SECTION ENGINE CONTROL SYSTEM o

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< PRECAUTION > PRECAUTION PRECAUTIONS

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

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

WARNING:

Always observe the following items for preventing accidental activation.

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see "SRS AIR BAG".
- Never 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:

Always observe the following items for preventing accidental activation.

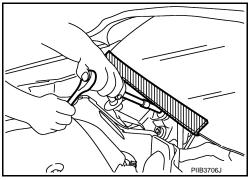
- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Precaution for Procedure without Cowl Top Cover

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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.)

PRECAUTIONS

< PRECAUTION >

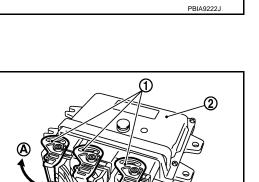
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to <u>PG-5</u>, "<u>Harness Connec-</u> tor".
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.
- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the 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

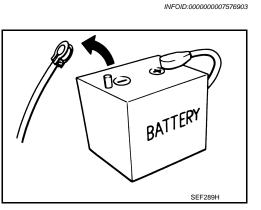
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage 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 ECM harness connector (1), fasten (B) it securely with a lever as far as it will go as shown in the figure.
 - 2. ECM
 - A. Loosen



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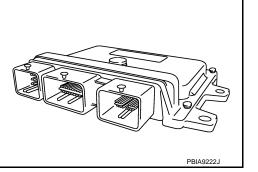
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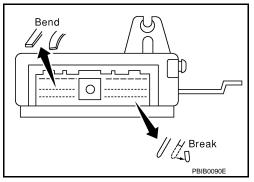
PRECAUTIONS

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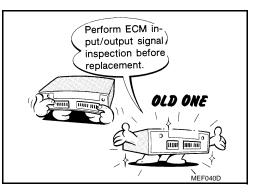
• When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).

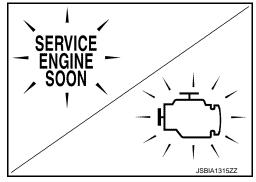
Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.

- 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.
- Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to <u>EC-84, "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.



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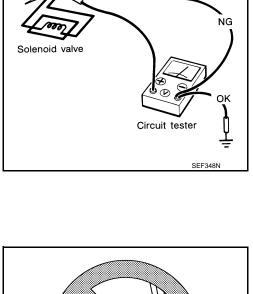




PRECAUTIONS

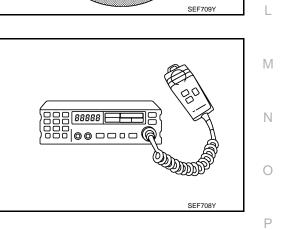
< PRECAUTION >

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



- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.
- Do not depress accelerator pedal when starting.
- · Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.

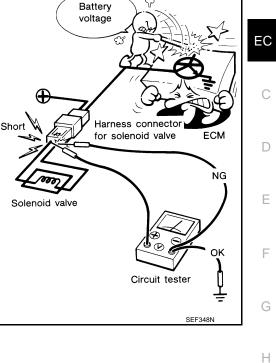
- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.
- Keep the antenna as far as possible from the electronic control units.
- Keep the antenna feeder line more than 20 cm (8 in)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



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PREPARATION

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PREPARATION

Special Service Tools

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NOTE:

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

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

Commercial Service Tools

Tool name (Kent-Moore No.)		Description
Leak detector i.e.: (J-41416)	S-NT703	Locates the EVAP leak
EVAP service port adapter i.e.: (J-41413-OBD)	C A A A A A A A A A A A A A A A A A A A	Applies positive pressure through EVAP service port
	S-NT704	

PREPARATION

< PREPARATION >

[MR16DDT]

Tool name (Kent-Moore No.)		Description	A
Fuel filler cap adapter i.e.: (MLR-8382)		Checks fuel tank vacuum relief valve opening pressure	
	EF ODD		EC
Socket wrench	S-NT815	Removes and installs engine coolant temperature sensor	D
	19 mm (0.75 in) More than 32 mm (1.26 in) S-NT705		F
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)	a Mating surface shave cylinder	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-	0
	Flutes	nia Oxygen Sensor	F
Anti-seize lubricant i.e.: (Permatex TM 133AR or equivalent meeting MIL specifica- tion MIL-A-907)		Lubricates oxygen sensor thread cleaning tool when reconditioning exhaust system threads.	J
	S-NT779		k

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< SYSTEM DESCRIPTION >

[MR16DDT]

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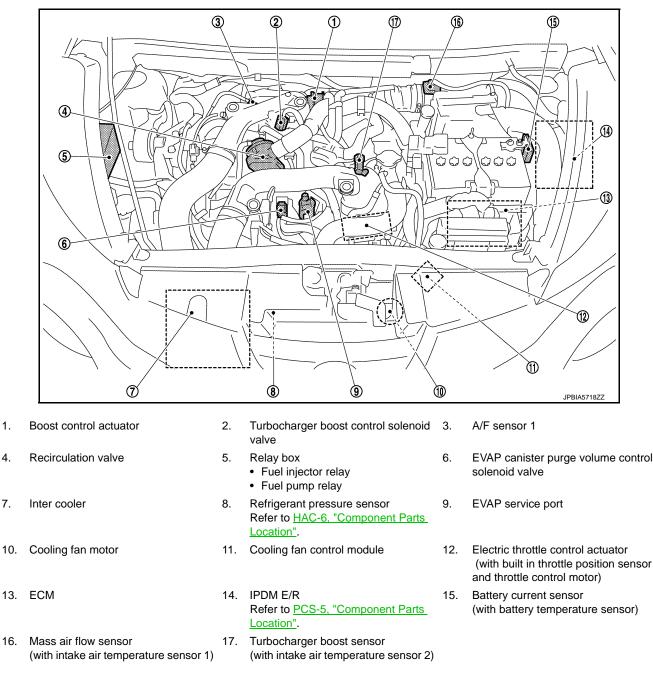
SYSTEM DESCRIPTION

