
Connector	Terminal	Connector	Terminal			
B48	5	E16	124	Existed		
4. Also cheo	ck harness t	for short to p	ower.		•	
Is the inspect	ion result ne	ormal?				
	GO TO 5. Repair or rep	blace error-d	etected pa	rts.		
5.CHECK FI	JEL TANK	TEMPERAT	URE (FTT)	SENSOR		
Check the FT	T sensor. R	efer to EC-2	259, "Comp	onent Inspec	tion".	
Is the inspect	ion result no	ormal?				
					mittent Incident". Refer to <u>FL-6, "Removal and</u>	Installation".
Componer	nt Inspect	ion				INFOID:000000009758508
1. СНЕСК F	JEL TANK	TEMPERAT	URE (FTT)	SENSOR		
	tion switch (
				ump harness		
J. Remove	iuel level se	insor unit. R			and Installation".	

P0182, P0183 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

4. Check resistance between fuel level sensor unit and fuel pump terminals by heating with hot water as shown in the figure.

	sensor unit el pump	Condition		Resistance (kΩ)
+	-			
Terminal				
4	5	Temperature	20 (68)	2.3 – 2.7
4	5	[°C (°F)]	50 (122)	0.79 – 0.90



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel level sensor unit and fuel pump. Refer to <u>FL-6, "Removal and Installation"</u>.

P0196 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0196 EOT SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0196 is displayed with DTC P0197 or P0198, first perform the trouble diagnosis for DTC P0197 or P0198. Refer to <u>EC-264, "DTC Logic"</u>.

P0196 EOT SENSOR (Engine oil temperature sensor range/performance) A) Rationally incorrect vo sensor is sent to ECM the voltage signals fro and intake air temperature sensor (IAT sensor, EC sensor, and EOT sensi- signal voltage of the EC er/lower than that of of sensors when the engi- its cold state. DTC CONFIRMATION PROCEDURE 1.INSPECTION START Is it necessary to erase permanent DTC? YES >> GO TO 6. NO >> GO TO 2. 2.PRECONDITIONING If DTC CONFIRMATION PROCEDURE has been previously dure before conducting the next test. 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch OFF and wait at least 10 seconds. Sefore performing the following procedure, confirm that >> GO TO 3. 3. PERFORM DTC CONFIRMATION PROCEDURE FOR M. 1. Start engine and warm it up to normal operating tempera 2. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF. 4. Turn ignition swit	ompared with EOT sensor (EOT sensor circuit is open or short- ed) re sensor. • EOT sensor f signals trans- t temperature • EOT sensor
P0196 (Engine oil temperature sensor range/performance) mitted to ECM from ease sensor (IAT sensor, EC sensor, and EOT sensor, when the engine sensor sensor sensor when the engine sensor senser sensor send sensor sensor sensor senserent sensor sensor senso	temperature
 1.INSPECTION START Is it necessary to erase permanent DTC? YES >> GO TO 6. NO >> GO TO 2. 2.PRECONDITIONING If DTC CONFIRMATION PROCEDURE has been previously dure before conducting the next test. 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. TESTING CONDITION: Before performing the following procedure, confirm that >> GO TO 3. 3. PERFORM DTC CONFIRMATION PROCEDURE FOR M. 1. Start engine and warm it up to normal operating tempera 2. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 4. Turn ignition switch OFF and wait at least 10 seconds. 5. Start engine and let it idle for 5 minutes and 10 seconds. 	shows that the sensor is high- er temperature(High or low resistance in the EOT sensor circuit)• EOT sensor
Is it necessary to erase permanent DTC? YES >> GO TO 6. NO >> GO TO 2. 2.PRECONDITIONING If DTC CONFIRMATION PROCEDURE has been previously dure before conducting the next test. 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. TESTING CONDITION: Before performing the following procedure, confirm that >> GO TO 3. 3.PERFORM DTC CONFIRMATION PROCEDURE FOR M. 1. Start engine and warm it up to normal operating tempera 2. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 5. Start engine and let it idle for 5 minutes and 10 seconds.	
 YES >> GO TO 6. NO >> GO TO 2. 2.PRECONDITIONING If DTC CONFIRMATION PROCEDURE has been previously dure before conducting the next test. 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. TESTING CONDITION: Before performing the following procedure, confirm that >> GO TO 3. 3. PERFORM DTC CONFIRMATION PROCEDURE FOR M. 1. Start engine and warm it up to normal operating tempera 2. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 	
 PERFORM DTC CONFIRMATION PROCEDURE FOR M. Start engine and warm it up to normal operating tempera Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Start engine and let it idle for 5 minutes and 10 seconds. 	
 Start engine and warm it up to normal operating tempera Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Start engine and let it idle for 5 minutes and 10 seconds. 	
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Start engine and let it idle for 5 minutes and 10 seconds. 	
	FUNCTION A-1
Is 1st trip DTC detected?	
YES >> Proceed to <u>EC-263, "Diagnosis Procedure"</u> . NO >> GO TO 4.	
4.PERFORM DTC CONFIRMATION PROCEDURE FOR M	

EC-261

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P0196 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

If it is below 80°C (176°F), warm engine up until "COOLANT TEMP/S" indicates more than 80°C (176°F). Then perform the following steps.

3. Turn ignition switch OFF and soak the vehicle in a cool place.

4. Turn ignition switch ON. NOTE:

Do not turn ignition switch OFF until step 8.

- 5. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 6. Check the following.

COOLANT TEMP/S	Below 40°C (104°F)
INT/A TEMP SE	Below 40°C (104°F)
Difference between "COOLANT TEMP/S" and "INT/A TEMP SE"	Within 6°C (11°F)

If they are within the specified range, perform the following steps.

If they are out of the specified range, soak the vehicle to meet the above conditions. Then perform the following steps.

NOTE:

• Do not turn ignition switch OFF.

- If it is supposed to need a long period of time, do not deplete the battery.
- 7. Start engine and let it idle for 5 minutes.
- 8. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Proceed to EC-263, "Diagnosis Procedure".

NO >> GO TO 5.

5.PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)

Perform component function check. Refer to EC-263. "Component Function Check".

NOTE:

Use the component function check to check the overall function of the EOT sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-263, "Diagnosis Procedure".

6.PRECONDITIONING

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

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

TESTING CONDITION:

- Before performing the following procedure, do not add fuel.
- Before performing the following procedure, check that fuel level is between 1/4 and 4/4.
- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 7.

7.PERFORM DTC CONFIRMATION PROCEDURE B

- 1. Move the vehicle to a cool place.
- NOTE:

Cool the vehicle in an environment of ambient air temperature between –10°C (14°F) and 35°C (95°F). 2. Turn ignition switch OFF and leave the vehicle for 12 hours.

- CAUTION: Never turn ignition switch ON during this procedure. NOTE:
- The vehicle must be cooled with the food open.
- 3. Start engine and let it idle for 5 minutes or more.

P0196 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

CAUTION:

Never turn ignition switch OFF during idling.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-263, "Diagnosis Procedure".

NO >> INSPECTION END

Component Function Check

1. CHECK ENGINE OIL TEMPERATURE (EOT) SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect EOT sensor harness connector.
- 3. Remove EOT sensor. Refer to EM-94, "Exploded View".
- Check resistance between EOT sensor terminals by heating with hot water as shown in the figure.

EOT sensor					
+	_	Condition		Resistance (k Ω)	
Terr	minal				
		Temperature [°C (°F)]	20 (68)	2.37 – 2.63	
1	2		50 (122)	0.68 – 1.00	
			90 (194)	0.236 - 0.260	

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-39, "Intermittent Incident".

NO >> Proceed to EC-263, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK ENGINE OIL TEMPERATURE (EOT) SENSOR

Check EOT sensor. Refer to EC-263, "Component Inspection".

Is the inspection result normal?

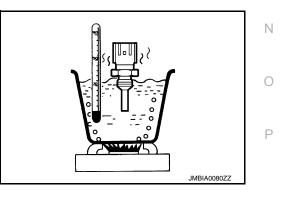
- YES >> Check intermittent incident. Refer to GI-39, "Intermittent Incident".
- NO >> Replace EOT sensor. Refer to <u>EM-94. "Exploded View"</u>.

Component Inspection

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

Engine oil temperature sensor		Quantities		
+	-	Condition		Resistance (kΩ)
Terminal				
		-	20 (68)	2.37 - 2.63
1	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 oil temperature sensor. Refer to EM-94. "Exploded View".

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INFOID:000000009758511

INFOID:000000009758512

< DTC/CIRCUIT DIAGNOSIS >

P0197, P0198 EOT SENSOR

DTC Logic

INFOID:000000009758513

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0197	EOT SEN/CIRC (Engine oil temperature sensor circuit low)	An excessively low voltage from the engine oil temperature sensor is sent to ECM.	Harness or connectors (EOT sensor circuit is open or shorted.)
P0198	EOT SEN/CIRC (Engine oil temperature sensor circuit high)	An excessively high voltage from the engine oil temperature sensor is sent to ECM.	Engine oil temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and wait at least 5 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-264, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK ENGINE OIL TEMPERATURE SENSOR POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect engine oil temperature (EOT) sensor harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between EOT sensor harness connector and ground.

	+		
EOT	sensor	-	Voltage (Approx.)
Connector Terminal			
F48 1		Ground	5.0 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.check engine oil temperature sensor power supply circuit

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between EOT sensor harness connector and ECM harness connector.

INFOID:000000009758514

P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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	+	-	-			А
	sensor	EC		Continuity		
Connector	Terminal	Connector	Terminal			EC
F48	1	F24	25	Existed		
		s for short to g	round.			0
-	ction result		acia far nov	vor cupply circui	+	C
		e flouble diagi		ver supply circui s.	ι.	
-	•	OR GROUND				D
	nition switch					
2. Discon	nect ECM h	arness conneo				Е
3. Check	the continui	y between EC)T sensor ha	arness connecto	r and ECM harness connector.	
	+					
EOT		EC	- `M			F
Connector	Terminal	Connector	Terminal	Continuity		
	2	F24	26	Existed		G
4. Also ch	neck harnes	s for short to p	ower.			0
	ection result	•	•••••			
	• GO TO 4.					Н
	-	eplace error-d	-			
4.CHECK	ENGINE OI	L TEMPERAT	URE SENS	OR		
	-	•	isor. Refer t	o <u>EC-265, "Com</u>	ponent Inspection (EOT Sensor)".	
-	ection result					
				<u>GI-39, "Intermitt</u> or Refer to FM-	ent Incident". 94. "Exploded View".	J
	•	ction (EOT		<u></u>		
Compon	ent inspe		Sensor)		INFOID:000000009758515	Κ
1. CHECK	ENGINE OI	L TEMPERAT	URE SENS	OR		
	nition switch					1
		oil temperatur temperature s		rness connector	r.	
				ature sensor ter	rmi-	
		n hot water as			·	M
Engine oil te ture ser	e oil tempera-					Ν
+	_	Condition		Resistance		
Termir	nal					_
			20 (6	8) 2.37 - 2.63 kg		0
1	2 Tem	perature [°C (°F)]	50 (12	22) 0.68 - 1.00 kg		
			90 (19	94) 0.236 - 0.260 H	JMBIA0080ZZ	Ρ
Is the inspe	ection result	normal?		1		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil temperature sensor. Refer to EM-94, "Exploded View".

P0222, P0223 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0222, P0223 TP SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0222 or P0223 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-353</u>, "<u>DTC Logic</u>".

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0222	TP SEN 1/CIRC-B1 (Throttle/Pedal position sensor/switch "B" circuit low)	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/Pedal position sensor/switch "B" circuit high)	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 perform the following procedure before conducting the next test.

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-266, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758517

1.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect electric throttle control actuator harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between electric throttle control actuator harness connector and ground.

	+		
	e control actu- tor	_	Voltage (Approx.)
Connector Terminal			
F7	2	Ground	5.0 V
Is the inspec	tion result n	ormal?	

Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 2. INFOID:000000009758516

P0222, P0223 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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$\overline{2}$. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

	+	-	_	
	le control actu- tor	EC	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F7	2	F25	80	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

3.CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

+				
Electric throttle control actu- ator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	4	F25	78	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT

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

ر	+	-	-	
Electric throttle	e control actu- or	EC	M	Continuity
Connector	Terminal	Connector	Terminal	
F7	1	F25	79	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to EC-268, "Component Inspection (TP Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-39, "Intermittent Incident"</u>.

NO >> Replace electric throttle control actuator. Refer to EM-27, "Removal and Installation".

P0222, P0223 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection (TP Sensor)

INFOID:000000009758518

[MRA8DE]

1. CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform "Throttle Valve Closed Position Learning". Refer to EC-139, "Work Procedure".
- 4. Turn ignition switch ON.
- 5. Set selector lever to D (CVT) or 1st (M/T) position.
- 6. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM					
Connec-	+	-	Co	Voltage	
tor	Terr	ninal			
	77		Accelerator	Fully released	Less than 4.75 V
F25		78		Fully depressed	More than 0.36 V
F20		70	pedal	Fully released	More than 0.36 V
	19			Fully depressed	Less than 4.75 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to <u>EM-27, "Removal and Installation"</u>.

< DTC/CIRCUIT DIAGNOSIS >

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Logic

INFOID:000000009758519

[MRA8DE]

DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function	0
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire	

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)

On the 1st trip, when a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the 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 on any one cylinder or on multiple cylinders.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	
P0300	MULTI CYL MISFIRE (Random/Multiple cylinder misfire de- tected)	Multiple cylinder misfire.	Improper spark plug Insufficient compression	J
P0301	CYL 1 MISFIRE (Cylinder 1 misfire detected)	No. 1 cylinder misfires.	 Incorrect fuel pressure Fuel Injector circuit is open or shorted Fuel injector 	K
P0302	CYL 2 MISFIRE (Cylinder 2 misfire detected)	No. 2 cylinder misfires.	Intake air leakIgnition signal circuit is open or shorted	
P0303	CYL 3 MISFIRE (Cylinder 3 misfire detected)	No. 3 cylinder misfires.	Lack of fuel Signal plate A/F sensor 1	L
P0304	CYL 4 MISFIRE (Cylinder 4 misfire detected)	No. 4 cylinder misfires.	Incorrect PCV hose connection	N/I

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

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

- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Restart engine and let it idle for about 15 minutes.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

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< DTC/CIRCUIT DIAGNOSIS >

YES >> Proceed to EC-270, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Start engine and drive the vehicle as per the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.

Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

CAUTION:

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

Engine speed	Engine speed in the freeze frame data \pm 400 rpm	
Vehicle speed	Vehicle speed in the freeze frame data \pm 10 km/h (6 MPH)	
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).	
	When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).	

The time to driving varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-270, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK FOR INTAKE AIR LEAK AND PCV HOSE

- 1. Start engine and run it at idle speed.
- 2. Listen for the sound of the intake air leak.
- 3. Check PCV hose connection.

Is intake air leak detected?

- YES >> Discover air leak location and repair.
- NO >> GO TO 2.

2. CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

Is the inspection result normal?

YES-1 (With CONSULT) >> GO TO 3.

- YES-2 (Without CONSULT)>> GO TO 4.
- NO >> Repair or replace it.

3.PERFORM POWER BALANCE TEST

With CONSULT

- 1. Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 3. Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

YES >> GO TO 9.

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NO >> GO TO 4.

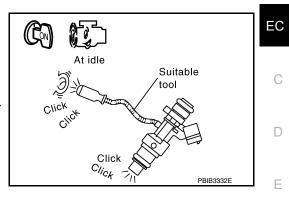
4.CHECK FUNCTION OF FUEL INJECTOR

- 1. Start engine and let engine idle.
- 2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Perform trouble diagnosis for FUEL INJECTOR. Refer to <u>EC-450</u>, "Diagnosis Procedure".



CHECK FUNCTION OF IGNITION COIL-1

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

- 1. Turn ignition switch OFF.
- 2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
- NOTE:

Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

- 3. Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- 5. Turn ignition switch OFF.
- 6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 7. Remove ignition coil and spark plug of the cylinder to be checked.
- 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 9. Connect spark plug and harness connector to ignition coil.
- 10. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

• Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.

• It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken. NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is mal-functioning.

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 6.

6.CHECK FUNCTION OF IGNITION COIL-2



- 2. Disconnect spark plug and connect a known-good spark plug.
- 3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

HEF.	J
	K
13 - 17 mm 777777777777777777777777777777777	L
(Cylinder head, cylinder block, etc.)	
JMBIA0066GB	М
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< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 7.

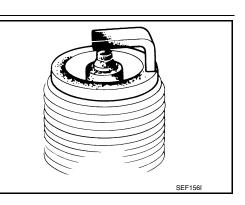
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-456. "Diagnosis Procedure".

7.CHECK SPARK PLUG

Check the initial spark plug for fouling, etc. Refer to <u>EM-45.</u> <u>"Removal and Installation"</u>.

Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-118, "Spark Plug"</u>.
 NO >> 1. Repair or clean spark plug.
 - >> 1. Repair or clean spark plug.2. GO TO 8.



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8.CHECK FUNCTION OF IGNITION COIL-3

- 1. Reconnect the initial spark plugs. Refer to <u>EM-45, "Removal and Installation"</u>.
- 2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace spark plug(s) with standard type one(s). For spark plug type. Refer to <u>EM-118, "Spark</u> <u>Plug"</u>.

9.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-23, "Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets. Refer to <u>EM-112.</u> <u>"Description"</u>.

10.CHECK FUEL PRESSURE

- 1. Install all removed parts.
- 2. Release fuel pressure to zero. Refer to EC-143, "Work Procedure".
- 3. Install fuel pressure gauge and check fuel pressure. Refer to EC-143, "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?

- YES >> Replace "fuel filter and fuel pump assembly". Refer to <u>FL-6, "Exploded View"</u>.
- NO >> Repair or replace error-detected parts.

12. CHECK IGNITION TIMING

Check ignition timing. Refer to EC-480, "Inspection".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Perform "BASIC INSPECTION". Refer to <u>EC-131, "Work Procedure"</u>.

13. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

2. Disconnect A/F sensor 1 harness connector.

^{1.} Turn ignition switch OFF.

< DTC/CIRCUIT DIAGNOSIS >

3. Disconnect ECM harness connector.

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

		+		_	
_	A/F se	ensor 1	E	СМ	Continuity
_	Connector	Terminal	Connector	Terminal	
_	F12 ^{*1}	1	F24	41	Existed
	F42 ^{*2}	2	124	45	LAISted

*1: Except California

*2: For California

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

+	F			
A/F se	ensor 1	-	Continuity	
Connector	Terminal			
F12 ^{*1}	1	Ground	Not existed	
F42 ^{*2}	2	Ground	NOL EXISTED	
	pt California California	3		
4	ŀ			
EC	CM	-	Continuity	
Connector	Terminal			
F24	41	Ground	Not existed	
Γ 24	45	Ground	NUL EXISTED	
. Also che	eck harness	for short to p	ower.	
the inspec	tion result n	ormal?		
	GO TO 14.			
-	•	•	letected parts.	
4.CHECK	(A/F SENS	OR 1 HEATE	ĒR	
heck the A	/F sensor 1	heater. Refe	r to <u>EC-177, "C</u>	omponent Inspection (A/F Sensor 1 Heater)
	tion result n	ormal?		
	GO TO 15.		ofer to EM 00	
	•	Sensor 1. R FLOW SEN		"Exploded View".
J.CHECK	K MASS AIR	LOW SEN	ISOR	
With CON				
neck "MAS	S AIRFLOW	v″ in "DATAN		le of "ENGINE" using CONSULT.
			: <u>EC-486, "M</u>	ass Air Flow
Spec	ification		Sensor"	
With GST				
	air flow sen	isor signal in	Service \$01 w	th GST.
			FO 400 W	
Spec	ification		: <u>EC-486, "M</u> Sensor"	ass Air Flow
		ue within the	specification?	
YES >> (GO TO 16.			

YES >> GO TO 16.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to <u>EC-186, "DTC Logic"</u>.

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< DTC/CIRCUIT DIAGNOSIS >

16.CHECK SYMPTOM TABLE

Check items on the rough idle symptom in EC-473. "Symptom Table".

Is the inspection result normal?

YES >> GO TO 17.

NO >> Repair or replace error-detected parts.

17.ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.

Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to <u>EC-55</u>. "Diagnosis Description".

>> GO TO 18.

18.CHECK INTERMITTENT INCIDENT

Perform GI-39, "Intermittent Incident".

>> INSPECTION END

P0327, P0328 KS

< DTC/CIRCUIT DIAGNOSIS >

P0327, P0328 KS

DTC Logic

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[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT scre (Trouble diagno tent)		DTC	detecting condition	Possible cause
P0327	KNOCK SEN/CI (Knock sensor 1 low bank 1)		An excessively lo sor is sent to ECN	w voltage from the knock sen- M.	 Harness or connectors (Knock sensor circuit is open or short-
P0328	KNOCK SEN/CI (Knock sensor 1 high bank 1)		An excessively hi sensor is sent to	gh voltage from the knock ECM.	ed.) • Knock sensor
DTC CON	FIRMATION	PROCE	DURE		
1.PRECO	NDITIONING				
before con 1. Turn ig 2. Turn ig 3. Turn ig TESTING	ducting the ney inition switch C inition switch C inition switch C CONDITION:	xt test.)FF and v)N.)FF and v	vait at least 10 vait at least 10	seconds.	ys perform the following procedure
~	> GO TO 2.				
2.PERFO	RM DTC CON	FIRMATI	ON PROCEDL	IRE	
	ngine and run i 1st trip DTC.	it for at le	ast 5 seconds	at idle speed.	
	DTC detected?				
YES >	> Proceed to E		Diagnosis Proc	<u>edure"</u> .	
NO >:	> INSPECTION	NEND			
Diagnosi	is Procedure	е			INFOID:000000009758522
1.снеск	KNOCK SENS	SOR GRO	OUND CIRCUI	т	
1. Turn ig	nition switch C	DFF.			
2. Discor	nect knock ser	nsor harn			
	nect ECM harr			arness connector and I	ECM harness connector.
4. Oneon	the continuity i	between			
	+		-		
Knoc	ck sensor		ECM	Continuity	
Connector	Terminal	Connecto	r Terminal		
F8	2	F24	8	Existed	
	heck harness fo		o power.		
	ection result no	ormal?			
	> GO TO 2. > Repair or rep	lace erre	r-datacted port	6	
-					
	KNOCK SENS		UT SIGNAL CI	KUUII	

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

P0327, P0328 KS

< DTC/CIRCUIT DIAGNOSIS >

	+	-	_	
Knock	sensor	E	CM	Continuity
Connector	Terminal	Connector	Terminal	
F8	1	F24	4	Existed

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

Is the inspection result normal?

YES >> GO TO 3.

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

3. CHECK KNOCK SENSOR

Check knock sensor. Refer to EC-276, "Component Inspection (KS)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-39, "Intermittent Incident".

NO >> Replace knock sensor. Refer to EM-94, "Exploded View".

Component Inspection (KS)

INFOID:000000009758523

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 $\text{M}\Omega.$

Knock	sensor			
+	_	Condition		Resistance (Approx.)
Tern	ninals			(FF -)
1	2	Temperature °C (°F)	20 (68)	532 - 588 kΩ

CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones. Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace knock sensor. Refer to <u>EM-94, "Exploded View"</u>.

P0335 CKP SENSOR (POS)

< DTC/CIRCUIT DIAGNOSIS >

P0335 CKP SENSOR (POS)

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0340 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-</u><u>353, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0335	CKP SEN/CIRCUIT (Crankshaft position sensor "A" circuit)	 The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. The crankshaft position sensor (POS) signal is not in the normal pattern during engine run- ning. 	 Harness or connectors [Crankshaft position sensor (POS) cir- cuit is open or shorted.] Crankshaft position sensor (POS) Signal plate
	NFIRMATION PROCE	DURE	
	ONDITIONING		
before co 1. Turn	nducting the next test. ignition switch OFF and	has been previously conducted, alway wait at least 10 seconds.	s perform the following procedure
	ignition switch ON.	wait at least 10 seconds.	
TESTING	CONDITION:		
tion swit		g procedure, confirm that battery volt	age is more than 10.5 v with igni-
-	>> GO TO 2.		
	ORM DTC CONFIRMAT	ION PROCEDURE	
	analiza and latitidle for		
2. Chec	jine does not start, crank k 1st trip DTC.	at least 5 seconds.	
2. Chec Is 1st trip	ine does not start, crank k 1st trip DTC. <u>DTC detected?</u>	at least 5 seconds. engine for at least 2 seconds.	
2. Chec Is 1st trip YES	jine does not start, crank k 1st trip DTC.	at least 5 seconds. engine for at least 2 seconds.	
2. Chec <u>Is 1st trip</u> YES NO	ine does not start, crank k 1st trip DTC. <u>DTC detected?</u> >> Proceed to <u>EC-277,</u> "	at least 5 seconds. engine for at least 2 seconds.	INFOID:00000009758525
2. Chec <u>Is 1st trip</u> YES NO Diagnos	ine does not start, crank k 1st trip DTC. <u>DTC detected?</u> >> Proceed to <u>EC-277, "</u> >> INSPECTION END sis Procedure	at least 5 seconds. a engine for at least 2 seconds. Diagnosis Procedure".	
2. Chec <u>Is 1st trip</u> YES NO Diagnos 1. CHEC	ine does not start, crank k 1st trip DTC. <u>DTC detected?</u> >> Proceed to <u>EC-277, "</u> >> INSPECTION END sis Procedure K CRANKSHAFT POSIT	at least 5 seconds. c engine for at least 2 seconds. Diagnosis Procedure". TION (CKP) SENSOR (POS) POWER S	UPPLY
2. Chec <u>Is 1st trip</u> YES NO Diagnos 1. CHEC 1. Disco 2. Turn	ine does not start, crank k 1st trip DTC. <u>DTC detected?</u> >> Proceed to <u>EC-277. "</u> >> INSPECTION END sis Procedure K CRANKSHAFT POSIT onnect crankshaft positio ignition switch ON.	at least 5 seconds. c engine for at least 2 seconds. <u>Diagnosis Procedure"</u> . CION (CKP) SENSOR (POS) POWER S n (CKP) sensor (POS) harness connecte	UPPLY pr.
2. Chec <u>Is 1st trip</u> YES NO Diagnos 1. CHEC 1. Disco 2. Turn	ine does not start, crank k 1st trip DTC. <u>DTC detected?</u> >> Proceed to <u>EC-277. "</u> >> INSPECTION END sis Procedure K CRANKSHAFT POSIT onnect crankshaft positio ignition switch ON.	at least 5 seconds. c engine for at least 2 seconds. Diagnosis Procedure". TION (CKP) SENSOR (POS) POWER S	UPPLY pr.
2. Chec <u>Is 1st trip</u> YES NO Diagnos 1. CHEC 1. Disco 2. Turn	ine does not start, crank k 1st trip DTC. <u>DTC detected?</u> >> Proceed to <u>EC-277. "</u> >> INSPECTION END sis Procedure K CRANKSHAFT POSIT onnect crankshaft positio ignition switch ON.	at least 5 seconds. c engine for at least 2 seconds. <u>Diagnosis Procedure"</u> . CION (CKP) SENSOR (POS) POWER S n (CKP) sensor (POS) harness connecte	UPPLY pr.

CKP sen	+ sor (POS)	_	Voltage (Approx.)	
Connector	Terminal		()	
F22	3	Ground	5.0 V	

Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 2. INFOID:000000009758524

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С

P0335 CKP SENSOR (POS)

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

$\overline{2.}$ CHECK CKP SENSOR (POS) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

+				
CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F22	3	F25	72	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

$\mathbf{3}$.check CKP sensor (pos) ground circuit

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

+				
CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F22	2	F25	70	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT

1. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

+				
CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F22	1	F25	71	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK CRANKSHAFT POSITION SENSOR (POS)

Check the crankshaft position sensor (POS). Refer to <u>EC-279, "Component Inspection [CKP Sensor (POS)]"</u>. <u>Is the inspection result normal?</u>

YES >> GO TO 6.

```
NO >> Replace crankshaft position sensor (POS). Refer to <u>EM-33</u>, "Exploded View".
```

O.CHECK GEAR TOOTH

1. Remove crankshaft position sensor (POS). Refer to EM-33. "Exploded View".

P0335 CKP SENSOR (POS)

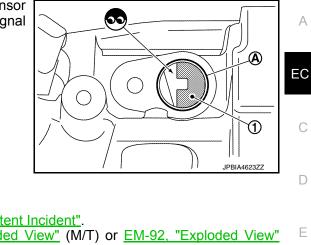
< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

INFOID:000000009758526

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Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-39. "Intermittent Incident".
- NO >> Replace the signal plate. Refer to <u>EM-90</u>, "<u>Exploded View</u>" (M/T) or <u>EM-92</u>, "<u>Exploded View</u>" (CVT).

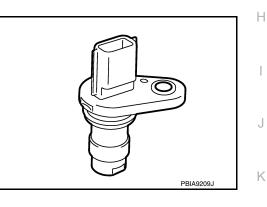
Component Inspection [CKP Sensor (POS)]

1.CHECK CRANKSHAFT POSITION SENSOR (POS)-1

- 1. Turn ignition switch OFF.
- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect crankshaft position sensor (POS) harness connector.
- 4. Remove the sensor.
- 5. Visually check the sensor for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace crankshaft position sensor (POS). Refer to <u>EM-</u> <u>33, "Exploded View"</u>.



2. CHECK CRANKSHAFT POSITION SENSOR (POS)-2

Check the resistance between crankshaft position sensor (POS) terminals as per the following.

Crankshaft position sensor (POS) + – Terminal (Polarity)		Condition		Resistance					
					1	2			
					· ·	3	Temperature °C (°F)	25 (77)	Except 0 or ∞ Ω
2	3								
Is the in	Is the inspection result normal?								
YES	S >> INSPECTION END								

NO >> Replace crankshaft position sensor (POS). Refer to EM-33, "Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

P0340 CMP SENSOR (PHASE)

DTC Logic

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0340	CMP SEN/CIRC-B1 (Camshaft position sen- sor "A" circuit bank 1)	 The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. The cylinder No. signal is not sent to ECM during engine running. The cylinder No. signal is not in the normal pattern during engine running. 	 Harness or connectors (Camshaft position sensor circuit is open or shorted) Camshaft position sensor Camshaft (Intake) Starter motor Starting system circuit Dead (Weak) battery Sensor power supply 2 circuit

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

- Start engine and let it idle for at least 5 seconds. If engine does not start, crank engine for at least 2 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-280, "Diagnosis Procedure".
- NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-2

1. Maintaining engine speed at more than 800 rpm for at least 5 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-280, "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-20, "Work Flow (With GR8-1200 NI)"</u> or <u>STR-24, "Work Flow</u> (Without <u>GR8-1200 NI)"</u>.
- 2.CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY

EC-280

INFOID:000000009758528

P0340 CMP SENSOR (PHASE)

< DTC/CIR	CUIT DIAGN		1340 CIMF	SENSOR (PHASE) [MRA8DE]
	nition switch			
			MP) sensor	(PHASE) harness connector.
	hition switch the voltage b		sensor (PH	IASE) harness connector and ground.
	5		,	,
	+			
CMP sens	or (PHASE)	_	Voltage (Approx.)	
Connector	Terminal		\ FF - 7	
F39	1	Ground	5.0 V	
Is the inspe	<u>ction result n</u>	ormal?		
	GO TO 4.			
•	GO TO 3.			U-T
	SENSOR PC			
			Refer to EC	C-444, "Diagnosis Procedure".
	<u>n result norm</u>		nania far nau	vor supply signit
	Repair or re			wer supply circuit.
	CMP SENSC	•	•	
	nition switch			
	nect ECM ha		ctor.	
3. Check t	he continuity	between CN	VP sensor (I	PHASE) harness connector and ECM harness connector.
	+	-	_	
	or (PHASE)		CM	Continuity
Connector	Terminal	Connector	Terminal	
F39	2	F24	30	Existed
	eck harness	•	ower.	
	<u>ction result n</u> GO TO 5.	<u>onnal?</u>		
	Repair or re	place error-d	etected part	S.
5.CHECK	CMP SENSC	OR (PHASE)	INPUT SIG	NAL CIRCUIT
	nect ECM ha			
				PHASE) harness connector and ECM harness connector.
	+	-	_	
	or (PHASE)	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	
F39	3	F24	31	Existed
	eck harness	-	round and t	o power.
	ction result n	ormal?		
	GO TO 6. Repair or re	place error-d	etected part	S
^	CAMSHAFT		•	
			•	
Check the <u>(PHASE)]"</u> .	camsnatt po	Sation Senso	וע (PHASE)	. Refer to EC-282, "Component Inspection [CMP Sensor
· · · · · · · · · · · · · · · · · · ·	ction result n	ormal?		
	GO TO 7.			
		nshaft positio	on sensor (P	PHASE) Refer to EM-60 "Removal and Installation"

NO >> Replace camshaft position sensor (PHASE). Refer to EM-60. "Removal and Installation".

P0340 CMP SENSOR (PHASE)

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

INFOID:000000009758529

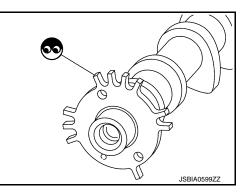
7.CHECK CAMSHAFT (INT)

Check the following.

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

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-39, "Intermittent</u> <u>Incident"</u>.
- NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to <u>EM-60, "Removal and Installation"</u>.



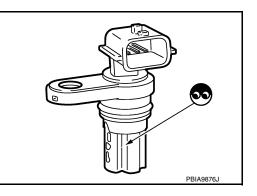
Component Inspection [CMP Sensor (PHASE)]

1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-1

- 1. Turn ignition switch OFF.
- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect camshaft position sensor (PHASE) harness connector.
- 4. Remove the sensor.
- 5. Visually check the sensor for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace camshaft position sensor (PHASE). Refer to <u>EM-60, "Removal and Installation"</u>.



2. CHECK CAMSHAFT POSITION SENSOR (PHASE)-2

Check the resistance camshaft position sensor (PHASE) terminals as per the following.

Camshaft position sensor (PHASE)				
+	-	Condition	Resistance	
Terminals	s (Polarity)			
1	2			
1	3	Temperature °C (°F)	25 (77)	Except 0 or ∞ Ω
2	3			

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace camshaft position sensor (PHASE). Refer to EM-60, "Removal and Installation".

< DTC/CIRCUIT DIAGNOSIS >

P0420 THREE WAY CATALYST FUNCTION

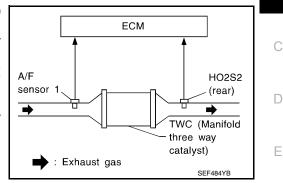
DTC Logic

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 air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause	G
P0420	TW CATALYST SYS-B1 (Catalyst system efficiency below threshold bank 1)	 Three way catalyst (manifold) does not operate properly. Three way catalyst (manifold) does not have enough oxygen storage capacity. 	 Three way catalyst (manifold) Exhaust tube Intake air leaks Fuel injector Fuel injector leaks Spark plug Improper ignition timing 	Н

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

Will CONSULT be used?

	ES >> GO TO 2. O >> GO TO 6.	L
2.	PERFORM DTC CONFIRMATION PROCEDURE-1	M
\sim	With CONSULT STING CONDITION:	
	o not hold engine speed for more than the specified minutes below.	Ν
1. 2.	Start engine and warm it up to the normal operating temperature. Turn ignition switch OFF and wait at least 10 seconds.	
3. 4.	Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds.	0
5.	Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.	
6. 7.	Let engine idle for 1 minute. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.	Р
8.	Check that "COOLANT TEMP/S" indicates more than 70°C (158°F). If not, warm up engine and go to next step when "COOLANT TEMP/S" indication reaches to 70°C	

- (158°F).
- 9. Open engine hood.
- 10. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode of "ENGINE" using CON-SULT.

INFOID:000000009758530

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< DTC/CIRCUIT DIAGNOSIS >

11. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.

12. Check the indication of "CATALYST".

Which is displayed on CONSULT screen?

CMPLT>> GO TO 5.

INCMP >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Wait 5 seconds at idle.

 Rev engine up to 2,000 to 3,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take approximately 5 minutes).

Does the indication change to "CMPLT"?

YES >> GO TO 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-3

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-285, "Diagnosis Procedure".

NO >> INSPECTION END

6.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-284, "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 >> Proceed to EC-285, "Diagnosis Procedure".

Component Function Check

INFOID:000000009758531

1.PERFORM COMPONENT FUNCTION CHECK

Without CONSULT

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Restart engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Open engine hood.
- 6. Check the voltage between ECM harness connector terminals as per the following condition.

ECM				
Connector	+	_	Condition Voltage (V)	
Connector	Terminal			
F24	22	23	Keeping engine speed at 2500 rpm constant under no load	The voltage fluctuation cy- cle takes more than 5 sec- onds. • 1 cycle: $0.6 - 1.0 \rightarrow 0 - 0.3$ $\rightarrow 0.6 - 1.0$

Is the inspection result normal?



[MRA8DE] < DTC/CIRCUIT DIAGNOSIS > YES >> INSPECTION END NO >> Proceed to EC-285, "Diagnosis Procedure". А Diagnosis Procedure INFOID:000000009758532 EC CHECK EXHAUST SYSTEM Visually check exhaust tubes and muffler for dent. Is the inspection result normal? YES >> GO TO 2. NO >> Repair or replace error-detected parts. 2.CHECK EXHAUST GAS LEAK D 1. Start engine and run it at idle. 2. Listen for an exhaust gas leak before the three way catalyst (manifold). Ε Three way catalyst Three way catalyst Muffler (Manifold) (Under floor) HO2S2 A/F sensor To exhaust manifold ⇒ : Exhaust gas PBIB1216F Is exhaust gas leak detected? Н YES >> Repair or replace error-detected parts. NO >> GO TO 3. 3.CHECK INTAKE AIR LEAK Listen for an intake air leak after the mass air flow sensor. Is intake air leak detected? YES >> Repair or replace error-detected parts. NO >> GO TO 4. **4**.CHECK IGNITION TIMING AND IDLE SPEED Κ Check the following items. Ignition timing (Refer to EC-480, "Inspection".) Idle speed (Refer to EC-479, "Inspection".) Is the inspection result normal? YES >> GO TO 5. NO >> Perform "BASIC INSPECTION". Refer to EC-131, "Work Procedure". M **5.**CHECK FUEL INJECTOR Check the fuel injector. Refer to EC-450, "Component Function Check". Ν Is the inspection result normal? YES >> GO TO 6. NO >> Perform EC-450, "Diagnosis Procedure". Ο **6.**CHECK FUNCTION OF IGNITION COIL-1 CAUTION: Ρ Do the following procedure in the place where ventilation is good without the combustible. Turn ignition switch OFF. 1. 2. Remove fuel pump fuse in IPDM E/R to release fuel pressure. NOTE: Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

- 3. Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.

< DTC/CIRCUIT DIAGNOSIS >

- 5. Turn ignition switch OFF.
- 6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 7. Remove ignition coil and spark plug of the cylinder to be checked.
- 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 9. Connect spark plug and harness connector to ignition coil.
- 10. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

- Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken. NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is mal-functioning.

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-2

- 1. Turn ignition switch OFF.
- 2. Disconnect spark plug and connect a known-good spark plug.
- 3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

YES >> GO TO 8.

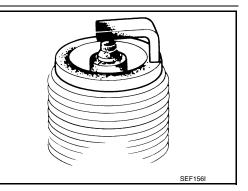
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-456, "Diagnosis Procedure".

8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc. Refer to <u>EM-13, "Inspec-</u> tion".

Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-118</u>, "Spark Plug".
- NO >> 1. Repair or clean spark plug. Refer to <u>EM-45.</u> "Removal and Installation".
 - 2. GO TO 9.