COMPONENT PARTS

ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : Component Parts Location

ENGINE ROOM COMPARTMENT



ENGINE COMPARTMENT

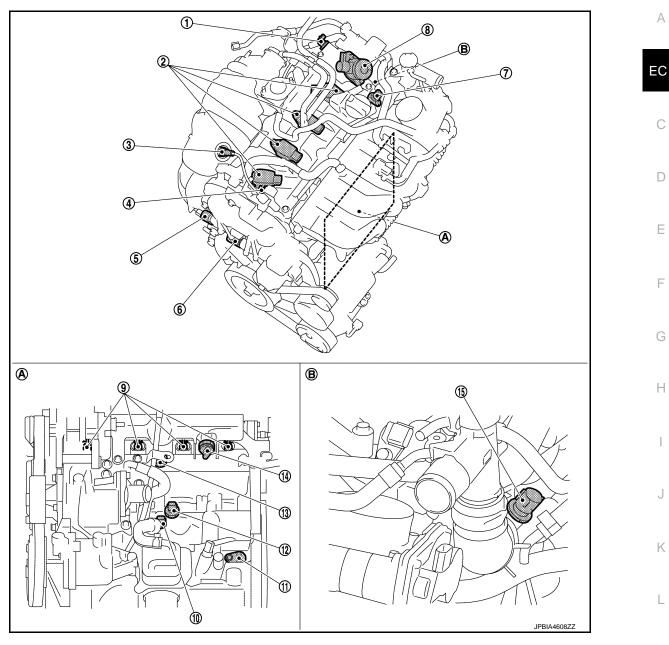
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Revision: 2011 October

< SYSTEM DESCRIPTION >

[MR16DDT]



- 1. Exhaust valve timing control position sensor
- 4. PCV valve
- 7. Camshaft position sensor (PHASE)
- 10. Engine oil temperature sensor
- 13. Knock sensor
- A. Cylinder block left side

EXHAUST COMPARTMENT

2WD

- 2. Ignition coil (with power transistor)
- 5. Exhaust valve timing control solenoid 6. valve
- 8. High pressure fuel pump
- 11. Crankshaft position sensor (POS)
- 14 Fuel rail pressure sensor

B. Engine rear end

3. A/F sensor 1

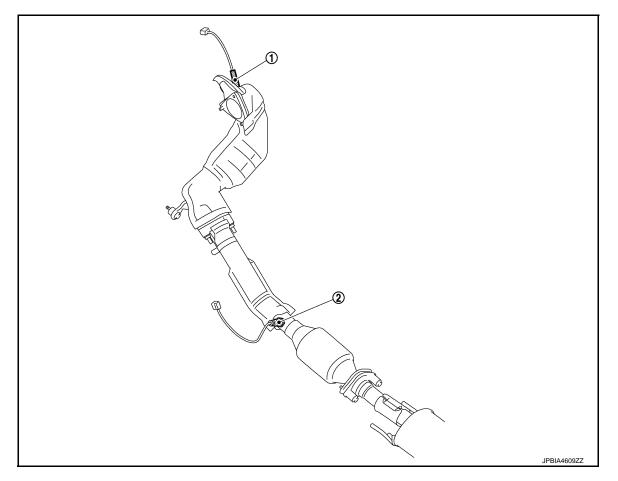
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- Intake valve timing control solenoid valve
 Fuel injector
- 12. Engine oil pressure sensor
- 15. Engine coolant temperature sensor
- Ρ

< SYSTEM DESCRIPTION >



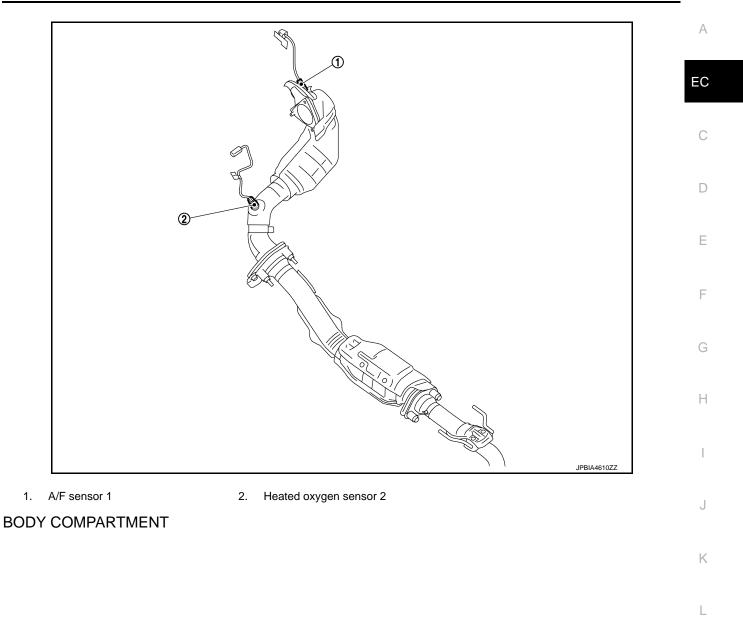
1. A/F sensor 1

2. Heated oxygen sensor 2

AWD

< SYSTEM DESCRIPTION >

[MR16DDT]



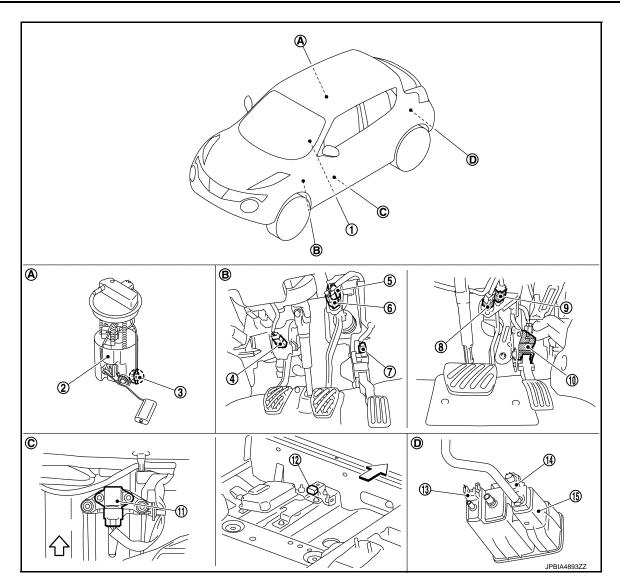
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< SYSTEM DESCRIPTION >



- 1. ASCD steering switch
- 4. Clutch pedal position switch (with M/T models)
- Accelerator pedal position sensor (with M/T models)
- 10. Accelerator pedal position sensor (with CVT models)
- 13. EVAP control system pressure sensor 14.
- A. Under of right side second seat
- D. Fuel tank rear
- : Vehicle front

- 2. Fuel level sensor unit, fuel filter and fuel pump assembly
- 5. Brake pedal position switch (with M/T models)
- 8. Brake pedal position switch (with CVT models)
- 11. G sensor (with 2WD models)
- 14. EVAP canister vent control valveB. Periphery of pedals

3. Fuel tank temperature sensor

6. Stop lamp switch (with M/T models)

- 9. Stop lamp switch (with CVT models)
- 12. G sensor (with AWD models) EVAP canister
- C. Under of left side front seat

ENGINE CONTROL SYSTEM : Component Description

Component	Reference
ECM	<u>EC-22, "ECM"</u>
Accelerator pedal position sensor	EC-22, "Accelerator Pedal Position Sensor"

< SYSTEM DESCRIPTION >

[MR16DDT]

Component	Reference
Electric throttle control actuator	
Throttle control motor	EC-22, "Electric Throttle Control Actuator"
Throttle position sensor	
Ignition coil with power transistor	EC-23, "Ignition Coil With Power Transistor"
Fuel injector	EC-24, "Fuel Injector"
High pressure fuel pump	EC-24, "High Pressure Fuel Pump"
Fuel rail pressure sensor	EC-25, "Fuel Rail Pressure Sensor"
Low pressure fuel pump	EC-25, "Low Pressure Fuel Pump"
Fuel tank temperature sensor	EC-25, "Fuel Tank Temperature Sensor"
Fuel level sensor	EC-25, "Fuel Level Sensor"
Mass air flow sensor	EC-26, "Mass Air Flow Sensor (With Intake Air Temperature Sen
Intake air temperature sensor 1	<u>sor 1)"</u>
Turbocharger	
Boost control actuator	EC-26. "Turbocharger"
Turbocharger boost control solenoid valve	
Turbocharger boost sensor	EC-27, "Turbocharger Boost Sensor (With Intake Air Temperature
Intake air temperature sensor 2	Sensor 2)"
Engine coolant temperature sensor	EC-28. "Engine Coolant Temperature Sensor"
Crankshaft position sensor	EC-28, "Crankshaft Position Sensor (POS)"
Camshaft position sensor	EC-29, "Camshaft Position Sensor (PHASE)"
Intake valve timing control solenoid valve	EC-29, "Intake Valve Timing Control Solenoid Valve"
Exhaust valve timing control position sensor	EC-29, "Exhaust Valve Timing Control Position Sensor"
Exhaust valve timing control solenoid valve	EC-30, "Exhaust Valve Timing Control Solenoid Valve"
Air fuel ratio (A/F) sensor 1	EC-30, "Air Fuel Ratio (A/F) Sensor 1"
Heated oxygen sensor 2	EC-30, "Heated Oxygen Sensor 2"
Knock sensor	EC-31, "Knock Sensor"
Engine oil pressure sensor	EC-31, "Engine Oil Pressure Sensor"
Engine oil temperature sensor	EC-32, "Engine Oil Temperature Sensor"
Cooling fan	EC-32, "Cooling Fan"
EVAP canister purge volume control solenoid valve	EC-32, "EVAP Canister Purge Volume Control Solenoid Valve"
EVAP canister vent control valve	EC-33, "EVAP Canister Vent Control Valve"
EVAP control system pressure sensor	EC-33, "EVAP Control System Pressure Sensor"
Battery current sensor	EC-33, "Battery Current Sensor (With Battery Temperature Sen-
Battery temperature sensor	sor)"
Malfunction indicator lamp (MIL)	EC-34, "Malfunction Indicator lamp (MIL)"
Oil pressure warning lamp	EC-34, "Oil Pressure Warning Lamp"
Refrigerant pressure sensor	EC-34, "Refrigerant Pressure Sensor"
Stop lamp switch	
Brake pedal position switch	EC-34, "Stop Lamp Switch & Brake Pedal Position Switch"
Clutch pedal position switch	EC-35, "Clutch Pedal Position Switch"
ASCD steering switch	EC-35, "ASCD Steering Switch"
Information display	EC-35, "Information Display"

< SYSTEM DESCRIPTION >

ECM

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

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelera-

tor position and sends a signal to the ECM.

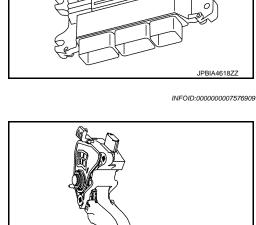
Accelerator Pedal Position Sensor

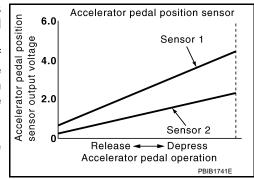
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the 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.

Electric Throttle Control Actuator

OUTLINE



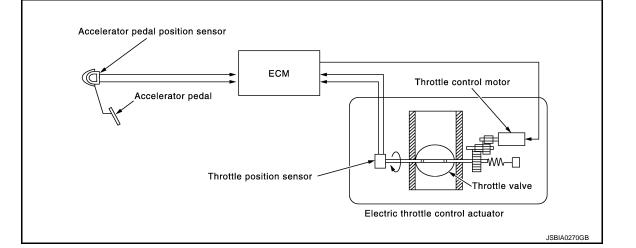


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< SYSTEM DESCRIPTION >

[MR16DDT]

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.

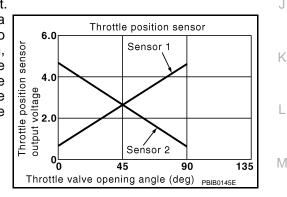
THROTTLE CONTROL MOTOR

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.

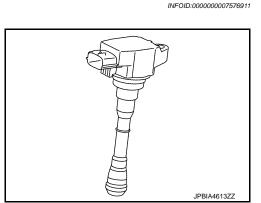
THROTTLE POSITION SENSOR

The throttle position sensor responds to the throttle valve movement. 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.



Ignition Coil With Power Transistor

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



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< SYSTEM DESCRIPTION >

Fuel Injector

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

Inflow process

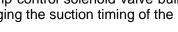
Low pressure fuel in

Inflow check valve

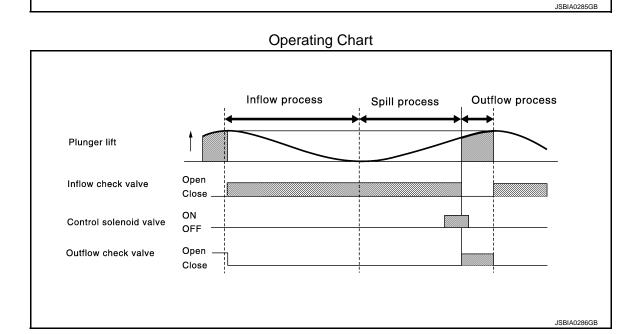
Plunger

High Pressure Fuel Pump

The high pressure fuel pump is activated by the exhaust camshaft. ECM controls the high pressure fuel pump control solenoid valve built into the high pressure fuel pump and adjusts the amount of discharge by changing the suction timing of the low pressure fuel.