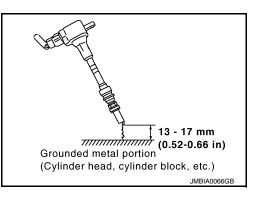


9. CHECK FUNCTION OF IGNITION COIL-3

- 1. Reconnect the initial spark plugs.
- 2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal? YES >> INSPECTION END



DTC/CIRCUIT DIAGNOSIS > [MRA8DE]		
NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-118, "Spark</u> <u>Plug"</u> .	А	
10. CHECK FUEL INJECTOR		
2. Remove rue injector assembly. Relef to <u>EM-40, Removal and Installation</u> .	EC	
Keep fuel hose and all fuel injectors connected to fuel tube. 3. Disconnect all ignition coil harness connectors.		
 Reconnect all fuel injector harness connectors disconnected. Turn ignition switch ON. 	С	
Does fuel drip from fuel injector?		
 YES >> GO TO 11. NO >> Replace the fuel injector(s) from which fuel is dripping. Refer to <u>EM-40, "Removal and Installa-</u>tion". 	D	
11.CHECK INTERMITTENT INCIDENT	Е	
Check intermittent incident. Refer to <u>GI-39, "Intermittent Incident"</u> .		
<u>Is the trouble fixed?</u> YES >> INSPECTION END	F	
NO >> Replace three way catalyst assembly. Refer to <u>EX-5, "Exploded View"</u> .		
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P0441 EVAP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

P0441 EVAP CONTROL SYSTEM

DTC Logic

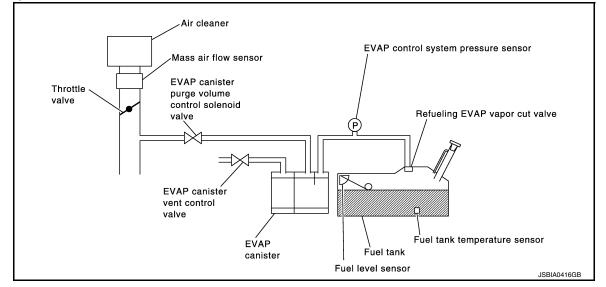
DTC DETECTION LOGIC

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0441	EVAP PURG FLOW/MON (Evaporative emission sys- tem incorrect purge flow)	EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	 EVAP canister purge volume control solenoid valve stuck closed EVAP control system pressure sensor and the circuit Loose, disconnected or improper connection of rubber tube Blocked rubber tube Cracked EVAP canister EVAP canister purge volume control solenoid valve circuit Accelerator pedal position sensor Blocked purge port EVAP canister vent control valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- Will CONSULT be used?

YES >> GO TO 2. NO >> GO TO 5. INFOID:000000009758533

< DTC/CIRCUIT DIAGNOSIS >

$\overline{2.}$ PERFORM DTC CONFIRMATION PROCEDURE-1

WITH CONSULT

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and let it idle for at least 70 seconds.
- Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode of "ENGINE" using CONSULT.
- 7. Touch "START".

Is "COMPLETED" displayed on CONSULT screen?

YES >> GO TO 4.

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-2

When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

Selector lever	Suitable position	G
VHCL SPEED SE	32 - 120 km/h (20 - 75 MPH)	-
ENG SPEED	500 - 3,800 rpm	H
B/FUEL SCHDL	1.0 - 10.0 msec	
COOLANT TEMP/S	More than 0°C (32°F)	-
CALITION		-

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "TESTING" does not change for a long time, retry from step 2.

Is "COMPLETED" displayed on CONSULT screen?

YES	>> GO TO 4.
NO	>> Perform DTC CONFIRMATION

NO >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 2. 4.PERFORM DTC CONFIRMATION PROCEDURE-3

Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Proceed to EC-290, "Diagnosis Procedure".

5.PERFORM COMPONENT FUNCTION CHECK

WITH GST

Perform component function check. Refer to <u>EC-289. "Component Function Check"</u>. **NOTE:**

Use component function check to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-290, "Diagnosis Procedure".

Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK

1. Lift up drive wheels.

2. Start engine (VDC switch OFF) and warm it up to normal operating temperature.

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

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< DTC/CIRCUIT DIAGNOSIS >

- 4. Start engine and wait at least 70 seconds.
- 5. Set voltmeter probes to ECM harness connector terminals as per the following.

	ECM		
Connector	+	-	
Connector	Terr	minal	
E16	114	124	
*1: Except for California			

*1: Except for California

*2: For California

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-290, "Diagnosis Procedure"</u>.

Diagnosis Procedure

INFOID:000000009758535

1.CHECK EVAP CANISTER

- 1. Turn ignition switch OFF.
- 2. Check EVAP canister for cracks.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 2.

YES-2 >> Without CONSULT: GO TO 3.

NO >> Replace EVAP canister. Refer to FL-15, "Removal and Installation".

2. CHECK PURGE FLOW

WITH CONSULT

- 1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port.
- 2. Start engine and let it idle.
- 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL CONT/V" opening and check vacuum existence.

PURG VOL CONT/V	Vacuum
100%	Existed
0%	Not existed

Is the inspection result normal?

YES >> GO TO 7.

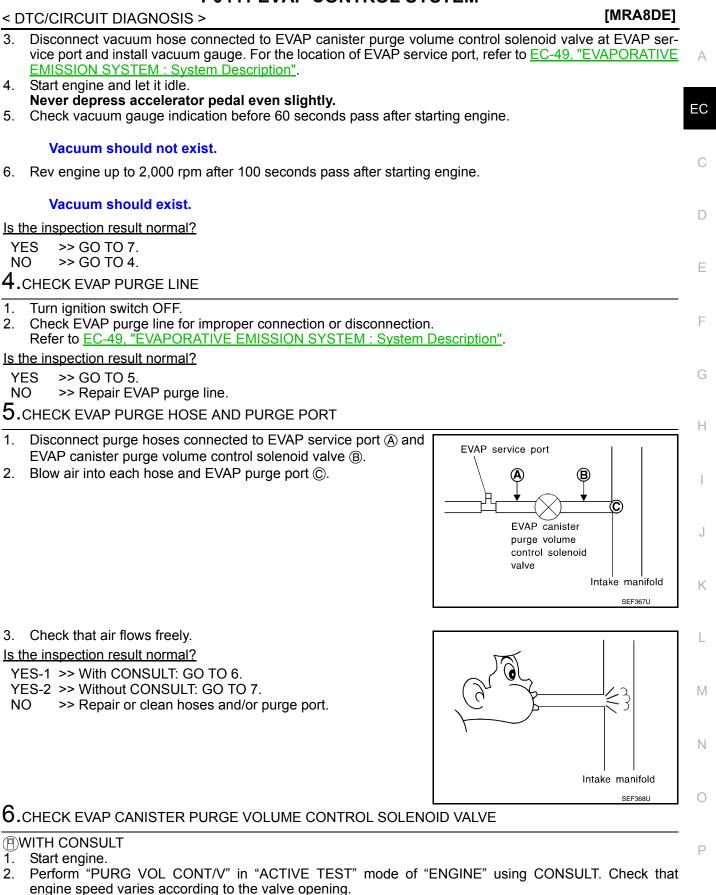
NO >> GO TO 4.

3.CHECK PURGE FLOW

WITHOUT CONSULT

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

2. Stop engine.



Does engine speed vary according to the valve opening?

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

< DTC/CIRCUIT DIAGNOSIS >

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Check the EVAP canister purge volume control solenoid valve. Refer to <u>EC-296</u>, "Component Inspection". Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-27, "Exploded View".

8.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.

2. Check that water is not inside connectors.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-15, "Removal and Installation"</u>.

9.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to EC-313, "DTC Logic" for DTC P0452, EC-316, "DTC Logic" for DTC P0453.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace EVAP control system pressure sensor. Refer to FL-15, "Removal and Installation".

10.CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.

2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Clean the rubber tube using an air blower.

11.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the EVAP canister vent control valve. Refer to EC-303, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace EVAP canister vent control valve. Refer to <u>FL-15, "Removal and Installation"</u>.

12.CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.

Refer to <u>EC-482, "Inspection"</u>. Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace malfunctioning part.

13.CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 14.

14.CHECK INTERMITTENT INCIDENT

Perform GI-39, "Intermittent Incident".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Logic

INFOID:000000009758536

DTC DETECTION LOGIC

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1	L	,	

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DTC No.	CONSULT screen terms (Trouble diagnosis content)		DTC detecting condition	Possible cause
P0443	PURG VOLUME CONT/V (Evaporative emission system purge control valve circuit)	A	The canister purge flow is detected during the vehicle is stopped while the engine is running, even when EVAP canister purge volume control solenoid valve is com- pletely closed. The canister purge flow is detected during the specified driving conditions, even	 EVAP control system pressure sensor EVAP canister purge volume control solenoid valve (The valve is stuck open.) EVAP canister vent control valve EVAP canister Hoses
		В	when EVAP canister purge volume control solenoid valve is completely closed.	(Hoses are connected incorrectly or clogged.)
	NFIRMATION PROCED	UR	E	
	ONDITIONING			
before co	Confirmation Procedure han nducting the next test. ignition switch OFF and ware ignition switch OFF and ignition		een previously conducted, always t least 10 seconds.	perform the following procedure
2. Turn	ignition switch ON.			
	ignition switch OFF and wa	ait a	t least 10 seconds.	
Perform	n DTC CONFIRMATION P	RO	CEDURE when the fuel is betwee	n 1/4 and 3/4 full, and vehicle is
 Always 			re of 5 to 60°C (41 to 140°F).	
	-	coo	lant temperature becomes same	level as ambient temperature.
-	<u>ave CONSULT</u> >> GO TO 2.			
	>> GO TO 4.			
2.PERF	ORM DTC CONFIRMATIO	ΝP	ROCEDURE A	
With C				
	ignition switch ON. ct "DATA MONITOR" mode	of '	'ENGINE" using CONSULT.	
3. Chec	k that the following condition	on a	ire met.	
	_ T/TMP SE: 0 - 35°C (32 - engine and wait at least 60		,	
5. Chec	k 1st trip DTC.			
	DTC detected?			
	>> Proceed to <u>EC-294, "Di</u> >> GO TO 3.	agn	osis Procedure.	
3.PERF	ORM DTC CONFIRMATIO	N P	ROCEDURE B	
(P)With C				
1. Start	engine and warm it up to r			
	ignition switch OFF and wa ignition switch ON.	ait a	t least 10 seconds.	
4. Selec "ENG	ct "PURG VOL CN/V P14 BINE" using CONSULT.	44"	of "EVAPORATIVE SYSTEM" in "I	DTC WORK SUPPORT" mode of
	h "START". engine and let it idle until "	TES	STING" on CONSULT changes to "C	
	ly 10 seconds.)	\		

Touch "SELF-DIAG RESULT". 7.

< DTC/CIRCUIT DIAGNOSIS >

Which is displayed on CONSULT?

OK >> INSPECTION END

NG >> Proceed to EC-294, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE A

With GST

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector and ground.

	+		
	ECM	_	Voltage
Connector	Terminal		
E16	125	Ground	3.1 - 4.0 V

3. Start engine and wait at least 60 seconds.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-294, "Diagnosis Procedure".

NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE

With GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and let it idle for at least 20 seconds.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-294, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758537

[MRA8DE]

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

	÷		
	⁻ purge volume enoid valve	_	Voltage
Connector	Terminal		
F13	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect IPDM E/R harness connector.
- Check the continuity between EVAP canister purge volume control solenoid valve harness connector and IPDM E/R harness connector.

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

	+					
EVAP canister purge volume IPDM E/R						
control sol	enoid valve	IPDN	1 E/R	Continuity		E
Connector	Terminal	Connector	Terminal			
F13	1	E45	25	Existed		
4. Also che Is the inspect	ck harness fo	-	round.			(
			losis for pr	ower supply ci	cuit	
	Repair or repl					
3. снеск е	VAP CANIST	ER PURGE	E VOLUME	E CONTROL S	OLENOID VALVE GROUND CIRCUIT	
 Disconne Check th 	tion switch O ect ECM harn e continuity t ness connec	ess connec between EV		er purge volun	e control solenoid valve harness connector and	
	+	-	-			
	[·] purge volume enoid valve	EC	M	Continuity		(
Connector	Terminal	Connector	Terminal			,
F13	2	F24	17	Existed		
-	ck harness fo					
	tion result no					
YES >> (GO TO 4.					
	Repair or repl					
4. CHECK E	VAP CONTR	OL SYSTE	M PRESS	URE SENSOF	CONNECTOR	
	ect EVAP con onnectors for		pressure s	sensor harnes	s connector.	
		water.				
Wate	r should not	exist.				
Is the inspect	tion result nor	rmal?				
	GO TO 5.	2 control av	stom pros	ouro concor E	efer to FL-15, "Removal and Installation".	
				URE SENSOF		
	IAP control s		sure senso	n. Refer to <u>EC</u>	-296. "Component Inspection".	
	Vith CONSU		6.			
YES-2 >> V	Vithout CON	SULT: GO T	07.			
^	•	-	-		efer to <u>FL-15, "Removal and Installation"</u> .	
O. CHECK E	VAP CANIST	ER PURGE	E VOLUME	E CONTROL S	OLENOID VALVE	
With CON						
	tion switch O ect harness co		isconnecte	ed.		
3. Start eng	jine.					
	"PURG VOL peed varies a				de of "ENGINE" using CONSULT. Check that	
-	tion result no	-		opening.		
	GO TO 8.					
NO >> (GO TO 7.					
	VAP CANIST	ER PURGE		E CONTROL S	OLENOID VALVE	

< DTC/CIRCUIT DIAGNOSIS >

Check the EVAP canister purge volume control solenoid valve. Refer to <u>EC-296. "Component Inspection"</u>. Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to <u>EM-27, "Exploded View"</u>.

8.CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.

2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Clean the rubber tube using an air blower.

9.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the EVAP canister vent control valve. Refer to EC-303. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

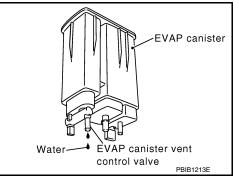
NO >> Replace EVAP canister vent control valve. Refer to FL-15, "Removal and Installation".

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.

Does water drain from the EVAP canister?

- YES >> GO TO 11.
- NO >> Check intermittent incident. Refer to <u>GI-39, "Intermittent</u> <u>Incident"</u>.



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 2.1 kg (4.6 lb).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-39. "Intermittent Incident".

- NO >> GO TO 12.
- 12. DETECT MALFUNCTIONING PART

Check the following.

• EVAP canister for damage

• EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-15, "Removal and Installation".

Component Inspection

INFOID:000000009758538

[MRA8DE]

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

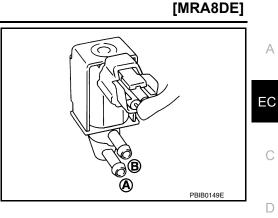
With CONSULT

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 4. Turn ignition switch ON.
- 5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.

< DTC/CIRCUIT DIAGNOSIS >

 Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve as per the following conditions.

Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



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Without CONSULT

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 4. Check air passage continuity of EVAP canister purge volume control solenoid valve as per the following conditions.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Existed
No supply	Not existed
the inspection result normal?	

YES >> INSPECTION END

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to <u>EM-27, "Exploded View"</u>.

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Logic

INFOID:000000009758539

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0444	PURG VOLUME CONT/V (Evaporative emission system purge control valve circuit open)	An excessively low voltage signal is sent to ECM through the EVAP canister purge vol- ume control solenoid valve.	 Harness or connectors (EVAP canister purge volume control solenoid valve circuit is open or shorted.) EVAP canister purge volume control solenoid valve
P0445	PURG VOLUME CONT/V (Evaporative emission system purge control valve circuit short- ed)	An excessively high voltage signal is sent to ECM through the valve	 Harness or connectors (EVAP canister purge volume control solenoid valve circuit is shorted.) EVAP canister purge volume control solenoid valve

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for at least 13 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to <u>EC-298, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758540

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

+			
EVAP canister purge vol- ume control solenoid valve		_	Voltage
Connector Terminal			
F13	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

-	GO TO 2. EVAP CANIS			CONTROLSO	LENOID VALVE POWER SUPPLY CIRCUIT
 Turn ign Disconn Check tl 	ition switch ect IPDM E/ he continuity	OFF. R harness co between E\	onnector.		control solenoid valve harness connector and
IPDM E	/R harness c	connector.			
	+	-	-		-
	er purge vol- solenoid valve	IPDN	1 E/R	Continuity	Г
Connector	Terminal	Connector	Terminal		-
F13	1	E45	25	Existed	
4. Also che Is the inspec		-	round.		E
•		<u>urnar:</u> ILT)>>GO T(4 د		
		ISULT)>>GC			F
NO >>	Repair or re	place error-d	etected par		
3. CHECK E	EVAP CANIS	TER PURG	E VOLUME	CONTROL SO	LENOID VALVE GROUND CIRCUIT
	ition switch				
		rness conne between E\		r purae volume	control solenoid valve harness connector and
	rness conne			puige volume	
	+	-	-	-	I
	er purge vol- solenoid valve	EC	M	Continuity	
Connector	Terminal	Connector	Terminal	-	
F13	2	F24	17	Existed	
4. Also che	eck harness	for short to p	ower.	<u>.</u>	•
Is the inspec	<u>tion result n</u>	ormal?			k
		ILT)>>GO T(
		ISULT)>>GC place error-d		te	L
4	•		•		LENOID VALVE OPERATION
With CON 1. Reconner		ss connector	s disconneo	cted.	Ν
2. Start en	gine.				<i></i>
				FEST [®] mode of the valve oper	"ENGINE" using CONSULT.
	-	according to	-		ng.
	•			GI-39, "Intermit	tent Incident".
_	GO TO 5.				C
D. CHECK E	EVAP CANIS	TER PURG	E VOLUME	CONTROL SO	LENOID VALVE
Check the E					e. Refer to EC-300, "Component Inspection F
Is the inspec	<u>tion result n</u>	ormal?			
				GI-39, "Intermit e control solend	<u>tent Incident"</u> . bid valve. Refer to <u>EM-27, "Exploded View"</u> .

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Component Inspection (EVAP Canister Purge Volume Control Solenoid Valve)

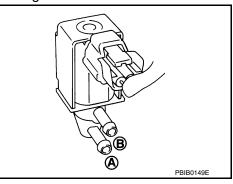
, INFOID:000000009758541

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT

- T. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 4. Turn ignition switch ON.
- 5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve as per the following conditions.

Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



Without CONSULT

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- Check air passage continuity of EVAP canister purge volume control solenoid valve as per the following conditions.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-27. "Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

P0447 EVAP CANISTER VENT CONTROL VALVE

DTC Logic

INFOID:000000009758542

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DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0447	VENT CONTROL VALVE (Evaporative emission system vent control circuit open)	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	 Harness or connectors (EVAP canister vent control valve circuit is open or shorted.) EVAP canister vent control valve
DTC CONI	FIRMATION PROCEDURE		
1.PRECO	NDITIONING		
before conc 1. Turn igi 2. Turn igi 3. Turn igi TESTING C Before per	lucting the next test. nition switch OFF and wait at lea nition switch ON. nition switch OFF and wait at lea CONDITION: forming the following procedu		
•	GO TO 2.		
	RM DTC CONFIRMATION PRO		
	ngine and wait at least 8 second 1st trip DTC.	5.	
YES >>	TC detected? Proceed to <u>EC-301, "Diagnosis</u> INSPECTION END	<u>Procedure"</u> .	
Diagnosis	s Procedure		INFOID:00000009758543
1.INSPEC	TION START		
Do you hav	e CONSULT?		
-	e CONSULT?		
	GO TO 2. GO TO 3.		
~	EVAP CANISTER VENT CONT	ROL VALVE CIRCUIT	
With COI 1. Turn igi 2. Select ' 3. Touch "	NSULT nition switch OFF and then turn	ON. E TEST" mode of "ENGINE" using	CONSULT.
	king sound should be heard.		
•	<u>ction result normal?</u> GO TO 7.		
	GO TO 3.		
3.снеск	EVAP CANISTER VENT CONT	ROL VALVE POWER SUPPLY	
	nition switch OFF.		

Turn ignition switch ON.

3.

2. Disconnect EVAP canister vent control valve harness connector.

< DTC/CIRCUIT DIAGNOSIS >

4. Check the voltage between EVAP canister vent control valve harness connector and ground.

	+		
EVAP canister v	ent control valve	_	Voltage
Connector	Terminal	*	
B17	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector.
- 3. Check the continuity between EVAP canister vent control valve harness connector and IPDM E/R harness connector.

+		_		
	er vent control Ive	IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
B17	1	E45	26	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

5.check evap canister vent control valve output signal circuit

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 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	
B17	2	E16	97	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK RUBBER TUBE FOR CLOGGING

- 1. Disconnect rubber tube connected to EVAP canister vent control valve.
- 2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Clean the rubber tube using an air blower.

7.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the EVAP canister vent control valve. Refer to EC-303, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-39, "Intermittent Incident".

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace EVAP canister vent control valve. Refer to FL-15. "Removal and Installation"

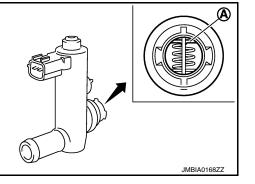
Component Inspection

1.CHECK EVAP CANISTER VENT CONTROL VALVE-1

- 1. Turn ignition switch OFF.
- 2. Remove EVAP canister vent control valve from EVAP canister.

Is it rusted?

- YES >> Replace EVAP canister vent control valve. Refer to <u>FL-</u> <u>15, "Removal and Installation"</u>.
- NO >> GO TO 2.



2. CHECK EVAP CANISTER VENT CONTROL VALVE-2

With CONSULT

- 1. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 4. Check air passage continuity and operation delay time.

Make sure new O-ring is installed properly.

Condition (VENT CONT/V)	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT

Check air passage continuity and operation delay time under the following conditions.

Make sure new O-ring is installed properly.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace EVAP canister vent control valve. Refer to FL-15, "Removal and Installation".

3.CHECK EVAP CANISTER VENT CONTROL VALVE-3

With CONSULT

1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.

2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.

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< DTC/CIRCUIT DIAGNOSIS >

3. Check air passage continuity and operation delay time. **Make sure new O-ring is installed properly.**

Condition (VENT CONT/V)	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Check air passage continuity and operation delay time under the following conditions. **Make sure new O-ring is installed properly.**

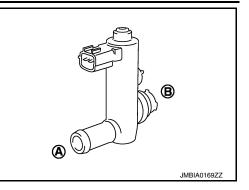
Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve. Refer to <u>FL-15, "Removal and Installation"</u>.



[MRA8DE]

< DTC/CIRCUIT DIAGNOSIS >

P0448 EVAP CANISTER VENT CONTROL VALVE

DTC Logic

INFOID:000000009758545

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0448	VENT CONTROL VALVE (Evaporative emission system vent control circuit shorted)	EVAP canister vent control valve remains closed under specified driving conditions.	 EVAP canister vent control valve EVAP control system pressure sensor and the circuit Blocked rubber tube to EVAP canister vent control valve EVAP canister is saturated with water
DTC CON	FIRMATION PROCEDU	RE	
1.PRECO	NDITIONING		
		been previously conducted, alway	s perform the following procedure
	ducting the next test. nition switch OFF and 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 2.		
2.PERFO	RM DTC CONFIRMATION	PROCEDURE	
With CO			
	nition switch ON and wait a nition switch OFF and wait		
3. Turn ig	nition switch ON and selec	t "DATA MONITOR" mode of "ENG	NE" using CONSULT.
5. Repeat	ngine and let it idle for at le t next procedures three tim	ies.	
 Increas utes. 	se the engine speed up to	3,000 to 3,500 rpm and keep it for	2 minutes and 50 seconds to 3 min-
Never ex	ceed 3 minutes.	and keep analysis idle for about C as	
	t next procedure 20 times.	and keep engine idle for about 5 sec	onds.
		d up to 4,000 to 4,500 rpm or more and keep engine idle for at least 35 s	
	Engine speed	Never exceed 3 minutes	
	4,000 rpm		3
	3,000 rpm		······································
	Idle 0 rpm	┩┈┈┈╴┩┈┈╴┛┈┈╴┩┈┝━┩┈┝━	<u></u>
		5 seconds 25 to 30 More than	
		nute 2 minutes and 50 seconds 35 seconds seconds to 3 minutes	5
7. Check	Engine start 1st trip DTC.	Seconds to 3 minutes	PBIB0972E
With GS	Т		
	procedure "With CONSULT	Γ" above.	
•	<u>)TC detected?</u> ▶ Proceed to EC-306, "Diac	anosis Procedure"	

- YES >> Proceed to <u>EC-306</u>, "Diagnosis Procedure".
- NO >> INSPECTION END

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< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

[MRA8DE]

1.CHECK RUBBER TUBE

- 1. Turn ignition switch OFF.
- 2. Disconnect rubber tube connected to EVAP canister vent control valve.
- 3. Check the rubber tube for clogging.
- Is the inspection result normal?

YES >> GO TO 2.

NO >> Clean rubber tube using an air blower.

2.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the EVAP canister vent control valve. Refer to EC-307, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

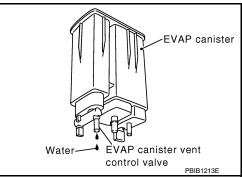
NO >> Replace EVAP canister vent control valve. Refer to FL-15, "Removal and Installation".

3.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

- 1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- 2. Check if water will drain from the EVAP canister.

Does water drain from EVAP canister?

YES >> GO TO 4. NO >> GO TO 6.



4.CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.1 kg (4.6 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-15, "Removal and Installation".

6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

- 1. Disconnect EVAP control system pressure sensor harness connector.
- 2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-15. "Removal and Installation"</u>.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to EC-311, "Component Inspection".

< DTC/CIRCUIT DIAGNOSIS >

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Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-39, "Intermittent Incident"</u>.
- NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-15</u>, "Removal and Installation".

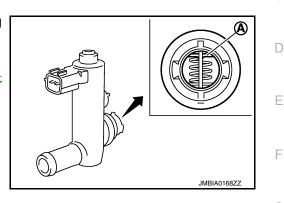
Component Inspection

1.CHECK EVAP CANISTER VENT CONTROL VALVE-1

- 1. Turn ignition switch OFF.
- 2. Remove EVAP canister vent control valve from EVAP canister.
- 3. Check portion (A) of EVAP canister vent control valve for being rusted.

Is it rusted?

- YES >> Replace EVAP canister vent control valve. Refer to <u>FL-</u> <u>15. "Removal and Installation"</u>.
- NO >> GO TO 2.



2. CHECK EVAP CANISTER VENT CONTROL VALVE-2

With CONSULT

- 1. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 4. Check air passage continuity and operation delay time.

Make sure new O-ring is installed properly.

Condition (VENT CONT/V)	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT

Check air passage continuity and operation delay time under the following conditions.

Make sure new O-ring is installed properly.

Condition	Air passage continuity between (Å) and (B)
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace EVAP canister vent control valve. Refer to FL-15. "Removal and Installation".

3.CHECK EVAP CANISTER VENT CONTROL VALVE-3

With CONSULT

1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.

2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.



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< DTC/CIRCUIT DIAGNOSIS >

3. Check air passage continuity and operation delay time. **Make sure new O-ring is installed properly.**

Condition (VENT CONT/V)	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Check air passage continuity and operation delay time under the following conditions. **Make sure new O-ring is installed properly.**

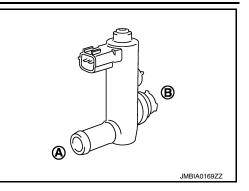
Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve. Refer to <u>FL-15, "Removal and Installation"</u>.



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< DTC/CIRCUIT DIAGNOSIS >

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

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DTC DETECTION LOGIC

DTC No.	CONSULT screen terms	DTC detecting condition	Possible cause
B10 N0.	(Trouble diagnosis content) EVAP SYS PRES SEN		Harness or connectors
P0451	(Evaporative emission system pressure sensor/switch range/ performance)	ECM detects a sloshing signal from the EVAP control system pressure sensor	(EVAP control system pressure sensor circuit is shorted.)EVAP control system pressure sensor
	NFIRMATION PROCEDU	RE	
NOTE: Never rer	nove fuel filler cap during	DTC confirmation procedure.	
4	ONDITIONING		
		been previously conducted, alwa	ays perform the following procedure
	nducting the next test. ignition switch OFF and wait	t at least 10 seconds	
2. Turn i	ignition switch ON.		
3. Turn i	ignition switch OFF and wait	t at least 10 seconds.	
(With (CONSULT>>GO TO 2.		
<u> </u>	ut CONSULT>>GO TO 5.		
2.PERF	ORM DTC CONFIRMATION	PROCEDURE-1	
With Co			
1. Start NOTE	engine and let it idle for leas	t 40 seconds.	
Do no	ot depress accelerator peo	lal even slightly.	
	k 1st trip DTC. DTC detected?		
•	> Proceed to <u>EC-310</u> , "Diad	anosis Procedure".	
NO >	>> GO TO 3.		
3. PERF	ORM DTC CONFIRMATION	PROCEDURE-2	
			F "
		DATA MONITOR" mode of "ENGIN AG READY" changes to "ON".	Ε.
		I "OFF" of "EVAP DIAG READY"	changes to "ON"
3. Turn i	ignition switch OFF and wait		
	E: r turn ignition switch ON α	luring 90 minutes	
4. Turn i	ignition switch ON.	-	
	t "EVAP LEAK DIAG" in "DA k that "EVAP LEAK DIAG" ir	ATA MONITOR" mode of "ENGINE" adjustion	
	displayed on CONSULT?		
CMPLT>	>> GO TO 4.		
YET >	 > 1. Perform DTC CONFI 2. GO TO 1. 	RMATION PROCEDURE again.	
4.PERF	ORM DTC CONFIRMATION	PROCEDURE-3	
With Co			
	t trip DTC.		
is ist trip	DTC detected?		

< DTC/CIRCUIT DIAGNOSIS >

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- YES >> Proceed to EC-310, "Diagnosis Procedure".
- NO >> INSPECTION END

5. PERFORM DTC CONFIRMATION PROCEDURE-4

With GST

1. Start engine and let it idle for least 40 seconds. NOTE:

Do not depress accelerator pedal even slightly.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-310, "Diagnosis Procedure".

NO >> GO TO 6.

6.PERFORM DTC CONFIRMATION PROCEDURE-5

With GST

- 1. Let it idle for at least 2 hours.
- 2. Turn ignition switch OFF and wait at least 90 minutes. **NOTE:**

Never turn ignition switch ON during 90 minutes.

- 3. Turn ignition switch ON.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-310, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758549

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP control system pressure sensor harness connector.
- 3. Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace harness connector.

2. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch ON.

2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

	+		
	tem pressure sen- or	_	Voltage (Approx.)
Connector Terminal			
B47	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

${\it 3.}$ CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

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.

< DTC/CIRCUIT DIAGNOSIS >

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is the inspection result normal? YES >> Perform the trouble diagnosis for power supply circuit. NO >> Repair or replace error-detected parts 4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector. * - EVAP control system pressure sensor ECM connector Terminal Connector Terminal A Also check harness for short to power. Is the inspection result normal? YES >> GO TO 5. NO >> Repair or replace error-detected parts. 5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SIGNAL CIRCUIT 1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector. ** - EVAP control system pressure ECM Continuity sure sensor ECM Continuity Connector Terminal Existed 2. Also check harness for short to ground and to power. Existed 2. Also check harness for short to ground and to power. Existed						
Sure sensor Connector Terminal B47 3 E16 113 Example 1 Existed 4. Also check harness for short to ground and to power. Is the inspection result normal? YES >> Repair or replace error-detected parts 4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT 1. Turn ignition switch OFF. 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 harness connector and ECM harness for short to power. Is the inspection result normal? YES >> Repair or replace error-detected parts. 5 . Check the continuity between EVAP control system pressure sensor harness connector and ECM harness for short to power. Is the inspection result normal? YES >> GO To 5. NO >> Repair or replace error-detected parts. 5 . CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SIGNAL CIRCUIT 1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector. 1 1 2 E16 114	-	+	-	_		
B47 3 E16 113 Existed 4. Also check harness for short to ground and to power. Is the inspection result normal? YES >> Perform the trouble diagnosis for power supply circuit. NO >> Repair or replace error-detected parts 4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between EVAP control system pressure sensor harness connector and ECM h ness connector. EVAP control system pressure sensor ECM Continuity Connector Terminal Ba7 1 E16 124 Existed 4. Also check harness for short to power. Is the inspection result normal? YES >> GO TO 5. NO >> Repair or replace error-detected parts. 5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SIGNAL CIRCUIT 1. Check the continuity between EVAP control system pressure sensor harness connector and ECM h ness connector. EVAP control system pressure sensor Continuity aure sensor ECM Continuity Connector Terminal Connector Terminal Connector			EC	CM	Continuity	
4. Also check harness for short to ground and to power. Is the inspection result normal? YES >> Perform the trouble diagnosis for power supply circuit. NO >> Repair or replace error-detected parts 4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector. <u>* - Connector Terminal B47 1 E16 124 Existed Existed 4. Also check harness for short to power. Is the inspection result normal? YES > GO TO 5. NO >> Repair or replace error-detected parts. 5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SIGNAL CIRCUIT 1. Check the continuity between EVAP control system pressure sensor harness connector and ECM h ness connector. <u>************************************</u></u>	Connector	Terminal	Connector	Terminal		
Is the inspection result normal? YES >> Perform the trouble diagnosis for power supply circuit. NO >> Repair or replace error-detected parts 4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector. * - EVAP control system pressure ECM continuity Continuity Connector Terminal B47 1 E16 B47 1 E16 B47 1 E16 YES > GO TO 5. NO >> Repair or replace error-detected parts. 5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SIGNAL CIRCUIT 1. Check the continuity between EVAP control system pressure sensor harness connector and ECM h ness connector. * - EVAP control system pressure ECM continuity Continuity Connector Terminal Connector Terminal Connector Terminal Connector Terminal	B47	3	E16	113	Existed	
YES >> Perform the trouble diagnosis for power supply circuit. NO >> Repair or replace error-detected parts 4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector. EVAP control system pressure sensor Sure sensor EVAP control system pressure sensor from and to power. Is the inspection result normal? YES YEA Connector Terminal Control system pressource sensor harness connector and ECM harness for short to power. Is the inspection result normal? YES >> GO TO 5. NO >> Repair or replace error-detected parts. 5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SIGNAL CIRCUIT 1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector. EVAP control system pressource sensor ECM Connector Terminal B47 2 E16 14 Existed 2. Also check harness for short to ground and to power. Is the inspection result normal?			-	round and t	o power.	
NO →> Repair or replace error-detected parts 4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.						
4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector. terminal terminal terminal terminal terminal terminal Setter inspection result normal? YES >> GO TO 5. NO >> Repair or replace error-detected parts. Continuity terminal terminal terminal terminal terminal Connector terminal terminal Connector terminal terminal terminal Continuity Connector is system pressure sensor terminal terminal terminal Context terminal Context terminal Continuity Connector terminal Context terminal Context terminal terminal Context terminal terminal terminal Context terminal Context terminal Context terminal Context ter						cuit.
1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between EVAP control system pressure sensor harness connector and ECM h ness connector. EVAP control system pres- sure sensor ECM Connector Terminal B47 1 E46 124 Existed 4. Also check harness for short to power. Is the inspection result normal? YES > GO T0 5. NO >> Repair or replace error-detected parts. 5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SIGNAL CIRCUIT 1. Check the continuity between EVAP control system pressure sensor harness connector and ECM h ness connector. EVAP control system pres- sure sensor ECM Connector Terminal B47 2 E16 114 EVAP control system pres- sure sensor ECM Connector Terminal B47 2 E16 114 EVAP control system pres- sure sensor ECM Connector Terminal B47 2 E16 114 EVAP control system presare ECM </td <td>4</td> <td>•</td> <td></td> <td>•</td> <td></td> <td></td>	4	•		•		
 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 harness connector and ECM harness connector. Connector Terminal Connector Terminal B47 1 E16 124 Existed 4. Also check harness for short to power. Is the inspection result normal? YES >> GO TO 5. NO >> Repair or replace error-detected parts. 5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SIGNAL CIRCUIT 1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector. EVAP control system pression ECM continuity Connector Terminal Connector Terminal B47 2 E16 114 Existed EVAP control system pression econ and to power. Is the inspection result normal? YES >> GO TO 6. NO >> Repair or replace error-detected parts. 6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR Connector Terminal Connector Terminal B47 2 E16 114 Existed 2. Also check harness for short to ground and to power. Is the inspection result normal? YES >> GO TO 6. NO >> Repair or replace error-detected parts. 6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR Check the EVAP control system pressure sensor. Refer to EC-311, "Component Inspection". Is the inspection result normal? YES >> Check intermittent incident. Refer to GI-39, "Intermittent Incident". NO >> Replace EVAP control system pressure sensor. Refer to FL-15, "Removal and Installation". Component Inspection Accountered and system pressure sensor. Achieve to PL-15, "Removal and Installation". Component Inspection Accountered and anot pressure sensor. Achieve town of					INE SENSOR	GROOND CIRCON
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM h ness connector. 				ctor.		
* - EVAP control system pressures sensor ECM Continuity Connector Terminal Connector Terminal B47 1 E16 124 Existed 4. Also check harness for short to power. Esthe inspection result normal? YES >> GO TO 5. NO >> Repair or replace error-detected parts. 5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SIGNAL CIRCUIT 1. Check the continuity between EVAP control system pressure sensor harness connector and ECM h ness connector. * - Continuity EVAP control system pressures ECM Continuity Connector Terminal Connector #47 2 E16 114 EVAP control system pressure sensor sharness connector and ECM h ness connector. Continuity Connector Terminal Control 847 2 E16 114 Existed 2. Also check harness for short to ground and to power. Is the inspection result normal? YES >> GO TO 6. NO >> Repair or replace error-detected parts. C.HECK EVAP CONTROL SYSTEM PRESSURE SENSOR Check the EVAP control system pressure sensor. Refer to EC-311, "Component Inspection". </td <td>3. Check t</td> <td>he continuity</td> <td></td> <td></td> <td>l system pres</td> <td>sure sensor harness connector and ECM har</td>	3. Check t	he continuity			l system pres	sure sensor harness connector and ECM har
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EVAP control system pressure sensor ECM Continuity $\overline{Connector}$ Terminal Connector Terminal $B47$ 1 E16 124 Existed 4. Also check harness for short to power. Is the inspection result normal? Existed YES > GO TO 5. NO >> Repair or replace error-detected parts. 5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SIGNAL CIRCUIT 1. Check the continuity between EVAP control system pressure sensor harness connector and ECM h ness connector. $\frac{+}{2}$ $\frac{-}{164}$ Continuity $\frac{-}{2}$ ECM Continuity $\frac{-}{2}$ ECM Continuity $\frac{-}{2}$ E16 114 Existed 2. Also check harness for short to ground and to power. Is the inspection result normal? It is the inspection result normal? YES > GO TO 6. NO >> Repair or replace error-detected parts. Check the EVAP Control system pressure sensor. Refer to EC-311, "Component Inspection". St the inspection result normal? YES >> Check intermittent incident. Refer to GL-39. "Intermittent Incident". NO >> Replace EVAP control system pressure sensor. Refer to EL-15, "Removal and Installation". NO >>		+		_		
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B47 1 E16 124 Existed 4. Also check harness for short to power. Is the inspection result normal? YES >> GO TO 5. NO >> Repair or replace error-detected parts. 5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SIGNAL CIRCUIT 1. Check the continuity between EVAP control system pressure sensor harness connector and ECM h ness connector. * - EVAP control system pressure ECM Sure sensor Continuity Connector Terminal B47 2 EVAP control system pressure ECM Connector Terminal B47 2 E16 114 Existed 2. Also check harness for short to ground and to power. Is the inspection result normal? YES > GO TO 6. NO >> Repair or replace error-detected parts. 6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR Check the EVAP control system pressure sensor. Refer to EC-311, "Component Inspection". Is the inspection result normal? YES >> Check intermittent incident. Refer to GI-39, "Intermittent Incident". NO <t< td=""><td></td><td></td><td>EC</td><td>CM</td><td>Continuity</td><td></td></t<>			EC	CM	Continuity	
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Is the inspection result normal? YES >> Check intermittent incident. Refer to GI-39, "Intermittent Incident". NO >> Replace EVAP control system pressure sensor. Refer to FL-15, "Removal and Installation". Component Inspection INFOID:00000000975 1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR						
YES >> Check intermittent incident. Refer to <u>GI-39</u> , "Intermittent Incident". NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-15</u> , "Removal and Installation". Component Inspection 1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR					. Refer to <u>Lo</u>	orr, component inspection.
NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-15</u> , " <u>Removal and Installation</u> ". Component Inspection INFOLD:0000000075 1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR				nt. Refer to	GI-39. "Interi	nittent Incident".
1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR						
	Compone	nt Inspec	tion			INFOID:00000000975855
		•				
1 Turn ignition switch OFF					INE SENSUR	
 Remove EVAP control system pressure sensor with its harness connector connected from EVAP canist 				essure sens	sor with its ha	mess connector connected from EVAP caniste

2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. Always replace O-ring with a new one.

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

- 3. Install a vacuum pump to EVAP control system pressure sensor.
- 4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

ECM			Condition	
Connector	+	-	Condition [Applied vacuum kPa (kg/cm ² , psi)]	Voltage
Connector	Terminal			
E16	114	124	Not applied	0.5 - 4.6 V
L 10	114	124	-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value

CAUTION:

• Always calibrate the vacuum pump gauge when using it.

Do not apply below -93.3 kPa (-0.952 kg/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. Refer to FL-15, "Removal and Installation".