Spill process



Operating Description

Fuel spill out

Control solenoid valve

Cam

High pressure fuel out

Outflow check valve

Outflow process

Revision: 2011 October

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JSBIA028777

< SYSTEM DESCRIPTION >

Fuel Rail Pressure Sensor

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

Low Pressure Fuel Pump

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

Fuel Tank Temperature Sensor

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

<Reference data>

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

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

Fuel Level Sensor

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

The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM via the CAN communication line.

It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

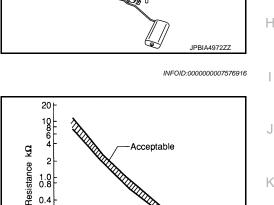
EC-25

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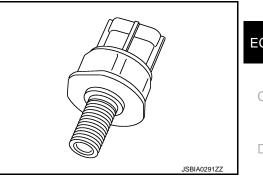


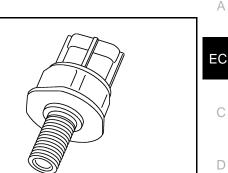
2012 JUKE



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

0.4 0.2 0.1





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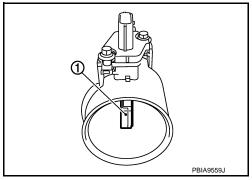
< SYSTEM DESCRIPTION >

Mass Air Flow Sensor (With Intake Air Temperature Sensor 1)

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 hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.

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



INTAKE AIR TEMPERATURE SENSOR 1

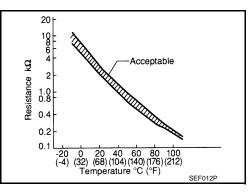
The intake air temperature sensor 1 is built-into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.

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

<Reference data>

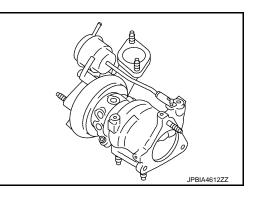
Intake air temperature [°C (°F)]	Voltage [*] (V)	Resistance (kΩ)
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

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



Turbocharger

Turbocharger boost is controlled by adjusting the pressure to the diaphragm of the boost control actuator.



TURBOCHARGER BOOST CONTROL SOLENOID VALVE Turbocharger boost control solenoid valve is ON/OFF duty controlled by ECM. INFOID:000000007576919

< SYSTEM DESCRIPTION >

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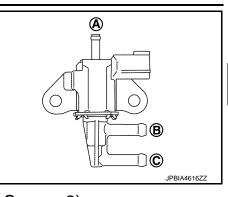
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And it adjusts the pressure in the diaphragm of the boost control actuator. The longer the turbocharger boost control solenoid valve is ON, the higher the boost is increased.

- Α. From boost pipe
- В. To boost control actuator
- C. To Air cleaner

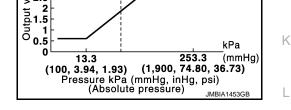


Turbocharger Boost Sensor (With Intake Air Temperature Sensor 2)

TURBOCHARGER BOOST SENSOR

The turbocharger boost sensor detects the pressure of the outlet side of the intercooler. When increasing the pressure, the output voltage of the sensor to the ECM increases.

Ε 000 Н JPBIA4620ZZ Vacuum Chage air pressure 5 4.5 4 t voltage



INTAKE AIR TEMPERATURE SENSOR 2

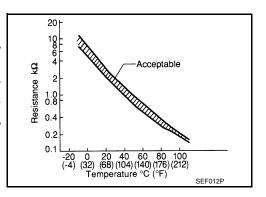
The intake air temperature sensor 2 is built-into turbocharger boost sensor. The sensor detects intake air temperature and transmits a signal to the ECM.

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

<Reference data>

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

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



< SYSTEM DESCRIPTION >

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.

<Reference data>

Engine coolant temperature [°C (°F)]	Voltage [*] (V)	Resistance ($k\Omega$)
-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

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

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.

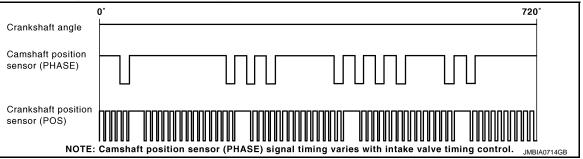
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

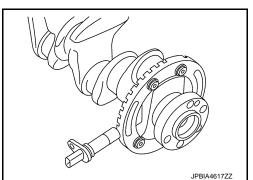
The changing gap causes the magnetic field near the sensor to change.

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

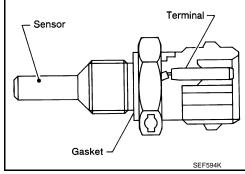
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

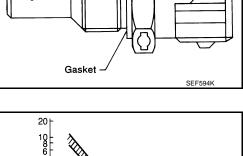
ECM receives the signals as shown in the figure.





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





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Resistance 1.0 0.8 0.4 0.2 0.1

Acceptable



< SYSTEM DESCRIPTION >

Camshaft Position Sensor (PHASE)

The camshaft position sensor (PHASE) senses the retraction of intake camshaft to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.

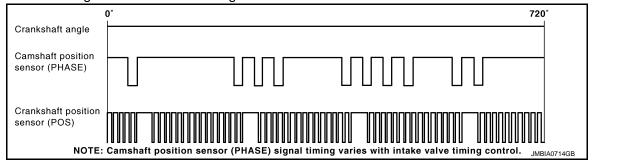
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

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. ECM receives the signals as shown in the figure.



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.

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.

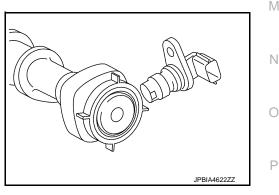
The sensor consists of a permanent magnet and Hall IC.

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.

Plunger Coil



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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.

< SYSTEM DESCRIPTION >

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.

Air Fuel Ratio (A/F) Sensor 1

DESCRIPTION

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

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

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

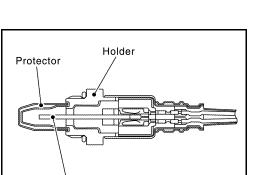
Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of approximately 760° C (1,400°F).

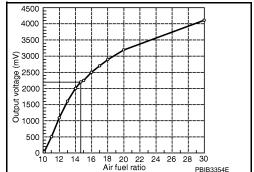
A/F SENSOR 1 HEATER

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

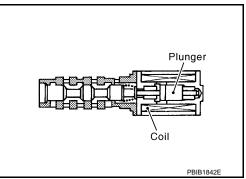
Heated Oxygen Sensor 2

DESCRIPTION





Zirconia element



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JPBIA4038GE

< SYSTEM 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

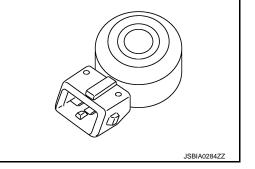
Heated oxygen sensor 2 heater is integrated in the sensor.

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	F
 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	G

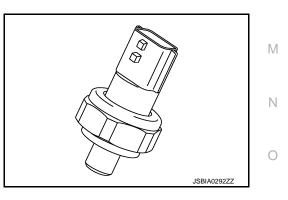
Knock Sensor

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.



Engine Oil Pressure Sensor

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





А Holder Heater pad EC С Zirconia tube SEF327R

[MR16DDT]

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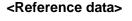
Ε

< SYSTEM DESCRIPTION >

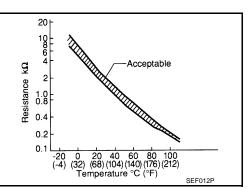
Engine Oil Temperature Sensor

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.

Sensor Gasket



Engine oil temperature [°C (°F)]	Voltage [*] (V)	Resistance ($k\Omega$)
-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.

Cooling Fan

COOLING FAN CONTROL MODULE

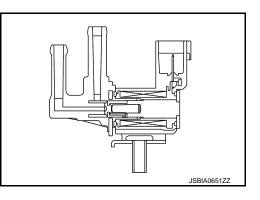
Cooling fan control module receives ON/OFF pulse duty signal from IPDM E/R. Corresponding to this ON/OFF pulse duty signal, cooling fan control module sends cooling fan motor operating voltage to cooling fan motor. The revolution speed of cooling fan motor is controlled by duty cycle of the voltage.

COOLING FAN MOTOR

Cooling fan motor receives cooling fan motor operating voltage from cooling fan control module. The revolution speed of cooling fan motor is controlled by duty cycle of the voltage.

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.



INFOID:000000007576931

[MR16DDT]

SEF594K

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< SYSTEM DESCRIPTION >

EVAP Canister Vent Control Valve

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

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

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

EVAP 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.

Battery Current Sensor (With Battery Temperature Sensor)

OUTLINE

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator.

Based on sensor signals, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to<u>CHG-7</u>, "POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : System Description".

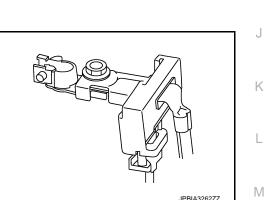
CAUTION:

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

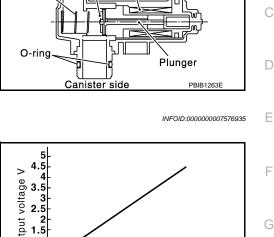
BATTERY CURRENT SENSOR

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

BATTERY TEMPERATURE SENSOR



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



106.7

(1.088, 15.47)

PBIB3370E

INFOID:000000007576936

Coi

To atmosphere

Spring

1.5-0.5-0.5-0.0-60.0

(0.61, 8.7)

Valve



Terminal

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< 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.

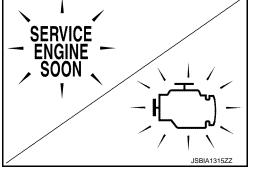
Malfunction Indicator lamp (MIL)

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

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

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

For details, refer to <u>EC-70</u>, "<u>DIAGNOSIS DESCRIPTION</u> : <u>Malfunc-</u> tion Indicator Lamp (<u>MIL</u>)".



Oil Pressure Warning Lamp

Oil pressure warning lamp is located on the combination meter.

It indicates the low pressure of the engine oil and the malfunction of the engine oil pressure system.

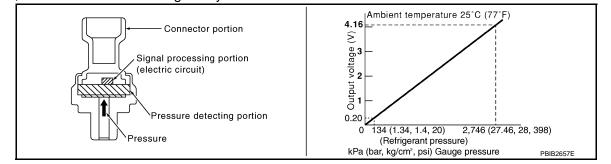
Combination meter turns the oil pressure warning lamp ON/OFF according to the oil pressure warning lamp signal received from ECM via CAN communication.



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Refrigerant Pressure Sensor

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



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).

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

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Resistance

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SEF012F

[MR16DDT]

< SYSTEM DESCRIPTION >

[MR16DDT]

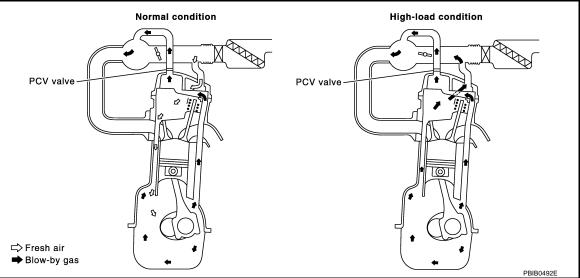
Brake pedal	Brake pedal position switch	Stop lamp switch	А
Released	ON	OFF	
Depressed	OFF	ON	EC
Clutch Pedal Position Switch	1	INFOID:00000007576941	EC
	l, the clutch pedal position switch turn e ECM judges the clutch pedal condit		С
ASCD Steering Switch		INFOID:00000007576942	
ASCD steering switch has variant va of switch, and determines which but	alues of electrical resistance for each ton is operated.	button. ECM reads voltage variation	D
Information Display		INFOID:00000007576943	Е
	indicated on the information display in he combination meter via CAN comm		F
			G
			Η
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			J
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STRUCTURE AND OPERATION

Positive Crankcase Ventilation

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[MR16DDT]



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.

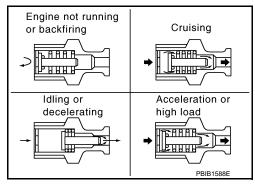
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

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.

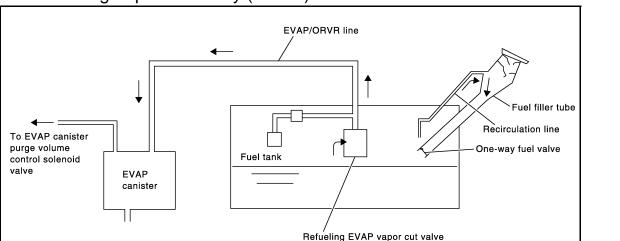
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



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.