< DTC/CIRCUIT DIAGNOSIS >

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

INFOID:000000009758551

[MRA8DE]

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DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0452	EVAP SYS PRES SEN (Evaporative emission system pressure sensor/switch low)	An excessively low voltage from the sensor is sent to ECM.	 Harness or connectors (EVAP control system pressure sensor circuit is shorted.) EVAP control system pressure sensor
	NFIRMATION PROCEDUF	RE	
1. PREC	CONDITIONING		
before co 1. Turn 2. Turn 3. Turn TESTIN	Confirmation Procedure has onducting the next test. ignition switch OFF and wait ignition switch ON. ignition switch OFF and wait G CONDITION: perform test at a temperatur	at least 10 seconds. at least 10 seconds.	ays perform the following procedure
•	>> GO TO 2.		
2.PERF	ORM DTC CONFIRMATION	PROCEDURE	
 Start Turn Turn Turn Sele Make Start 	CONSULT engine and warm it up to norm ignition switch OFF and wait ignition switch ON. ct "DATA MONITOR" mode of e sure that "FUEL T/TMP SE" engine and wait at least 20 se ck 1st trip DTC.	at least 10 seconds. "ENGINE" using CONSULT. indication is more than 0°C (32°F	.).
	engine and warm it up to nor	mal operating temperature. ess connector terminals as per th	e following.
	ECM		
Connec	tor + Terminal	Voltage	
E16	114 124	Less than 4.2 V	
4. Turn	e sure that the voltage is less ignition switch OFF and wait engine and wait at least 20 se	at least 10 seconds.	
	ck 1st trip DTC.		
YES	 <u>DTC detected?</u> >> Proceed to <u>EC-313, "Diagneters</u>" >> INSPECTION END 	nosis Procedure".	
	sis Procedure		INFOID:00000009758552
1 .снес	CK EVAP CONTROL SYSTEM	PRESSURE SENSOR CONNE	CTOR FOR WATER
1. Turn 2. Disc	ignition switch OFF.	pressure sensor harness connecto	

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Water should not exist.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace harness connector.

2. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch ON.

2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

	+		
-	tem pressure sen- or	-	Voltage (Approx.)
Connector	Terminal		
B47	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

	+			
	l system pres- sensor	ECM		Continuity
Connector	Terminal	Connector Terminal		
B47	3	E16 113		Existed

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

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

	+			
EVAP control system pres- sure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B47	1	E16	124	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SIGNAL CIRCUIT

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

< DTC/CIRCUIT DIAGNOSIS >

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						-
	+ I system pres-	-	-			
	sensor	EC	CM	Continuity		
Connector	Terminal	Connector	Terminal		_	
B47	2	E16	114	Existed	_	
	eck harness	-	ground and t	o power.		
	ction result n	ormal?				
	GO TO 6. Repair or re	olace error-d	letected part	ts		
	EVAP CONT				B	
					C-311, "Component Inspection".	-
	ction result n	•			<u></u>	
-			ent. Refer to	GI-39. "Inte	mittent Incident".	
					Refer to FL-15, "Removal and Installation".	
Compone	nt Inspec	tion			INFOID:00000000975855	3
	•					
.CHECK	EVAP CONT	ROL SYSTE	M PRESSU	IRE SENSO	R	
following	g conditions.					
	+	_	Condition		Voltage	
Connector -	Terminal	[Applie	d vacuum kPa	(kg/cm ² , psi)]		
		Not app	olied		0.5 - 4.6 V	
E16	114	124	0.272, -3.87)		2.1 to 2.5 V lower than above value	
• Do no cm ² , ²	/s calibrate	ow -93.3 kP		-	ing it. 53 psi) or pressure over 101.3 kPa (1.033 kg	I
	INSPECTIO					
NO >>	Replace EV	AP control sy	stem press	ure sensor.	Refer to FL-15. "Removal and Installation".	

< DTC/CIRCUIT DIAGNOSIS >

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

INFOID:000000009758554

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0453	EVAP SYS PRES SEN (Evaporative emission system pressure sensor/switch high)	An excessively high voltage from the sensor is sent to ECM.	 Harness or connectors (EVAP control system pressure sensor circuit is shorted.) EVAP control system pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

(I) With CONSULT

- 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. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 5. Make sure that "FUEL T/TMP SE" indication is more than 0°C (32°F).
- 6. Start engine and wait at least 20 seconds.
- 7. Check 1st trip DTC.

With GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Set voltmeter probes to ECM harness connector terminals as per the following.

Connector	+	-	Voltage
Connector	Tern	ninal	
E16	114	124	Less than 4.2 V

- 3. Make sure that the voltage is less than 4.2 V.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and wait at least 20 seconds.
- 6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-316, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758555

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

1. Turn ignition switch OFF.

2. Disconnect EVAP control system pressure sensor harness connector.

3. Check sensor harness connector for water.

Revision: October 2013

EC-316

< DTC/CIRCUIT DIAGNOSIS >

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14/-4-	n ala and al area	4 aviat				
	r should no					A
<u>Is the inspec</u> YES >> (<u>tion result n</u> GO TO 2.	<u>ormal?</u>				
		place harnes	s connecto	` .		EC
2. CHECK E	VAP CONT	ROL SYSTE	M PRESSU	IRE SENSO	R POWER SUPPLY	
	tion switch he voltage b		P control sy	stem pressu	re sensor harness connector and ground.	С
	+					D
EVAP control s	system pressu	re sen-	_	Voltage (Approx.)		
Connector	Termi	nal		(Αρριολ.)		Е
B47	3		round	5 V		
Is the inspec	_	ormal?				
•	GO TO 4.	<u></u>				F
•	GO TO 3.					
3.CHECK E	VAP CONT	ROL SYSTE	M PRESSU	JRE SENSO	R POWER SUPPLY CIRCUIT	G
1. Turn igni	tion switch	OFF.				0
		rness conne				
 Check the ness cor 		/ between E	VAP contro	i system pre	ssure sensor harness connector and ECM har-	Н
11033 001						
+			_			
EVAP control	system pres-					
sure s		EC	CM	Continuity		
Connector	Terminal	Connector	Terminal			J
B47	3	E16	113	Existed		
4. Also che			round and	o power.		V
Is the inspec				_		K
				wer supply c	ircuit.	
		place error-d	•			L
			IN PRESSU	JRE SENSU	R GROUND CIRCUIT	
	tion switch	OFF. rness conne	ctor			
				l svstem pre	ssure sensor harness connector and ECM har-	Μ
ness cor				- ,		
						Ν
+	-	-	_			
EVAP control sure s		EC	СМ	Continuity		0
Connector	Terminal	Connector	Terminal	-		0
B47	1	E16	124	Existed		
4. Also che	ck harness	for short to p	ower.			Ρ
Is the inspect	<u>tion result n</u>	ormal?				
	GO TO 5.		-1	L-		
_	•	place error-d	•			
J.CHECK E	VAP CONT	KUL SYSTE	M PRESSU	IRE SENSO	R SIGNAL CIRCUIT	
1 Chook th	no continuit	/ hotwoon E	VAD contro	Levetom pro	seure sensor harness connector and ECM har-	

^{1.} Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

	+			
	l system pres- sensor	E	СМ	Continuity
Connector	Terminal	Connector Terminal		
B47	2	E16	114	Existed

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK RUBBER TUBE

1. Disconnect rubber tube connected to EVAP canister vent control valve.

2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Clean the rubber tube using an air blower, repair or replace rubber tube.

7.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-303, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP canister vent control valve. Refer to FL-15, "Removal and Installation".

8.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-319, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

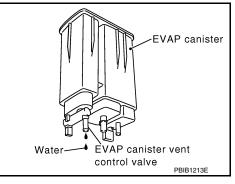
NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-15, "Removal and Installation"</u>.

9.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 the EVAP canister.

Does water drain from EVAP canister?

- YES >> GO TO 10.
- NO >> Check intermittent incident. Refer to <u>GI-39. "Intermittent</u> <u>Incident"</u>.



10. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-39, "Intermittent Incident".
- NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

• EVAP canister for damage

· EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

< DTC/CIRCUIT DIAGNOSIS >

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>>	Repair ho	ose or re	eplace EVAP canister. Refer to	FL-15, "Removal and Installation".	А	
Compone	ent Insp	ection		INFOID:000000009758556		
1.снеск	EVAP CO	NTROL	SYSTEM PRESSURE SENSC	R	EC	
2. Remove Always	replace	ontrol sy O-ring \		arness connector connected from EVAP canister.	С	
4. Turn igr		ch ON a		en ECM harness connector and ground under the	D	
	ECM		Condition		Е	
Connector	Connector Terminal [Applied vacuum kPa (kg/cm ² , psi)] Voltage					
E16 114 124 Not applied 0.5 - 4.6 V		F				
-26.7 (-0.272, -3.87) 2.1 to 2.5 V lower than above value						
	ys calibra		/acuum pump gauge when us	sing it. 53 psi) or pressure over 101.3 kPa (1.033 kg/	G	
	14.69 psi).			Н	
	INSPECT Replace			Refer to FL-15, "Removal and Installation".	1	
					I	
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< DTC/CIRCUIT DIAGNOSIS >

P0456 EVAP CONTROL SYSTEM

DTC Logic

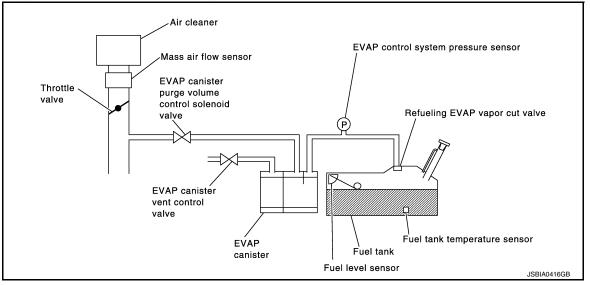
INFOID:000000009758557

[MRA8DE]

DTC DETECTION LOGIC

This diagnosis detects leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the negative pressure caused by decrease of fuel temperature in the fuel tank after turning ignition switch OFF.

If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0456	EVAP VERY SML LEAK [Evaporative emission system leak detected (very small leak)]	 EVAP system has a leak. EVAP system does not operate properly. 	 Incorrect fuel tank vacuum relief valve Incorrect fuel filler cap used Fuel filler cap remains open or does not close. Foreign matter caught in fuel filler cap. Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. Foreign matter caught in EVAP canister vent control valve. EVAP canister or fuel tank leaks EVAP purge line (pipe and rubber tube) leaks EVAP purge line rubber tube bent Loose or disconnected rubber tube EVAP canister vent control valve and the circuit EVAP canister purge volume control solenoid valve and the circuit Fuel tank temperature sensor O-ring of EVAP canister vent control valve is missing or damaged EVAP 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 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

< DTC/CIRCUIT DIAGNOSIS >

1.PRECONDITIONING	А
If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.	
1. Turn ignition switch OFF and wait at least 10 seconds.	EC
 Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. 	
Do you have CONSULT?	0
YES >> GO TO 2. NO >> GO TO 4.	С
2.PERFORM DTC CONFIRMATION PROCEDURE-1	
	D
1. Turn ignition switch ON and select "EVAP DIAG READY" in "DATA MONITOR" mode of "ENGINE" using CONSULT.	E
 Start engine and wait at idle until "OFF" of "EVAP DIAG READY" changes to "ON". NOTE: 	
It will take at most 2 hours until "OFF" of "EVAP DIAG READY" changes to "ON". 3. Turn ignition switch OFF and wait at least 90 minutes. NOTE:	F
 Never turn ignition switch ON during 90 minutes. 4. Turn ignition switch ON and select "EVAP LEAK DIAG" in "DATA MONITOR" mode of "ENGINE" using CONSULT. 	G
5. Check that "EVAP LEAK DIAG" indication.	
Which is displayed on CONSULT? CMPLT>> GO TO 3.	Н
YET >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 1.	
3.PERFORM DTC CONFIRMATION PROCEDURE-2	
Check 1st trip DTC.	
Is 1st trip DTC detected?	J
YES >> Proceed to <u>EC-321, "Diagnosis Procedure"</u> . NO >> INSPECTION END.	
4.PERFORM DTC CONFIRMATION PROCEDURE	K
WITH GST	
 Start engine and wait engine idle for at least 2 hours. Turn ignition switch OFF and wait at least 90 minutes. 	L
NOTE: Never turn ignition switch ON during 90 minutes.	
3. Turn ignition switch ON.	N
4. Check 1st trip DTC. Is 1st trip DTC detected?	1.0
YES >> Proceed to <u>EC-321, "Diagnosis Procedure"</u> . NO >> INSPECTION END.	N
Diagnosis Procedure	
1.CHECK FUEL FILLER CAP DESIGN	С
1. Turn ignition switch OFF.	

Ρ

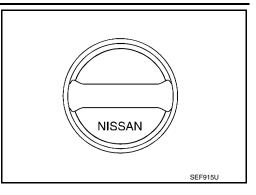
< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

2. Check for genuine NISSAN fuel filler cap design.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Then retighten until reteaching sound is heard.

3.CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-325, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel filler cap with a genuine one.

5.CHECK FOR EVAP LEAK

Refer to EC-482, "Inspection".

Is there any leak in EVAP line?

YES >> Repair or replace.

NO >> GO TO 6.

 $\mathbf{6}$.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly. Refer to <u>FL-14</u>, "<u>Exploded View</u>".
- EVAP canister vent control valve. Refer to <u>FL-15, "Removal and Installation"</u>.

Is the inspection result normal?

YES >> GO TO 7.

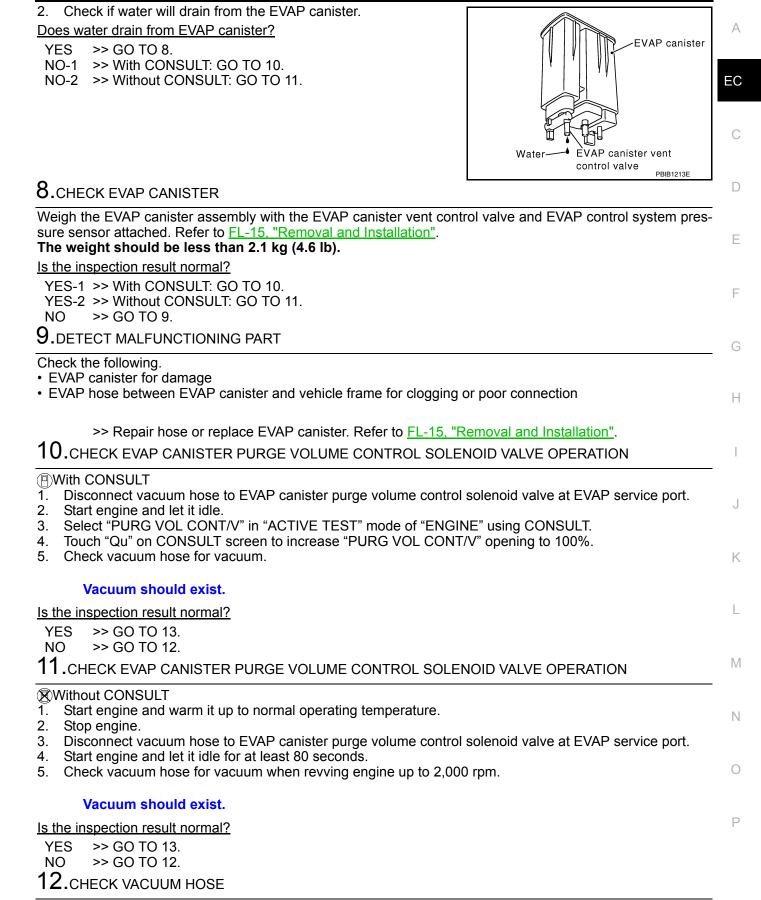
NO >> Repair or replace EVAP canister vent control valve and O-ring. Refer to <u>FL-15, "Removal and</u> <u>Installation"</u>.

7.CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]



Check vacuum hoses for clogging or disconnection. <u>Is the inspection result normal?</u>

[MRA8DE]

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 13.

NO >> Repair or reconnect the hose.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Check the EVAP canister purge volume control solenoid valve. Refer to <u>EC-296, "Component Inspection"</u>. Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-27, "Exploded View".

14.CHECK FUEL TANK TEMPERATURE SENSOR

Check the fuel tank temperature sensor. Refer to EC-257, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace fuel level sensor unit. Refer to <u>FL-6</u>, "Removal and Installation".

15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to FL-15, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-15, "Removal and Installation"</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>EC-49</u>, "EVAPORATIVE EMISSION SYSTEM : System Description".

Is the inspection result normal?

YES >> GO TO 17.

NO >> Repair or reconnect the hose.

17.CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 18.

18.CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to <u>EC-49</u>, "EVAPORATIVE EMISSION SYSTEM : System Description".

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-10, "Exploded View"</u>.

20. CHECK REFUELING EVAP VAPOR CUT VALVE

Check the refueling EVAP vapor cut valve. Refer to FL-13, "Inspection".

Is the inspection result normal?

YES >> GO TO 21.

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to <u>FL-10, "Removal and Installation"</u>.

21. CHECK FUEL LEVEL SENSOR

Check the fuel level sensor. Refer to MWI-59, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-39, "Intermittent Incident".

Revision: October 2013

P0456 EVAP CONTROL SYSTEM

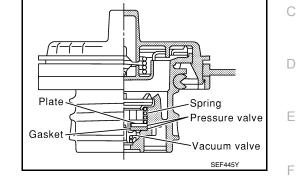
< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace fuel level sensor unit. Refer to <u>FL-6</u>, "Removal and Installation".

Component Inspection

1.CHECK FUEL FILLER CAP

- 1. Turn ignition switch OFF.
- 2. Remove fuel filler cap.
- 3. Wipe clean valve housing.

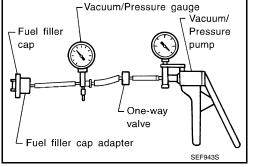


- 4. Install fuel filler cap adapter (commercial service tool) to fuel filler cap.
- 5. Check valve opening pressure and vacuum.

Pressure:	15.3 - 20.0 kPa (0.156 - 0.204 kg/cm ² , 2.22 - 2.90 psi)
Vacuum:	–6.0 to −3.3 kPa (–0.061 to –0.034 kg/cm ² , –0.87 to –0.48 psi)

Is the inspection result normal?

YES >> INSPECTION END NO >> GO TO 2. 2.REPLACE FUEL FILLER CAP



Replace fuel filler cap.

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.

>> INSPECTION END

[MRA8DE]

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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-350, "DTC Logic"</u>.

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0460	FUEL LEV SEN SLOSH (Fuel Level Sensor "A" Circuit)	Even though the vehicle is parked, a sig- nal being varied is sent from the fuel level sensor to ECM.	 Harness or connectors (The CAN communication line is open or shorted) Harness or connectors (The sensor circuit is open or shorted) Combination meter Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and wait maximum of 2 consecutive minutes.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to <u>EC-326, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK COMBINATION METER FUNCTION

Refer to MWI-17, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-39. "Intermittent Incident".

NO >> Refer to <u>MWI-58</u>, "Diagnosis Procedure".

INFOID:000000009758561

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-350, "DTC Logic".

Driving long distances naturally affect fuel gauge level.

This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	E
P0461	FUEL LEVEL SENSOR (Fuel level sensor "A" circuit range/performance)	The output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.	 Harness or connectors (The CAN communication line is open or shorted) Harness or connectors (The sensor circuit is open or shorted) Combination meter Fuel level sensor 	F

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK		
Perform component function check. Refer to <u>EC-327</u> , "Component Function Check". Use component function check to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed. Is the inspection result normal?	I	
YES >> INSPECTION END NO >> Proceed to <u>EC-328, "Diagnosis Procedure"</u> .	J	
Component Function Check	K	
1.PRECONDITIONING	TX.	
WARNING: When performing following procedure, be sure to observe the handling of the fuel. Refer to <u>EC-10,</u> <u>"General Precautions"</u> . TESTING CONDITION:	L	
Before starting component function check, preparation of draining fuel and refilling fuel is required.	M	
Do you have CONSULT? YES >> GO TO 2. NO >> GO TO 3.	Ν	
2.PERFORM COMPONENT FUNCTION CHECK		
With CONSULT NOTE: Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/	0	
8 Imp gal) in advance.	Р	
1. Prepare a fuel container and a spare hose.	-	
 Release fuel pressure from fuel line, refer to <u>EC-143, "Work Procedure"</u>. Remove the fuel feed hose on the fuel level sensor unit. 		
 Connect a spare fuel hose where the fuel feed hose was removed. 		
5 Turn ignition switch OFF and wait at least 10 seconds then turn ON		

- wait at least 10 seconds then turn
- Select "FUEL LEVEL SE" in "DATA MONITOR" mode of "ENGINE" using CONSULT. 6.
- Check "FUEL LEVEL SE" output voltage and note it. 7.
- Select "FUEL PUMP RELAY" in "ACTIVE TEST" mode of "ENGINE" using CONSULT. 8.

EC-327

INFOID:000000009758562

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EC

С

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P0461 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

- 9. Touch "ON" and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
- 10. Check "FUEL LEVEL SE" output voltage and note it.
- 11. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
- 12. Check "FUEL LEVEL SE" output voltage and note it.
- 13. Confirm whether the voltage changes more than 0.03 V during step 7 to 10 and 10 to 12.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-328, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

Without CONSULT

NOTE:

Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

- 1. Prepare a fuel container and a spare hose.
- 2. Release fuel pressure from fuel line. Refer to EC-143. "Work Procedure".
- 3. Remove the fuel feed hose on the fuel level sensor unit.
- 4. Connect a spare fuel hose where the fuel feed hose was removed.
- 5. Turn ignition switch ON.
- 6. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
- 7. Confirm that the fuel gauge indication varies.
- 8. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
- 9. Confirm that the fuel gauge indication varies.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to <u>EC-328, "Diagnosis Procedure"</u>.

Diagnosis Procedure

1. CHECK COMBINATION METER FUNCTION

Refer to MWI-17, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-39. "Intermittent Incident"</u>.
- NO >> Refer to <u>MWI-58</u>, "Diagnosis Procedure".

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-350, "DTC Logic"</u>.

This diagnosis indicates the former, to detect open or short circuit malfunction.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0462	FUEL LEVL SEN/CIRC (Fuel level sensor "A" circuit low)	An excessively low voltage from the sen- sor is sent to ECM.	Harness or connectors (The CAN communication line is open
P0463	FUEL LEVL SEN/CIRC (Fuel level sensor "A" circuit high)	An excessively high voltage from the sen- sor is sent to ECM.	or shorted) Harness or connectors (The sensor circuit is open or shorted) Combination meter Fuel level sensor
4	NFIRMATION PROCEDUR	RE	
If DTC Co least 10 s TESTING Before p	econds before conducting the CONDITION: erforming the following pro	een previously conducted, always tu e next test. ocedure, confirm that battery volt	-
,	switch ON. >> GO TO 2. ORM DTC CONFIRMATION F	PROCEDURE	
2. Chec	ignition switch ON and wait at k 1st trip DTC. DTC detected?	t least 5 seconds.	
	Proceed to <u>EC-329, "Diagr</u> >> INSPECTION END	nosis Procedure".	
Diagnos	sis Procedure		INFOID:00000009758566
1. CHEC	K COMBINATION METER FU	JNCTION	
Is the insp	<u>MWI-17, "CONSULT Function</u> <u>pection result normal?</u> >> Check intermittent incident	(METER/M&A)".	nt".
	>> Proceed to <u>MWI-58, "Com</u>		

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P0500 VSS

EXCEPT FOR M/T MODELS

EXCEPT FOR M/T MODELS : Description

ECM receives vehicle speed signals from two different paths via CAN communication line: One is from the ABS actuator and electric unit (control unit) via the combination unit and the other is from TCM.

EXCEPT FOR M/T MODELS : DTC Logic

INFOID:000000009758568

INFOID:000000009758567

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-</u>350, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0500	VEHICLE SPEED SEN A (Vehicle speed sensor "A")	At 20 km/h (13 MPH), ECM detects the fol- lowing status continuously for 5 seconds or more: The difference between a vehicle speed calculated by a output speed sensor transmitted from TCM to ECM via CAN com- munication and the vehicle speed indicated on the combination meter exceeds 15km/h (10 MPH).	 Harness or connector (CAN communication line is open or shorted.) Combination meter ABS actuator and electric unit (control unit) Wheel sensor TCM Output speed sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine.
- 2. Shift the selector lever to D range and wait at least for 2 seconds.
- 3. Drive the vehicle at least 10 seconds at 20 km/h (13 MPH) or more.
 - **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.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-330, "EXCEPT FOR M/T MODELS : Diagnosis Procedure"

NO >> INSPECTION END

EXCEPT FOR M/T MODELS : Diagnosis Procedure

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-108, "CONSULT Function".

Is the inspection result normal?

P0500 VSS

< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]	
NO >> Perform trouble shooting relevant to DTC indicated. Refer to <u>TM-126. "DTC Index"</u> .		
2. CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)		А
Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-31, "CONSULT Funct	ion (ABS)".	
Is the inspection result normal?		EC
YES >> GO TO 3. NO >> Perform trouble shooting relevant to DTC indicated. Refer to <u>BRC-43</u> , " <u>DTC Index</u> ".		
3. CHECK DTC WITH COMBINATION METER		0
		C
Check DTC with combination meter. Refer to <u>MWI-17, "CONSULT Function (METER/M&A)"</u> .		
<u>Is the inspection result normal?</u> YES >> GO TO 4.		D
NO >> Perform trouble shooting relevant to DTC indicated. Refer to <u>MWI-26, "DTC Index"</u> .		
4.CHECK OUTPUT SPEED SENSOR		Е
Check output speed sensor. Refer to TM-178, "Diagnosis Procedure".		
Is the inspection result normal?		
YES >> GO TO 5.		F
NO >> Replace or replace error-detected parts.		
5.CHECK WHEEL SENSOR		G
Check wheel sensor. Refer to <u>BRC-68, "Diagnosis Procedure"</u> .		
Is the inspection result normal?		
YES >> Check intermittent incident. Refer to <u>GI-39, "Intermittent Incident"</u> . NO >> Replace or replace error-detected parts.		Н
M/T MODELS		
M/T MODELS : Description	IFOID:000000009758570	
The vehicle speed signal is sent to the combination meter from the "ABS actuator and electric unit)" via the CAN communication line. The combination meter then sends a signal to the ECM communication line.		J
M/T MODELS : DTC Logic	IFOID:000000009758571	K
		L/

DTC DETECTION LOGIC NOTE:

If DTC P0500 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-350, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	
P0500	VEHICLE SPEED SEN A (Vehicle speed sensor "A")	The vehicle speed signal sent to ECM is al- most 0 km/h (0 MPH) even when vehicle is being driven.	 Harness or connectors (CAN communication line is open or shorted) Harness or connectors (Vehicle speed signal circuit is open or shorted) Wheel sensor Combination meter ABS actuator and electric unit (control unit) 	N O P

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT? Do you have CONSULT? L

Μ

YES >> GO TO 2. NO >> GO TO 5.

2. PRECONDITIONING

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

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

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

>> GO TO 3.

3.CHECK VEHICLE SPEED 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.

With CONSULT

- 1. Start engine.
- 2. Read "VHCL SPEED SE" in "DATA MONITOR" mode of "ENGINE" using CONSULT. The vehicle speed on CONSULT should exceed 10 km/h (6 mph) when rotating wheels with suitable gear position.

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Proceed to EC-333. "M/T MODELS : Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 2. Warm engine up to normal operating temperature.
- Maintain the following conditions for at least 50 consecutive seconds. CAUTION:

Always drive vehicle at a safe speed.

ENG SPEED	2,100 - 6,000 rpm
COOLANT TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	4.0 - 19.0 msec
Selector lever	Except Neutral position
PW/ST SIGNAL	OFF

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to <u>EC-333</u>, "M/T MODELS : Diagnosis Procedure".

NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to <u>EC-332, "M/T MODELS : Component Function Check"</u>. Use component function check to check the overall function of the vehicle speed signal circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to <u>EC-333</u>, "M/T MODELS : Diagnosis Procedure".

M/T MODELS : Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK

With GST

- 1. Lift up drive wheels.
- 2. Start engine.
- 3. Read vehicle speed signal in Service \$01 with GST.

P0500 VSS

F0500 V35	
< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]
The vehicle speed signal on GST should be able to exceed 10 km/h (6 MPH) when rotating suitable gear position.	wheels with A
Is the inspection result normal?	
YES >> INSPECTION END	
NO >> Proceed to EC-333, "M/T MODELS : Diagnosis Procedure".	EC
M/T MODELS : Diagnosis Procedure	IFOID:000000009758573
1. CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)	С
Check DTC with ABS actuator and electric unit (control unit). Refer to <u>BRC-31, "CONSULT Funct</u>	<u>ion (ABS)"</u> .
Is the inspection result normal?	D
YES >> GO TO 2. NO >> Perform trouble shooting relevant to DTC indicated. Refer to <u>BRC-43</u> , "DTC Index".	
2. CHECK DTC WITH COMBINATION METER	E
Check DTC with combination meter. Refer to <u>MWI-17, "CONSULT Function (METER/M&A)"</u> .	
Is the inspection result normal?	F
YES >> INSPECTION END	F
NO >> Perform trouble shooting relevant to DTC indicated. Refer to <u>MWI-26, "DTC Index"</u> .	
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P0506 ISC SYSTEM

Description

INFOID:000000009758574

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

INFOID:000000009758575

DTC DETECTION LOGIC

NOTE:

If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0506	ISC SYSTEM (Idle air control system RPM lower than expected)	The idle speed is less than the target idle speed by 100 rpm or more.	 Electric throttle control actuator Intake air leak

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

If the target idle speed is out of the specified value, perform<u>EC-140, "Work Procedure"</u>, before conducting DTC Confirmation Procedure.

TESTING CONDITION:

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

• Always perform the test at a temperature above -10°C (14°F).

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and run it for at least 1 minute at idle speed.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-334, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK INTAKE AIR LEAK

- 1. Start engine and let it idle.
- 2. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Discover air leak location and repair.

P0506 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace ECM. Refer to <u>EC-485</u>, "Removal and Installation".

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P0507 ISC SYSTEM

Description

INFOID:000000009758577

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

INFOID:000000009758578

DTC DETECTION LOGIC

NOTE:

If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0507	ISC SYSTEM (Idle air 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 leakPCV system

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

If the target idle speed is out of the specified value, perform <u>EC-140, "Work Procedure"</u>, before conducting DTC Confirmation Procedure.

TESTING CONDITION:

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

• Always perform the test at a temperature above –10°C (14°F).

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and run it for at least 1 minute at idle speed.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-336, "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 error-detected parts.

INFOID:000000009758579

[MRA8DE]

P0507 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

Start engine and let it idle. Listen for an intake air leak after the mass air flow sensor.	<i>k</i>
intake air leak detected?	E
YES >> Discover air leak location and repair. NO >> Replace ECM. Refer to <u>EC-485, "Removal and Installation"</u> .	
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P050A, P050B, 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:000000009758581

INFOID:000000009758580

DTC DETECTION LOGIC

If DTC P050A, P050B or P050E is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P050A	COLD START CONTROL (Cold start idle air control system performance)	ECM does not control engine idle speed properly when engine is started with pre-warming up con- dition.	
P050B	COLD START CONTROL (Cold start ignition timing perfor- mance)	ECM does not control ignition timing properly when engine is started with pre-warming up con- dition.	 Lack of intake air volume Fuel injection system ECM
P050E	COLD START CONTROL (Cold start engine exhaust tem- perature too low)	The temperature of the catalyst inlet does not rise to the proper temperature when the engine is started with pre-warming up condition.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Select "DATA MONITOR" mode with CONSULT.
- 4. Check the indication of "COOLANT TEMP/S".

With GST

Follow the procedure "With CONSULT" above.

Is the value of "COOLANT TEMP/S" between 15°C (59°F) and 36°C (97°F)?

YES >> GO TO 3.

NO-1 [If it is below 15°C (59°F)]>>Warm up the engine until the value of "COOLANT TEMP/S" reaches 15°C (59°F) or more. Retry from step 1.

NO-2 [If it is above 36°C (97°F)]>>Cool engine down to less than 36°C (97°F). Retry from step 1.

3. PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

- 1. Set the select lever in N range.
- Start the engine and warm up in idle with the value of "COOLANT TEMP/S" between 15°C (59°F) and 40°C (104°F) for more than 15 seconds.
- 3. Check 1st trip DTC.

P050A, P050B, P050E COLD START CONTROL

< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]
With GST Follow the procedure "With CONSULT" above.	
Is 1st trip DTC detected?	_
YES >> Proceed to <u>EC-339, "Diagnosis Procedure"</u> . NO >> INSPECTION END	
Diagnosis Procedure	INFOID:000000009758582
1.PERFORM IDLE AIR VOLUME LEARNING	
Perform <u>EC-140, "Work Procedure"</u> .	
Is Idle Air Volume Learning carried out successfully?	
YES >> GO TO 2. NO >> Follow the instruction of Idle Air Volume Learning.	
2.CHECK INTAKE SYSTEM	
Check for the cause of intake air volume lacking. Refer to the following. Crushed intake air passage 	
Intake air passage clogging	
Clogging of throttle body	
Is the inspection result normal?	
YES >> GO TO 3. NO >> Repair or replace malfunctioning part	
3. CHECK FUEL INJECTION SYSTEM FUNCTION	
Perform DTC Confirmation Procedure for DTC P0171. Refer to <u>EC-246, "DTC Logic"</u> .	
<u>Is the inspection result normal?</u> YES >> GO TO 4.	
NO >> Proceed to <u>EC-247, "Diagnosis Procedure"</u> for DTC P0171.	
4.PERFORM DTC CONFIRMATION PROCEDURE	
1. Turn ignition switch ON.	
2. Erase DTC.	
3. Perform DTC Confirmation Procedure.	
See <u>EC-338, "DTC Logic"</u> .	
Is the 1st trip DTC P050A, P050B or P050E displayed again?	
YES >> Replace ECM. Refer to <u>EC-485, "Removal and Installation"</u> . NO >> INSPECTION END	

P0520 EOP SENSOR

DTC Logic

INFOID:000000009758583

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0520	EOP SENSOR/SWITCH (Engine oil pressure sensor/ switch circuit)	 ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the engine oil pressure sensor is lower than 0.3 V. A voltage signal transmitted from the engine oil pressure sensor is higher than 5.02 V. 	 Harness or connectors (EOP sensor circuit is open or short- ed) EOP sensor Sensor power supply 2 circuit

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2. CHECK ENGINE OIL LEVEL

- 1. Turn ignition switch OFF.
- 2. Check engine oil level. Refer to LU-7, "Inspection".
- Is inspection result normal?

YES >> GO TO 3.

NO >> Check engine oil leak. Refer to <u>LU-6, "Engine Lubrication System Schematic"</u>.

3. PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-340, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758584

1.CHECK EOP SENSOR POWER SUPPLY CIRCUIT-1

- 1. Turn ignition switch OFF.
- 2. Disconnect EOP sensor harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between EOP sensor harness connector terminals.

Connector	+	-	Voltage (Approx.)
Connector	Terr	ninal	(11 - 7
F2	3	1	5.0 V

Is the inspection result normal?

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

P0520 EOP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

2. Disconne	tion switch ect ECM ha	OFF. rness conne	ctors.	arness connector and ECM harness connector.	_ A
+		-	_		
EOP s		EC	M	Continuity	C
Connector	Terminal	Connector	Terminal		0
F2	2	F24	39	Existed	
4. Also che	ck harness	for short to g	round and s	short to power.	D
	GO TO 3. Repair or rej	place error-d	etected part	ts.	E
Check EOP s	sensor. Refe	er to <u>EC-342</u>	"Compone	nt Inspection (EOP Sensor)".	F
Is the inspect			-		
				GI-39, "Intermittent Incident".	0
NO >> F 4.CHECK E	•			4, "Exploded View".	G
					_
Check the vo	ltage betwe	en EOP sen	sor harness	connector terminal and ground.	H
+				<u> </u>	
EOP s		_	Voltage		1
Connector	Terminal		(Approx.)		
F2	3	Ground	5.0 V		
Is the inspect	tion result n			—	J
YES >> (GO TO 6.				
-	GO TO 5.				k
5. CHECK S	ENSOR PC	WER SUPP	LY 2 CIRCU	JIT	
	• •		Refer to EC	C-444, "Diagnosis Procedure".	
Is inspection					L
		trouble diagr place error-d		wer supply circuit.	
6.CHECK E	•				Ν
 Turn igni Disconne 	tion switch ect ECM ha	OFF. rness conne	ctor.	arness connector and ECM harness connector.	-
+		-	-		С
EOP s	ensor	EC	М	Continuity	0
Connector	Terminal	Connector	Terminal		
F2	1	F24	38	Existed	F
Is the inspect	tion result n	ormal?			
NO >> F	•	place error-d	•	ts.	

Check the continuity between ECM harness connector and ground.

P0520 EOP SENSOR

+			
ECM		-	Continuity
Connector	Terminal		
F24	12	Ground	Existed
1 24	16		
F25	52		
E16	123		
	128		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-39, "Intermittent Incident"</u>.

NO >> Repair or replace error-detected parts.

Component Inspection (EOP Sensor)

1.CHECK EOP SENSOR

1. Turn ignition switch OFF.

2. Disconnect EOP sensor harness connector.

3. Check the resistance between EOP sensor connector terminals.

EOP				
+	+ –			
Terr				
1	2	4 – 10		
1	3	2 – 8		
2	1	4 – 10		
2	3	1 – 3		
3	1	2 – 8		
5	2	1 – 3		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EOP sensor. Refer to <u>EM-94, "Exploded View"</u>.

P0524 ENGINE OIL PRESSURE

< DTC/CIRCUIT DIAGNOSIS >

P0524 ENGINE OIL PRESSURE

DTC Logic

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INFOID:000000009758586

[MRA8DE]

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0524	ENGINE OIL PRESSURE (Engine oil pressure too low)	An EOP sensor signal voltage applied to ECM remains lower than the specified value continuously for 10 seconds or more when the engine speed is 1,000 rpm ore more.	 Decrease in engine oil pressure Decrease in engine oil level Engine oil condition EOP sensor Engine body
CAUTION			
	ONDITIONING-1	shed, be sure to perform Step 3 and	4.
before con 1. Turn i	nducting the next test. gnition switch OFF and wa	been previously conducted, always it at least 10 seconds.	perform the following procedure
3. Turn i	gnition switch ON. gnition switch OFF and wa NDITION:	it at least 10 seconds.	
		rocedure, confirm that battery voltag	je is 11 V or more at idle.
-	>> GO TO 2.		
2.PREC	ONDITIONING-2		
	osis Procedure" of DTC P08	524 finished?	
-	>> GO TO 5. >> GO TO 3.		
-	KENGINE OIL LEVEL		
Check en	gine oil level. Refer to <u>LU-7</u>	, "Inspection".	
	ection result normal?		
	 > GO TO 4. > Proceed to <u>EC-344, "Dia</u> 	<u>gnosis Procedure"</u> .	
	K ENGINE OIL PRESSURE	-	
With Control	ONSULT gnition switch ON.		
2. Selec	t "DATA MONITOR" mode	of "ENGINE" using CONSULT. EOP SENSOR" changes, according to	engine speeds.

Monitor item	Condition		Value (Approx.)
	 Engine oil temperature: 80°C (176°F) Selector lever: P or N (CVT), Neutral 	Engine speed: Idle	1,450 mV or more
EOP SENSOR	(M/T) • Air conditioner switch: OFF • No load	Engine speed: 2,000 rpm	2,850 mV or more

Without CONSULT

Check engine oil pressure. Refer to LU-7, "Inspection".

Is the inspection result normal?

YES >> GO TO 5.

Revision: October 2013

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P0524 ENGINE OIL PRESSURE

< DTC/CIRCUIT DIAGNOSIS >

NO >> Proceed to EC-344, "Diagnosis Procedure".

5. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and warm it up to normal operating temperature.
- 2. Maintain the following conditions for about 10 consecutive seconds.

Selector lever	P or N (CVT), Neutral (M/T)
Engine coolant temperature	70°C (158°F) or more
Engine speed	1,000 rpm or more

NOTE:

With engine speed set around 4,000 rpm, the phenomenon can be reproduced more easily.

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to <u>EC-344, "Diagnosis Procedure"</u>.

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK ENGINE OIL LEVEL

1. Turn ignition switch OFF.

2. Check engine oil level. Refer to LU-7, "Inspection".

Is the inspection result normal?

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

2. CHECK ENGINE OIL PRESSURE

With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 3. Start the engine and check that "EOP SENSOR" changes, according to engine speeds.

Monitor item	Condition		Value (Approx.)
EOP SENSOR	 Engine oil temperature: 80°C (176°F) Selector lever: P or N (CVT), Neutral 	Engine speed: Idle	1,450 mV or more
	(M/T) Air conditioner switch: OFF No load 	Engine speed: 2,000 rpm	2,850 mV or more

Without CONSULT

Check engine oil pressure. Refer to LU-7, "Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Check oil pump. Refer to <u>LU-15, "Removal and Installation"</u>.

3.CHECK EOP SENSOR

Check EOP sensor. Refer to EC-342, "Component Inspection (EOP Sensor)".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-39, "Intermittent Incident"</u>.
- NO >> Repair or replace error-detected parts.