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-530, "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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[MR16DDT]

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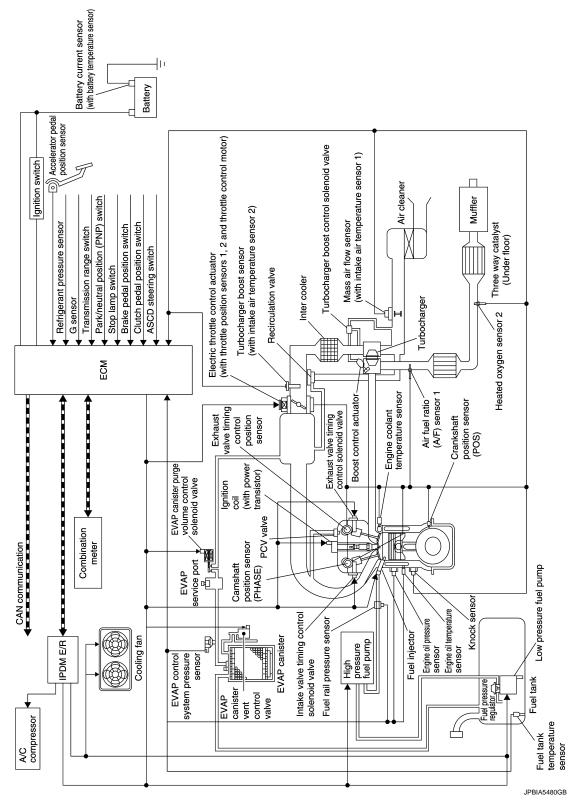
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[MR16DDT]

SYSTEM ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : System Diagram

INFOID:000000007576946



ENGINE CONTROL SYSTEM : System Description

INFOID:000000007576947

ECM controls the engine by various functions.

< SYSTEM DESCRIPTION >

Function	Reference	
Direct injection gasoline system	EC-40. "DIRECT INJECTION GASOLINE SYSTEM : System De- scription"	
Fuel pressure control	EC-43, "FUEL PRESSURE CONTROL : System Description"	
Electric ignition control	EC-45, "ELECTRIC IGNITION SYSTEM : System Description"	
Intake valve timing control	EC-46, "INTAKE VALVE TIMING CONTROL : System Description"	
Exhaust valve timing control	EC-47, "EXHAUST VALVE TIMING CONTROL : System Descrip- tion"	
Turbocharger boost control	EC-49. "TURBOCHARGER BOOST CONTROL : System Descrition"	
Engine protection control (Low engine oil pressure)	EC-50. "ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description"	
Fuel filler cap warning system	EC-51, "FUEL FILLER CAP WARNING SYSTEM : System De- scription"	
Air conditioning cut control	EC-52, "AIR CONDITIONING CUT CONTROL : System Descrip- tion"	
Cooling fan control	EC-54, "COOLING FAN CONTROL : System Description"	
Starter motor drive control	EC-54, "STARTER MOTOR DRIVE CONTROL : System Descrip- tion"	
Evaporative emission system	EC-55, "EVAPORATIVE EMISSION SYSTEM : System Descrip- tion"	
ASCD (Automatic speed control device)	EC-57, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : Sys- tem Description"	
Integrated control system	EC-58, "INTEGRATED CONTROL SYSTEM : System Descrip- tion"	
CAN communication	EC-59, "CAN COMMUNICATION : System Description"	

DIRECT INJECTION GASOLINE SYSTEM

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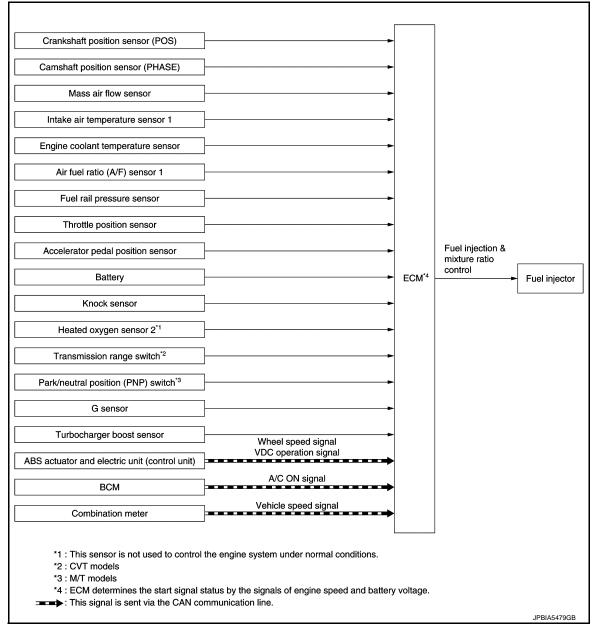
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< SYSTEM DESCRIPTION >

DIRECT INJECTION GASOLINE SYSTEM : System Diagram





DIRECT INJECTION GASOLINE SYSTEM : System Description

INFOID:000000007576949

INPUT/OUTPUT SIGNAL CHART

< SYSTEM DESCRIPTION >

[MR16DDT]

Sensor	Input signal to ECM		ECM func- tion	Actuator	А
Crankshaft position sensor (POS)	Engine speed ^{*4}				
Camshaft position sensor (PHASE)	Camshaft position				EC
Mass air flow sensor	Amount of intal	Amount of intake air			
Intake air temperature sensor 1	Intake air temp	erature	-		C
Engine coolant temperature sensor	Engine coolant	temperature	-		0
Air fuel ratio (A/F) sensor 1	Density of oxyg	gen in exhaust gas			
Fuel rail pressure sensor	Fuel rail pressu	ire	-		D
Throttle position sensor	Throttle positio	Throttle position			
Accelerator pedal position sensor	Accelerator pedal position		Fuelinjection		F
Battery	Battery voltage ^{*4}		& mixture ra- tio control	Fuel injector	
Knock sensor	Engine knocking condition				
Heated oxygen sensor 2 ^{*1}	Density of oxygen in exhaust gas		-		F
Transmission range switch ^{*2}	Coorposition				
Park/neutral position (PNP) switch ^{*3}	Gear position				G
G sensor	Inclination angl	e	-		
Turbocharger boost sensor	Turbocharger b	poost	-		
ABS actuator and electric unit (control unit)	CAN commu- nication • Wheel speed signal • VDC/TCS operation command				Н
BCM	CAN commu- nication	A/C ON signal			Ι
Combination meter	CAN commu- nication	Vehicle speed signal			,

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

*2: CVT models

*3: M/T models

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

SYSTEM DESCRIPTION

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

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

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

<Fuel increase>

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

<Fuel decrease>

- During deceleration
- During high engine speed operation

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FUEL INJECTION CONTROL

Stratified-charge Combustion

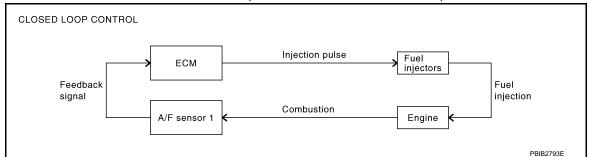
Stratified-charge combustion is a combustion method which enables extremely lean combustion by injecting fuel in the latter half of a compression process, collecting combustible air-fuel around the spark plug, and forming fuel-free airspace around the mixture.