4.CHECK ENGINE OIL LEAKAGE

Check engine oil leakage. Refer to LU-7. "Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

P0524 ENGINE OIL PRESSURE

< DTC/CIRCUIT DIAGNOSIS >

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INFOID:000000009758588

5. Check cause of engine oil consumption

Check the following item.

Step	Inspection item	Equipment	Standard	Reference	
1	PCV valve	EC-484, "Inspection"	1		-
2	Exhaust front tube	Visual	No blockingNo abnormal sounds	_	-
3	Oil pump	LU-16. "Inspection"			-
4	PistonPiston pinPiston ring	 Piston to piston pin oil clearance Piston ring side clearance Piston ring end gap 		EM-112, "Description"	-
5	Cylinder block	 Cylinder block top surface distortion Piston to cylinder bore clearance 		EM-103, "Inspection"	-

>> Repair or replace error-detected parts.

Component Inspection (EOP Sensor)

1.CHECK EOP SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect EOP sensor harness connector.
- 3. Check the resistance between EOP sensor connector terminals.

EOP sensor			
+	-	Resistance (kΩ)	
Terminal			
1	2	4 – 10	
I	3	2 – 8	
2	1	4 – 10	
2	3	1 – 3	
3	1	2 – 8	
	2	1 – 3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EOP sensor. Refer to EM-94, "Exploded View".

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< DTC/CIRCUIT DIAGNOSIS > P0603 ECM

DTC Logic

INFOID:000000009758589

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0603	ECM BACK UP CIRCUIT [Internal control module keep alive memory (KAM) error]	 Malfunction in the internal back up RAM of ECM. Malfunction in the internal EEP-ROM system of ECM. 	ECM power supplyECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Repeat step 1 and 2 for 10 times.
- 4. Turn ignition switch ON.
- 5. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-346, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758590

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Perform trouble diagnosis for ECM power supply and ground circuit. Refer to <u>EC-164, "Diagnosis Procedure"</u>. Is the inspection result normal?

YES >> GO TO 2.

- NO >> Repair or replace error-detected parts.
- 2. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

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

3. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC confirmation procedure. Refer to <u>EC-346</u>, "DTC Logic".
- Is the 1st trip DTC P0603 displayed again?
- YES >> Replace ECM. Refer to EC-485, "Removal and Installation".
- NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS > P0604 ECM

DTC Logic

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INFOID:000000009758591

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0604	ECM [Internal control module random access memory (RAM) error]	Malfunction in the internal RAM of ECM.	ECM
DTC CON	IFIRMATION PROCE	DURE	
1.PRECC	NDITIONING		
 Turn i Turn i TESTING 	gnition switch ON. gnition switch OFF and v CONDITION: rforming the following	vait at least 10 seconds. vait at least 10 seconds. I procedure, confirm that battery volta	ge is 11 V or more with ignition
~	> GO TO 2.		
	RM DTC CONFIRMATI		
CAUT Never 2. Turn ig 3. Turn ig	ION: start engine during th gnition switch OFF and v gnition switch ON.	e stopped) and wait least 20 minutes. is procedure. vait at least 10 seconds.	
	1st trip DTC. DTC detected?		
YES >	Proceed to <u>EC-347, "E</u> INSPECTION END	Diagnosis Procedure".	
Diagnos	is Procedure		INFOID:00000009758592
1 .PERFC	RM DTC CONFIRMATI	ON PROCEDURE	
 Erase Perfor 	m DTC confirmation pro	cedure. Refer to <u>EC-347, "DTC Logic"</u> .	
YES >	<u>rip DTC P0604 displaye</u> > Replace ECM. Refer t > INSPECTION END	d again? o EC-485, "Removal and Installation".	

< DTC/CIRCUIT DIAGNOSIS > P0605 ECM

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0605	ECM [Internal control module read only memory (ROM) error]	Malfunction in the internal ROM of ECM.	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 11 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

Turn ignition switch ON (engine stopped) and wait least 20 minutes.
 CAUTION:

Never start engine during this procedure.

- 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 >> Proceed to EC-348, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758594

1.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- Perform DTC confirmation procedure. Refer to <u>EC-348</u>, "<u>DTC Logic</u>".
- Is the 1st trip DTC P0605 displayed again?
- YES >> Replace ECM. Refer to EC-485, "Removal and Installation".
- NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS > P0606 ECM

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INFOID:000000009758595

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0606	CONTROL MODULE (Control module processor)	Malfunction in ECM processor.	ECM
DTC CON	FIRMATION PROCE	DURE	
1.PRECC	ONDITIONING		
2. Turn i 3. Turn i TESTING			oltage is 11 V or more with ignitior
>	> GO TO 2.		
~	ORM DTC CONFIRMATION	ON PROCEDURE-1	
1. Turn ig CAUT		e stopped) and wait at least 10 secon	ds.
2. Turn ig 3. Turn ig 4. Check <u>Is 1st trip I</u> YES > NO >	start engine during this gnition switch OFF and v gnition switch ON. (1st trip DTC. <u>DTC detected?</u> Proceed to <u>EC-349, "E</u> S GO TO 3.	vait at least 10 seconds. <u>Diagnosis Procedure"</u> .	
3.PERFC	RM DTC CONFIRMATIO	ON PROCEDURE-2	
 Rev u the ac Let the Turn ig Turn ig 	engine. p the engine quickly to a celerator pedal. e engine idle and wait at gnition switch OFF and v gnition switch ON. (1st trip DTC.		ded condition and completely release
YES >	<u>DTC detected?</u> > Proceed to <u>EC-349, "E</u> > INSPECTION END	liagnosis Procedure".	
-	is Procedure		INFQID:00000000975855
1. PERFC	RM DTC CONFIRMATIO	ON PROCEDURE	
2. Erase 3. Perfor <u>Is the 1st t</u> YES >	m DTC confirmation pro	cedure for 3 times. Refer to <u>EC-349, '</u> <u>d again?</u> o <u>EC-485, "Removal and Installation"</u> .	-

NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS > P0607 ECM

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0607	ECM (Control module perfor- mance)	ECM internal communication system is malfunc- tioning.	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 11 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON (engine stopped) and wait least 10 seconds.
- 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 >> Proceed to EC-350, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758598

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.

- 2. Erase DTC.
- 3. Perform DTC confirmation procedure. Refer to <u>EC-350, "DTC Logic"</u>.
- Is the 1st trip DTC P0607 displayed again?
- YES >> Replace ECM. Refer to EC-485, "Removal and Installation".
- NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS > P060A ECM

DTC Logic

Revision: October 2013

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P060A	CONTROL MODULE (Internal control module monitoring processor per- formance)	ECM internal monitoring processor is malfunction- ing.	ECM
DTC COM	NFIRMATION PROCE	DURE	
1 .PRECC	ONDITIONING		
 Turn ig Turn ig TESTING Before pe 	gnition switch ON. gnition switch OFF and v CONDITION: erforming the following	wait at least 10 seconds. wait at least 10 seconds. I procedure, confirm that battery voltag	e is 11 V or more with ignition
switch ON	۱.		
-	> GO TO 2.		
	ORM DTC CONFIRMATI		
 Turn ig Repeat Turn ig 	at step 1 and 2 for 5 time gnition switch ON.	wait at least 10 seconds.	
	< 1st trip DTC. DTC detected?		
YES >	Proceed to EC-351, "[Diagnosis Procedure".	
	> INSPECTION END		
Diagnos	sis Procedure		INFOID:00000009758600
1			
I.PERFC		ON PROCEDURE	
1. Turn ig	gnition switch ON.	ON PROCEDURE	
1. Turn ig 2. Erase	gnition switch ON. DTC.		
 Turn ig Erase Perfor 	gnition switch ON. DTC.	cedure. Refer to <u>EC-351, "DTC Logic"</u> .	
1. Turn ig 2. Erase 3. Perfor <u>Is the 1st t</u> YES >	gnition switch ON. DTC. rm DTC confirmation pro trip DTC P060A displaye > Replace ECM. Refer t	cedure. Refer to <u>EC-351, "DTC Logic"</u> .	
1. Turn ig 2. Erase 3. Perfor <u>Is the 1st t</u> YES >	gnition switch ON. DTC. M DTC confirmation pro trip DTC P060A displaye	cedure. Refer to <u>EC-351, "DTC Logic"</u> . ed again?	
1. Turn ig 2. Erase 3. Perfor <u>Is the 1st t</u> YES >	gnition switch ON. DTC. rm DTC confirmation pro trip DTC P060A displaye > Replace ECM. Refer t	cedure. Refer to <u>EC-351, "DTC Logic"</u> . ed again?	

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DTC DETECTION LOGIC

< DTC/CIRCUIT DIAGNOSIS > P060B ECM

INFOID:000000009758601

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P060B	CONTROL MODULE (Internal control module A/ D processing performance)	ECM internal analog/digital conversion processing system is malfunctioning.	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 11 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON (engine stopped) and wait least 10 seconds.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-352, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758602

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.

- 2. Erase DTC.
- 3. Perform DTC confirmation procedure. Refer to <u>EC-352, "DTC Logic"</u>.
- Is the 1st trip DTC P060B displayed again?
- YES >> Replace ECM. Refer to EC-485, "Removal and Installation".
- NO >> INSPECTION END

P0643 SENSOR POWER SUPPLY

Description

ECM supplies a voltage of 5.0 V to some of the sensors systematically divided into 2 groups, respectively. Accordingly, when a short circuit develops in a sensor power source, a malfunction may occur simultaneously in the sensors belonging to the same group as the shorted-circuit sensor.

Sensor power supply 1 Battery current sensor	С
 Crankshaft position (CKP) sensor (POS) Throttle position (TP) sensor Accelerator pedal position (APP) sensor 1 NOTE: 	D
f sensor power supply 1 circuit is malfunctioning, DTC P0643 is displayed.	Е
 Camshaft position (CMP) sensor (PHASE) Mass air flow (MAF) sensor Engine oil pressure (EOP) sensor Exhaust valve timing (EVT) control position sensor 	F
Accelerator pedal position (APP) sensor 2 Intake manifold runner control valve position sensor	G

DTC Logic

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	
P0643	SENSOR POWER/CIRC (Sensor reference voltage "A" circuit high)	ECM detects that the voltage of sensor power supply 1 is excessively low or high.	 Harness or connectors (Battery current sensor circuit is shorted.) (CKP sensor circuit is shorted.) (TP sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (APP sensor 1 circuit is shorted.) Battery current sensor CKP sensor TP sensor Refrigerant pressure sensor APP sensor 	J K L

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.

2. Check DTC.

Is DTC detected?

YES >> Refer to EC-354, "Diagnosis Procedure".

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P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758605

[MRA8DE]

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.

+			N / 14	
APP s	sensor	-	Voltage (Approx.)	
Connector	Terminal		(FF - 7	
E12	4	Ground	5.0 V	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

E	CM	Sensor			
Connector	Terminal	Name	Name Connector		
	72	CKP sensor (POS)	F22	3	
F25	64	Battery current sensor	F54	1	
	80	Electric throttle control actuator	F7	2	
E16	122	APP sensor 1	E12	4	

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.

Sensor	Reference		
Battery current sensor	EC-375, "Component Inspection (Battery Current Sensor)"		
CKP sensor	EC-279. "Component Inspection [CKP Sensor (POS)]"		
Refrigerant pressure sensor	EC-465, "Diagnosis Procedure"		
TP sensor	EC-202, "Component Inspection (TP Sensor)"		

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning component.

4.CHECK APP SENSOR

Check APP sensor. Refer to EC-433, "Component Inspection (APP Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-39. "Intermittent Incident"</u>.

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

P0850 PNP SWITCH

Description

For CVT models, transmission range switch is turn ON when the selector lever is P or N. For M/T models, park/neutral position (PNP) range switch is ON when the selector lever is Neutral position. ECM detects the position because the continuity of the line (the ON) exists.

DTC Logic

INFOID:000000009758607

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis conter	L) I (' detecting condition	on	Possible cause
P0850	P-N POS SW/CIRCUIT (Park/Neutral switch input circuit)	 For CVT models, the signal of sion range switch is not chan process of engine starting an For M/T models, the signal of neutral position (PNP) switch changed in the process of engand driving. 	iged in the id driving. f the park/ i is not	 Harness or connectors [Transmission range switch circuit is open or shorted. (CVT models)] [Park/neutral position (PNP) switch cir- cuit is open or shorted. (M/T models)] Transmission range switch (CVT mod- els) Park/neutral position (PNP) switch (M/T models)
DTC CONF	IRMATION PROCE	DURE		
1.PRECON	IDITIONING			
		nas been previously conduc	ted, alway	vs perform the following procedure
	ucting the next test. hition switch OFF and t	vait at least 10 seconds.		
2. Turn ign	ition switch ON.	vait at least 10 seconds.		
5. Turriyi	IIIION SWICH OFF and	wait at least 10 seconds.		
>>	GO TO 2.			
2.PERFOR		ICTION CHECK		
Perform con	nponent function chec	<. Refer to <u>EC-356, "Compon</u>	ent Functio	on Check".
<u>s the inspec</u>	tion result normal?			
-	GO TO 3. Proceed to EC-356, "I	Diagnosis Procedure"		
-	M DTC CONFIRMATI	-		
_		ONTROCEDORE		
With CON I. Select "		le of "ENGINE" using CONSI	ULT.	
2. Start en	gine and warm it up to	normal operating temperature	re.	
 Maintair CAUTIC 		ns for at least 60 consecutive	e seconds.	
Always	drive vehicle at a sa	fe speed.		
		(0) (7)		
ENG SPEED		00 - 6,375 rpm (CVT) 00 - 6,375 rpm (M/T)		
COOLANT TE	EMP/S Mo	re than 70°C (158°F)		
B/FUEL SCH	DL 1.3	- 31.8 msec		
BIT OFF OOT				
VHCL SPEED	D SE Mo	re than 64 km/h (40 mph)		

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P0850 PNP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

Follow the procedure "With CONSULT" above. Is 1st trip DTC detected?

- YES >> Proceed to EC-356, "Diagnosis Procedure".
- NO >> INSPECTION END

Component Function Check

INFOID:000000009758608

1.CHECK PNP SIGNAL FUNCTION

With CONSULT

- Turn ignition switch ON.
- 2. Select "P/N POSI SW" in "DATA MONITOR" mode of "ENGINE" using CONSULT. Then check the "P/N POSI SW" signal as per the following conditions.

Selector lever position	Indication
N or P position (CVT) Neutral position (M/T)	ON
Except above position	OFF

Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to EC-356. "Diagnosis Procedure".

2. PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector and ground as per the following conditions.

ECM							
Connector	+	-	Condition				Voltage (Approx.)
Connector	Terr	ninal			X FF - 7		
E16	117	128	Selector lever	P or N (CVT)Neutral (M/T)	Battery voltage		
				Except above	0 V		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-356, "Diagnosis Procedure".

Diagnosis Procedure

1.INSPECTION START

Check which type of transmission the vehicle is equipped with.

Which type of transmission?

CVT models>>GO TO 2. M/T models>>GO TO 6.

2.CHECK TRANSMISSION RANGE SWITCH POWER SUPPLY

1. Turn ignition switch OFF.

- 2. Disconnect transmission range switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between transmission range switch harness connector and ground.

P0850 PNP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

	+			
	range switch	_	Voltage	
Connector F26	Terminal 7	Ground	Battery volta	ade
-	tion result n		Duttory Volta	
YES >> NO >>	GO TO 4. GO TO 3.			
	ition switch		SWITCHP	POWER SUPPLY CIRCUIT
2. Disconn	ect IPDM E/	R harness c		range switch harness connector and IPDM E/R harness co
	+		_	
Transmission	range switch	IPDN	/IE/R	Continuity
Connector	Terminal	Connector	Terminal]
F26	7	E43	14	Existed
	ition switch			
3. Check tl	ect ECM hai he continuity	rness conne		ange switch harness connector and ECM harness connect
3. Check tl	ect ECM hai he continuity +	rness conne between tra	nsmission ra	
3. Check tl	ect ECM hai he continuity	rness conne between tra		ange switch harness connector and ECM harness connect
3. Check th	ect ECM han he continuity + h range switch	rness conne between tra E	nsmission ra - CM	
3. Check the second sec	ect ECM ha he continuity + range switch Terminal	rness conne between tra E Connector E16	CM Terminal	Continuity Existed
3. Check the second sec	ect ECM hat he continuity + range switch Terminal 10 eck harness ction result n GO TO 5. Repair or rej	rness conne between tra En Connector E16 for short to g ormal? place error-c	Terminal 117 ground and to	Continuity Existed to power.
3. Check the second sec	ect ECM hat he continuity + range switch Terminal 10 eck harness ction result n GO TO 5. Repair or rep FRANSMISS	rness conne between tra El6 for short to g ormal? place error-c sION RANGE	Terminal 117 ground and to SWITCH	Continuity Existed to power. ts.
3. Check the transmission Transmission Connector F26 4. Also che Is the inspect YES >> NO >> 5. CHECK The transmission Check the transmission	ect ECM han he continuity + range switch Terminal 10 eck harness ction result n GO TO 5. Repair or rej FRANSMISS	rness conne between tra En Connector E16 for short to g ormal? place error-c SION RANGE range switch	Terminal 117 ground and to SWITCH	Continuity Existed to power.
3. Check the transmission Transmission Connector F26 4. Also che Is the inspect YES >> 5. CHECK 1 Check the transpect YES >>	ect ECM hai he continuity range switch Terminal 10 eck harness ction result n GO TO 5. Repair or rep FRANSMISS ansmission re ction result n Check interr	rness conne between tra En Connector E16 for short to g ormal? place error-c FION RANGE range switch ormal? nittent incide	Terminal 117 ground and to SWITCH Refer to The ent. Refer to	Continuity Existed to power. ts. <u>M-165, "Component Inspection"</u> . <u>GI-39, "Intermittent Incident"</u> .
3. Check the Transmission Connector F26 4. Also che Is the inspec YES >> NO >> 5. CHECK The Check the tr Is the inspec YES >> NO >>	ect ECM hai he continuity + range switch Terminal 10 eck harness ction result n GO TO 5. Repair or rej FRANSMISS ansmission r ction result n Check intern Replace trar	rness conne between tra El Connector E16 for short to g ormal? place error-c SION RANGE range switch ormal? nittent incide	Terminal Terminal 117 ground and to SWITCH Refer to The ont. Refer to The onbly. Refer to	Continuity Existed to power. ts. <u>M-165, "Component Inspection"</u> .

4. Check the voltage between PNP switch harness connector and ground.

P0850 PNP SWITCH

		+			
	PNP	switch	-	Voltage	
-	Connector Terminal				
	F52	2	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 7.

NO >> Perform the trouble diagnosis for power supply circuit.

7. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT

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

+				
PNP	switch	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F52	3	E16	117	Existed

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

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.CHECK PNP SWITCH

Check the PNP switch. Refer to <u>TM-17, "PARK/NEUTRAL POSITION (PNP) SWITCH : Component Inspec-</u> tion".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-39, "Intermittent Incident".

NO >> Replace PNP switch. Refer to <u>TM-21. "Removal and Installation"</u>.

P1078 EVT CONTROL POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1078 EVT CONTROL POSITION SENSOR

DTC Logic

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INFOID:000000009758610

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT sc (Trouble diagno		DTC detecting condition	Possible cause
P1078	EXH TIM SEN// (Exhaust valve trol position ser bank 1)	timing con-	An excessively high or low voltage from the sensor is sent to ECM.	 Harness or connectors (Exhaust valve timing control position sensor circuit is open or shorted) Accumulation of debris to the signal pick-up portion of the camshaft Exhaust valve timing control position sensor Sensor power supply 2 circuit
	IFIRMATION	PROCED	URE	
1. PRECO	NDITIONING			
before con 1. Turn ig 2. Turn ig	ducting the ne gnition switch (gnition switch (ext test. OFF and wa ON.	s been previously conducted, an ait at least 10 seconds. ait at least 10 seconds.	ways perform the following procedure
~	> GO TO 2. RM DTC CON	IFIRMATIO	N PROCEDURE	
2. Check <u>Is 1st trip [</u> YES >>	ngine and let i 1st trip DTC. <u>DTC detected?</u> Proceed to <u>E</u> INSPECTIOI	<u>-</u> EC-359, "Dia	seconds. agnosis Procedure".	
	is Procedur			INFOID:00000000975861:
1.снеск	EXHAUST VA	ALVE TIMIN	IG (EVT) CONTROL POSITION SI	ENSOR POWER SUPPLY
1. Turn ig	gnition switch (OFF.		
3. Turn ig	gnition switch (ON.	(EVT) control position sensor har	
	+		Mellerer	
EVT control	I position sensor	-	Voltage (Approx.)	
Connector		a		
F57	1	Ground	5.0 V	
YES >	<u>ection result no</u> > GO TO 3. > GO TO 2.	ormal?		
2. снеск	SENSOR PO	WER SUPP		
2.снеск			. Refer to <u>EC-444, "Diagnosis Proc</u>	cedure".

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

EC-359

P1078 EVT CONTROL POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

$\overline{\mathbf{3}}$. CHECK EVT CONTROL POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- Check the continuity between EVT control position sensor harness connector and ECM harness connector.

+				
EVT control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F57	2	F24	42	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK EVT CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.

Check the continuity between EVT control position sensor harness connector and ECM harness connector.

+			_	
EVT control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F57	3	F24	43	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK EVT CONTROL POSITION SENSOR

Check the EVT control position sensor. Refer to <u>EC-360</u>, "Component Inspection (EVT Control Position Sensor)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace EVT control position sensor. Refer to EM-60, "Removal and Installation".

6.CHECK CAMSHAFT (EXT)

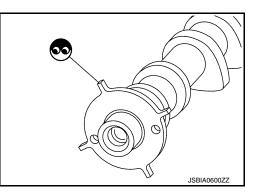
Check the following.

Accumulation of debris to the signal plate of camshaft rear end

Chipping signal plate of camshaft rear end

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-39</u>, "Intermittent <u>Incident"</u>.
- NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-60, "Removal and Installation".



Component Inspection (EVT Control Position Sensor)

INFOID:000000009758612

1.EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR-1

1. Turn ignition switch OFF.

P1078 EVT CONTROL POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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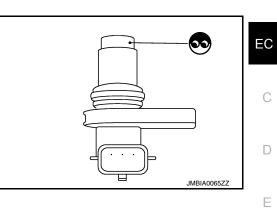
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- 2. Disconnect EVT control position sensor harness connector.
- 3. Loosen the fixing bolt of the sensor.
- 4. Remove EVT control position sensor.
- 5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace EVT control position sensor. Refer to <u>EM-60</u>, <u>"Removal and Installation"</u>.



$2.{\tt EVT} \ {\tt CONTROL} \ {\tt POSITION} \ {\tt SENSOR-2}$

Check resistance EVT control position sensor terminals as shown below.

EVT contro sen	ol position Isor			
+	-	Condition		Resistance
Terminal				
1	2			
1 +	3	Temperature °C (°F)	25 (77)	Except 0 or ∞ Ω
2	3			

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace EVT control position sensor. Refer to <u>EM-60, "Removal and Installation"</u>.

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P1148 CLOSED LOOP CONTROL

< DTC/CIRCUIT DIAGNOSIS >

P1148 CLOSED LOOP CONTROL

DTC Logic

DTC DETECTION LOGIC

NOTE:

DTC P1148 is displayed with DTC for A/F sensor 1. When the DTC is detected, perform the trouble diagnosis of DTC corresponding to A/F sensor 1.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1148	CLOSED LOOP-B1 (CLOSED LOOP-B1)	The closed loop control function does not operate even when vehicle is being driven in the specified condition.	 Harness or connectors (A/F sensor 1 circuit is open or shorted.) A/F sensor 1 A/F sensor 1 heater

Diagnosis Procedure

DTC P1148 is displayed with DTC for A/F sensor 1.

When the DTC is detected, perform the trouble diagnosis of DTC corresponding to A/F sensor 1. Refer to <u>EC-94, "DTC Index"</u>.

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INFOID:000000009758614

[MRA8DE]

P117A AIR FUEL RATIO

< DTC/CIRCUIT DIAGNOSIS >

P117A AIR FUEL RATIO

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P117A is displayed with other DTC, first perform the trouble diagnosis for the other DTC. Refer to <u>EC-94, "DTC Index"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P117A	AIR FUEL RATIO B1 (AIR FUEL RATIO B1)	ECM detects a lean/rich air fuel ratio state in any cylinder for a specified length of time.	 Fuel injector Exhaust gas leaks Incorrect fuel pressure Mass air flow sensor Intake air leaks Lack of fuel Incorrect PCV hose connection Improper spark plug Insufficient compression The fuel injector circuit is open or shorted ignition coil The ignition signal circuit is open or shorted

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING-1

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

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

NOTE:

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

>> GO TO 2.

2. PRECONDITIONING-2

1. Turn ignition switch ON.

2. Clear the mixture ratio self-learning value. Refer to EC-142, "Work Procedure".

Will CONSULT be used?

YES >> GO TO 3.

NO >> GO TO 6.

3.PERFORM DTC CONFIRMATION PROCEDURE-1

- 1. Turn ignition switch ON.
- 2. Select "COOLANT TEMP/S" in "DATA MONITOR" mode of "ENGINE" using CONSULT.

3. Start engine.

4. Make sure that "COOLANT TEMP/S" indicates more than 80°C (176°F).

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

- 1. Select "SYSTEM 1 DIAGNOSIS B B1" and "SYSTEM 1 DIAGNOSIS A B1" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 2. Drive vehicle under the following conditions for at least 5 consecutive seconds. CAUTION:

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• Always drive vehicle at a safe speed.

ENG SPEED	1,000 – 1,250rpm
COOLANT TEMP/S	More than 80°C (176°F)
B/FUEL SCHDL	4 – 8 msec
Selector lever	D position
SYSTEM 1 DIAGNOSIS B B1	PRSENT

NOTE:

- Drive the vehicle at approximately 88 km/h (55MPH) allows easy diagnosis.
- Keep the accelerator pedal as possible during crusing.
- 3. Check "SYSTEM 1 DIAGNOSIS A B1" indication.

Is "CMPLT" displayed?

YES >> GO TO 5.

NO >> GO TO 2.

5.PERFORM DTC CONFIRMATION PROCEDURE-3

Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-364, "Diagnosis Procedure".
- NO >> INSPECTION END

6.PERFORM DTC CONFIRMATION PROCEDURE-4

Without CONSULT

- 1. Start the engine and warm it up to normal operating temperature.
- 2. Drive vehicle under the following conditions for at least 5 consecutive seconds.
 - CAUTION:

Always drive vehicle at a safe speed.

Engine speed	1,000 – 1,250 rpm	
Calculated load value	26 – 46 %	
Selector lever	D position	

NOTE:

- Drive the vehicle at approximately 88 km/h (55MPH) allows easy diagnosis.
- Keep the accelerator pedal as possible during crusing.

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to <u>EC-364</u>, "Diagnosis Procedure". NO >> INSPECTION END

Diagnosis Procedure

1.CHECK FOR INTAKE AIR LEAK

- 1. Stop engine and check the following for connection.
- Air duct
- Vacuum hoses
- PCV hose
- Intake air passage between air duct to intake manifold
- 2. Start engine and let it idle.
- 3. Listen for an intake air leak after the mass air flow sensor.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

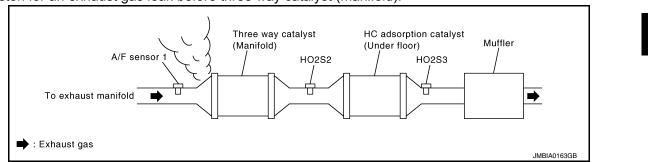
2.CHECK EXHAUST GAS LEAK

INFOID:000000009758616

P117A AIR FUEL RATIO

< DTC/CIRCUIT DIAGNOSIS >

- 1. Stop engine and visually check exhaust tube, three way catalyst and muffler for dents connection.
- 2. Start engine and let it idle.
- 3. Listen for an exhaust gas leak before three way catalyst (manifold).



Is the inspection result normal?

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

3.CHECK FUEL PRESSURE

- 1. Release fuel pressure to zero. Refer to <u>EC-143, "Work Procedure"</u>.
- 2. Check fuel pressure. Refer to EC-143, "Work Procedure".

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 9.

4.CHECK MASS AIR FLOW SENSOR

With CONSULT

Check "MASS AIR FLOW" in "DATA MONITOR" mode of "ENGINE" using CONSULT. For specification, refer to <u>EC-486, "Mass Air Flow Sensor"</u>. @With GST

Check mass air flow sensor signal in Service \$01 using GST.

For specification, refer to <u>EC-486, "Mass Air Flow Sensor"</u>.

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to <u>EC-187, "Diagnosis Procedure"</u>.

5. CHECK FUNCTION OF FUEL INJECTOR-1

With CONSULT

1. Start engine.

- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 3. Check that each circuit produces a momentary engine speed drop.

Without CONSULT

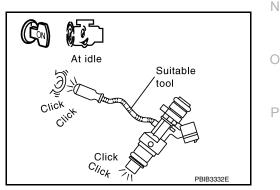
- 1. Let engine idle.
- 2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform trouble diagnosis for fuel injector, refer to <u>EC-</u> <u>450, "Component Function Check"</u>.



6.CHECK FUNCTION OF FUEL INJECTOR-2

CAUTION:

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< DTC/CIRCUIT DIAGNOSIS >

Perform the following procedure in a place with no combustible objects and good ventilation.

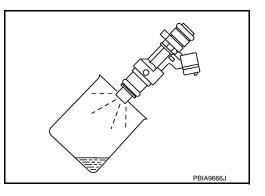
- 1. Turn ignition switch OFF.
- 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- 3. Disconnect all fuel injector harness connectors.
- 4. Remove fuel tube assembly. Refer to <u>EM-40, "Removal and Installation"</u>. Keep fuel hose and all fuel injectors connected to fuel tube.
- 5. Disconnect all ignition coil harness connectors.
- 6. Prepare pans or saucers under each fuel injector.
- 7. Crank engine for approximately 3 seconds.

• Fuel should be sprayed evenly for each fuel injector.

• Fuel must not drip from the tip of fuel injector.

Is the inspection result normal?

NO >> Replace fuel injector. Refer to <u>EM-40, "Removal and</u> <u>Installation"</u>.



7.CHECK FUNCTION OF IGNITION COIL-1

CAUTION:

Perform the following steps in a well-ventilated area with no combustibles.

- 1. Turn ignition switch OFF.
- 2. Remove fuel pump fuse from IPDM E/R to release fuel pressure. **NOTE:**

CONSULT must not be used to release fuel pressure. It develops again during the following steps, if released by using CONSULT.

- 3. Start the engine.
- 4. After an engine stall, crank the engine two or three times to release all the fuel pressure.
- 5. Turn ignition switch OFF.
- Disconnect all the harness connectors of ignition coil to prevent electric discharge from occurring in ignition coil.
- 7. Remove ignition coil assembly and spark plug of cylinder. Refer to EM-45, "Removal and Installation".
- 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 9. Connect spark plug and harness connector to ignition coil.
- 10. Allow a 13-17mm (0.52-0.66 in) spacing between spark plug and grounded metal portion as shown in the figure to fix the ignition coil with a rope or an equivalent.
- 11. Crank the engine for approximately 3 seconds to see if sparking occurs between spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

- The discharge voltage becomes 20 kV or higher. Therefore, always stay away from the spark plug and ignition coil at least 50 cm (19.7 in) during the inspection.
- Leaving a space of more than 17mm (0.66 in) may damage the ignition coil.
 NOTE:

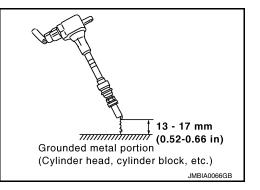
When the gap is less than 13 mm (0.52 in), a the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

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

8.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to <u>EM-23, "Inspection"</u>. <u>Is the inspection result normal?</u>



P117A AIR FUEL RATIO

FITTA AIR FUEL RATIO				
< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]			
YES >> Check intermittent incident. Refer to <u>GI-39. "Intermittent Incident"</u> . NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.		А		
9. DETECT MALFUNCTIONING PART				
Check fuel hoses and fuel tubes for clogging.				
Is the inspection result normal?		EC		
YES >> Replace fuel filter and fuel pump assembly. Refer to <u>FL-6, "Removal and Installation"</u> NO >> Repair or replace error-detected parts.	•			
10. CHECK FUNCTION OF IGNITION COIL-2		С		
 Turn ignition switch OFF. Disconnect spark plug and connect a non-malfunctioning spark plug. 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.		E		
Is the inspection result normal?				
 YES >> GO TO 11. NO >> Check ignition coil, power transistor and their circuits. Refer to <u>EC-456</u>, "Component Check". 	ent Function	F		
11.check spark plug		G		
Check the initial spark plug for fouling, etc.				
Is the inspection result normal?				
YES >> 1. Repair or clean spark plug. Refer to <u>EM-45</u> , "Removal and Installation".	3.	Η		
2. GO TO 12. NO >> Replace spark plug(s) with standard type one(s). For				
spark plug type, refer to <u>EM-118, "Spark Plug"</u> .				
	2	J		
12.CHECK FUNCTION OF IGNITION COIL-3	SEF156I			
		K		
 Reconnect the initial spark plugs. Crank engine for approximately 3 seconds, and recheck whether spark is generated betwe plug and the grounded portion. 	en the spark	L		
Spark should be generated.				
Is the inspection result normal?		M		
YES >> Check intermittent incident. Refer to <u>GI-39, "Intermittent Incident"</u> .				
NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM</u> <u>Plug"</u> .	<u>-118, "Spark</u>	Ν		
		0		
		Ρ		

P1212 TCS COMMUNICATION LINE

< DTC/CIRCUIT DIAGNOSIS >

P1212 TCS COMMUNICATION LINE

Description

This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and "ABS actuator and electric unit (control unit)".

Be sure to erase the malfunction information such as DTC not only for "ABS actuator and electric unit (control unit)" but also for ECM after TCS related repair.

DTC Logic

INFOID:000000009758618

[MRA8DE1

INFOID:000000009758617

DTC DETECTION LOGIC

NOTE:

- If DTC P1212 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to <u>EC-169, "DTC Logic"</u>.
- If DTC P1212 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-350, "DTC Logic"</u>.

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1212	TCS/CIRC (TCS/CIRC)	ECM can not receive the information from "ABS actuator and electric unit (control unit)" continuously.	 Harness or connectors (CAN communication line is open or shorted.) ABS actuator and electric unit (control unit) Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for at least 10 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-368, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758619

Perform the trouble diagnosis for TCS. Refer to <u>BRC-51, "Work Flow"</u>. **NOTE:**

If DTC P1212 is displayed with DTC UXXXX and/or P0607, perform the following trouble diagnosis.

- Trouble diagnosis for DTC UXXXX Refer to <u>EC-94, "DTC Index"</u>.
- Trouble diagnosis for DTC P0607 Refer to <u>EC-350</u>, "DTC Logic".

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, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1217 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-350, "DTC Logic"</u>.

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No. CONSULT screen ter (Trouble diagnosis c tent)		Possible cause	E
ENG OVER TEMP P1217 (Engine over tempera ture)	 Cooling fan does not operate properly (Overheat). Cooling fan system does not operate properly (Overheat). Engine coolant was not added to the system using the proper filling method. Engine coolant is not within the specified range. 	 Harness or connectors (Cooling fan circuit is open or shorted.) IPDM E/R Cooling fan motor Radiator hose Radiator Radiator cap Reservoir tank Water pump 	F G H

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to <u>CO-12, "Changing Engine</u> <u>Coolant"</u>. Also, replace the engine oil. Refer to <u>LU-9, "Refilling"</u>.

- 1. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to <u>MA-12</u>, <u>"Engine 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-369, "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 >> Proceed to <u>EC-370, "Diagnosis Procedure"</u>.

Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK-1

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

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

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[MRA8DE]

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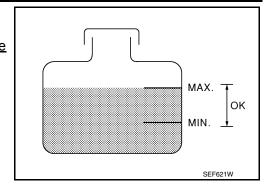
P1217 ENGINE OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Check the coolant level in the reservoir tank and radiator. **Allow engine to cool before checking coolant level.** <u>Is the coolant level in the reservoir tank and/or radiator below the</u> <u>proper range?</u>

YES >> Proceed to <u>EC-370, "Diagnosis Procedure"</u>. NO >> GO TO 2.



2. PERFORM COMPONENT FUNCTION CHECK-2

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

YES >> Proceed to EC-370, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-3

(I) With CONSULT

- 1. Turn ignition switch ON.
- 2. Perform "COOLING FAN" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 3. Check that cooling fan speed varies according to the percentage.

Without CONSULT

- Activate IPDM E/R auto active test and check cooling fan motors operation. Refer to <u>PCS-9</u>, "<u>Diagnosis</u> <u>Description</u>" (With Intelligent Key System) or <u>PCS-37</u>, "<u>Diagnosis Description</u>" (Without Intelligent Key System).
- 2. Check that cooling fan operates.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to EC-370, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000009758622

1. CHECK COOLING FAN OPERATION

With CONSULT

- $\widetilde{1.}$ Turn ignition switch ON.
- 2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 3. Check that cooling fan speed varies according to the percentage.

Without CONSULT

- Activate IPDM E/R auto active test and check cooling fan motors operation. Refer to <u>PCS-9</u>, "<u>Diagnosis</u> <u>Description</u>" (With Intelligent Key System) or <u>PCS-37</u>, "<u>Diagnosis Description</u>" (Without Intelligent Key System).
- 2. Check that cooling fan operates.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to EC-463, "Diagnosis Procedure".

2.CHECK COOLING SYSTEM FOR LEAK-1

Check cooling system for leak. Refer to CO-11, "System Inspection".

Is leakage detected?

YES >> GO TO 3.

NO >> GO TO 4.

3.CHECK COOLING SYSTEM FOR LEAK-2

Check the following for leak.

• Hose (Refer to <u>CO-11, "System Inspection"</u>.)

• Radiator (Refer to <u>CO-16, "Inspection"</u>.)

P1217 ENGINE OVER TEMPERATURE [MRA8DE] < DTC/CIRCUIT DIAGNOSIS > • Water pump (Refer to CO-19, "Removal and Installation".) >> Repair or replace malfunctioning part. **4.**CHECK RADIATOR CAP Check radiator cap. Refer to CO-11, "System Inspection". Is the inspection result normal? >> GO TO 5. >> Replace radiator cap. Refer to CO-15, "Exploded View". **5.**CHECK THERMOSTAT Check thermostat. Refer to CO-23, "Inspection". Is the inspection result normal? >> GO TO 6. >> Replace thermostat. Refer to CO-21, "Removal and Installation of Thermostat". 6.CHECK WATER CONTROL VALVE Check water control valve. Refer to CO-25, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 7. NO >> Replace water control valve. Refer to CO-25, "Removal and Installation".

YES

YES

NO

NO

7.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-199, "Component Inspection (ECT Sensor)".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace engine coolant temperature sensor. Refer to <u>CO-24, "Exploded View"</u>.

8. OVERHEATING CAUSE ANALYSIS

If the cause cannot be isolated, check the CO-9, "Troubleshooting Chart".

>> INSPECTION END

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< DTC/CIRCUIT DIAGNOSIS >

P1225 TP SENSOR

DTC Logic

INFOID:000000009758623

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P1225	CTP LEARNING-B1 (Closed throttle position learning bank 1)	Closed throttle position learning value is excessively low.	Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

- YES >> Proceed to EC-372, "Diagnosis Procedure".
- NO >> INSPECTION END

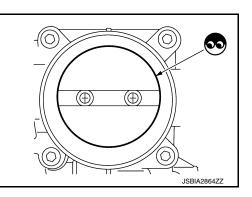
Diagnosis Procedure

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- 1. Turn ignition switch OFF.
- 2. Remove the intake air duct. Refer to EM-25, "Exploded View".
- 3. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

- YES >> Replace electric throttle control actuator. Refer to <u>EM-</u> 27, "Removal and Installation".
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to <u>EC-139</u>, "Work Procedure".



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P1226 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1226 TP SENSOR

DTC Logic

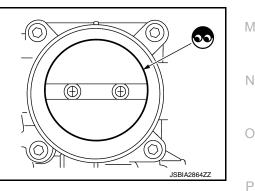
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[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1226	CTP LEARNING-B1 (CTP LEARNING-B1)	Closed throttle position learning is not performed successfully, repeatedly.	Electric throttle control actuator (TP sensor 1 and 2)
DTC CON	NFIRMATION PROCEDUI	RE	
1.PRECO	ONDITIONING		
before cor 1. Turn i 2. Turn i 3. Turn i TESTING	nducting the next test. gnition switch OFF and wait gnition switch ON. gnition switch OFF and wait CONDITION:		
•	> GO TO 2.	, , , , , , , , , , , , , , , , , , , 	
2.PERFC	ORM DTC CONFIRMATION	PROCEDURE	
 Turn i Turn i Repeating Check 	gnition switch ON. gnition switch OFF, wait at le gnition switch ON. at steps 2 and 3 for 32 times < 1st trip DTC. <u>DTC detected?</u>		
	 Proceed to <u>EC-373, "Diag</u> INSPECTION END 	nosis Procedure".	
Diagnos	sis Procedure		INFOID:00000009758626
1.CHECK	KELECTRIC THROTTLE C	ONTROL ACTUATOR VISUALLY	
 Remo Check 		to <u>EM-25, "Exploded View"</u> . between the throttle valve and	
•	 Replace electric throttle of 27, "Removal and Installa 	control actuator. Refer to EM_{-}	

NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to <u>EC-139</u>, "Work Procedure".