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

Homogeneous Combustion

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

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can better reduce CO, HC and NOx emissions. This system uses A/F sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about A/F sensor 1, refer to <u>EC-30</u>, "Air Fuel Ratio (A/F) Sensor 1". This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).

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

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

Open Loop Control

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

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

MIXTURE RATIO SELF-LEARNING CONTROL

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

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

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

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

< SYSTEM DESCRIPTION >

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

FUEL INJECTION TIMING

Sequential Direct Injection Gasoline System Fuel is injected into each cylinder during each engine cycle according to the ignition order.

STRATIFIED-CHARGE START CONTROL

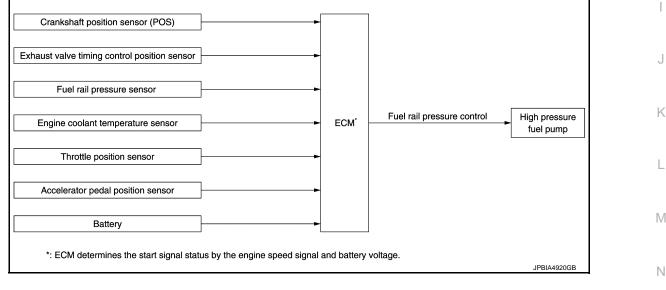
The use of the stratified-charge combustion method enables emissions-reduction when starting the engine with engine coolant temperature between 5°C (41°F) and 40°C (104°F).

FUEL SHUT-OFF

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

FUEL PRESSURE CONTROL

FUEL PRESSURE CONTROL : System Diagram



FUEL PRESSURE CONTROL : System Description

INPUT/OUTPUT SIGNAL CHART

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Injection pulse

JPBIA4704GE

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1 engine cycle

No. 1 Cylinder

No. 3 Cylinder

No. 4 Cylinder No. 2 Cylinder

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D

А

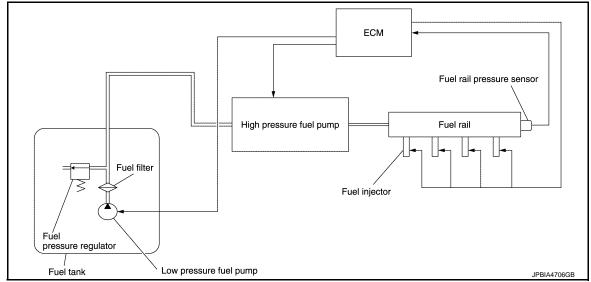
EC

< SYSTEM DESCRIPTION >

Sensor	Sensor Input signal to ECM		Actuator
Crankshaft position sensor (POS)	Engine speed [*]		
Exhaust valve timing control position sensor	Camshaft position		
Fuel rail pressure sensor	Fuel rail pressure		
Engine coolant temperature sensor	Engine coolant temperature	Fuel rail pres- sure control	High pressure fuel pump
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*		

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

System Description



Low fuel pressure control

- The low fuel pressure pump is controlled by ECM. The pumped fuel passes through the fuel filter and is sent to the high pressure fuel pump.
- Low fuel pressure is adjusted by the fuel pressure regulator.

High fuel pressure control

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

ELECTRIC IGNITION SYSTEM

< SYSTEM DESCRIPTION >

ELECTRIC IGNITION SYSTEM : System Diagram INFOID:000000007576952 Crankshaft position sensor (POS) Camshaft position sensor (PHASE) EC Mass air flow sensor Engine coolant temperature sensor Throttle position sensor Accelerator pedal position sensor Ignition timing control Ignition coil Turbocharger boost sensor ECM^{*3} (with power transistor) Intake air temperature sensor 2 Transmission range switch*1 Park/neutral position (PNP) switch*2 Battery Knock sensor Vehicle speed signal Combination meter *1 : CVT models *2 : M/T models *3 : ECM determines the start signal status by the signals of engine speed and battery voltage. JPBIA4921GB

ELECTRIC IGNITION SYSTEM : System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	1	nput Signal to ECM	ECM func- tion	Actuator		
Crankshaft position sensor (POS)	Engine speed	*3				
Camshaft position sensor (PHASE)	Piston position					
Mass air flow sensor	Amount of inta	ike air				
Engine coolant temperature sensor	Engine coolan	t temperature				
Throttle position sensor	Throttle position			Ignition coil (with power tran-		
Accelerator pedal position sensor	Accelerator pedal position					
Turbocharger boost sensor	Turbocharger boost		Ignition tim-			
Intake air temperature sensor 2	Intake air temp	Intake air temperature		sistor)		
Transmission range switch ^{*1}	Coorposition					
Park/neutral position (PNP) switch ^{*2}	Gear position	Gear position				
Battery	Battery voltage*					
Knock sensor	Engine knocking condition					
Combination meter	CAN commu- nication	Vehicle speed signal				

*1: CVT models

*2: M/T models

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

SYSTEM DESCRIPTION Firing order: 1 - 3 - 4 - 2

[MR16DDT]

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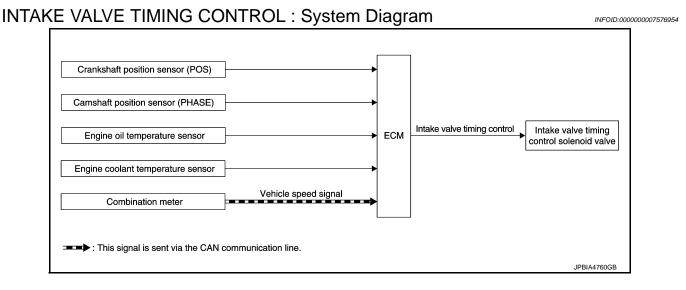
The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.

The ECM receives information such as the injection pulse width and camshaft position sensor (PHASE) signal. Computing this information, ignition signals are transmitted to the power transistor.