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< DTC/CIRCUIT DIAGNOSIS >

P1550 BATTERY CURRENT SENSOR

DTC Logic

INFOID:000000009758627

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1550	BAT CURRENT SENSOR (Battery current sensor)	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.) Battery current sensor Camshaft position sensor Camshaft (Intake) Starter motor Starting system circuit Dead (Weak) battery Sensor power supply 1 circuit

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 10 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-374, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758628

1. CHECK BATTERY CURRENT SENSOR POWER SUPPLY

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

	+		
Battery cur	rent sensor	-	Voltage (Approx.)
Connector	Terminal		
F54	1	Ground	5.0 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Check sensor power supply 2 circuit. Refer to EC-444. "Diagnosis Procedure".

		0 BATTE		SENSOR [MRA8DE]
< DTC/CIRCUIT E				
<u>Is the inspection re</u> YES >> Perfor		nosis for nov	ver supply circuit.	
	or replace error-			
3.CHECK BATTE	RY CURRENT S	ENSOR GRO	OUND CIRCUIT	
1. Turn ignition s				
2. Disconnect EC	M harness conne			-
3. Check the con	inuity between b	attery current	sensor harness cor	nnector and ECM harness connector.
+				
Battery current ser	sor F	CM	Continuity	
Connector Tern		Terminal	Continuity	
F54 3		62	Existed	
_	ness for short to			
Is the inspection re		ponon		
YES >> GO TO				
	or replace error-			
4. CHECK BATTE	RY CURRENT S	ENSOR INPL	JT SIGNAL CIRCUI	Т
1. Check the con	inuity between b	attery current	t sensor harness cor	nnector and ECM harness connector.
+		-		
Battery current ser	sor E	CM	Continuity	
Connector Tern		Terminal		
F54 4	_	63	Existed	
	ness for short to	ground and t	o power.	
Is the inspection re				
YES >> GO TO NO >> Repair	 5. or replace error- 	detected part	S	
5. CHECK BATTE	•	•		
			E "Component Inon	eation (Pattery Current Senser)"
Is the inspection re		eler to <u>EC-37</u>	<u>5. Component insp</u>	ection (Battery Current Sensor)".
		ent Refer to	GI-39, "Intermittent	Incident"
			er to <u>PG-53, "Remov</u>	
Component Ins	pection (Batt	erv Currer	nt Sensor)	INFOID:000000009758629
		-		
1. CHECK BATTE	RY CURRENT S	ENSOR		
1. Turn ignition s			_	
	ness connectors tery negative cal		J.	
			e terminal and body	
ground.		, .	,	
				■
				JPBIA3286ZZ

P1550 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

5. Turn ignition switch ON.

6. Check the voltage between ECM harness connector terminals.

Connector	+	-	Voltage (Approx.)
Connector	Terr	ninal	
F25	63	62	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to <u>PG-4</u>, "How to <u>Handle Battery</u>".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery current sensor. Refer to <u>PG-53, "Removal and Installation"</u>.

P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1551, P1552 BATTERY CURRENT SENSOR

DTC Logic

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[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1551	BAT CURRENT SENSOR (Battery current sensor)	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (Battery current sensor circuit is open
P1552	BAT CURRENT SENSOR (Battery current sensor)	An excessively high voltage from the sen- sor is sent to ECM.	or shorted.) • Battery current sensor • Camshaft position sensor • Camshaft (Intake) • Starter motor • Starting system circuit • Dead (Weak) battery • Sensor power supply 1 circuit
TC CON	FIRMATION PROCEDU	RE	
.PRECO	NDITIONING		
ig the next		en previously conducted, always pe at least 10 seconds.	rform the following before conduct-
. Turn iği	nition switch ON. nition switch OFF and wait		

>>	GO	то	2.
----	----	----	----

switch ON

2.PERFORM DTC CONFIRMATION PROCEDURE

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

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-377, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK BATTERY CURRENT SENSOR POWER SUPPLY

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

	+			
Battery cur	rent sensor	_	Voltage (Approx.)	
Connector Terminal				
F54	1	Ground	5.0 V	

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Check sensor power supply 2 circuit. Refer to EC-444, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT

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	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F54	3	F25	62	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		_		
Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F54	4	F25	63	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts

5.CHECK BATTERY CURRENT SENSOR

Check the battery current sensor. Refer to EC-378, "Component Inspection (Battery Current Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-39. "Intermittent Incident".

NO >> Replace battery current sensor. Refer to <u>PG-53</u>, "<u>Removal and Installation</u>".

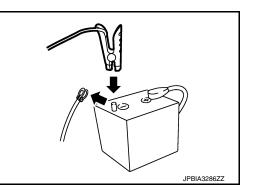
Component Inspection (Battery Current Sensor)

INFOID:000000009758632

1.CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.

- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable.
- 4. Install jumper cable between battery negative terminal and body ground.



P1551, P1552 BATTERY CURRENT SENSOR

DTC/CIRC	UIT DIAGNOSIS >			
5. Turn ignit 5. Check the	tion switch ON. e voltage between E	CM harness conne	ector terminals.	
	ECM			
	+ -	Voltage		E
Connector	Terminal	(Approx.)		
F25	63 62	2.5 V		
Before m	easuring the termina	al voltage, confirm	that the battery is fully charged. Refer	to <u>PG-4, "How to</u>
Handle B	<u>attery"</u> . <u>ion result normal?</u>			
	NSPECTION END			
		nt sensor. Refer to	PG-53, "Removal and Installation".	

< DTC/CIRCUIT DIAGNOSIS >

P1553 BATTERY CURRENT SENSOR

DTC Logic

INFOID:000000009758633

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1553	BAT CURRENT SENSOR (Battery current sensor)	The signal voltage transmitted from the sensor to ECM is higher than the amount of the maximum power generation.	 Harness or connectors (Battery current sensor circuit is open or shorted.) Battery current sensor Camshaft position sensor Camshaft (Intake) Starter motor Starting system circuit Dead (Weak) battery Sensor power supply 1 circuit

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 10 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-380, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758634

1.CHECK BATTERY CURRENT SENSOR POWER SUPPLY

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

	+			
Battery cur	rent sensor	-	Voltage (Approx.)	
Connector Terminal			(FF - 7	
F54	1	Ground	5.0 V	

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Check sensor power supply 2 circuit. Refer to EC-444, "Diagnosis Procedure".

			BATTE	RY CURRENT	SENSOR [MRA8DE]
< DTC/CIRC					
Is the inspect YES >>			nosis for nov	wer supply circuit.	A
		place error-d			
3.CHECK E		URRENT SE	NSOR GRO	OUND CIRCUIT	
	nition switch				E0
2. Disconn	ect ECM ha	rness conne			
3. Check t	he continuity	between ba	ttery curren	t sensor harness c	onnector and ECM harness connector.
	+				
		E	 CM	Continuity	
	rrent sensor			Continuity	D
Connector	Terminal	Connector	Terminal	Eviated	
F54	3	F25	62	Existed	E
		for short to p	ower.		
Is the inspect YES >>	GO TO 4.	<u>ormal?</u>			
		place error-d	etected part	s.	F
	•		•	JT SIGNAL CIRCU	ШТ
T. Check i	ne continuity	between ba	ttery curren	l sensor namess c	onnector and ECM harness connector.
	+		_		
	rrent sensor	FC	CM	Continuity	Н
Connector	Terminal	Connector	Terminal	Continuity	
F54	4	F25	63	Existed	
-		-			I
Is the inspec		for short to g	iouna ana t	o power.	
	GO TO 5.	<u>umai :</u>			
		place error-d	etected part	S	
_		URRENT SE	•		
				1 "Component Ins	spection (Battery Current Sensor)".
Is the inspec	•				speation (Battery Barrent Benobly).
			nt. Refer to	GI-39, "Intermitten	t Incident".
					oval and Installation".
Compone	ent Inspec	tion (Batte	erv Currer	nt Sensor)	INFOID:00000009758635
	•	·	•	,	N
1. CHECK E	BATTERY C	URRENT SE	NSOR		
	nition switch				
		connectors of		d.	Ν
		negative cabl between bat		e terminal and bod	
ground.			iory nogativ		
					A.A.
					JPBIA3286ZZ
					JPDIA320022

P1553 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

5. Turn ignition switch ON.

6. Check the voltage between ECM harness connector terminals.

Connector	+	-	Voltage (Approx.)
Connector	Terr		
F25	63	62	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to <u>PG-4</u>, "How to <u>Handle Battery</u>".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery current sensor. Refer to PG-53, "Removal and Installation".

P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1554 BATTERY CURRENT SENSOR

DTC Logic

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DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1554	BAT CURRENT SENSOR (Battery current sensor)	The output voltage of the battery 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.) Battery current sensor Camshaft position sensor Camshaft (Intake) Starter motor Starting system circuit Dead (Weak) battery Sensor power supply 1 circuit
DTC CONF	FIRMATION PROCEDUR	E	
1.PERFOF	RM COMPONENT FUNCTIO	ON CHECK	
Perform cor	nponent function check. Ref	fer to EC-383, "Component Functio	n Check".

NOTE:

Use component function check to check the overall function of the battery current sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES	>> INSPECTION END
NO	DESCRIPTION DO AND DO

NO >> Proceed to <u>EC-384, "Diagnosis Procedure"</u>.

Component Function Check

.PRECONDITIONING
FRECONDITIONING

- TESTING CONDITION:Before performing the following procedure, confirm that battery voltage is more than 12.8 V at idle.
- Before performing the following procedure, confirm that all load switches and A/C switch are turned OFF.

>> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK

With CONSULT

- 1. Start engine and let it idle.
- 2. Select "BAT CUR SEN" in "DATA MONITOR" mode of "ENGINE" using CONSULT.

once

3. Check "BAT CUR SEN" indication for 10 seconds.

"BAT CUR SEN"

: above 2,300 mv at least

Without CONSULT

1. Start engine and let it idle.

Check the voltage between ECM harness connectors.

Connector	+	-	Voltage
Connector	Terr	-	
F25	63	62	Above 2.3 V at least once

P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

INFOID:000000009758638

<u>Is the inspection result normal?</u> YES >> INSPECTION END

NO >> Proceed to EC-384, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK BATTERY CURRENT SENSOR POWER SUPPLY

1. Turn ignition switch OFF.

2. Disconnect battery current sensor harness connector.

- 3. Turn ignition switch ON.
- 4. Check the voltage between battery current sensor harness connector and ground.

	÷		N7 H		
Battery cur	rent sensor	-	Voltage (Approx.)		
Connector	Terminal				
F54	1	Ground	5.0 V		

Is the inspection result normal?

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

NO >> GOTO 2. **2**

2.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Check sensor power supply 2 circuit. Refer to EC-444, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT

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	rrent sensor	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F54	3	F25	62	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

	+			
Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F54	4	F25	63	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts

5.CHECK BATTERY CURRENT SENSOR

P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

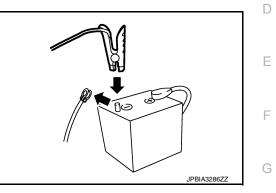
Check the battery current sensor. Refer to EC-385. "Component Inspection (Battery Current Sensor)".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-39. "Intermittent Incident".
- NO >> Replace battery current sensor. Refer to <u>PG-53</u>, "Removal and Installation".

Component Inspection (Battery Current Sensor)

- 1. CHECK BATTERY CURRENT SENSOR
- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable.
- 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.

	ECM		
Connector	+	-	Voltage (Approx.)
Connector	Terminal		
F25	63	62	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to <u>PG-4</u>, "How to <u>Handle Battery</u>".

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace battery current sensor. Refer to PG-53, "Removal and Installation".

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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-353, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	
P1556	BAT TMP SEN/CIRC (BAT TMP SEN/CIRC)	Signal voltage from Battery temperature sensor remains 0.16V or less for 5 seconds or more.	Harness or connectors [Battery current sensor (Battery tem-	
P1557	BAT TMP SEN/CIRC (BAT TMP SEN/CIRC)	Signal voltage from Battery temperature sensor remains 4.84V or more for 5 seconds or more.	 perature sensor) circuit is shorted.] Battery current sensor (Battery 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:

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-386, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK BATTERY TEMPERATURE SENSOR POWER SUPPLY

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

	+		Voltage (Approx.)	
Battery cur	rrent sensor	-		
Connector	Terminal			
F54	2	Ground	5 V	

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK BATTERY TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between battery current sensor harness connector and ECM harness connector.

EC-386

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P1556, P1557 BATTERY TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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-		_	-			ŀ
Battery cur		EC		Continuity		
Connector	Terminal	Connector	Terminal			E
F54	2	F25	61	Existed		
4. Also che		-	ground.			
<u>Is the inspec</u> YES >>			nacia for na	wer supply cire		(
		place error-d				
-	•		•	R GROUND C	RCUIT	[
 Turn ign Disconn 	ition switch ect ECM ha	OFF. rness conne	ctor.		ss connector and ECM harness connector.	E
-	-	-	-			F
Battery cur	rent sensor	EC	СМ	Continuity		1
Connector	Terminal	Connector	Terminal			
F54	3	F25	62	Existed		(
NO >> 4.CHECK E Check the based s the inspective YES >>	GO TO 4. Repair or re BATTERY TE attery tempe tion result n Check interr Replace bat	place error-d EMPERATUR erature sense ormal? mittent incide tery negative	RE SENSO or. Refer to j ent. Refer to	R <u>EC-387, "Com</u> <u>GI-39, "Interm</u>	oonent Inspection". ittent Incident".	ŀ
	-				INFOID:000000009758642	
	BATTERY TH		RE SENSO	R		
2. Disconn	ect battery o	current sense		nt sensor conr	ector terminals.	
Battery cu	rrent sensor					Ν
+	_		Resis	tance		
Ter	ninal					ľ
2	3		ith the resistar	nce value 100 Ω o	more	
	NSPECTIO					(

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-348, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1564	ASCD SW (ASCD SW)	 An excessively high voltage signal from the ASCD steering switch is sent to ECM. ECM detects that input signal from the ASCD steering switch is out of the specified range. ECM detects that the ASCD steering switch is stuck ON. 	 Harness or connectors (ASCD steering switch circuit is open or shorted.) ASCD steering switch ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Wait at least 10 seconds.
- 3. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 4. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 5. Press ACCEL/RES switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 6. Press COAST/SET switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 7. Check DTC.

Is DTC detected?

YES >> Proceed to EC-388, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758644

1. CHECK ASCD STEERING SWITCH CIRCUIT

(I) With CONSULT

- 1. Turn ignition switch ON.
- Select "CANCEL SW", "RESUME/ACC SW" and "SET SW" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 3. Check each item indication as per the following conditions.

Monitor item	Condition	Indication	
MAIN SW	MAIN switch	Pressed	ON
		Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
CANCEL SW		Released	OFF

INFOID:000000009758643

P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

Monitor item	Condition	Indication	
RESUME/ACC	ACCEL/RES switch	Pressed	ON
SW	ACCEL/RES SWICH	Released	OFF
SET SW	COAST/SET switch	Pressed	ON
3E1 3W		Released	OFF

Without CONSULT

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals.

	ECM			Х. И.	
Connector	+	-	Condition	Condition Voltage (Approx.)	
Connector	Terr	minal		(tippiox)	
			MAIN switch: Pressed	0 V	
			CANCEL switch: Pressed	1 V	
E16	110	111	COAST/SET switch: Pressed	2 V	
			ACCEL/RES switch: Pressed	3 V	
			All ASCD steering switches: Released	4 V	
Is the inspe	ection re	sult norr	nal?		

YES >> Check intermittent incident. Refer to <u>GI-39</u>, "Intermittent Incident". NO >> GO TO 2.

2.check ascd steering switch ground circuit

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Disconnect combination switch (spiral cable) harness connector.
- 4. Check the continuity between combination switch (spiral cable) and ECM harness connector.

	+			
Combination switch (Spiral cable)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M80	22	E16	111	Existed

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

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

 $\mathbf{3}$.check ascd steering switch input signal circuit

1. Check the continuity between ECM harness connector and combination switch.

		+		_	
-	Combination switch (Spiral cable)		ECM		Continuity
	Connector Terminal		Connector	Terminal	
	M80	27	E16	110	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

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P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

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4.CHECK ASCD STEERING SWITCH

Refer to EC-390, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-39, "Intermittent Incident"</u>.

NO >> Replace ASCD steering switch. Refer to <u>EC-15, "ENGINE CONTROL SYSTEM :</u> <u>Component Parts Location"</u>.

Component Inspection

1. CHECK ASCD STEERING SWITCH

- 1. Disconnect combination switch (spiral cable) harness connector.
- 2. Check the resistance between combination switch harness connector terminals as per the following conditions.

Combination switch (Spiral cable)				Resistance (Approx.)	
Connector + -		_	Condition		
Connector Termina	inals				
	1			MAIN switch: Pressed	0 Ω
		3	CANCEL switch: Pressed	250 Ω	
M108			COAST/SET switch: Pressed	660 Ω	
			ACCEL/RES switch: Pressed	1,480 Ω	
			All ASCD steering switches: Released	4,000 Ω	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD steering switch. Refer to <u>EC-15, "ENGINE CONTROL SYSTEM :</u> <u>Component Parts Location"</u>.

< DTC/CIRCUIT DIAGNOSIS >

P1572 ASCD 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-348, "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 OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	CONSULT screen terms (Trouble diagnosis content)		DTC detecting condition	Possible cause	E
	ASCD BRAKE SW	A)	When the vehicle speed is above 30 km/ h (19 MPH), ON signals from the stop lamp switch and the brake pedal position switch are sent to the ECM at the same time.	 Harness or connectors (Stop lamp switch circuit is shorted.) (Brake pedal position switch circuit is shorted.) Stop lamp switch 	F
P1572	(ASCD BRAKE SW)	B)	Brake pedal position switch signal is not sent to ECM for extremely long time while the vehicle is driving.	 Brake pedal position switch Stop lamp relay Incorrect stop lamp switch installation Incorrect brake pedal position switch installation ECM 	G

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

NOTE:

Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

1. Start engine.

2. Press MAIN switch and make sure that CRUISE indicator is displayed in combination meter.

3. Drive the vehicle for at least 5 consecutive seconds as per the following conditions.

CAUTION:

Always drive vehicle at a safe speed. NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)	
Selector lever	Suitable position	

4. Check DTC.

Is DTC detected?

NO >> GO TO 3.

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YES >> Proceed to <u>EC-397, "Diagnosis Procedure"</u>.

< DTC/CIRCUIT DIAGNOSIS >

INFOID:000000009758647

$\overline{\mathbf{3}}$. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Drive the vehicle for at least 5 consecutive seconds as per the following conditions.

CAUTION:

Always drive vehicle at a safe speed. NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehi- cle speed.

2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-397, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK OVERALL FUNCTION-1

(I) With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "BRAKE SW1" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 3. Check "BRAKE SW1" indication as per the following conditions.

Monitor item	C	Condition	Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
DIVARE SWI	Blake pedal	Fully released	ON

Without CONSULT

1. Turn ignition switch ON.

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

ECM			Condition		Voltage (Approx.)	
Connector + –						
Connector	Tern	ninal				
E16	116	128	Brake pedal	Slightly depressed	0 V	
E10 110	110	120	Блаке рецаг	Fully released	Battery voltage	

Is the inspection result normal?

YES >> GO TO 2.

NO >> MT models: GO TO 3.

>> CVT models: GO TO 4.

2. CHECK OVERALL FUNCTION-2

(I) With CONSULT

Select "BRAKE SW2" and check indication as per the following conditions.

Monitor item	Condition		Indication
BRAKE SW2	Brake pedal	Slightly depressed	ON
BRAKE SVV2	Diake pedai	Fully released	OFF

< DTC/CIRCUIT DIAGNOSIS >

Without CONSULT

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

	ECM					
Connector +		_	-	Condition	Voltage (Approx.)	
Connector	Tern	ninal			(/ ()))	
E16	115	128	Brake pedal	Slightly depressed	Battery voltage	_
210	110	120	Brake peda	Fully released	0 V	
NO >>	Check int GO TO 7	ermittent	incident. Re	efer to <u>GI-39, "Interm</u> WITCH POWER SU		
. Turn igr . Disconr . Turn igr	nition swite nect clutch nition swite	ch OFF. n pedal p ch ON.	osition switc	h harness connector al position switch ha		and ground.
	+					
Clutch pe	dal position	switch	-	Voltage		
Connector	r Te	erminal				
E32		1	Ground	Battery voltage		
YES >> NO >>	GO TO 4 Perform t	he troubl	e diagnosis	for power supply circ		
YES >> NO >> CHECK I . Turn igr . Disconr . Turn igr	GO TO 4 Perform t BRAKE P nition swite nect brake nition swite	he troubl EDAL P(ch OFF. e pedal po ch ON.	e diagnosis DSITION SW	for power supply circ /ITCH POWER SUP h harness connector. al position switch ha	PLY	and ground.
YES >> NO >> CHECK I . Turn igr . Disconr . Turn igr	GO TO 4 Perform t BRAKE P nition swite nect brake nition swite	he troubl EDAL P(ch OFF. e pedal po ch ON.	e diagnosis DSITION SW	ITCH POWER SUP	PLY	and ground.
YES >> NO >> CHECK I . Turn igr . Disconr . Turn igr . Check t	GO TO 4 Perform t BRAKE P nition swite nect brake nition swite the voltage	he troubl EDAL PC ch OFF. pedal po ch ON. e betwee	e diagnosis DSITION SW	ITCH POWER SUP	PLY	and ground.
YES >> NO >> CHECK I . Turn igr . Disconr . Turn igr . Check t	GO TO 4 Perform t BRAKE P nition swite nect brake nition swite the voltage	he troubl EDAL PC ch OFF. pedal po ch ON. e betwee	e diagnosis DSITION SW	/ITCH POWER SUP h harness connector. al position switch ha	PLY	and ground.
YES >> NO >> .CHECK I . Turn igr . Disconr . Turn igr . Check t Brake per Connector E36	GO TO 4 Perform t BRAKE P nition swite nect brake nition swite the voltage + dal position r Te	he troubl EDAL PC ch OFF. pedal po ch ON. e betwee switch rminal	e diagnosis DSITION SW Disition switch n brake peda	/ITCH POWER SUP h harness connector. al position switch ha	PLY	and ground.
YES >> NO >> .CHECK I . Turn igr . Disconr . Turn igr . Check t Brake per Connector E36 sthe inspec YES >> NO >> .CHECK I	GO TO 4 Perform t BRAKE P nition switch nect brake nition switch the voltage + dal position r Te dal position r Te dal position r Te dal position r BRAKE P	he troubl EDAL PC ch OFF. pedal po ch ON. e betwee switch minal 1 <u>It normal</u> he troubl EDAL PC	e diagnosis DSITION SW Dosition switch n brake peda 	VITCH POWER SUP	PLY	and ground.
YES >> NO >> .CHECK I . Turn igr . Disconr . Turn igr . Check t Brake per Connector E36 sthe insper YES >> NO >> .CHECK I . Turn igr . Disconr	GO TO 4 Perform t BRAKE P nition switch nect brake nition switch the voltage + dal position r Te dal position r Te dal position r Te dal position r BRAKE P nition switch nect ECM	he troubl EDAL PC ch OFF. pedal po ch ON. e betwee switch minal 1 1 he troubl EDAL PC ch OFF. harness	e diagnosis DSITION SW Dosition switch n brake peda 	/ITCH POWER SUP h harness connector. al position switch har Voltage Battery voltage for power supply circ /ITCH INPUT SIGNA	PLY The second s	and ground.
NO >> 1. CHECK I 1. Turn igr 2. Disconr 3. Turn igr 4. Check t Brake per Connector E36 S the insper YES >> NO >> D.CHECK I 1. Turn igr 2. Disconr 3. Check t tor.	GO TO 4 Perform t BRAKE P nition switch nect brake nition switch the voltage + dal position r Te dal position r Te dal position r Te dal position r BRAKE P nition switch nect ECM	he troubl EDAL PC ch OFF. pedal po ch ON. e betwee switch minal 1 1 he troubl EDAL PC ch OFF. harness	e diagnosis DSITION SW Dosition switch n brake peda 	/ITCH POWER SUP h harness connector. al position switch har Voltage Battery voltage for power supply circ /ITCH INPUT SIGNA	PLY The second s	

4. Also check harness for short to ground and to power. Is the inspection result normal?

Connector

E16

Terminal

116

Terminal

2

Connector

E36

Existed

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< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

Ó.CHECK BRAKE PEDAL POSITION SWITCH

Check the brake pedal position switch. Refer to <u>EC-394</u>, "Component Inspection (Brake Pedal Position <u>Switch)</u>"

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-39. "Intermittent Incident"</u>.

NO >> Replace brake pedal position switch. Refer to <u>BR-22</u>, "Exploded View".

7. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- 3. Check the voltage between stop lamp switch harness connector and ground.

+				
Stop lamp switch		_	Voltage	
Connector	Connector Terminal			
E60	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 8.

NO >> Perform the trouble diagnosis for power supply circuit.

8.CHECK STOP LAMP SWITCH GROUND CIRCUIT

1. Disconnect stop lamp relay harness connector.

2. Check the continuity between stop lamp switch harness connector and ECM harness connector.

+		-		
Stop lam	p switch	EC	Continuity	
Connector	Terminal	Connector	Terminal	
E60	2	E16	115	Existed

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

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9.CHECK STOP LAMP SWITCH

Check the stop lamp switch. Refer to EC-395, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-39. "Intermittent Incident".

NO >> Replace stop lamp switch. Refer to <u>BR-22, "Exploded View"</u>.

Component Inspection (Brake Pedal Position Switch)

INFOID:000000009758648

1. CHECK BRAKE PEDAL POSITION SWITCH-1

1. Turn ignition switch OFF.

2. Disconnect brake pedal position harness connector.

3. Check the continuity between brake pedal position switch terminals as per the following conditions.

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

		1			
Brake pedal p	position switch	Condition			/
+	—			Continuity	
Term	ninals				E
			Fully released	Existed	
1	2	Brake pedal	Slightly de- pressed	Not existed	(
s the inspectio	n result normal	<u>?</u>			
NO >> GC	SPECTION ENI) TO 2.				[
	AKE PEDAL PO				
				R-15. "Adjustment". In terminals as per the following conditions.	I
Brake pedal p	position switch				
+	_	Co	ndition	Continuity	1
Term	ninals	1			
			Fully released	Existed	(
1	2	Brake pedal	Slightly de- pressed	Not existed	
s the inspectio	n result normal	?			
YES >> INS	SPECTION EN				
			itch. Refer to BF	R-22, "Exploded View".	
Jomponent	Inspection (Switch)	INFOID:000000009758649	
LCHECK STO	OP LAMP SWIT	CH-1			
	n switch OFF.				
	t stop lamp swit	ch harness co	nnector.		
				as per the following conditions.	
Stop lan	np switch				
+	_	Co	ndition	Continuity	
Term	ninals	-			
			Fully released	Not existed	
1	2	Brake pedal	Slightly de- pressed	Existed	ľ
s the inspectio	n result normal	?	<u> </u>		
	SPECTION ENI				
) TO 2.				
CHECK STO	OP LAMP SWIT	CH-2			
			rto DD 15 "Ad	ustmont"	
			er to <u>BR-15, "Adj</u> switch terminals	as per the following conditions.	
Ston Ion	np switch				
		Condition		Continuity	
+	-		nullion	Continuity	
Iem	ninals				
	_		Fully released	Not existed	
1	2	Brake pedal	Slightly de- pressed	Existed	

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal? YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to <u>BR-22, "Exploded View"</u>.

P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1574 ASCD VEHICLE SPEED SENSOR

Description

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to <u>EC-51, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description"</u> for ASCD functions.

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1574 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to <u>EC-168, "DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to <u>EC-330, "EXCEPT FOR M/T MODELS : DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-348, "DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-350, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	G
P1574	ASCD VHL SPD SEN (ASCD VHL SPD SEN)	ECM detects a difference between two vehicle speed signals is out of the specified range.	 Harness or connectors (CAN communication line is open or shorted.) ABS actuator and electric unit (control unit) TCM ECM 	Н

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

	0
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.	k
	- n

- 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.	M
2. Drive the vehicle at more than 40 km/h (25 MPH).	
CAUTION:	
Always drive vehicle at a safe speed.	Ν
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.	0
3. Check DTC.	0
Is DTC detected?	
YES >> Proceed to EC-397, "Diagnosis Procedure".	_
NO >> INSPECTION END	P
Diagnosis Procedure	INFOID:00000009758652
Blaghoold i roocdard	INFOID.00000009758652
1.снеск отс with тсм	

Check DTC with TCM. Refer to <u>TM-108, "CONSULT Function"</u>. Is DTC detected? INFOID:000000009758650

INFOID:000000009758651

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P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

YES >> Perform trouble shooting relevant to DTC indicated.

 $2. {\sf CHECK} \ {\sf DTC} \ {\sf WITH} \ "{\sf ABS} \ {\sf ACTUATOR} \ {\sf AND} \ {\sf ELECTRIC} \ {\sf UNIT} \ ({\sf CONTROL} \ {\sf UNIT})"$

Check DTC with ABS actuator and electric unit (control unit). Refer to <u>BRC-31</u>, "CONSULT Function (ABS)". <u>Is DTC detected?</u>

NO >> INSPECTION END

YES >> Perform trouble shooting relevant to DTC indicated.

P1650 STARTER MOTOR RELAY 2

< DTC/CIRCUIT DIAGNOSIS >

P1650 STARTER MOTOR RELAY 2

Description

ECM controls ON/OFF state of the starter relay, according to the engine and vehicle condition. ECM transmits a control signal to IPDM E/R via BCM by CAN communication.

Under normal conditions, ECM controls and maintains the starter relay in OFF state during following condition: • Engine is running.

• Selector lever is D position.

When detecting a decrease in engine speed due to rapid deceleration or heavy load condition, ECM controls and reactivates the starter relay.

IPDM E/R detects a control state of starter relay and starter control relay and transmits a feedback signal to ECM via CAN communication.

DTC Logic

INFOID:000000009758654

DTC DETECTION LOGIC

NOTE:

- If DTC P1650 is displayed with DTC U1001, perform the trouble diagnosis for DTC U1001. Refer to <u>EC-169</u>, F <u>"DTC Logic"</u>.
- If DTC P1650 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to <u>EC-350</u>, <u>"Diagnosis Procedure"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition		Possible cause	
	STR MTR RELAY 2	A	Starter relay is stuck ON.	 Harness and connectors (Between IPDM E/R harness connector and BCM harness connector is shorted to ground.) IPDM E/R 	
P1650		В	Starter relay power supply circuit is excessively high voltage.	 Harness and connectors (Between IPDM E/R harness connector and BCM harness is open or shorted to power.) (Between IPDM E/R harness connector and bat- tery is open.) IPDM E/R 	
		с	Starter relay circuit is excessively low voltage	 Harness and connectors (Starter relay circuit is open or shorted.) IPDM E/R 	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND C

- 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. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-400, "Diagnosis Procedure".

NO >> GO TO 3.

INFOID:000000009758653

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P1650 STARTER MOTOR RELAY 2

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

$\overline{\mathbf{3}}$. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

With CONSULT

CAUTION:

Always drive at a safe speed.

- 1. Start the engine.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Start the engine and warm it up to normal operating temperature.
- 5. Turn ignition switch OFF.
- 6. Lift up drive wheels.
- 7. Turn ignition switch ON.
- 8. Select "POWER BALANCE" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 9. Restart the engine and let it idle at least 10 seconds.
- 10. Shift the selector lever to D position while depressing fully the brake pedal.
- 11. Select 1 4 cylinders in "POWER BALANCE" and cut the fuel of all cylinders.
- 12. Check 1st trip DTC.

Without CONSULT

CAUTION:

Always drive at a safe speed.

- 1. Start the engine.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Start the engine and warm it up to normal operating temperature.
- 5. Turn ignition switch OFF.
- 6. Lift up drive wheels.
- 7. Restart the engine and let it idle at least 10 seconds.
- 8. For CVT models: Shift the selector lever to D position while depressing fully the brake pedal. For M/T models: Fully release the clutch pedal.
- 9. Disconnect vacuum hoses from intake manifold.
- 10. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-400, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758655

1. CHECK SELF-DIAGNOSTIC RESULT IN BCM

(I) With CONSULT

Check self-diagnostic result in BCM.

Are any DTC detected?

YES >> Check the DTC. Refer to <u>PCS-20, "DTC Index"</u> (with intelligent key), <u>PCS-48, "DTC Index"</u> (without intelligent key).

NO >> GO TO 2.

2.CHECK SELF-DIAGNOSTIC RESULT IN IPDM E/R

With CONSULT

Check self-diagnostic result in IPDM E/R.

Are any DTC detected?

YES >> Check the DTC. Refer to <u>BCS-49, "DTC Index"</u> (with intelligent key), <u>BCS-109, "DTC Index"</u> (without intelligent key).

NO >> GO TO 3.

 ${
m 3.}$ CHECK STARTER RELAY POWER SUPPLY CIRCUIT

Check the starter motor relay power supply circuit. Refer to <u>PCS-29, "Diagnosis Procedure"</u> (with intelligent key), or <u>PCS-57, "Diagnosis Procedure"</u> (without intelligent key).

Is the inspection result normal?

YES >> GO TO 4.

P1650 STARTER MOTOR RELAY 2 [MRA8DE] < DTC/CIRCUIT DIAGNOSIS > NO >> Repair or replace error-detected parts. А 4.CHECK STARTER RELAY CONTROL SIGNAL CIRCUIT 1. Turn ignition switch OFF. Disconnect IPDM E/R harness connector. 2. EC 3. Disconnect ECM harness connector. Check the continuity between IPDM E/R harness connector and ECM harness connector. 4. + _ IPDM E/R ECM Continuity Connector Terminal Connector Terminal D E46 44 E16 105 Existed 5. Also check harness for short to ground to power. Е Is the inspection result normal? YES >> GO TO 5. NO >> Repair or replace error-detected parts. F 5. CHECK INTERMITTENT INCIDENT Check intermittent incident. Refer to GI-39, "Intermittent Incident". Is the inspection result normal? YES >> Replace IPDM E/R. Refer to PCS-30, "Removal and Installation". NO >> Repair or replace error-detected parts. Н

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P1651 STARTER MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

P1651 STARTER MOTOR RELAY

Description

ECM controls ON/OFF state of the starter relay, according to the engine and vehicle condition. ECM transmits a control signal to IPDM E/R by CAN communication.

Under normal conditions, ECM controls and maintains the starter relay in OFF state during following condition:

• Engine is running.

• Selector lever is D position. (CVT models)

Clutch pedal is fully released. (M/T models)

When detecting a decrease in engine speed due to rapid deceleration or heavy load condition, ECM controls and reactivates the starter relay.

IPDM E/R detects a control state of starter relay and starter control relay and transmits a feedback signal to ECM via CAN communication.

DTC Logic

INFOID:000000009758657

DTC DETECTION LOGIC

NOTE:

- If DTC P1651 is displayed with DTC U1001, perform the trouble diagnosis for DTC U1001. Refer to <u>EC-169</u>, <u>"DTC Logic"</u>.
- If DTC P1651 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to <u>EC-350</u>, <u>"DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	
P1651	STR MTR RELAY (Starter motor relay)	A correlated error is detected for 2 sec- onds or more between a control signal transmitted from ECM and a feedback sig- nal transmitted from IPDM E/R via CAN communication line.	 Harness or connectors (Between ECM harness connector and IPDM E/R harness connector is short- ed to power.) IPDM E/R 	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Start the engine and let it idle at least 30 seconds.
- 3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to <u>EC-402, "Diagnosis Procedure"</u>.

NO >> INSPECTION END

Diagnosis Procedure

1.INSPECTION START

Check the starter motor operation.

Is the starter motor operated?

YES >> GO TO 3. NO >> GO TO 2. INFOID:000000009758656

INFOID:000000009758658

P1651 STARTER MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

2.CHECK	DTC WITH II	PDM E/R				Δ
	Check DTC with IPDM E/R. Refer to <u>PCS-10</u> , <u>"CONSULT Function (IPDM E/R)"</u> (with intelligent key), or <u>PCS-38</u> , <u>"CONSULT Function (IPDM E/R)</u> " (without intelligent key).				~	
Is the inspec	tion result n			ionigent ttey).		EC
NO >>	or <u>PCS-48. '</u>	Ible diagnosi: " <u>DTC_Index"</u> REQUEST S	(without inte	elligent key).	o <u>PCS-20, "DTC Index"</u> (with intelligent key),	С
 Disconn Disconn 	ect IPDM E/	rness conneo R harness co	onnector.	connector and I	PDM E/R harness connector.	D
						Е
	+		-	Continuity		
Connector	CM Terminal	IPDN Connector	Terminal	Continuity		F
E16	101	E46	37	Existed		
<u>Is the inspec</u> YES >>	<u>xtion result n</u> GO TO 4.	for short to g ormal? place error-d	·			G H
	•					11
Is the inspec	tion result n	ormal?		mittent Incident	-	Ι
		0M E/R. Refe place error-d		<u>, "Removal and</u> s.	<u>Installation"</u> .	J
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P1652 STARTER MOTOR SYSTEM COMM

< DTC/CIRCUIT DIAGNOSIS >

P1652 STARTER MOTOR SYSTEM COMM

Description

ECM controls ON/OFF state of the starter relay, according to the engine and vehicle condition. ECM transmits a control signal to IPDM E/R via BCM by CAN communication.

Under normal conditions, ECM controls and maintains the starter relay in OFF state during following condition:

• Engine is running.

• Selector lever is D position. (CVT models)

Clutch pedal is fully released. (M/T models)

When detecting a decrease in engine speed due to rapid deceleration or heavy load condition, ECM controls and reactivates the starter relay.

IPDM E/R detects a control state of starter relay and starter control relay and transmits a feedback signal to ECM via CAN communication.

DTC Logic

INFOID:000000009758660

DTC DETECTION LOGIC

NOTE:

- If DTC P1652 is displayed with DTC U1001, perform the trouble diagnosis for DTC U1001. Refer to <u>EC-169</u>, <u>"DTC Logic"</u>.
- If DTC P1652 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to <u>EC-350</u>, <u>"DTC Logic"</u>.
- If DTC P1652 is displayed with B209F or B20A0 of IPDM E/R, perform the trouble diagnosis for B209F or B20A0. Refer to <u>SEC-118</u>, "<u>DTC Logic</u>" or <u>SEC-120</u>, "<u>DTC Logic</u>".
- If DTC P1652 is displayed with B26F9 or B26FA of BCM, perform the trouble diagnosis for B26F9 or B26FA. Refer to <u>SEC-112. "DTC Logic"</u> or <u>SEC-114. "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	
P1652	STR MTR SYS COMM (Starter motor system com- munication)	ECM detects malfunction in starter motor drive circuit of the IPDM E/R.	IPDM E/R	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Start the engine and wait at least 5 minutes.
- 3. Repeat step 1 and 2 for 20 times.
- 4. Check DTC.

Is DTC detected?

- YES >> Proceed to EC-404. "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK SELF-DIAGNOSTIC RESULT IN BCM

With CONSULT
 Check self-diagnostic result in BCM.

INFOID:000000009758661

INFOID:000000009758659

P1652 STARTER MOTOR SYSTEM COMM

< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]	
Are any DTC detected?		
YES >> Check the DTC. Refer to <u>BCS-49, "DTC Index"</u> (with intelligent key), <u>BCS-109, '</u> (without intelligent key).	<u>"DTC Index"</u>	А
NO >> GO TO 2.		
2. CHECK SELF-DIAGNOSTIC RESULT IN IPDM E/R		EC
With CONSULT Check self-diagnostic result in IPDM E/R.		С
Are any DTC detected?		C
 YES >> Check the DTC. Refer to <u>PCS-20, "DTC Index"</u> (with intelligent key), <u>PCS-48, "DTC</u> out intelligent key). NO >> GO TO 3. 	Index" (with-	D
3. PERFORM DTC CONFIRMATION PROCEDURE		
		_
 Erase DTC. Perform DTC confirmation procedure again. Refer to <u>EC-404, "DTC Logic"</u>. Check DTC. 		E
Is the P1652 displayed again?		F
YES >> GO TO 4. NO >> INSPECTION END		
4.CHECK INTERMITTENT INCIDENT		G
Check intermittent incident. Refer to GI-39, "Intermittent Incident".		
Is the inspection result normal?		Н
YES >> Replace IPDM E/R. Refer to <u>PCS-58, "Removal and Installation"</u> . NG >> Repair or replace error-detected parts.		
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< DTC/CIRCUIT DIAGNOSIS >

P1715 INPUT SPEED SENSOR

Description

ECM receives input speed sensor signal from TCM through CAN communication line. ECM uses this signal for engine control.

DTC Logic

INFOID:000000009758663

DTC DETECTION LOGIC

NOTE:

- If DTC P1715 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to <u>EC-277, "DTC Logic"</u>.
- If DTC P1715 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer to <u>EC-280, "DTC Logic"</u>.
- If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-348, "DTC Logic"</u>.
- If DTC P1715 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-350, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1715	IN PULY SPEED (IN PULY SPEED)	Input speed sensor signal is different from the theoretical value calculated by ECM from output speed sensor signal and en- gine rpm signal.	 Harness or connectors (The CAN communication line is open or shorted) Harness or connectors (Input speed sensor circuit is open or shorted) TCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and drive the vehicle at more than 50 km/h (31 MPH) for at least 5 seconds. CAUTION:

Always drive vehicle at a safe speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to <u>EC-406, "Diagnosis Procedure"</u>. NO >> INSPECTION END

NO >> INSPECTION EN

Diagnosis Procedure

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-108, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble shooting relevant to DTC indicated.



INFOID:000000009758662

P1715 INPUT SPEED SENSOR < DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]
2.REPLACE TCM	<u> </u>
Replace TCM. Refer to TM-263, "Removal and Installation".	
>> INSPECTION END	

Ρ

P1800 INTAKE MANIFOLD TUNING VALVE

< DTC/CIRCUIT DIAGNOSIS >

P1800 INTAKE MANIFOLD TUNING VALVE

DTC Logic

INFOID:000000009758665

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1800	VIAS S/V-1	An excessively low or high voltage signal	 Harness or connectors
	(Variable intake air system con-	is sent to ECM through the intake manifold	(The solenoid valve 1 circuit is open or
	trol solenoid valve-1)	tuning valve.	shorted.) Intake manifold tuning valve

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

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

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

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and warm it up to the normal operating temperature. [more than 60°C (140°F)]
- 2. Let it idle for at least 10 seconds. (engine speed: less than 1,000 rpm)
- 3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-408, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758666

1. CHECK INTAKE MANIFOLD TUNING VALVE MOTOR POWER SUPPLY

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

-					
_					
		+		Voltage	
-	Connector	Terminal	Connector	Terminal	
	F24	6	E16	128	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK INTAKE MANIFOLD TUNING VALVE MOTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Disconnect IPDM E/R harness connector.

4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

P1800 INTAKE MANIFOLD TUNING VALVE

< DTC/CIRCUIT DIAGNOSIS >

E	+		_		
	CM	IPDM	I E/R	Continuity	
Connector	Terminal	Connector	Terminal		
F24	6	E45	26	Existed	
5. Also ch	eck harness	for short to g	round.		
	ction result n				
				wer supply circuit.	
	Repair or rep		•		
				MOTOR OUTPUT SIGNAL CIRCUIT	
	the continuity			or harness connector. Id tuning valve motor harness connector and E	ECM harness
	+	-	-		
	old tuning valve otor	EC	M	Continuity	
Connector	Terminal	Connector	Terminal		
	1		5	Existed	
F56		F24	7	Not existed	
	2	-	5	Not existed	
3. Also ch	eck harness		7	Existed	
YES >> NO >>	ction result n GO TO 4. Repair or rep	place error-d			
Check the in ng Valve)".	ntake manifol	ld tuning valv	e motor. Re	efer to EC-409, "Component Inspection (Intake I	Manifold Tun-
	ction result ne	ormal?			
				GI-39, "Intermittent Incident".	
	•		-	Refer to EM-27, "Removal and Installation".	
	nt Insner	tion (Intak	e Manifo ^l	d Tuning Valve)	
			•		NFOID:000000009758667
Compone		,			NFOID:000000009758667
Compone 1.снеск 1. Turn igr 2. Disconr	INTAKE MAN nition switch (nect intake m	NIFOLD TUN OFF. anifold tuning	ING VALVE		
Compone 1.CHECK 1. Turn igr 2. Disconr 3. Check t	INTAKE MAN nition switch (nect intake m	NIFOLD TUN OFF. anifold tuning	ING VALVE g valve mot take manifo	MOTOR or harness connector. Id tuning valve motor terminals as per the follow	
Compone 1.CHECK 1. Turn igr 2. Disconr 3. Check t	INTAKE MAN nition switch (nect intake m the resistance	NIFOLD TUN OFF. anifold tuning	ING VALVE g valve mot take manifo Resistar	MOTOR or harness connector. Id tuning valve motor terminals as per the follow	
Compone 1.CHECK 1. Turn igr 2. Disconr 3. Check t IM1 +	INTAKE MAN nition switch (nect intake m the resistance	NIFOLD TUN OFF. anifold tuning	ING VALVE g valve mot take manifo	MOTOR or harness connector. Id tuning valve motor terminals as per the follow	

< DTC/CIRCUIT DIAGNOSIS >

P1805 BRAKE SWITCH

DTC Logic

INFOID:000000009758668

INFOID:000000009758669

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1805	BRAKE SW/CIRCUIT (Brake switch circuit)	Stop lamp signal is not sent to ECM for ex- tremely long time while the vehicle is driving.	 Harness or connectors (Stop lamp switch circuit is open or shorted.) Stop lamp switch

DTC CONFIRMATION PROCEDURE

1	.PERFORM DTC CONFIRMATION PROCEDURE
-	

NOTE:

Since this DTC is difficult to be confirmed, check component function to judge the normality.

>> Proceed to EC-410, "Component Function Check".

Component Function Check

1.CHECK BRAKE SWITCH FUNCTION

With CONSULT

- 1. On the CONSULT screen, select "ENGINE" >> "DATA MONITOR" >> "BRAKE SW 2".
- 2. Check "STOP LAMP SW" indication under the following conditions.

Monitor item	Con	Indication	
STOP LAMP SW	Brake pedal	Slightly depressed	ON
STOP LAWP SW	Diake pedal	Fully released	OFF

Without CONSULT

1. Turn ignition switch ON.

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

ECM					Valtaga	
Connector	+	_	Condition		Voltage (Approx.)	
Connector	Terminal	Terminal				
E16	115	128	Brake padel Slightly depressed		Battery voltage	
210	115 128 Brake pedal		Fully released	0 V		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-410, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000009758670

1.CHECK STOP LAMP SWITCH OPERATION

1. Turn power switch OFF.

2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

P1805 BRAKE SWITCH

			P1805 E	BRAKE SWITCH	
< DTC/CIRC				ĮM	RA8DE]
Is the inspec		ormal?			A
	GO TO 5. GO TO 2.				A
2.CHECK S					
					EC
			ness connec	tor. harness connector and ground.	
Z. Official	ie voltage b		amp switch	hamess connector and ground.	
+	-				С
Stop lam	p switch	_	Voltage		
Connector	Terminal				D
E60	1	Ground	Battery voltag		
3. Also che	ck harness	for short to g			
Is the inspect		-	jiounu.		E
	GO TO 4.	<u> </u>			
NO >> (GO TO 3.				F
3.CHECK S	TOP LAMP	SWITCH PO	OWER SUPF	PLY CIRCUIT	Г
1. Pull out #	#30 fuse.				
		is not fusing			G
3. Check th	ne continuity	between sto	op lamp swite	ch harness connector and fuse terminal.	
+					Н
Stop lam	-	_	Continuity		
Connector	Terminal				1
E60	1	#30 fuse ter- minal	Existed		
4. Also che	ck harness	for short to c	around and s	hort to power.	
Is the inspec					J
			uit for 12V ba	attery power supply.	
			letected parts	, , , ,	К
4.CHECK S	TOP LAMP	SWITCH			
Check stop la	amp switch.	Refer to EC	-412, "Comp	onent Inspection (Stop Lamp Switch)".	
Is the inspec	-				L
	GO TO 5.				
_	•			R-22, "Exploded View".	Ъ. Л.
5.CHECK S	TOP LAMP	SWITCH IN	PUT SIGNA	L CIRCUIT	Μ
1. Disconne	ect stop lam	p switch har	ness connec	tor.	
		rness conne		h have a supration and ECM have a supration	Ν
3. Check th	ie continuity	between sto	op lamp swite	ch harness connector and ECM harness connector.	
+	_				
			- CM	Continuity	0
Stop lam	-			Continuity	
Connector	Terminal	Connector	Terminal	Frietod	Р
E60	2	E16	115	Existed	Г
		for short to g	ground.		
Is the inspect	tion result n	ormal?			

YES >> Check intermittent incident. Refer to GI-39, "Intermittent Incident".

NO >> Repair or replace error-detected parts.

P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection (Stop Lamp Switch)

INFOID:000000009758671

[MRA8DE]

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.

Stop lamp switch					
+	-	Cor	dition	Continuity	
Terminals					
1	2	Brake pedal	Fully released	Not existed	
	2	Diake pedal	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-15, "Adjustment"</u>.

2. Check the continuity between stop lamp switch terminals under the following conditions.

Stop lan	np switch				
+	-	C	Condition	Continuity	
Tern	ninals				
1	2	Brake pedal	Fully released	Not existed	
I	2	Diake pedal	Slightly depressed	Existed	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to <u>BR-22, "Exploded View"</u>.

P2004 INTAKE MANIFOLD RUNNER CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

P2004 INTAKE MANIFOLD RUNNER CONTROL VALVE

DTC Logic

INFOID:000000009758672

[MRA8DE]

DTC No.	CONSULT se (Trouble diagr		D	TC detecting condition	Possible cause
P2004	TUMBLE CONT (Intake manifold stuck open ban	I runner control	control valv put signal fr	angle of intake manifold runner e controlled by ECM and the in- rom intake manifold runner con- solition sensor is not in the normal	 Harness or connectors (Intake manifold runner control valve motor circuit is open or shorted.) Intake manifold runner control valve motor Intake manifold runner control valve is stuck
	NFIRMATION		URE		
1.PREC	ONDITIONING	3			
least 10 s TESTING • Before	econds before CONDITION: performing th	e conducting ne following	the next te	st.	urn ignition switch OFF and wait at Itage is more than 11 V at idle.
~	>> GO TO 2.				
Z .PERF	ORM DTC CO	NFIRMATIO	N PROCEI	DURE	
 Select Make If not 60°C Fully Event Depro Chect With C 	, cool engine o (140°F). Then release accele ess accelerato k 1st trip DTC.	ITOR" mode OLANT TEN down or warn go to the fo erator pedal r pedal and	/IP/S" indic m engine u llowing ste and wait at wait at leas	ates between –7°C (19°F) t p until "COOLANT TEMP/S os. least 10 seconds. t 10 seconds.	to 60°C (140°F). S" indicates between –7°C (19°F) to
<u>Is 1st trip</u>	DTC detected	?			
	> Proceed to >> INSPECTIC		agnosis Pro	ocedure".	
	sis Procedu				
					INFOID:00000009758673
1.CHEC	K INTAKE MA	NIFOLD RU	NNER CO	NTROL VALVE MOTOR PO	OWER SUPPLY
	ignition switch k the voltage t		A harness	connector.	
	EC	CM			
	+	-		Voltage	
				4	
Connecto F25	r Terminal 50	Connector E16	Terminal 128	Battery voltage	

Is the inspection result normal?

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

P2004 INTAKE MANIFOLD RUNNER CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

$\overline{2}$. CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Disconnect IPDM E/R harness connector.
- 4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

	+			
ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F25	50	E45	26	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

${f 3.}$ CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR OUTPUT SIGNAL CIRCUIT

- 1. Disconnect intake manifold runner control valve motor harness connector.
- 2. Check the continuity between intake manifold runner control valve motor harness connector and ECM harness connector.

	+	-		
	ld runner con- ve motor	ECM		Continuity
Connector	Connector Terminal		Terminal	
	1	1 F25 2	49	Not existed
F1			51	Existed
Г I			49	Existed
			51	Not existed

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR

Check the intake manifold runner control valve motor. Refer to <u>EC-414</u>, "Component Inspection". <u>Is the inspection result normal?</u>

YES >> Check intermittent incident. Refer to <u>GI-39, "Intermittent Incident"</u>.

NO >> Replace intake manifold assembly. Refer to EM-27, "Removal and Installation".

Component Inspection

INFOID:000000009758674

1. CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE

(B) With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "DATA MONITOR" mode with CONSULT.
- Make sure that "COOLANT TEMP/S" indicates between -7°C (19°F) to 60°C (140°F). If not, cool engine down or warm engine up until "COOLANT TEMP/S" indicates between -7°C (19°F) to 60°C (140°F). Then go to the following steps.
- 4. Fully release accelerator pedal and make sure that "TUMBLE POS SEN" indicates between 2.8 V to 4.1 V.
- 5. Depress accelerator pedal and make sure that "TUMBLE POS SEN" indicates between 0.2 V to 1.4 V.
- 6. Check 1st trip DTC.
- With GST

- - -

		KE MANIFOLD RUI	NER CONTROL	
DTC/CIRCUIT E				
st trip DTC det		ONSULT" above.		
		ifold assembly. Refer to EN	I-27, "Removal and In	nstallation".
0 >> GO TO	02.	•		
CHECK INTAKE	E MANIFOLD	RUNNER CONTROL VAL	/E MOTOR	
Turn ignition s				
		unner control valve motor en intake manifold runner o		minals as per the following
				·····
take manifold runne	r control valve			
motor +		Resistance		
Terminal	-	(Approx.)		
1	2	3 - 8 Ω [at 25°C (77°F)]	_	
the inspection re		0 0 32 [dt 20 0 (77 1)]	_	
	ECTION END			
	ce intake mani	ifold assembly. Refer to <u>EN</u>	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to <u>EN</u>	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to <u>EN</u>	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to <u>EN</u>	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to <u>EN</u>	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to <u>EN</u>	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to <u>EN</u>	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to <u>EN</u>	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to <u>EN</u>	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to <u>EN</u>	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to <u>EN</u>	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to <u>EN</u>	I-27. "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to <u>EN</u>	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to EN	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to EN	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to EN	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to EN	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to EN	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to EN	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to EN	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to EN	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to EN	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to EN	I-27, "Removal and In	nstallation".
	ce intake mani	ifold assembly. Refer to EN	I-27, "Removal and In	nstallation".

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P2014, P2016, P2017, P2018 INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

P2014, P2016, P2017, P2018 INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR

DTC Logic

INFOID:000000009758675

DTC DETECTION LOGIC

NOTE:

If DTC P2014, P2016, P2017 or P2018 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-353, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2014	IN/MANIFOLD RUNNER POS SEN B1 (Intake manifold runner position sensor/ switch circuit bank 1)	An excessively low voltage from the sen-	
P2016	IN/MANIFOLD RUNNER POS SEN B1 (Intake manifold runner position sensor/ switch circuit low bank 1)	sor is sent to ECM.	Harness or connectors (Intake manifold runner control position sensor circuit is short- ad)
P2017	IN/MANIFOLD RUNNER POS SEN B1 (Intake manifold runner position sensor/ switch circuit high bank 1)	An excessively high voltage from the sen-	ed.) Intake manifold runner control position sensor Sensor power supply 2 circuit
P2018	IN/MANIFOLD RUNNER POS SEN B1 (Intake manifold runner position sensor/ switch circuit intermittent bank 1)	sor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

- YES >> Proceed to EC-416, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758676

1. CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect intake valve manifold runner control valve position sensor harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between intake valve manifold runner control valve position sensor harness connector.

P2014, P2016, P2017, P2018 INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Intake manifold r	unner control valv	e position sensor		-
	+	-	Voltage (Approx.)	
Connector	Ter	minal	(Αρριολ.)	
F29	1	3	5 V	_
s the inspection	n result normal	?		-
YES >> GO				
NO >> GO				
	AKE MANIFOL	D RUNNER CO	ONTROL VAL	VE POSITION SENSOR POWER SUPPLY CIR
heck the volta round.	ge between in	ake valve manif	fold runner co	ntrol valve position sensor harness connector ar
4	÷			-
Intake manifold ru		-	Voltage	
position		4	(Approx.)	
Connector	Terminal			_
F29	1	Ground	5 V	_
s the inspection		<u>7</u>		
YES >> GO NO >> GO				
•		SUPPLY 2 CIR	CUIT	
<u>s inspection res</u> YES >> Per NO >> Rep	sult normal? form the troub pair or replace	e diagnosis for error-detected p	power supply	inosis Procedure". circuit.
inspection res YES >> Per NO >> Rep .CHECK ECN . Turn ignition . Disconnect	sult normal? form the troub pair or replace // GROUND CI n switch OFF. ECM harness	e diagnosis for error-detected p RCUIT	power supply parts.	circuit.
Sinspection res YES >> Per NO >> Rep .CHECK ECM . Turn ignition . Disconnect . Check the c	sult normal? form the troub pair or replace // GROUND CI n switch OFF. ECM harness continuity betw	e diagnosis for error-detected p RCUIT connector.	power supply parts.	circuit.
inspection res YES >> Per NO >> Rep .CHECK ECN . Turn ignition . Disconnect	sult normal? form the troub pair or replace A GROUND CI n switch OFF. ECM harness continuity betw	e diagnosis for error-detected p RCUIT connector.	power supply parts. ss connector a	circuit.
inspection res YES >> Per NO >> Rep .CHECK ECN . Turn ignition . Disconnect . Check the context	sult normal? form the troub pair or replace A GROUND CI n switch OFF. ECM harness continuity betw	e diagnosis for error-detected p RCUIT connector.	power supply parts.	circuit.
Sinspection res YES >> Per NO >> Rep CHECK ECM . Turn ignition . Disconnect . Check the context EC Connector	sult normal? form the troub pair or replace // GROUND CI n switch OFF. ECM harness continuity betw	e diagnosis for error-detected p RCUIT connector.	power supply parts. ss connector a	circuit.
YES >> Per NO >> Rep CHECK ECM Turn ignition Disconnect Check the c	sult normal? form the troub pair or replace A GROUND CI n switch OFF. ECM harness continuity betw 	e diagnosis for perior-detected perior-detected period connector. een ECM harne	power supply parts. ss connector a Continuity	circuit.
Sinspection res YES >> Per NO >> Rep CHECK ECM . Turn ignition . Disconnect . Check the context EC Connector	sult normal? form the troub pair or replace A GROUND CI n switch OFF. ECM harness continuity betw 	e diagnosis for error-detected p RCUIT connector.	power supply parts. ss connector a	circuit.
Sinspection res YES >> Per NO >> Rep CHECK ECM . Turn ignition . Disconnect . Check the context ECC Connector F24	sult normal? form the troub pair or replace A GROUND CI n switch OFF. ECM harness continuity betw 	e diagnosis for perior-detected perior-detected period connector. een ECM harne	power supply parts. ss connector a Continuity	circuit.
S inspection res YES >> Per NO >> Rep • CHECK ECM • Turn ignition • Disconnect • Check the content • Check the content • Connector • F24 • F25 • E16	sult normal? form the troub pair or replace A GROUND CI n switch OFF. ECM harness continuity betw CM Terminal 12 16 52	e diagnosis for perior-detected perior-detected period connector. een ECM harne	power supply parts. ss connector a Continuity	circuit.
sinspection res YES >> Per NO >> Rep . CHECK ECM . Turn ignition . Disconnect . Disconnect . Check the context . Connector F24 F25 E16 . Also check sthe inspection	sult normal? form the troub pair or replace A GROUND CI n switch OFF. ECM harness continuity betw CM Terminal 12 16 52 128 harness for sh n result normal	e diagnosis for perror-detected perror-detected percented percente	power supply parts. ss connector a Continuity Existed	and ground.
inspection res YES >> Per NO >> Rep . CHECK ECM . Turn ignition . Disconnect . Disconnect . Check the content . Check the content . Connector F24 F25 E16 . Also check sthe inspection YES > Check	sult normal? form the troub pair or replace A GROUND CI n switch OFF. ECM harness continuity betw 	e diagnosis for perror-detected perror-detected percented percente	power supply parts. ss connector a Continuity Existed	circuit.
inspection res YES >> Per NO >> Rep .CHECK ECN . Turn ignition . Disconnect . Disconnect . Check the content . Check the content . Connector F24 F25 E16 . Also check Sthe inspection YES > Check NO >> Rep	sult normal? form the troub pair or replace A GROUND CI n switch OFF. ECM harness continuity betw 	e diagnosis for perior-detected perior-detected period connector. een ECM harne Ground ort to power. ? t incident. Refer error-detected p	power supply parts. ss connector a Continuity Existed to <u>GI-39, "Inte</u> parts.	and ground.
inspection res YES >> Per NO >> Rep .CHECK ECN . Turn ignition . Disconnect . Disconnect . Check the construction . Check the construction . F24 F25 E16 . Also check s the inspection YES > Check NO >> Rep D.CHECK INTA	sult normal? form the troub pair or replace A GROUND CI n switch OFF. ECM harness continuity betw Terminal 12 16 52 128 harness for sh n result normal pair or replace AKE MANIFOL	e diagnosis for perior-detected perior-detected period connector. een ECM harne Ground ort to power. ? t incident. Refer error-detected p	power supply parts. ss connector a Continuity Existed to <u>GI-39, "Inte</u> parts.	and ground.
inspection res YES >> Per NO >> Rep .CHECK ECN .Turn ignition .Disconnect .Check the content .Check the content .Connector F24 F25 E16 .Also check sthe inspection YES > Check NO >> Rep .CHECK INTA .Turn ignition	sult normal? form the troub pair or replace A GROUND CI n switch OFF. ECM harness continuity betw Terminal 12 16 52 128 harness for sh n result normal eck intermitten pair or replace AKE MANIFOL n switch OFF.	e diagnosis for perror-detected percor-detected perconnector. een ECM harne Ground ort to power. ? t incident. Refer error-detected percor-detected percor-detected perconnected perconnect	power supply parts. ss connector a Continuity Existed to <u>GI-39, "Inte</u> parts.	and ground.
inspection res YES >> Per NO >> Rep . CHECK ECN . Turn ignition . Disconnect . Disconnector F24 F25 E16 . Also check Sthe inspection YES > Check NO >> Rep . CHECK INTA . Turn ignition . CHECK INTA . Turn ignition . Disconnect . CHECK INTA	sult normal? form the troub pair or replace A GROUND CI n switch OFF. ECM harness continuity betw Terminal 12 16 52 128 harness for sh n result normal eck intermitten pair or replace AKE MANIFOL n switch OFF. ECM harness	e diagnosis for perror-detected perror-detected percented of the second	power supply parts. ss connector a Continuity Existed to <u>GI-39, "Inte</u> parts. DNTROL VALV	and ground.

P2014, P2016, P2017, P2018 INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

+		-		
Intake manifold valve posit		ECM		Continuity
Connector	Terminal	Connector Terminal		
F29	3	F25	92	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. Check intake manifold runner control valve position sensor input signal circuit

1. Check the continuity between intake manifold runner control valve position sensor harness connector and ECM harness connector.

+	+			
Intake manifold valve posit		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	2	F25	83	Existed

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

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK INTERMITTENT INCIDENT

Perform GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake manifold assembly. Refer to <u>EM-27, "Exploded View"</u>.

NO >> Repair or replace error-detected parts.

< DTC/CIRCUIT DIAGNOSIS >

DTC DETECTION LOGIC

P2096, P2097 A/F SENSOR 1

DTC Logic

А

EC

INFOID:000000009758677

[MRA8DE]

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P2096	POST CAT FUEL TRIM SYS B1 (Post catalyst fuel trim system too lean bank 1)	The output voltage computed by ECM from the A/F sensor 1 signal is shifts to the lean side for a specified period.	 A/F sensor 1 A/F sensor 1 heater Heated oxygen sensor 2
P2097	POST CAT FUEL TRIM SYS B1 (Post catalyst fuel trim system too rich bank 1)	The A/F signal computed by ECM from the A/F sensor 1 signal is shifts to the rich side for a spec- ified period.	 Fuel pressure Fuel injector Intake air leaks Exhaust gas leaks
	NFIRMATION PROCEDU	RE	
before co I. Turn 2. Turn 3. Turn F ESTING	nducting the next test. ignition switch OFF and wait ignition switch ON. ignition switch OFF and wait CONDITION:		
-	>> GO TO 2.		
_	>> GO TO 2. ORM DTC CONFIRMATION	PROCEDURE	
2.PERF0 1. Clear 2. Turn 3. Start 4. Let en 5. Keep	ORM DTC CONFIRMATION the mixture ratio self-learnin ignition switch OFF and wait engine and keep the engine ngine idle for 1 minute. engine speed between 2,50	ng value. Refer to <u>EC-142, "Work Proced</u>	
2.PERF(1. Clear 2. Turn 3. Start 4. Let en 5. Keep 6. Chec	ORM DTC CONFIRMATION the mixture ratio self-learnin ignition switch OFF and wait engine and keep the engine ngine idle for 1 minute.	ng value. Refer to <u>EC-142, "Work Proced</u> t at least 10 seconds. speed between 3,500 and 4,000 rpm for	
2.PERF(1. Clear 2. Turn 3. Start 4. Let en 5. Keep 6. Chec <u>s 1st trip</u> YES	ORM DTC CONFIRMATION the mixture ratio self-learnin ignition switch OFF and wait engine and keep the engine ngine idle for 1 minute. engine speed between 2,50 k 1st trip DTC.	ng value. Refer to <u>EC-142, "Work Proced</u> t at least 10 seconds. speed between 3,500 and 4,000 rpm for 00 and 3,000 rpm for 20 minutes.	
2.PERF(1. Clear 2. Turn 3. Start 4. Let en 5. Keep 6. Chec <u>s 1st trip</u> YES NO	ORM DTC CONFIRMATION the mixture ratio self-learnin ignition switch OFF and wait engine and keep the engine ngine idle for 1 minute. engine speed between 2,50 k 1st trip DTC. <u>DTC detected?</u> >> Proceed to <u>EC-419</u> , "Diag	ng value. Refer to <u>EC-142, "Work Proced</u> t at least 10 seconds. speed between 3,500 and 4,000 rpm for 00 and 3,000 rpm for 20 minutes.	
2.PERF(1. Clear 2. Turn 3. Start 4. Let el 5. Keep 6. Chec <u>s 1st trip</u> YES NO 2 Diagnos	ORM DTC CONFIRMATION the mixture ratio self-learnin ignition switch OFF and wait engine and keep the engine ngine idle for 1 minute. engine speed between 2,50 k 1st trip DTC. <u>DTC detected?</u> >> Proceed to <u>EC-419. "Diag</u> >> INSPECTION END	ng value. Refer to <u>EC-142, "Work Proced</u> t at least 10 seconds. speed between 3,500 and 4,000 rpm for 00 and 3,000 rpm for 20 minutes. gnosis Procedure".	1 minute under no load.
2.PERF(1. Clear 2. Turn 3. Start 4. Let el 5. Keep 6. Chec <u>s 1st trip</u> YES NO 2 Diagnos 1.CHEC 1. Turn 2. Disco	ORM DTC CONFIRMATION the mixture ratio self-learnin ignition switch OFF and wait engine and keep the engine ngine idle for 1 minute. engine speed between 2,50 k 1st trip DTC. <u>DTC detected?</u> >> Proceed to <u>EC-419, "Diag</u> >> INSPECTION END sis Procedure	ng value. Refer to <u>EC-142, "Work Proced</u> t at least 10 seconds. speed between 3,500 and 4,000 rpm for 00 and 3,000 rpm for 20 minutes. <u>Sposis Procedure</u> ".	1 minute under no load.
2.PERF(1. Clear 2. Turn 3. Start 4. Let end 5. Keep 6. Chec is 1st trip YES NO Diagnos 1. CHEC 1. Turn 2. Disco 3. Chec	DRM DTC CONFIRMATION the mixture ratio self-learnin ignition switch OFF and wait engine and keep the engine ngine idle for 1 minute. engine speed between 2,50 k 1st trip DTC. <u>DTC detected?</u> >> Proceed to <u>EC-419, "Diag</u> >> INSPECTION END sis Procedure K HARNESS CONNECTOR ignition switch OFF. onnect A/F sensor 1 harness	ng value. Refer to <u>EC-142, "Work Proced</u> t at least 10 seconds. speed between 3,500 and 4,000 rpm for 00 and 3,000 rpm for 20 minutes. <u>Sposis Procedure</u> ".	1 minute under no load.
2.PERF(1. Clear 2. Turn 3. Start 4. Let el 5. Keep 6. Chec 1. Start YES NO 2. Diagnos 1.CHEC 1. Turn 2. Disco 3. Chec W	ORM DTC CONFIRMATION the mixture ratio self-learnin ignition switch OFF and wait engine and keep the engine ngine idle for 1 minute. engine speed between 2,50 k 1st trip DTC. <u>DTC detected?</u> >> Proceed to <u>EC-419, "Diag</u> >> INSPECTION END sis Procedure K HARNESS CONNECTOR ignition switch OFF. onnect A/F sensor 1 harness k harness connector for wat	ng value. Refer to <u>EC-142, "Work Proced</u> t at least 10 seconds. speed between 3,500 and 4,000 rpm for 00 and 3,000 rpm for 20 minutes. <u>Sposis Procedure</u> ".	1 minute under no load.
2.PERF(1. Clear 2. Turn 3. Start 4. Let el 5. Keep 6. Chec is 1st trip YES NO 2. Diagnos 1.CHEC 1. Turn 2. Disco 3. Chec Weight the inservation of the second Sthe inservation of the second YES 2. Turn 2. Disco 3. Chec Weight the inservation of the second YES 2. Turn 3. Chec Weight the inservation of the second YES 2. Turn 3. Chec Weight the inservation of the second 2. Turn 3. Chec Weight the inservation of the second 3. Chec Weight the inservation of the second 3. Chec 2. Turn 3. Chec 3. Chec 4.	DRM DTC CONFIRMATION the mixture ratio self-learnin ignition switch OFF and wait engine and keep the engine ngine idle for 1 minute. engine speed between 2,50 k 1st trip DTC. <u>DTC detected?</u> >> Proceed to <u>EC-419, "Diagonal Sis Procedure K HARNESS CONNECTOR ignition switch OFF. onnect A/F sensor 1 harness k harness connector for wat ater should not exit.</u>	ng value. Refer to <u>EC-142, "Work Proced</u> t at least 10 seconds. speed between 3,500 and 4,000 rpm for 00 and 3,000 rpm for 20 minutes. <u>gnosis Procedure"</u> .	1 minute under no load.

>> GO TO 3.

< DTC/CIRCUIT DIAGNOSIS >

3.CHECK FOR EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- 2. Listen for an exhaust gas leak before the three way catalyst 2.

Is exhaust gas leak detected?

YES >> Repair or replace malfunctioning parts.

NO >> GO TO 4.

4.CHECK FOR INTAKE AIR LEAK

- 1. Reconnect A/F sensor 1 harness connector.
- 2. Start engine and run it at idle.
- 3. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace malfunctioning parts.

NO >> GO TO 5.

5.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-142, "Work Procedure".

2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to <u>EC-246. "DTC Logic"</u> or <u>EC-250.</u> <u>"DTC Logic"</u>.

NO >> GO TO 6.

6.CHECK A/F SENSOR 1 POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect A/F sensor 1 harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between A/F sensor 1 harness connector and ground.

	+		
A/F sensor 1		-	Voltage
Connector	Terminal		
F12 ^{*1} F42 ^{*2}	4	Ground	Battery voltage

*1: Except California

*2: For California

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7.CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

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

+		_		
A/F ser	nsor 1	IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F12 ^{*1} F42 ^{*2}	4	E45	26	Existed

*1: Except California

*2: For California

4. Also check harness for short to ground.

P2096, P2097 A/F SENSOR 1

< DTC/CIRC			2096, P2	2097 A/F \$	SENSOR 1 [MRA8DE]	
s the inspect						
YES >> F NO >> F	Perform the Repair or re	trouble diagr place error-d	etected pa	rts.	circuit.	
B. CHECK A	/F SENSO	R 1 INPUT S	GNAL CIF	RCUIT		E
2. Disconne		rness conneo		harness con	nector and ECM harness connector.	
+		_			-	
A/F ser	nsor 1	EC	М	Continuity		
Connector	Terminal	Connector	Terminal		_	
F12 ^{*1}	1	F24	41	Existed		
F42 ^{*2}	2 pt California		45		-	
*2: For C Check th and grou	ne continuit Ind.	y between A	'F sensor	1 harness co	nnector and ground, or ECM harness connector	
۵/F s	+ ensor 1			Continuity		
Connector	Terminal			Continuity		
F12 ^{*1}	1				-	
F42 ^{*2}	2	Grour	ld	Not existed		
*1: Exce *2: For C	pt California California	a			_	
	+ ECM			Continuity		
Connector	Terminal			Continuity		
	41				-	
F24	45	Grou	hd	Not existed		
Also che	ck harness	for short to p	ower.		-	
the inspect		ormal?				
	GO TO 9. Repair or re	place error-d	etected pa	rts.		
	•	R 1 HEATER				
				7 <u>, "Compon</u> e	nt Inspection (A/F Sensor 1 Heater)".	
the inspect						
	GO TO 10. GO TO 12.					
-		DXYGEN SE				
				3 "Compone	ent Inspection (HO2S2)".	
the inspect			. to <u>LO-22</u>			
YES >> (GO TO 11.					
	-			Refer to <u>EX-5</u>	, "Exploded View".	
		TENT INCID				
erform GI-3	9. "Intermit	tent Incident"				

Revision: October 2013

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

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

12.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

Do you have CONSULT?

YES >> GO TO 13.

NO >> GO TO 14.

13. CONFIRM A/F ADJUSTMENT DATA

(D) With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "A/F ADJ-B1" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 3. Make sure that "0.000" is displayed on CONSULT screen.

Is "0.000" displayed?

YES >> INSPECTION END

NO >> GO TO 14.

14.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

Clear the mixture ratio self-learning value. Refer to EC-142, "Work Procedure".

Do you have CONSULT?

YES >> GO TO 15.

NO >> INSPECTION END

15.CONFIRM A/F ADJUSTMENT DATA

() With CONSULT

- Turn ignition switch ON.
- 2. Select "A/F ADJ-B1" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 3. Make sure that "0.000" is displayed on CONSULT screen.

>> INSPECTION END

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

DTC Logic

INFOID:000000009758679

[MRA8DE]

DTC DETECTION LOGIC

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 OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 8 V. Witch DTC is detected? P2100 >> GO TO 2. P2103 >> GO TO 3. 2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100 1. Turn ignition switch ON and wait at least 2 seconds. 2. Start engine and let it idle for 5 seconds. 3. Check DTC. Is DTC detected? YES > Proceed to EC-423. "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 > Proceed to EC-423. "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. <t< th=""><th>DTC No.</th><th>CONSULT screen terms (Trouble diagnosis con- tent)</th><th>DTC detecting condition</th><th>Possible cause</th><th></th></t<>	DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause	
P2103 Chrottle actuator "A" ontrol motor circuit is stuck ON. Chrottle control motor relay is shorted) shorted) Throttle actuator "A" inph" ECM detect the throttle control motor relay is shorted) (Throttle control motor relay is shorted) DTC CONFIRMATION PROCEDURE 1. PRECONDITIONING Throttle control motor relay 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. Turn ignition switch ONF and wait at least 10 seconds. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 8 V. Witch DTC is detected? P2100 >> GO TO 2. P2100 >> GO TO 3. 2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100 1. Turn ignition switch ON and wait at least 2 seconds. 3. Check DTC. Is DTC detected? YES > Proceed to EC-423. "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 > Proceed to EC-423. "Diagnosis Procedure". NO >> INSPECTION END 3. PERFORM DTC CONFIRMATION PROC	P2100	(Throttle actuator "A" control motor circuit/		(Throttle control motor relay circuit is open)	
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 OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 8 V. Witch DTC is detected? P2100 >> GO TO 2. P2103 >> GO TO 3. 2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100 1. Turn ignition switch ON and wait at least 2 seconds. 2. Start engine and let it idle for 5 seconds. 3. Check DTC. Is DTC detected? YES > Proceed to EC-423. "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 > Proceed to EC-423. "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. <t< td=""><td>P2103</td><td>(Throttle actuator "A" control motor circuit</td><td>-</td><td>(Throttle control motor relay circuit is shorted)</td><td></td></t<>	P2103	(Throttle actuator "A" control motor circuit	-	(Throttle control motor relay circuit is shorted)	
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 OFF and wait at least 10 seconds. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 8 V. Witch DTC is detected? P2100 >> GO TO 2. P2103 >> GO TO 3. 2. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100 1. Turn ignition switch ON and wait at least 2 seconds. 2. Start engine and let it idle for 5 seconds. 3. Check DTC. Is DTC detected? YES >> Proceed to EC-423. "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 >> Proceed to EC-423. "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 >> Proceed to EC-423. "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 >> Proceed to EC-423. "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i> <i>Medicide</i>	DTC CON	FIRMATION PROC	EDURE		
before conducting the next test. 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch OFF and wait at least 10 seconds. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 8 V. Witch DTC is detected? P2100 >> GO TO 2. P2103 >> GO TO 3. 2. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100 1. Turn ignition switch ON and wait at least 2 seconds. 2. Start engine and let it idle for 5 seconds. 3. Check DTC. Is DTC detected? YES >> Proceed to EC-423. "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 >> Proceed to EC-423. "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure I. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY	1.PRECO	NDITIONING			
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch OFF and wait at least 10 seconds. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 8 V. Witch DTC is detected? P2100 >> GO TO 2. P2103 >> GO TO 3. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100 Turn ignition switch ON and wait at least 2 seconds. Start engine and let it idle for 5 seconds. Check DTC. Is DTC detected? YES >> Proceed to EC-423. "Diagnosis Procedure". NO >> INSPECTION END Turn ignition switch ON and wait at least 1 second. Check DTC. DTC detected? YES >> Proceed to EC-423. "Diagnosis Procedure". NO >> INSPECTION END Check DTC. DTC detected? YES >> Proceed to EC-423. "Diagnosis Procedure". NO >> INSPECTION END Check DTC. DTC detected? YES >> Proceed to EC-423. "Diagnosis Procedure". NO >> INSPECTION END Check DTC. DTC detected? YES >> Proceed to EC-423. "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure Mo >> INSPECTION END Diagnosis Procedure 			has been previously conducted, alw	rays perform the following procedure	
 3. Turn ignition switch OFF and wait at least 10 seconds. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 8 V. Witch DTC is detected? P2100 >> GO TO 2. P2103 >> GO TO 3. 2. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100 1. Turn ignition switch ON and wait at least 2 seconds. 2. Start engine and let it idle for 5 seconds. 3. Check DTC. Is DTC detected? YES >> Proceed to EC-423. "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 >> Proceed to EC-423. "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 >> Proceed to EC-423. "Diagnosis Procedure". NO >> INSPECTION END 3. Check DTC. Is DTC detected? YES >> Proceed to EC-423. "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure 	1. Turn ig	nition switch OFF and	l wait at least 10 seconds.		
TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 8 V. Witch DTC is detected? P2100 >> GO TO 2. P2103 >> GO TO 3. 2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100 1. Turn ignition switch ON and wait at least 2 seconds. 2. Start engine and let it idle for 5 seconds. 3. Check DTC. Is DTC detected? YES >> Proceed to EC-423. "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 >> Proceed to EC-423. "Diagnosis Procedure". NO >> INSPECTION END 3. DEC detected? YES >> Proceed to EC-423. "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure			wait at least 10 seconds		
Witch DTC is detected? P2100 >> GO TO 2. P2103 >> GO TO 3. 2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100 1. Turn ignition switch ON and wait at least 2 seconds. 2. Start engine and let it idle for 5 seconds. 3. Check DTC. Is DTC detected? YES >> Proceed to EC-423. "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 >> Proceed to EC-423. "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 >> Proceed to EC-423. "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure Information Support Support I.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY	TESTING O	CONDITION:			
$\begin{array}{l} \mbox{P2100} >> \mbox{GO TO 2.} \\ \mbox{P2103} >> \mbox{GO TO 3.} \\ \hline \mbox{2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100} \\ \hline \mbox{1. Turn ignition switch ON and wait at least 2 seconds.} \\ \mbox{2. Start engine and let it idle for 5 seconds.} \\ \mbox{3. Check DTC.} \\ \hline \mbox{seconds} \\ \hline seconds$	-	-	ig procedure, confirm that battery vo	bitage is more than 8 v.	
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 >> Proceed to EC-423. "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 >> Proceed to EC-423. "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure 1.cHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY	P2100 >>	GO TO 2.			
 Turn ignition switch ON and wait at least 2 seconds. Start engine and let it idle for 5 seconds. Check DTC. Is DTC detected? YES >> Proceed to EC-423. "Diagnosis Procedure". NO >> INSPECTION END PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103 Turn ignition switch ON and wait at least 1 second. Check DTC. Is DTC detected? YES >> Proceed to EC-423. "Diagnosis Procedure". NO >> INSPECTION END I. Turn ignition switch ON and wait at least 1 second. Check DTC. Is DTC detected? YES >> Proceed to EC-423. "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure InFold concomposition of the processes I. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY 	^				
 2. Start engine and let it idle for 5 seconds. 3. Check DTC. <u>Is DTC detected?</u> YES >> Proceed to <u>EC-423. "Diagnosis Procedure"</u>. 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. <u>Is DTC detected?</u> YES >> Proceed to <u>EC-423. "Diagnosis Procedure"</u>. NO >> INSPECTION END Diagnosis Procedure Information Support (Control MOTOR RELAY POWER SUPPLY) 					
Is DTC detected? YES >> Proceed to EC-423. "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 >> Proceed to EC-423. "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure INFOID:000000000000000000000000000000000000	2. Start ei	ngine and let it idle for			
YES >> Proceed to EC-423, "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 >> Proceed to EC-423, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure INFOLD-000000000000000000000000000000000000					
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 >> Proceed to EC-423. "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure INFOID.00000009756600 1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY			"Diagnosis Procedure".		
 Turn ignition switch ON and wait at least 1 second. Check DTC. <u>Is DTC detected?</u> YES >> Proceed to <u>EC-423</u>, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure INFOID:0000009758680 CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY 	NO >>	INSPECTION END	-		
2. Check DTC. <u>Is DTC detected?</u> YES >> Proceed to <u>EC-423</u> , "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure 1.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY	3. PERFO	RM DTC CONFIRMA	TION PROCEDURE FOR DTC P2103		
Is DTC detected? YES >> Proceed to EC-423. "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure INFOID:0000009758680 1.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY			wait at least 1 second.		
NO >> INSPECTION END Diagnosis Procedure INFOID:00000009758680 1.check Throttle Control Motor Relay Power Supply					
Diagnosis Procedure INFOID:00000009758680 1.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY			"Diagnosis Procedure".		
1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY	-			INFOID:000000009758680	
			OL MOTOR RELAY POWER SUPPLY		
	1. Turn ig	nition switch OFF.			
2. Check the voltage between ECM harness connector and ground.	2. Check	the voltage between I	ECM harness connector and ground.		

	+		_	
ECM				Voltage
Connector	Terminal	Connector	Terminal	
F24	21	E16	128	Battery voltage



EC

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Disconnect ECM harness connector.

2. Disconnect IPDM E/R harness connector.

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

	+		_	
ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F24	21	E43	16	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL

Check the voltage between ECM harness connector and ground as per the following conditions.

	E	СМ			
+		_		Condition	Voltage (Approx.)
Connector	Terminal	Connector	Terminal		X FF - 7
F24	2	E16	128	Ignition switch: OFF	0 V
1 24	Z	210	120	Ignition switch: ON	Battery voltage

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-39, "Intermittent Incident"</u>.

NO >> GO TO 4.

${f 4}$. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Disconnect IPDM E/R harness connector.

4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

	+			
E	ECM		IPDM E/R	
Connector	Terminal	Connector Terminal		
F24	2	E43	11	Existed

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

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-39, "Intermittent Incident".

NO >> Repair or replace error-detected parts.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P2101 is displayed with DTC P2100, first perform the trouble diagnosis for DTC P2100. Refer to EC-423, "DTC Logic".
- If DTC P2101 is displayed with DTC P2119, first perform the trouble diagnosis for DTC P2119. Refer to EC-430, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause	
P2101	ETC FNCTN/CIRC-B1 (Throttle actuator "A" control motor circuit range/performance)	Electric throttle control function does not operate properly.	 Harness or connectors (Throttle control motor circuit is open or shorted) Electric throttle control actuator 	E
	NFIRMATION PRO	CEDURE		G

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when engine is running.

>> GO TO 2. 2.PERFORM DTC CONFIRMATION PROCEDURE	J
 Turn ignition switch ON and wait at least 2 seconds. Start engine and let it idle for 5 seconds. Check DTC. 	K
Is DTC detected? YES >> Proceed to EC-425, "Diagnosis Procedure". NO >> INSPECTION END	L
Diagnosis Procedure	M

Diagnosis Procedure

1. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL

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

	E	СМ			
	+	-		Condition	Voltage (Approx.)
Connector	Terminal	Connector	Terminal		
F24	2	E16	128	Ignition switch: OFF	0 V
1 24	2		0 120	Ignition switch: ON	Battery voltage

Is the inspection result normal?

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

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INFOID:000000009758682

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

$\overline{2}$. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Disconnect IPDM E/R harness connector.
- 4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+				
E	ECM		IPDM E/R	
Connector	Terminal	Connector Terminal		
F24	2	E43	11	Existed

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

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

${\bf 3.}$ check throttle control motor relay power supply circuit

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

+		_		
ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F24	21	E43	16	Existed

2. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect electric throttle control actuator harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

+		_		
Electric throttle control actu- ator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
	5	- F24	3	Not existed
F7	6		1	Existed
17			3	Existed
			1	Not existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

 $\mathbf{5}$. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct. Refer to EM-25, "Exploded View".

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

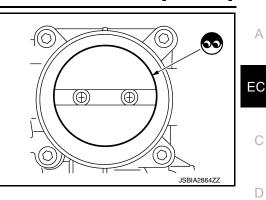
< DTC/CIRCUIT DIAGNOSIS >

2. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to <u>EC-139</u>, "Work Procedure".



[MRA8DE]

INFOID:000000009758683

6.CHECK THROTTLE CONTROL MOTOR

Check the throttle control motor. Refer to <u>EC-429, "Component Inspection (Throttle Control Motor)"</u>. Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-39, "Intermittent Incident".
- NO >> Replace electric throttle control actuator. Refer to EM-27, "Removal and Installation".

Component Inspection (Throttle Control Motor)

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.

Electric throttle control actu- ator				Resistance
+	_	Condition	(Approx.)	
Terminals				
5	6	Temperature °C (°F) 25 (77)		1 - 15 Ω

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace electric throttle control actuator. Refer to <u>EM-27</u>, "<u>Removal and Installation</u>".

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P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

P2118 THROTTLE CONTROL MOTOR

DTC Logic

INFOID:000000009758684

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)		Possible cause
P2118	ETC MOT-B1 (Throttle actuator con- trol motor current range/ performance)	ECM detects short in both circuits between ECM and throttle control motor.	 Harness or connectors (Throttle control motor circuit is shorted.) Electric throttle control actuator (Throttle control motor)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 2 seconds.
- 2. Start engine and let it idle for 5 seconds.
- 3. Check DTC.

Is DTC detected?

- YES >> Proceed to EC-428. "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758685

1. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect electric throttle control actuator harness connector.
- 3. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

-	+	-		
Electric throttle control actu- ator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
	5	F24	3	Not existed
F7	6		1	Existed
17		1 24	3	Existed
			1	Not existed

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

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

P2118 THROTTLE CONTROL MOTOR

[MRA8DE] < DTC/CIRCUIT DIAGNOSIS > 2. CHECK THROTTLE CONTROL MOTOR А Check the throttle control motor. Refer to EC-429, "Component Inspection (Throttle Control Motor)". Is the inspection result normal? YES >> Check intermittent incident. Refer to GI-39, "Intermittent Incident". EC NO >> Replace electric throttle control actuator. Refer to EM-27, "Removal and Installation". Component Inspection (Throttle Control Motor) INFOID:000000009758686 С 1. CHECK THROTTLE CONTROL MOTOR 1. Turn ignition switch OFF. D 2. Disconnect electric throttle control actuator harness connector. 3. Check the resistance between electric throttle control actuator terminals as per the following. Е Electric throttle control actuator Resistance Condition + (Approx.) F Terminals 5 6 Temperature °C (°F) 25 (77) 1 - 15 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to <u>EM-27</u>, "Removal and Installation".

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P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Logic

INFOID:000000009758687

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition		Possible cause
	ETC ACTR-B1	А	Electric throttle control actuator does not function properly due to the return spring malfunction.	
P2119	(Throttle actuator con- trol throttle body range/ performance)	В	Throttle valve opening angle in fail-safe mode is not in specified range.	Electric throttle control actuator
	,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,	С	ECM detect the throttle valve is stuck open.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND B

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Set selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
- 3. Set selector lever to P (CVT) or Neutral (M/T) position.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON and wait at least 1 second.
- 6. Set selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
- 7. Set selector lever to P (CVT) or Neutral (M/T) position.
- 8. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- 9. Check DTC.

Is DTC detected?

YES >> Proceed to EC-430, "Diagnosis Procedure".

NO >> GO TO 3.

 $\mathbf{3}$. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Set selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
- 3. Set selector lever to P (CVT) or Neutral (M/T) position.
- 4. Start engine and let it idle for 3 seconds.
- 5. Check DTC.

Is DTC detected?

YES >> Proceed to EC-430, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct. Refer to <u>EM-25</u>, "Exploded View".

INFOID:000000009758688

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

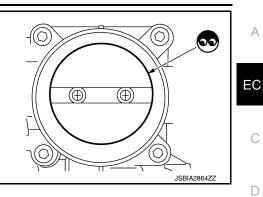
< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

2. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

- YES >> Replace electric throttle control actuator. Refer to <u>EM-</u> 27, "Removal and Installation".
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to <u>EC-139</u>, "Work Procedure".



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P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P2122, P2123 APP SENSOR

DTC Logic

NOTE:

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-353, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P2122	APP SEN 1/CIRC (Throttle/Pedal position sensor/switch "D" circuit low)	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 (Throttle/Pedal position sensor/switch "D" circuit high)	An excessively high voltage from the APP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

- YES >> Proceed to <u>EC-432</u>, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009758690

1. CHECK APP SENSOR 1 POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect accelerator pedal position (APP) sensor harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between APP sensor harness connector and ground.

APF	+ sensor	-	Voltage (Approx.)
Connector	Terminal		
E12	4	Ground	5.0 V

Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 2. INFOID:000000009758689

P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

					<u> </u>
2.CHECK A			SUPPLY C	IRCUIT	A
	ition switch	OFF. rness conne	otor		
				arness connect	or and ECM harness connector.
	,				EC
+	÷	-	_		-
APP s	ensor	EC	M	Continuity	С
Connector	Terminal	Connector	Terminal		
E12	4	E16	122	Existed	-
4. Also che	ck harness	for short to g	round.		D
Is the inspec	<u>tion result n</u>	ormal?			
				ver supply circ	uit. E
•	•	place error-d	•	5.	
3.CHECK A			DCIRCUIT		
	ition switch	OFF. rness conne	otor		F
				arness connect	or and ECM harness connector.
	,				G
+	+	-	-		-
APP s	ensor	EC	M	Continuity	
Connector	Terminal	Connector	Terminal		Н
E12	2	E16	127	Existed	-
4. Also che	ck harness	for short to p	ower.		-
Is the inspec	tion result n	ormal?			
-	GO TO 4.				
	•	place error-d	•		J
4.CHECK A	APP SENSO	R 1 INPUT S	SIGNAL CIR	CUIT	
1. Check th	ne continuity	between AF	P sensor ha	arness connect	or and ECM harness connector.
					-
+		-	-	Continuity	
APP s		EC		Continuity	L
Connector	Terminal	Connector	Terminal	Eviated	-
E12	3	E16	126	Existed	- M
2. Also che ls the inspec		for short to g	round and to	o power.	
	GO TO 5.	<u>umai :</u>			
-		place error-d	etected part	S.	Ν
5.CHECK A	PP SENSO	R			
			"Componer	nt Inspection (A	APP Sensor)".
Is the inspec					<u> </u>
				<u>GI-39, "Intermi</u>	
NO >>	Replace acc	elerator ped	al assembly.	Refer to ACC	-3, "Removal and Installation".
Compone	nt Inspec	tion (APP	Sensor)		INFOID:00000009758691
1.CHECK A	CCELERAT	OR PEDAL	POSITION	SENSOR	
1. Turn igni	ition switch	OFF.			
2. Reconne	ect all harne	ss connector	s disconnec	ted.	
3. Turn igni	ition switch	UN.			

P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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

	ECM					
Connector	+ –		Condition		Voltage	
Connector	Terminal					
	126		- Accelerator pedal	Fully released	0.6 - 0.9 V	
E16				Fully depressed	3.9 - 4.7 V	
EIO	119			Fully released	0.3 - 0.6 V	
	119	120		Fully depressed	1.95 - 2.4 V	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal assembly. Refer to <u>ACC-3. "Removal and Installation"</u>.

P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P2127, P2128 APP SENSOR

DTC Logic

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INFOID:000000009758692

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)		Possible cause
P2127	APP SEN 2/CIRC (Throttle/Pedal position sensor/switch "E" circuit low)	An excessively low voltage from the APF sensor 2 is sent to ECM.	Harness or connectors (APP sensor 2 circuit is open or shorted.)
P2128	APP SEN 2/CIRC (Throttle/Pedal position sensor/switch "E" circuit high)	An excessively high voltage from the AP sensor 2 is sent to ECM.	 Accelerator pedal position sensor (APP sensor 2) Sensor power supply 2 circuit
	FIRMATION PROCE	EDURE	
before cond I. Turn ig 2. Turn ig 3. Turn ig	ducting the next test. nition switch OFF and nition switch ON.	wait at least 10 seconds. wait at least 10 seconds.	always perform the following procedure
		g procedure, confirm that battery	voltage is more than 8 V at idle.
Before per			voltage is more than 8 V at idle.
Before per >> 2.PERFOI	Forming the followin GO TO 2. RM DTC CONFIRMAT	ION PROCEDURE	voltage is more than 8 V at idle.
Before per >> 2.PERFOI 1. Start er 2. Check <u>s DTC deta</u> YES >>	Forming the followin GO TO 2. RM DTC CONFIRMAT Ingine and let it idle for DTC. ected?	ION PROCEDURE	voltage is more than 8 V at idle.
Before per >> 2.PERFOI 1. Start er 2. Check Is DTC dete YES >> NO >>	Forming the followin GO TO 2. RM DTC CONFIRMAT Ingine and let it idle for DTC. Ected? Proceed to <u>EC-435, '</u>	ION PROCEDURE 1 second.	voltage is more than 8 V at idle.
Before per >> 2.PERFOI 1. Start er 2. Check s DTC deta S DTC deta YES >> NO >> Diagnosi	Forming the followin GO TO 2. RM DTC CONFIRMAT Ingine and let it idle for DTC. Ected? Proceed to <u>EC-435.</u> INSPECTION END	ION PROCEDURE 1 second. Diagnosis Procedure".	
Before per >> 2.PERFOI 1. Start er 2. Check S DTC dete YES >> NO >> Diagnosi 1.CHECK 1. Turn ig 2. Discon 3. Turn ig	forming the followin GO TO 2. RM DTC CONFIRMAT ngine and let it idle for DTC. ected? Proceed to <u>EC-435.</u> INSPECTION END S Procedure APP SENSOR 2 POV nition switch OFF. nect accelerator peda nition switch ON.	ION PROCEDURE 1 second. Diagnosis Procedure".	INFOID.00000009758693
Before per >> 2.PERFOI 1. Start er 2. Check S DTC dete YES >> NO >> Diagnosi 1.CHECK 1. Turn ig 2. Discon 3. Turn ig	forming the followin GO TO 2. RM DTC CONFIRMAT ngine and let it idle for DTC. ected? Proceed to <u>EC-435.</u> INSPECTION END S Procedure APP SENSOR 2 POV nition switch OFF. nect accelerator peda nition switch ON.	TON PROCEDURE 1 second. Diagnosis Procedure". VER SUPPLY position (APP) sensor harness con PP sensor harness connector and g	INFOID.000000009758693
Before per >> 2.PERFOI 1. Start er 2. Check <u>s DTC dete</u> YES >> NO >> Diagnosi 1.CHECK 1. Turn ig 2. Discon 3. Turn ig 4. Check	forming the followin GO TO 2. RM DTC CONFIRMAT ngine and let it idle for DTC. ected? Proceed to <u>EC-435.</u> INSPECTION END S Procedure APP SENSOR 2 POV nition switch OFF. nect accelerator peda nition switch ON. the voltage between A	TION PROCEDURE 1 second. Diagnosis Procedure". VER SUPPLY position (APP) sensor harness con	INFOID.00000009758693

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Check sensor power supply 2 circuit. Refer to EC-444, "Diagnosis Procedure".

P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

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

3.CHECK APP SENSOR 2 GROUND CIRCUIT

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

	+			
APP	sensor	ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	1	E16	120	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT

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

	+			
APP	sensor	ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	6	E16	119	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK APP SENSOR

Check APP sensor. Refer to EC-436, "Component Inspection (APP Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-39. "Intermittent Incident".

NO >> Replace accelerator pedal assembly. Refer to <u>ACC-3. "Removal and Installation"</u>.

Component Inspection (APP Sensor)

INFOID:000000009758694

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 between ECM harness connector terminals as per the following condition.

	ECM					
Connector	+ –		Condition		Voltage	
Connector	Terminal					
	126 127 119 120	127		Fully released	0.6 - 0.9 V	
E16			Accelerator pedal	Fully depressed	3.9 - 4.7 V	
EIO			Fully released	0.3 - 0.6 V		
	119	120		Fully depressed	1.95 - 2.4 V	

Is the inspection result normal?

P2127, P2128 APP SENSOR

EC-437

< DTC/CIRCUIT DIAGNOSIS > YES >> INSPECTION END

NO >> Replace accelerator pedal assembly. Refer to <u>ACC-3, "Removal and Installation"</u>.

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P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P2135 TP SENSOR

DTC Logic

NOTE:

If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-353, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P2135	TP SENSOR-B1 (Throttle/Pedal position sensor/switch "A" / "B" voltage correlation)	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	 Harness or connector (TP sensor 1 or 2 circuit is open or shorted.) Electric throttle control actuator (TP sensor 1 or 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.

2. Check DTC.

Is DTC detected?

- YES >> Proceed to EC-438, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1. CHECK THROTTLE POSITION SENSOR POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect electric throttle control actuator harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between electric throttle control actuator harness connector and ground.

	+		
	e control actu- tor	_	Voltage (Approx.)
Connector	Terminal		
F7	ConnectorTerminalF72		5.0 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

2. Disconnect ECM harness connector.

EC-438

INFOID:000000009758696

P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

3. Check the continuity between electric throttle control actuator harness connector and ground.

	+	_		
	e control actu- tor	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	2	ConnectorTerminalF2580		Existed

Also check harness for short to ground.

Is the inspection result normal?

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

${\it 3.}$ CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- Check the continuity between electric throttle control actuator harness connector and ECM harness con-3. nector.

	+	+		_	
		ottle control actu- ator	E	СМ	Continuity
Connector	Terminal	r Terminal	Connector	Terminal	
F7	4	4	F25	78	Existed

Also check harness for short to power. 4.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT

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

	+		_	
	le control actu- tor	ECM		Continuity
Connector	Terminal	Connector Terminal		
F7	1	F25	79	Existed
17	3	125	77	LAISted

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

	•					
<u>Is the ir</u>	nspection result normal?					
YES	>> GO TO 5.					
NO	>> Repair open circuit or short to ground or short to power in harness or connectors.					
5.сне	5. CHECK THROTTLE POSITION SENSOR					
Check	throttle position sensor. Refer to EC-439, "Component Inspection (TP Sensor)".					
<u>Is the ir</u>	Is the inspection result normal?					
YES	>> Check intermittent incident. Refer to GI-39, "Intermittent Incident".					

>> Replace electric throttle control actuator. Refer to EM-27, "Removal and Installation". NO

Component Inspection (TP Sensor)

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF. А

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P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

- 2. Reconnect all harness connectors disconnected.
- 3. Perform "Throttle Valve Closed Position Learning". Refer to EC-139, "Work Procedure".
- 4. Turn ignition switch ON.
- 5. Set selector lever to D (CVT) or 1st (M/T) position.
- 6. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM						
Connec-	+	_	Condition		Voltage	
tor	Terr	ninal				
	77	- 78		Fully released	Less than 4.75 V	
F25			Accelerator	Fully depressed	More than 0.36 V	
FZƏ	79	pedal	Fully released	More than 0.36 V		
	19			Fully depressed	Less than 4.75 V	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to <u>EM-27, "Removal and Installation"</u>.

P2138 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P2138 APP SENSOR

DTC Logic

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DTC DETECTION LOGIC
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NOTE:

If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-353, "DTC Logic"</u>.

DTC No.	CONSULT screen ter (Trouble diagnosis co tent)	-	DTC detecting condition	Possible cause
P2138	APP SENSOR (Throttle/Pedal positio sensor/switch "D" / "E' voltage correlation)	" com	ionally incorrect voltage is sent to ECM npared with the signals from APP sensor nd APP sensor 2.	 Harness or connector (APP sensor 1 or 2 circuit is open or shorted.) Accelerator pedal position sensor (APP sensor 1 or 2) Sensor power supply 2 circuit
	FIRMATION PRO	CEDUF	RE	
before cond 1. Turn ig 2. Turn ig 3. Turn ig TESTING (ducting the next tes nition switch OFF a nition switch ON. nition switch OFF a CONDITION:	and wait and wait	been previously conducted, alwa at least 10 seconds. at least 10 seconds. cedure, confirm that battery vo	ays perform the following procedure Itage is more than 8 V at idle.
~	GO TO 2.			
`	RM DTC CONFIRM			
Z .PERFOR			ROOLDONL	
1. Start er	ngine and let it idle			
1. Start er 2. Check	ngine and let it idle DTC.			
1. Start er 2. Check I <u>s DTC dete</u> YES >>	ngine and let it idle DTC. ected? Proceed to <u>EC-44</u>	for 1 sec	cond.	
1. Start er 2. Check I <u>s DTC dete</u> YES >>	ngine and let it idle DTC. ected?	for 1 sec	cond.	
1. Start er 2. Check I <u>s DTC dete</u> YES >> NO >>	ngine and let it idle DTC. ected? Proceed to <u>EC-44</u>	for 1 sec	cond.	INFOID:00000009758699
1. Start er 2. Check I <u>s DTC dete</u> YES >> NO >> Diagnosis	ngine and let it idle DTC. ected? Proceed to <u>EC-44</u> INSPECTION ENI	for 1 sec <u>1, "Diag</u> D	cond. nosis Procedure".	INFOID:00000009758699
1. Start er 2. Check <u>Is DTC dete</u> YES >> NO >> Diagnosis 1. CHECK 1. Turn ig 2. Disconi 3. Turn ig	ngine and let it idle DTC. ected? Proceed to <u>EC-44</u> INSPECTION ENI S Procedure APP SENSOR 1 P nition switch OFF. nect accelerator pe nition switch ON.	for 1 sec <u>1, "Diag</u> D POWER S	cond. nosis Procedure".	ctor.
1. Start er 2. Check <u>Is DTC dete</u> YES >> NO >> Diagnosis 1. CHECK 1. Turn ig 2. Discon 3. Turn ig	ngine and let it idle DTC. ected? Proceed to <u>EC-44</u> INSPECTION ENI S Procedure APP SENSOR 1 P nition switch OFF. nect accelerator pe nition switch ON.	for 1 sec <u>1, "Diag</u> D POWER S	cond. <u>nosis Procedure"</u> . SUPPLY tion (APP) sensor harness connector and gro	ctor.
1. Start er 2. Check Is DTC dete YES >> NO >> Diagnosis 1.CHECK 1. Turn ig 2. Discon 3. Turn ig 4. Check	ngine and let it idle DTC. ected? Proceed to <u>EC-44</u> INSPECTION ENI S Procedure APP SENSOR 1 P nition switch OFF. nect accelerator pe nition switch ON. the voltage betwee	for 1 sec <u>1, "Diag</u> D POWER S	cond. <u>nosis Procedure"</u> . SUPPLY tion (APP) sensor harness connector and gro Voltage	ctor.
1. Start er 2. Check Is DTC dete YES >> NO >> Diagnosis 1.CHECK 1. Turn ig 2. Discon 3. Turn ig 4. Check	ngine and let it idle DTC. ected? Proceed to <u>EC-44</u> INSPECTION ENI S Procedure APP SENSOR 1 P nition switch OFF. nect accelerator pe nition switch ON. the voltage betwee	for 1 sec <u>1, "Diag</u> D POWER S	cond. <u>nosis Procedure"</u> . SUPPLY tion (APP) sensor harness connector and gro	ctor.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

P2138 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

2. Disconnect ECM harness connector.

3. Check the continuity between APP sensor harness connector and ECM harness connector.

+				
APP	APP sensor		ECM	
Connector	Terminal	Connector	Terminal	
E12	4	E16	122	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3.CHECK APP SENSOR 2 POWER SUPPLY

Check the voltage between APP sensor harness connector and ground.

	+			
APP	sensor	-	Voltage (Approx.)	
Connector	Connector Terminal			
E12	E12 5		5.0 V	

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Check sensor power supply 2 circuit. Refer to EC-444, "Diagnosis Procedure".

Is inspection result normal?

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

5. CHECK APP SENSOR GROUND CIRCUIT

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

3. Check the continuity between APP sensor harness connector and ECM harness connector.

	+	-			
APP	sensor	ECM		Continuity	
Connector	Terminal	Connector Terminal			
E12	1	E16	120	Existed	
L'12	2		127	LAISIEU	

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

 $\mathbf{6}$.CHECK APP SENSOR INPUT SIGNAL CIRCUIT

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

P2138 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

	+		_				
	sensor	F	CM	Continuity			
Connector	Terminal	Connector	Terminal	Gontinoity			
E40	3	F16	126	Eviated			
E12	6	E16	119	Existed			
Also che	eck harness	for short to g	ground and to	o power.			
	<u>ction result n</u>	ormal?					
-	GO TO 7. Repair or re	nlace error-d	latacted nart	.e			
-	APP SENSO	•		.0			
			"Componer	at Inspection	(APP Sensor)".		
	ction result n		<u>, componer</u>	<u>it inspection</u>	(AFF Selisor).		
			ent. Refer to	GI-39. "Intern	nittent Incident"		
						and Installation".	
ompone	ent Inspec	tion (APP	Sensor)				INFOID:000000009758700
-	-						
	ACCELERAT		POSITION 8	SENSOR			
	nition switch ect all harne		ra diagonnag	tod			
	nition switch		rs disconnec	cled.			
			l harness co	nnector termi	nals as per the	following condition	on.
	-					J	
	ECM						
Connector	+	_		Condition		Voltage	
Connector		– minal		Condition		Voltage	
Connector				Condition	Fully released	0.6 - 0.9 V	
Connector E16	Terr	minal	Accelerator p	-	Fully depressed	0.6 - 0.9 V 3.9 - 4.7 V	
	Terr	minal	Accelerator po	-	Fully depressed Fully released	0.6 - 0.9 V 3.9 - 4.7 V 0.3 - 0.6 V	
E16	Terr 126 119	ninal 127 120	Accelerator po	-	Fully depressed	0.6 - 0.9 V 3.9 - 4.7 V	
E16	Terr 126 119 ction result n	ninal 127 120 <u>ormal?</u>	Accelerator po	-	Fully depressed Fully released	0.6 - 0.9 V 3.9 - 4.7 V 0.3 - 0.6 V	
E16 s the inspec YES >>	Terr 126 119 ction result n INSPECTIO	ninal 127 120 <u>ormal?</u> N END		edal	Fully depressed Fully released Fully depressed	0.6 - 0.9 V 3.9 - 4.7 V 0.3 - 0.6 V 1.95 - 2.4 V	
E16 s the inspec YES >>	Terr 126 119 ction result n INSPECTIO	ninal 127 120 <u>ormal?</u> N END		edal	Fully depressed Fully released Fully depressed	0.6 - 0.9 V 3.9 - 4.7 V 0.3 - 0.6 V	
E16 s the inspec YES >>	Terr 126 119 ction result n INSPECTIO	ninal 127 120 <u>ormal?</u> N END		edal	Fully depressed Fully released Fully depressed	0.6 - 0.9 V 3.9 - 4.7 V 0.3 - 0.6 V 1.95 - 2.4 V	
E16 <u>s the inspec</u> YES >>	Terr 126 119 ction result n INSPECTIO	ninal 127 120 <u>ormal?</u> N END		edal	Fully depressed Fully released Fully depressed	0.6 - 0.9 V 3.9 - 4.7 V 0.3 - 0.6 V 1.95 - 2.4 V	
E16 the inspec YES >>	Terr 126 119 ction result n INSPECTIO	ninal 127 120 <u>ormal?</u> N END		edal	Fully depressed Fully released Fully depressed	0.6 - 0.9 V 3.9 - 4.7 V 0.3 - 0.6 V 1.95 - 2.4 V	
E16 <u>s the inspec</u> YES >>	Terr 126 119 ction result n INSPECTIO	ninal 127 120 <u>ormal?</u> N END		edal	Fully depressed Fully released Fully depressed	0.6 - 0.9 V 3.9 - 4.7 V 0.3 - 0.6 V 1.95 - 2.4 V	
E16 the inspec YES >>	Terr 126 119 ction result n INSPECTIO	ninal 127 120 <u>ormal?</u> N END		edal	Fully depressed Fully released Fully depressed	0.6 - 0.9 V 3.9 - 4.7 V 0.3 - 0.6 V 1.95 - 2.4 V	
E16 s the inspec YES >>	Terr 126 119 ction result n INSPECTIO	ninal 127 120 <u>ormal?</u> N END		edal	Fully depressed Fully released Fully depressed	0.6 - 0.9 V 3.9 - 4.7 V 0.3 - 0.6 V 1.95 - 2.4 V	
E16 s the inspec YES >>	Terr 126 119 ction result n INSPECTIO	ninal 127 120 <u>ormal?</u> N END		edal	Fully depressed Fully released Fully depressed	0.6 - 0.9 V 3.9 - 4.7 V 0.3 - 0.6 V 1.95 - 2.4 V	
E16 s the inspec YES >>	Terr 126 119 ction result n INSPECTIO	ninal 127 120 <u>ormal?</u> N END		edal	Fully depressed Fully released Fully depressed	0.6 - 0.9 V 3.9 - 4.7 V 0.3 - 0.6 V 1.95 - 2.4 V	

SENSOR POWER SUPPLY 2 CIRCUIT

Description

ECM supplies a voltage of 5.0 V to some of the sensors systematically divided into 2 groups, respectively. Accordingly, when a short circuit develops in a sensor power source, a malfunction may occur simultaneously in the sensors belonging to the same group as the shorted-circuit sensor.

Sensor power supply 1

- Battery current sensor
- Crankshaft position (CKP) sensor (POS)
- Throttle position (TP) sensor
- Accelerator pedal position (APP) sensor 1

NOTE:

If sensor power supply 1 circuit is malfunctioning, DTC P0643 is displayed.

Sensor power supply 2

- Camshaft position (CMP) sensor (PHASE)
- Mass air flow (MAF) sensor
- Engine oil pressure (EOP) sensor
- Exhaust valve timing (EVT) control position sensor
- Accelerator pedal position (APP) sensor 2
- · Intake manifold runner control valve position sensor

Diagnosis Procedure

INFOID:000000009758702

1. CHECK ACCELERATOR PEDAL POSITION SENSOR 2 POWER SUPPLY CIRCUIT-1

- 1. Turn ignition switch OFF.
- 2. Disconnect accelerator pedal position (APP) sensor harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between APP sensor harness connector and ground.

	+		Voltage (Approx.)	
APP	sensor	_		
Connector	Connector Terminal		, , , ,	
E12 5		Ground	5.0 V	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 2 POWER SUPPLY CIRCUIT-2

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Turn ignition switch ON.
- 4. Check the continuity between APP sensor harness connector and ECM.

CVT models

+			_		
APP	APP sensor		ECM		
Connector	Terminal	Connector	Terminal		
E12	5	E16	118	Existed	

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

 ${\it 3.}$ CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

SENSOR POWER SUPPLY 2 CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

ECM Sensor Terminal Terminal Connector Name Connector 32 CMP sensor (PHASE) F39 1 F24 40 EOP sensor F2 1 EVT control position sensor 44 F57 1 F25 1 36 MAF sensor F31

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK COMPONENTS

Check the following.

Sensor	Reference
CMP sensor (PHASE)	EC-282, "Component Inspection [CMP Sensor (PHASE)]"
MAF sensor	EC-188. "Component Inspection (MAF Sensor)"
EOP sensor	EC-342, "Component Inspection (EOP Sensor)"
EVT control position sensor	EC-360, "Component Inspection (EVT Control Position Sensor)"
Is the inspection result normal	<u>?</u>
	malfunctioning component.
5. CHECK APP SENSOR	
Check APP sensor. Refer to <u>E</u>	C-436, "Component Inspection

Is the inspection result normal?

YES	>> Check intermittent incident. Refer to GI-39, "Intermittent Incident".

NO >> Replace accelerator pedal assembly. Refer to <u>ACC-3, "Removal and Installation"</u>.

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< DTC/CIRCUIT DIAGNOSIS >

BRAKE PEDAL POSITION SWITCH

Component Function Check

1.CHECK BRAKE PEDAL POSITION SWITCH FUNCTION

With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "ENGINE" using CONSULT.
- 3. Select "BRAKE SW1" in "DATA MONITOR" mode.
- 4. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Con	Indication	
BRAKE SW1	Brake pedal	Slightly depressed	OFF
DIVARE OWN	Diake pedal	Fully released	ON

Without CONSULT

1. Turn ignition switch ON.

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

ECM					
Connector	+	-	Con	Voltage (Approx.)	
Connector	Terminal	Terminal		√ FF - 7	
E16	116	127	Brake pedal Slightly depressed		0 V
	110	121	Diake pedal	Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-446, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000009758704

1. CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect brake pedal position switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between brake pedal position switch harness connector and ground.

	+			
Brake pedal p	position switch	-	Voltage	
Connector	Terminal			
E36	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

- 1. Pull out #5 fuse.
- 2. Check that the fuse is not fusing.

3. Check the continuity between stop lamp switch harness connector and fuse terminal.

BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

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	+		Continuity			
	Torminal	_	Continuity			
Connector E36	Terminal 1	#5 fuse ter-	Existed			
1 Alee eks		minal				
4. Also che Is the inspec		for short to g	round and s	nort to power	•	
•		er supply circu	uit for $12V/b$	attery nower	supply	
		place error-de			Supply.	
3. снеск е	BRAKE PED	AL POSITIO	N SWITCH I	NPUT SIGN	AL CIRCUIT	
 Turn ign Disconn 	ition switch ect ECM ha	OFF. rness connec	tor.			ector and ECM harness connec-
					_	
		-	N 4	Continuit		
	Torminal	EC		Continuity		
Connector E36	Terminal 2	Connector E16	Terminal 116	Existed		
			-		<u>.</u>	
4. Also che Is the inspec		for short to g		non to power	•	
YES >>	GO TO 4.					
	•	place error-de	•	S.		
		AL POSITIO				
			efer to <u>EC-4</u>	<u>47, "Compon</u>	ent Inspection	(Brake Pedal Position Switch)"
Is the inspec			at Dafarta (sitte et le sisle et	
					nittent Incident 22, "Exploded	
		tion (Brake				
	пі пізрес	lion (Diake	FEUdir		non	INFOID:00000009758705
 СНЕСК Е 	BRAKE PED	AL POSITIO	N SWITCH-			
1. Turn ign	ition switch	OFF.				
2. Disconn	ect brake pe	edal position s				
3. Check th	ne continuity	between bra	ike pedal po	sition switch	terminals und	er the following conditions.
Brake nedal r	osition switch					
+	_		Condition		Continuity	
	inals		Condition		Continuity	
ICIII	111015		Fully r	eleased	Existed	
1	2	Brake pedal		/ depressed	Not existed	-
le the inence	tion result n	ormal?	Sign	acpiesseu		
Is the inspec	INSPECTIO					
YES >>						
	GO TO 2.					
NO >>		AL POSITIO	N SWITCH-	I		
NO >> 2.CHECK E	BRAKE PED	AL POSITIO			R-15, "Adjustm	ent"

BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

Brake pedal position switch					
+	_	Condition Continuity			
Terminals					
1	2	Brake pedal	Fully released	Existed	
	2	Diake pedal	Slightly depressed	Not existed	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace brake pedal position switch. Refer to <u>BR-22</u>, "Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

ASCD INDICATOR

Component Function Check

1. CHECK ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	COND	ITION	SPECIFICATION
CRUISE LAMP	Ignition switch: ON	 MAIN switch: Pressed at the 1st time → at the 2nd time 	$ON\toOFF$
	MAIN switch: ON	ASCD: Operating	ON
SET LAMP	When vehicle speed is between 38 km/h (24 MPH) and 160 km/h (100 MPH)	ASCD: Not operating	OFF
Is the inspection re	esult normal?		
	ECTION END eed to <u>EC-449, "Diagnosis Procedure"</u>		
Diagnosis Pro		·	INFOID:000000009758707
1. СНЕСК ДТС			
Check that DTC U	JXXXX is not displayed.		
Is the inspection re			
YES >> GO T			
^	rm trouble diagnosis for DTC UXXXX. VITH COMBINATION METER		
Is the inspection r	combination meter. Refer to <u>MWI-26, "</u>		
YES >> GO T			
	ir or replace error-detected parts.		
3.CHECK INTER	RMITTENT INCIDENT		
Check intermittent	t incident. Refer to <u>GI-39, "Intermittent</u>	t Incident".	
Is the inspection re			
	ace combination meter. Refer to <u>MWI-</u> ir or replace error-detected parts.	77, "Removal and Installation".	

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INFOID:000000009758706

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FUEL INJECTOR

Component Function Check

1.INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.

NO >> Proceed to EC-450, "Diagnosis Procedure".

2. CHECK FUEL INJECTOR FUNCTION

With CONSULT

- 1. Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 3. Check that each circuit produces a momentary engine speed drop.

Without CONSULT

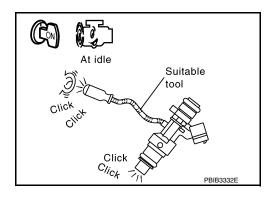
- 1. Let engine idle.
- 2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-450, "Diagnosis Procedure".



Diagnosis Procedure

1.CHECK FUSE

- 1. Turn ignition switch OFF.
- 2. Pull out #52 fuse and check that the fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the fuse after repairing the applicable circuit.

2. CHECK FUEL INJECTOR POWER SUPPLY

- 1. Insert the fuse which pulled out.
- 2. Disconnect fuel injector harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between fuel injector harness connector and ground.

	+			
	Fuel injector	-	Voltage	
Cylinder	Connector	Terminal		
1	F18	1		
2	F19	1	Ground	Pattony voltago
3	F20	1	Ground	Battery voltage
4	F21	1		

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3. INFOID:000000009758708

FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

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$\overline{\mathbf{3.}}$ CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector.
- 3. Check the continuity between fuel injector harness connector and IPDM E/R harness connector.

	+			-		
	Fuel injector			IPDM E/R		
Cylinder	Connector	Terminal	Connector	Terminal		
1	F18	1				
2	F19	1	E43	E43	E43 18	Existed
3	F20	1				
4	F21	1]			

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-39, "Intermittent Incident"</u>.

NO >> Repair or replace error-detected parts.

4.CHECK FUEL INJECTOR CONTROL CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between fuel injector harness connector and ECM harness connector.

	+			_	
	Fuel injector		E	CM	Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F18	2		13	
2	F19	2	F24	14	Existed
3	F20	2	F24	10	Existed
4	F21	2		9	

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

<u>Is the inspection result normal?</u> YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK FUEL INJECTOR

Check the fuel injector. Refer to EC-451. "Component Inspection (Fuel Injector)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-39, "Intermittent Incident"

NO >> Replace malfunctioning fuel injector. Refer to EM-40, "Removal and Installation".

Component Inspection (Fuel Injector)

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.

2. Disconnect fuel injector harness connector.

3. Check resistance between fuel injector terminals as per the following.

FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

Fuel i	njector				
+	_	Conditio	Resistance		
Term	ninals				
1	2	Temperature °C (°F)	10 - 60 (50 - 140)	11.1 – 14.5 Ω	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning fuel injector. Refer to <u>EM-40. "Removal and Installation"</u>

< DTC/CIRCUIT DIAGNOSIS >

FUEL PUMP

Component Function Check

1. CHECK FUEL PUMP FUNCTION

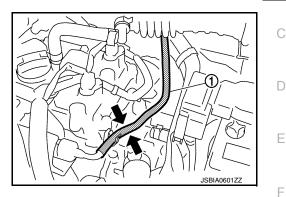
1. Turn ignition switch ON.

2. Pinch fuel feed hose ① with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to EC-453, "Diagnosis Procedure".



Diagnosis Procedure

INFOID:000000009758712

1.CHECK	UEL PUMP	POWER SL		CUIT-1	G
2. Disconn		rness conneo	ctor.		6
	iition switch he voltage b		harness co	onnector and ground.	Н
	E	СМ			I
	+	-	_	Voltage	
Connector	Terminal	Connector	Terminal		
F24	18	E16	128	Battery voltage	J
Is the inspec		ormal?			
	GO TO 3. GO TO 2.				K
•		POWER SU			
				5011-2	<u> </u>
	ition switch ect IPDM E	OFF. /R harness co	onnector.		L
				ness connector and ECM harness connector.	
					M
	+	-	_	_	
	/I E/R	EC	-	Continuity	NI
Connector	Terminal	Connector	Terminal		Ν
E46	45	F24	18	Existed	
		-	round and s	short to power.	0
Is the inspect YES >>	ction result n GO TO 8.	iormal?			
-		place error-d	etected par	ts.	D
•	•	POWER SL	•		Р
	ition switch	OFF.			
2. Reconn					
	ect all harne	ess connector		cted.	

5. Check the voltage between fuel pump harness connector and ground.

INFOID:000000009758711

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EC

FUEL PUMP

	+			
	Fuel	pump	_	Voltage
Conne	ector	Terminal		
B48 1		Ground	Battery voltage should for exist 1 second after ignition switch is turn ON.	
YES	>> (>> (<u>ion result nor</u> GO TO 6. GO TO 4. USE	<u>mal?</u>	
2. Dis	conne	tion switch O ect 15A fuse (5A fuse.	FF. (No. 50) from	IPDM E/R.
<u>Is the ir</u>	spect	ion result nor	<u>mal?</u>	
YES NO		GO TO 5. Replace 15A f	fuse.	

5. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-4

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector.
- 3. Check the continuity between IPDM E/R harness connector and fuel pump harness connector.

	+			
IPDN	/I E/R	Fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E43	10	B48	1	Existed

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK FUEL PUMP GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Check the continuity between fuel pump harness connector and ground.

	+			
Fuel	pump	_	Continuity	
Connector	Terminal			
B48	3	Ground	Existed	

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK FUEL PUMP

Check fuel pump. Refer to EC-455, "Component Inspection (Fuel Pump)".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace fuel filter and fuel pump. Refer to <u>FL-6. "Exploded View"</u>.

8.CHECK INTERMITTENT INCIDENT

FUEL PUMP

FUEL PUMP						
< DTC/CIR		NOSIS >			[MRA8DE]	
Check inter	mittent incide	ent. Refer to <u>GI-39, "Interr</u>	mittent In	<u>cident"</u> .		
	<u>ction result n</u>					А
YES >>	Replace IPE	DM E/R. Refer to <u>PCS-30.</u> nd Installation" (Without ir	<u>, "Remov</u>	<u>val and Installati</u>	ion" (With intelligent key) or <u>PCS-58.</u>	
NO >>		place error-detected parts		key).		EC
Compone	ent Inspec	tion (Fuel Pump)			INFCID:000000009758713	
	•	· · · · · · · · · · · · · · · · · · ·				С
	FUEL PUMP					C
	nition switch	OFF. I sensor unit and fuel pur	nn harna	as connector		
		etween fuel pump termina				D
		I				Е
+ Fuel	l pump	Condition		Resistance		
	 ninals	Condition		Resistance		F
1	3	Temperature °C (°F)	25 (77)	0.2 - 5.0 Ω	-	I
Is the inspe	tion result n	ormal?				
	INSPECTIO		_			G
NO >>	Replace fue	I filter and fuel pump. Ref	fer to <u>FL-</u>	6. "Removal an	<u>d Installation"</u> .	
						Н
						J
						Κ
						L

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< DTC/CIRCUIT DIAGNOSIS >

IGNITION SIGNAL

Component Function Check

1.INSPECTION START

- 1. Turn ignition switch OFF.
- 2. Start engine.

Does the engine start?

YES >> GO TO 2.

NO >> Proceed to EC-456, "Diagnosis Procedure".

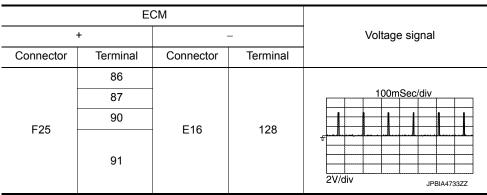
2. IGNITION SIGNAL FUNCTION

(I) With CONSULT

- 1. Perform "POWER BALANCE" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 2. Check that each circuit produces a momentary engine speed drop.

Without CONSULT

- 1. Let engine idle.
- 2. Check the voltage signal between ECM harness connector and ground with an oscilloscope.



NOTE:

The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-456, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK FUSE

1. Turn ignition switch OFF.

2. Pull out #51 fuse and check that the fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the fuse after repairing the applicable circuit.

2.CHECK IGNITION COIL POWER SUPPLY

- 1. Insert the fuse which pulled out.
- 2. Disconnect ignition coil harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ignition coil harness connector and ground.

INFOID:000000009758714

[MRA8DE]

< DTC/CIRCUIT DIAGNOSIS >

	+				—	
	Ignition coil		_	Voltage		
Cylinder	Connector	Terminal				
1	F34	3				
2	F35	3				
3	F36	3	Ground	Battery voltag	е	
4	F37	3				
Is the inspec	ction result n	ormal?		I	—	
NO >>	GO TO 4. GO TO 3. GNITION CO			IRCUIT		
 Turn igr Disconn Check t 	nition switch (nect IPDM E/	OFF. R harness c	onnector.	ness connect	or and ignitio	n c
	M E/R		Ignition coil		Continuity	
Connector	Terminal	Cylinder	Connector	Terminal		
		1	F34	3		—
		2	F35	3	Existed	
E43	17	3	F36	3		Existed
		4	F37	3		
Is the inspect YES >> NO >> 4.CHECK I	eck harness <u>ction result n</u> Check intern Repair or rep GNITION CO nition switch (ormal? nittent incide blace error-d DIL GROUN	ent. Refer to letected part	<u>GI-39, "Interr</u> s.	nittent Incide	<u>nt"</u> .
			nition coil ha	rness connec	tor and grou	าd.
	Ignition coil		_	Continuity		
Cylinder	Connector	Terminal		Continuity		
1	F34	2				
2	F35	2				
3	F36	2	Ground	Existed		
4	F37	2				
	eck harness		ower		—	
	ction result n	•				
•	GO TO 5.					
	Repair or rep	place error-d	etected part	S.		
_			SIGNAL C			

1. Disconnect ECM harness connector.

2. Check the continuity between ECM harness connector and ignition coil harness connector.

< DTC/CIRCUIT DIAGNOSIS >

	+				
	Ignition coil		E	СМ	Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F34	1		86	
2	F35	1	F25	87	Existed
3	F36	1	F20	90	Existed
4	F37	1		91	

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

 $\mathbf{6}$. CHECK IGNITION COIL WITH POWER TRANSISTOR

Check ignition coil with power transistor. Refer to EC-459, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-45, "Exploded View".

7. CHECK CONDENSER CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect condenser.
- 3. Disconnect IPDM E/R harness connector.
- 4. Check the continuity between IPDM E/R harness connector and condenser harness connector.

+				
IPDN	ME/R	Condenser		Continuity
Connector	Terminal	Connector	Terminal	
E43	17	F4	1	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.CHECK CONDENSER GROUND CIRCUIT

1. Check the continuity between Condenser harness connector and ground.

	+		
Cond	lenser	_	Continuity
Connector	Terminal		
F4	2	Ground	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9.CHECK CONDENSER

Check condenser. Refer to EC-459, "Component Inspection (Condenser)".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace condenser.

	IGINI		IGNAL				
< DTC/CIRCUIT DIAG	NOSIS >			[MRA8DE]			
Component Inspec	ction (Condenser)			INFOID:000000009758716			
1.CHECK CONDENSE	ER				A		
 Turn ignition switch Disconnect condens 	OFF. ser harness connector.				EC		
	etween condenser termi	nals as pe	r the following.				
Condenser					С		
+ –	Condition		Resistance				
Terminal	-				D		
1 2	Temperature °C (°F)	25 (77)	Above 1 M Ω				
Is the inspection result rYES>> INSPECTIONNO>> Replace Control	ON END				Ε		
Component Inspec	tion (Ignition Coil w	vith Pow	er Transistor	INFOID:000000009758717	F		
1. CHECK IGNITION C	OIL WITH POWER TRA	NSISTOR	-1				
1. Turn ignition switch					G		
	coil harness connector. etween ignition coil term	inals as pe	er the following				
			i the following.		Н		
Ignition coil with power tran-					11		
sistor	Condition		Resistance				
Terminal	-				I		
2			Except 0 or $\infty \Omega$				
1 3	Temperature °C (°F)	25 (77)	Except 0 Ω		J		
2 3							
Is the inspection result r	normal?				K		
YES >> GO TO 2. NO >> Replace ma	alfunctioning ignition coil	with powe	r transistor. Refe	er to <u>EM-45, "Exploded View"</u> .			
· ·	OIL WITH POWER TRA				L		
CAUTION:					_		
Do the following proce 1. Turn ignition switch	edure in the place wher	re ventilat	ion is good wit	nout the combustible.			
	ess connectors disconne	cted.			M		
3. Remove fuel pump NOTE:	fuse in IPDM E/R to rele	ase fuel p	ressure.				
Do not use CONSU	ILT to release fuel press	ure, or fue	l pressure applie	es again during the following proce-	Ν		
dure. 4. Start engine.							
5. After engine stalls, crank it two or three times to release all fuel pressure.							
 Turn ignition switch Remove all ignition 		to avoid t	he electrical disc	harge from the ignition coils. Refer			
to EM-45, "Explode	<u>d View"</u> .				Р		
	il and spark plug of the c seconds or more to remo			er to <u>EM-45, "Exploded View"</u> . cvlinder	Г		
	and harness connector			- ,			

10. Connect spark plug and harness connector to ignition coil.

< DTC/CIRCUIT DIAGNOSIS >

- 11. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

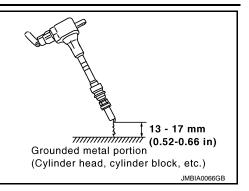
- During the operation, always stay 0.5 cm (19.7 in) away from the spark plug and the ignition coil. Be careful not to get an electrical shock while checking, because the elec-
- trical discharge voltage becomes 20 kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken. NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is mal-functioning.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-45, "Exploded View".



ELECTRICAL LOAD SIGNAL

[MRA8DE] < DTC/CIRCUIT DIAGNOSIS > ELECTRICAL LOAD SIGNAL А Description INFOID:000000009758718 The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred via EC the CAN communication line. Component Function Check INFOID 000000009758719 1.CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION (P)With CONSULT D 1. Turn ignition switch ON. 2. Select "DATA MONITOR" mode of "ENGINE" using CONSULT. 3. Select "LOAD SIGNAL" and check indication as per the following conditions. Ε Monitor item Condition Indication ON ON LOAD SIGNAL Rear window defogger switch OFF OFF Is the inspection result normal? YES >> GO TO 2. NO >> Proceed to EC-461, "Diagnosis Procedure". 2.CHECK LIGHTING SWITCH FUNCTION Н With CONSULT Check "LOAD SIGNAL" indication as per the following conditions. Monitor item Condition Indication ON at 2nd posi-ON tion LOAD SIGNAL Lighting switch OFF OFF Is the inspection result normal? YES >> GO TO 3. Κ NO >> Proceed to EC-461, "Diagnosis Procedure". $\mathbf{3}$.CHECK HEATER FAN CONTROL SWITCH FUNCTION With CONSULT Select "HEATER FAN SW" and check indication as per the following conditions. M Monitor item Condition Indication ON ON HEATER FAN Heater fan control switch SW OFF OFF Ν

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to <u>EC-461, "Diagnosis Procedure"</u>.

Diagnosis Procedure

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to <u>EC-461, "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.

Revision: October 2013

INFOID:000000009758720

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ELECTRICAL LOAD SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

2.CHECK REAR WINDOW DEFOGGER SYSTEM

Check the rear window defogger system. Refer to <u>DEF-27. "Work Flow"</u>.

>> INSPECTION END

3.CHECK HEADLAMP SYSTEM

Check the headlamp system. Refer to EXL-85, "Work Flow".

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Check the heater fan control system. Refer to <u>HA-15, "Workflow"</u>.

>> INSPECTION END

COOLING FAN

Component Function Check

1.CHECK COOLING FAN FUNCTION

With CONSULT

- 1. Turn ignition switch ON.
- 2. Perform "FAN" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 3. Check that cooling fan operates at low speed or high speed.

Without CONSULT

- Activate IPDM E/R auto active test and check cooling fan motors operation. Refer to <u>PCS-9</u>, "<u>Diagnosis</u> <u>Description</u>" (with intelligent key), or <u>PCS-37</u>, "<u>Diagnosis Description</u>" (without intelligent key).
- 2. Check that cooling fan operates.
- Is the inspection result normal?
- YES >> INSPECTION END NO >> Proceed to <u>EC-463</u>, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK COOLING FAN MOTOR GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect cooling fan motor harness connector.
- 3. Check the continuity between cooling fan motor harness connector and ground.

	+		
Cooling	fan motor	_	Continuity
Connector	Terminal		
E53	3	Ground	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK COOLING FAN MOTOR CIRCUIT-1

1. Disconnect IPDM E/R harness connector.

2. Check the continuity between IPDM E/R harness connector and cooling fan motor harness connector.

	+			
IPDI	II E/R	Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E44	23		1	
C44	21	E53	2	Existed
E48	58		4	

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK COOLING FAN MOTOR

Check cooling fan motor. Refer to EC-464, "Component Inspection (Cooling Fan Motor)".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace cooling fan motor. Refer to <u>CO-17, "Removal and Installation"</u>.

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< DTC/CIRCUIT DIAGNOSIS >

4. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Check IPDM E/R. Refer to <u>PCS-10, "CONSULT Function (IPDM E/R)"</u> (With intelligent key system) or <u>PCS-38, "CONSULT Function (IPDM E/R)"</u> (Without intelligent key system).

NO >> Repair or replace error-detected parts.

Component Inspection (Cooling Fan Motor)

INFOID:000000009758723

1. CHECK COOLING FAN MOTOR

Supply cooling fan motor terminals with battery voltage and check operation.

	fan motor minal	Condition	Operation	
+	_			
1	4	12 V direct current supply between terminals 1 and 2	Cooling fan operates.	
		No supply	Cooling fan not operates.	
2	3	12 V direct current supply between terminals 1 and 2	Cooling fan operates.	
		No supply	Cooling fan not operates.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace cooling fan motor. Refer to <u>CO-17, "Removal and Installation"</u>.

		REFR	IGERAN 1	PRESSURE SENSOR		
< DTC/CIRC	CUIT DIAGN	IOSIS >			[MRA8DE]	
REFRIG	ERANT F	PRESSU	RE SEN	SOR	٨	
Compone	nt Functio	on Check			A INFOID:000000009758724	L.
1.CHECK F	REFRIGERA	NT PRESSU	IRE SENSO	R OVERALL FUNCTION	EC	C
2. Turn A/0	C switch and	blower fan s	witch ON.	ng temperature. nnector terminals.	С	
	ECM			—		<u>_</u>
Connector	+	_	Voltage		D)
		ninal	4.0 4.0.1/			
E16	103	124	1.0 - 4.0 V	_	E	-
	<u>ction result ne</u>					
	Proceed to E		gnosis Proce	edure".	F	
Diagnosis	Procedu	re			INFOID:000000009758725	
1.CHECK F	REFRIGERA	NT PRESSU	IRE SENSO	R POWER SUPPLY	G	ì
 Disconn Turn ign Check the 	ition switch (ЭŃ.		ss connector. Ire sensor harness connector and ground	н I	I
	' essure sensor	_	Voltage			
Connector	Terminal		(Approx.)		1	
E35	3	Ground	5.0 V	_	J	
$\frac{NO >>}{2.CHECK F}$	GO TO 3. GO TO 2.	NT PRESSU		R POWER SUPPLY CIRCUIT	L	r 1.
tor.	-	between re	frigerant pre	ssure sensor harness connector and EC	M harness connec-	1
	+	-	-	Continuity	Ν	1
Connector	essure sensor Terminal	EC	Terminal	Continuity		
E35	3	E16	104	Existed	0)
	eck harness		-		0	
Is the inspect YES >> NO >>	<u>ction result n</u> Perform the Repair or rep	ormal? trouble diagr place error-d	nosis for pow etected parts	ver supply circuit. S. R GROUND	Ρ)
1. Turn ign 2. Disconn	ition switch (ect ECM har	OFF. mess connec	ctor.	ssure sensor harness connector and ECI	√ harness connec-	

REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

	+				
Refrigerant pr	essure sensor	E	ECM		
Connector	Terminal	Connector	Terminal		
E35	1	E16	124	Existed	

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT

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

+		_		
Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E35	2	E16	103	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK INTERMITTENT INCIDENT.

Check intermittent incident. Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor. Refer to <u>HAC-110, "Removal and Installation"</u> (For automatic air condittioner), or <u>HAC-191, "Removal and Installation"</u> (For manual air condittioner).

NO >> Repair or replace error-detected parts.

MALFUNCTION INDICATOR LAMP

< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]	
MALFUNCTION INDICATOR LAMP		А
Component Function Check	INFOID:000000009758726	A
1.CHECK MIL FUNCTION		EC
1. Turn ignition switch ON.		
2. Check that MIL lights up.		C
Is the inspection result normal?		С
YES >> INSPECTION END NO >> Proceed to <u>EC-467, "Diagnosis Procedure"</u> .		
		D
Diagnosis Procedure	INFOID:000000009758727	
1.снеск отс with есм		E
Check that DTC UXXXX is not displayed.		
Is the inspection result normal?		
YES >> GO TO 2. NO >> Perform trouble diagnosis for DTC UXXXX. Refer to <u>EC-94, "DTC Index"</u> .		F
2. CHECK DTC WITH COMBINATION METER		
Check DTC with combination meter. Refer to <u>MWI-17, "CONSULT Function (METER/M&A)"</u> .		G
Is the inspection result normal?		
YES >> GO TO 3.		Н
NO >> Perform trouble diagnosis for DTC indicated. Refer to <u>MWI-26, "DTC Index"</u> .		
3. CHECK INTERMITTENT INCIDENT		
Check intermittent incident. Refer to GI-39, "Intermittent Incident".		
Is the inspection result normal?		
 YES >> Replace combination meter. Refer to <u>MWI-77, "Removal and Installation"</u>. NO >> Repair or replace error-detected parts. 		J
		K
		1.
		L

M

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ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< 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-468, "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.

<u>A or B</u>

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. Refer to <u>FL-15</u>, "<u>Removal and Installation</u>".
- 2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.1 kg (4.6 lb).

Is the inspection result normal?

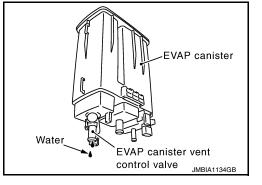
YES >> GO TO 3. NO >> GO TO 4.

3.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister

Does water drain from the EVAP canister?

YES >> GO TO 4. NO >> GO TO 6.



4.REPLACE EVAP CANISTER

Replace EVAP canister with a new one. Refer to FL-15, "Removal and Installation".

>> 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. Refer to <u>FL-15, "Removal and Installation"</u>.

6.CHECK REFUELING EVAP VAPOR CUT VALVE

Check refueling EVAP vapor cut valve. Refer to EC-470, "Component Inspection".

EC-468

INFOID:000000009758729

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Is the inspection result normal?	
YES >> INSPECTION END	А
NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to <u>FL-10, "Removal and Installation"</u> .	
7. CHECK EVAP CANISTER	
1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor	EC
attached. Refer to FL-15, "Removal and Installation".	<u>.</u>
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor	C
attached. The weight should be less than 2.1 kg (4.6 lb).	0
Is the inspection result normal?	
YES >> GO TO 8.	D
NO >> GO TO 9.	
8. CHECK IF EVAP CANISTER IS SATURATED WITH WATER	E
Check if water will drain from EVAP canister.	
Does water drain from the EVAP canister?	
YES >> GO TO 6.	F
NO >> GO TO 11.	
	0
	G
Water Water	
EVAP canister vent	Н
control valve JMBIA1134GB	
9.REPLACE EVAP CANISTER	
Replace EVAP canister with a new one. Refer to FL-15, "Removal and Installation".	
>> 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. Refer to <u>FL-14, "Exploded View"</u> .	
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?	Μ
YES >> GO TO 12. NO >> Repair or replace hoses and tubes.	
12. CHECK FILLER NECK TUBE	Ν
	14
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	
	Р
Check refugling EVAD vapor out value. Defer to EC 470. "Component Inspection"	
Check refueling EVAP vapor cut valve. Refer to <u>EC-470, "Component Inspection"</u> .	
Is the inspection result normal?	
Is the inspection result normal? YES >> GO TO 14.	
Is the inspection result normal? YES >> GO TO 14. NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-10. "Removal and Installation".	
Is the inspection result normal? YES >> GO TO 14.	

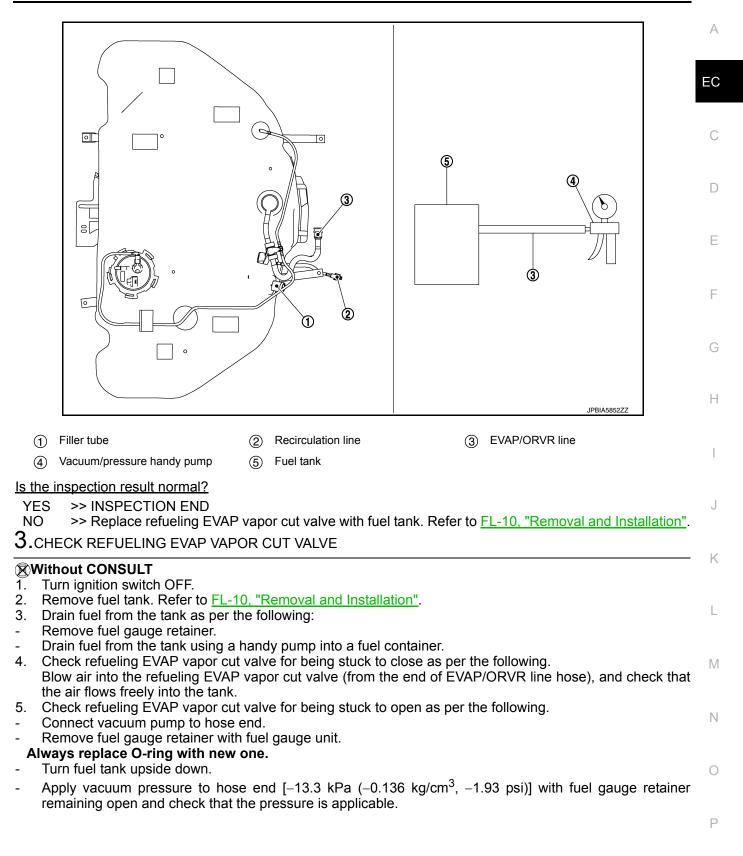
Revision: October 2013

ON BOARD REFUELING VAPOR REC	OVERY (ORVR)
< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]
Is the inspection result normal?	
YES >> GO TO 15. NO >> Replace fuel filler tube. Refer to <u>FL-10. "Exploded View"</u> .	
15. CHECK ONE-WAY FUEL VALVE-1	
Check one-way valve for clogging. Is the inspection result normal?	
YES $>>$ GO TO 16.	
NO >> Repair or replace one-way fuel valve with fuel tank. Refer	to FL-10, "Removal and Installation".
16.CHECK ONE-WAY FUEL VALVE-2	
1. Check that fuel is drained from the tank.	
 Remove fuel filler tube and hose. Refer to <u>FL-10. "Exploded View</u> Check one-way fuel valve for operation as per the following. 	 After removing filler tube
When a stick is inserted, the valve should open, when removing	Alter removing liner tube
stick it should close. Do not drop any material into the tank.	One-way fuel valve
Is the inspection result normal?	
YES >> INSPECTION END	
NO >> Replace fuel filler tube or replace one-way fuel valve with fuel tank. Refer to FL-10, "Removal and Installa-	
tion".	
	Fuel tank
Component Inspection	SEF665U
	INFOID:000000009758730
1.INSPECTION START	
Will CONSULT be used?	
Will CONSULT be used?	
YES >> GO TO 2. NO >> GO TO 3.	
2. CHECK REFUELING EVAP VAPOR CUT VALVE	
With CONSULT	
1. Turn ignition switch OFF.	
 Remove fuel tank. Refer to <u>FL-10, "Removal and Installation"</u>. Drain fuel from the tank as per the following: 	
- Remove fuel feed hose located on the fuel gauge retainer.	
 Connect a spare fuel hose, one side to fuel gauge retainer wher side to a fuel container. 	e the hose was removed and the other
 Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode v 	vith CONSULT.
4. Check refueling EVAP vapor cut valve for being stuck to close as	
Blow air into the refueling EVAP vapor cut valve (from the end of the air flows freely into the tank.	EVAP/ORVR line hose), and check that
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. Apply vacuum pressure to hose end [-13.3 kPa (-0.136 kg/cm 	1^3 -1.93 nsi)] with fuel dauge retainer
remaining open and check that the pressure is applicable.	, 1.00 point with fuch gauge retainer

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< DTC/CIRCUIT DIAGNOSIS >

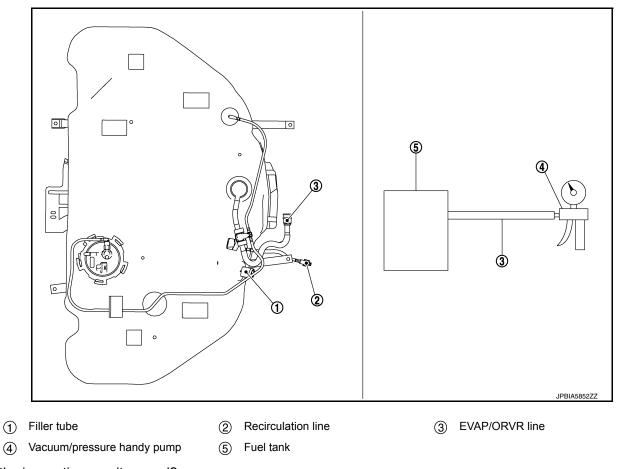
[MRA8DE]



ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to <u>FL-10, "Removal and Installation"</u>.

< SYMPTOM DIAGNOSIS >

SYMPTOM DIAGNOSIS ENGINE CONTROL SYSTEM

Symptom Table

SYSTEM — BASIC ENGINE CONTROL SYSTEM

SYMPTOM													С			
						_					Τ					
		RT (EXCP. HA)		AT SPOT	NOI	POWER/POOR ACCELERATION				ΓE	IPERATURE HIGH	IMPTION	IPTION	CHARGE)		D
		START/RESTART	1	URGING/FI	K/DETONAT	/ER/POOR /	W IDLE	HUNTING	TION	rurn to Id	NATER TEN	NEL CONSI	IL CONSUM	AD (UNDER	Reference page	F
		HARD/NO STA	ENGINE STALL	HESITATION/SURGING/FLAT	SPARK KNOCK/DETONATION	LACK OF POW	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)		G
Warrant	y symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		11
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	<u>EC-453</u>	
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			<u>EC-143</u>	
	Fuel injector circuit	1	1	2	3	2		2	2			2			<u>EC-450</u>	
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			<u>EC-49</u>	
Air	Positive crankcase ventilation sys- tem	3	3	4	4	4	4	4	4	4		4	1		<u>EC-30</u>	J
	Incorrect idle speed adjustment						1	1	1	1		1			<u>EC-479</u>	K
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-425, EC-428, EC-430	
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			<u>EC-480</u>	L
	Ignition circuit	1	1	2	2	2		2	2			2			<u>EC-456</u>	
Main po	wer supply and ground circuit	2	2	3	3	3		3	3		2	3			<u>EC-164</u>	M
Mass ai	r flow sensor circuit	4			2										<u>EC-187</u>	
Engine	coolant temperature sensor circuit	1				-	3			3					<u>EC-198</u>	
Air fuel	ratio (A/F) sensor 1 circuit		1	2	3	2		2	2			2			EC-210, EC-214, EC-217	Ν
Throttle	position sensor circuit						2			2					EC-200, EC-266, EC-372, EC-438	0
Accelera	ator pedal position sensor circuit			3	2	1									<u>EC-432,</u> <u>EC-435,</u> <u>EC-441</u>	Ρ
Knock s	ensor circuit			2								3			<u>EC-275</u>	
Cranksh	naft position sensor (POS) circuit	2	2												<u>EC-277</u>	
Camsha	aft position sensor (PHASE) circuit	3	2												<u>EC-280</u>	

INFOID:000000009758731

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EC

< SYMPTOM DIAGNOSIS >

[MRA8DE]

	SYMPTOM													
	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 symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Vehicle speed signal circuit		2	3		3						3			EC-330 (CVT mod- els), EC- <u>331</u> (M/T models)
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-346, EC-347, EC-348, EC-349, EC-350, EC-351, EC-352
Intake valve timing control solenoid valve cir- cuit		3	2		1	3	2	2	3		3			<u>EC-180</u>
Exhaust valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			<u>EC-183</u>
Exhaust valve timing control position sensor circuit		3	2		1	3	2	2	3		3			<u>EC-359</u>
PNP signal circuit			3		3		3	3			3			<u>EC-355</u>
Refrigerant pressure sensor circuit		2				3			3		4			<u>EC-465</u>
Battery current sensor circuit						4	5	5					3	<u>EC-374,</u> <u>EC-377,</u> <u>EC-380,</u> <u>EC-383</u>
Starter relay circuit	3													<u>EC-399</u> , <u>EC-402</u>
Starter control relay circuit	3													<u>EC-399,</u> <u>EC-402</u>
Electrical load signal circuit							3							<u>EC-461</u>
Intake manifold runner control valve motor cir- cuit					4	4								<u>EC-413</u>
Intake manifold runner control valve position sensor circuit					4	4								<u>EC-416</u>
Intake manifold tuning valve circuit					1									<u>EC-408</u>

< SYMPTOM DIAGNOSIS >

[MRA8DE]

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		SYMPTOM													^
	(EXCP. HA)		SPOT		ACCELERATION					ATURE HIGH	ION	Z	RGE)	1	A EC
	START/RESTART (E)		HESITATION/SURGING/FLAT S	SPARK KNOCK/DETONATION		DLE	ITING	7	N TO IDLE	ER TEMPERATURE	CONSUMPTION	CONSUMPTION	(UNDER CHARGE)	Reference page	С
		STALL	IION/SURG	KNOCK/DE	F POWER/POOR	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER	SIVE FUEL	OIL	DEAD		D
	HARD/NO	ENGINE	HESITAI	SPARK I	LACK OF	HIGH ID	ROUGH		SLOW/N	OVERHE	EXCESSIVE	EXCESSIVE	BATTERY		Е
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-51 (Auto A/C), HAC-156 (Manual air condition- ing)	F
ABS actuator and electric unit (control unit)			4											<u>BRC-51</u>	Н

1 - 6: The numbers refer to the order of inspection.

(continued on next table)

SYSTEM — ENGINE MECHANICAL & OTHER

							S	YMPT	ОМ							
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDTE/TOM IDTE	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	4 1 1 1
Warrant	y symptom code	A A	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		(
Fuel	Fuel tank	5													<u>FL-13</u>	
	Fuel piping	- 5		5	5	5		5	5			5			<u>FL-5</u>	
	Vapor lock		5												_	F
	Valve deposit														_	
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5			5			_	

< SYMPTOM DIAGNOSIS >

[MRA8DE]

							S`	YMPT	OM						
		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	A A	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Air	Air duct														<u>EM-26</u>
,	Air cleaner	-													<u>EM-26</u>
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)		5	5		5		5	5			5			<u>EM-26</u>
	Electric throttle control actuator	5			5		5			5					
	Air leakage from intake manifold/ Collector/Gasket														<u>EM-27</u>
Cranking	Battery	1	1	1		1		1	1					1	PG-4
	Generator circuit		1	I		I		I	I					1	<u>CHG-14</u>
	Starter circuit	3													<u>STR-20,</u> <u>STR-24</u>
	Signal plate	6										1			<u>EM-103</u>
	PNP signal	4													<u>TM-165</u> (CVT mod- els), <u>TM-</u> <u>17</u> (6MT models)
Engine	Cylinder head	5	5	5	5	5		5	5			5			<u>EM-79</u>
	Cylinder head gasket				5					ļ	4		3		
	Cylinder block														
	Piston												4		
	Piston ring	6	6	6	6	6		6	6			6			<u>EM-103</u>
	Connecting rod				-										
	Bearing														
	Crankshaft														
Valve mecha-	Timing chain														<u>EM-58</u>
nism	Camshaft														<u>EM-64</u>
	Intake valve timing control	5	5	5	5	5		5	5			5			<u>EC-181</u>
	Exhaust valve timing control	_													<u>EC-184</u>
	Intake valve												3		<u>EM-79</u>
	Exhaust valve														

< SYMPTOM DIAGNOSIS >

[MRA8DE]

SYMPTOM												Λ				
		ТАRТ (ЕХСР. НА)		3/FLAT SPOT	NATION	DR ACCELERATION		U) IDLE	TEMPERATURE HIGH	NSUMPTION	SUMPTION	ER CHARGE)		A EC C
		HARD/NO START/RESTART	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	D
Warranty s	symptom code	A A	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		F
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			<u>EX-4, EX-</u> <u>7, EM-32</u>	G
<u> </u>	Three way catalyst														EN4 05 111	G
Lubrica- tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			<u>EM-35, LU-</u> <u>11, LU-16</u>	
	Oil level (Low)/Filthy oil														<u>LU-7</u>	Н
Cooling	Radiator/Hose/Radiator filler cap														<u>CO-16</u>	
	Thermostat									5					<u>CO-23</u>	
	Water pump														<u>CO-19</u>	
	Water gallery	5	5	5	5	5		5	5		2	5			<u>CO-6</u>	
	Cooling fan														<u>CO-17</u>	J
	Coolant level (Low)/Contaminat- ed coolant									5					<u>CO-11</u>	
NATS (Nis	san Anti-Theft System)	1	1												SEC-58 (With intel- ligent key system), SEC-171 (Without in- telligent key sys- tem)	K L M

1 - 6: The numbers refer to the order of inspection.

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NORMAL OPERATING CONDITION

< SYMPTOM DIAGNOSIS >

NORMAL OPERATING CONDITION

Description

INFOID:000000009758732

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 2,500 rpm under no load (for example, the selector lever position is neutral and engine speed is over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 2,000 rpm, then fuel cut will be cancelled. **NOTE:**

This function is different from deceleration control listed under Multiport Fuel Injection System, <u>EC-35. "MUL-</u><u>TIPORT FUEL INJECTION SYSTEM : System Description"</u>.

IDLE SPEED

< PERIODIC MAINTENANCE >

PERIODIC MAINTENANCE **IDLE SPEED**

Inspection		INFOID:000000009758733
1.CHECK IDLE SPEED		
With CONSULT Check idle speed in "DATA MONITOF	R" mode of "ENGINE" using CONSULT.	
Specification	: <u>EC-486, "Idle Speed"</u>	
With GST Check idle speed with Service \$01 of	GST.	
Specification	: <u>EC-486, "Idle Speed"</u>	
>> INSPECTION END		

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IGNITION TIMING

< PERIODIC MAINTENANCE >

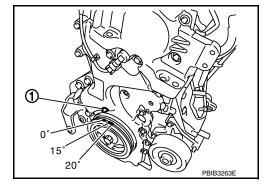
IGNITION TIMING

Inspection

- 1. CHECK IGNITION TIMING
- 1. Attach timing light to the ignition coil No.1 harness.
- 2. Check ignition timing.
 - () : Timing indicator

Specification

: EC-486, "Ignition Timing"



>> INSPECTION END

< PERIODIC MAINTENANCE >

EVAPORATIVE EMISSION SYSTEM

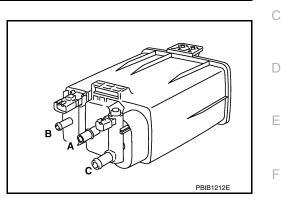
Inspection

EVAP CANISTER

1.CHECK EVAP CANISTER

- 1. Block port (B).
- 2. Blow air into port (A) and check that it flows freely out of port (C).
- 3. Release blocked port (B).
- 4. Apply vacuum pressure to port (B) and check that vacuum pressure exists at the ports (A) and (C).
- 5. Block port (A) and (B).
- 6. Apply pressure to port (C) and check that there is no leakage.

>> INSPECTION END





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EVAP LEAK CHECK

< 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.

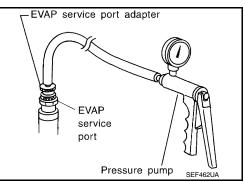
NOTE:

- Do not start engine.
- Improper installation of EVAP service port adapter [commercial service tool: (J-41413-OBD)] to the EVAP service port may cause a leak.

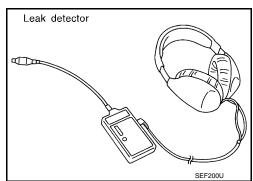
1.EVAP LEAK CHECK

() With CONSULT

 Install EVAP service port adapter [commercial service tool: (J-41413-OBD)] and pressure pump to EVAP service port.

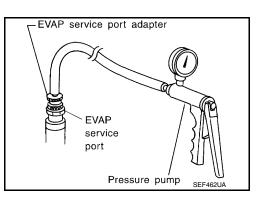


- 2. Turn ignition switch ON.
- 3. Select the "EVAP SYSTEM CLOSE" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
- 4. Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
- 5. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
- 6. Remove EVAP service port adapter [commercial service tool: (J-41413-OBD)] and hose with pressure pump.
- Locate the leak using a leak detector [commercial service tool: (J-41416)]. Refer to <u>EC-49</u>, "<u>EVAPORATIVE EMISSION SYS-</u> <u>TEM : System Description</u>".



Without CONSULT

1. Install EVAP service port adapter [commercial service tool: (J-41413-OBD)] and pressure pump to EVAP service port.



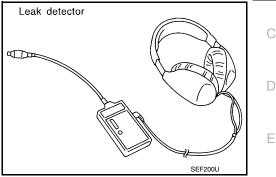
EVAP LEAK CHECK

< PERIODIC MAINTENANCE >

2. Apply battery voltage between the terminals of EVAP canister vent control valve to make a closed EVAP system.

- 3. To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm², 0.2 to 0.4 psi).
- 4. Remove EVAP service port adapter [commercial service tool: (J-41413-OBD)] and hose with pressure pump.
- Locate the leak using a leak detector [commercial service tool: (J-41416)]. Refer to <u>EC-49. "EVAPORATIVE EMISSION SYS-</u> <u>TEM : System Description"</u>.

>> INSPECTION END



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POSITIVE CRANKCASE VENTILATION

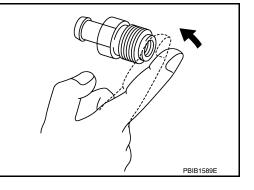
Inspection

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>EC-15</u>, "<u>ENGINE CON-</u> <u>TROL SYSTEM : Component Parts Location</u>".



[MRA8DE]

REMOVAL AND INSTALLATION ECM

Exploded View



[MRA8DE]

SEC. 220 С ി D Е 3 F G Н 2 J JSBIA2680ZZ (1) ECM bracket ② ECM (3) Engine mounting insulator bracket

Removal and Installation

CAUTION: Perform ADDITIONAL SERVICE WHEN REPLACING ECM. Refer to <u>EC-135, "Work Procedure"</u> .	L
REMOVAL	
1. Remove battery. Refer to PG-50, "Removal and Installation (Battery)".	M
Disconnect ECM harness connectors. Refer to <u>PG-42</u>, "<u>Description</u>".	IVI
Remove the fuse box bracket from the ECM bracket.	
Remove the ECM bracket from the engine mounting LH, together with ECM.	Ν
5. Remove ECM mounting nuts, and then remove ECM.	
INSTALLATION	
Install in the reverse order of removal.	0

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SERVICE DATA AND SPECIFICATIONS (SDS)

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Idle Speed

INFOID:000000009758740

[MRA8DE]

Transmission	Condition	Specification (Approx.)
CVT	No load* (in P or N position)	700 rpm
M/T	No load* (in Neutral position)	700 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:000000009758741

Transmission	Condition	Specification (Approx.)
CVT	No load* (in P or N position)	8° BTDC
M/T	No load* (in Neutral position)	8° 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:000000009758742

INFOID:000000009758743

Condition	Specification (Using CONSULT or GST)
At idle	10 – 35 %
At 2,500 rpm	10 – 35 %

Mass Air Flow Sensor

Condition	Specification (Using CONSULT)
At idle*	Approx. 2.9 g/sec
At 2,500 rpm*	Approx. 5.5 g/sec

*: Engine is warmed up to normal operating temperature and running under no load.