During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

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

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



INTAKE VALVE TIMING CONTROL : System Description

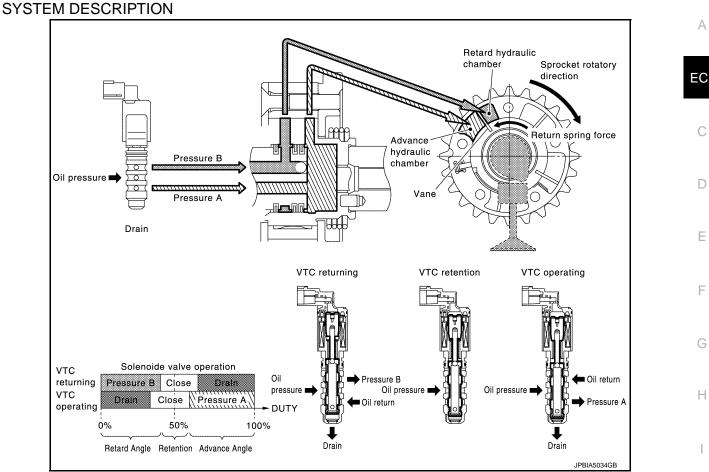
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INPUT/OUTPUT SIGNAL CHART

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

[MR16DDT]

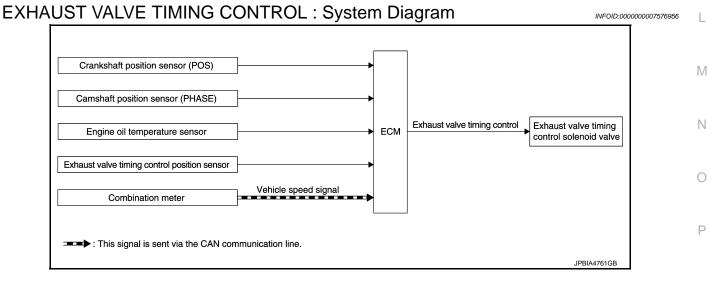
< SYSTEM DESCRIPTION >



This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intakevalve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolanttemperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing (IVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range. EXHAUST VALVE TIMING CONTROL

EXHAUST VALVE TIMING CONTROL



EXHAUST VALVE TIMING CONTROL : System Description

INPUT/OUTPUT SIGNAL CHART

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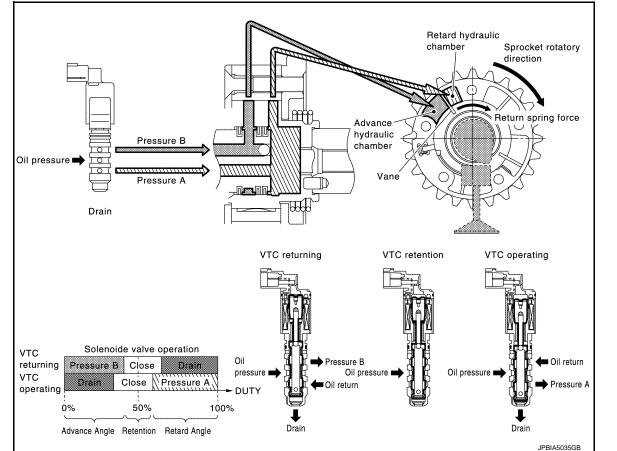
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< SYSTEM DESCRIPTION >

[MR16DDT]

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

SYSTEM DESCRIPTION



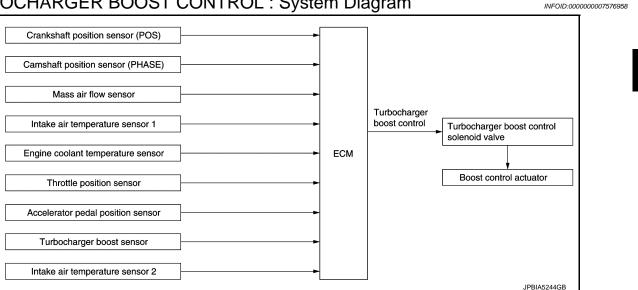
This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the exhaust valve.

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

TURBOCHARGER BOOST CONTROL

< SYSTEM DESCRIPTION >

TURBOCHARGER BOOST CONTROL : System Diagram



TURBOCHARGER BOOST CONTROL : System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine aread		
Camshaft position sensor (PHASE)	Engine speed		
Mass air flow sensor	Amount of intake air		
Intake air temperature sensor 1	Intake air temperature		Turbocharger boost control
Engine coolant temperature sensor	Engine coolant temperature	Turbocharger boost control	solenoid valve ↓
Throttle position sensor	Throttle position		Boost control actuator
Accelerator pedal position sensor	Accelerator pedal position		
Turbocharger boost sensor	Turbocharger boost		
Intake air temperature sensor 2	Intake air temperature		

SYSTEM DESCRIPTION

Depending on driving conditions, the ECM performs ON/OFF duty control of the turbocharger boost control solenoid valve and controls the boost by adjusting the pressure to the diaphragm of the boost control actuator. When driving conditions demand an increase in boost, the ECM prolongs the ON time of the turbocharger boost control solenoid valve and moves the boost control valve towards the closing direction by reducing the pressure in the diaphragm of the boost control actuator. The emission gas to the turbine wheel is then increased. When driving conditions demand a decrease in boost, the ECM shortens the ON time of the turbocharger boost control solenoid valve and moves the boost control valve towards the opening position by increasing the pressure in the diaphragm of the boost control actuator. The emission bypassing to the turbine wheel is then increased. Thus, by performing the most optimal boost control, the ECM improves engine output and response.

NOTE:

The boost varies depending on the vehicle and driving conditions.

BOOST CONTROL ACTUATOR LINE DRAWING



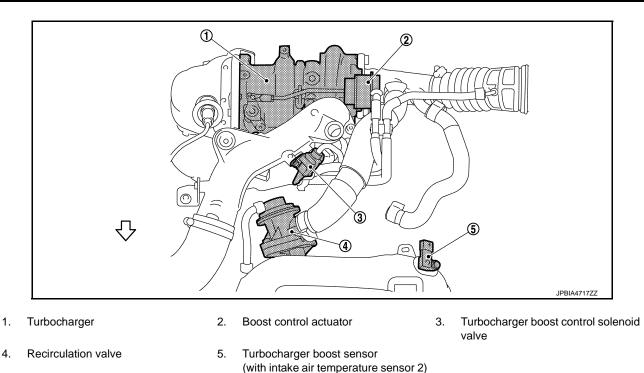
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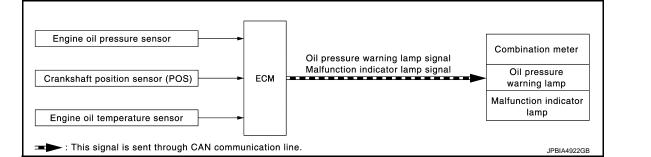
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< SYSTEM DESCRIPTION >



C: Vehicle front

ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Diagram



ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description

INPUT/OUTPUT SIGNAL CHART

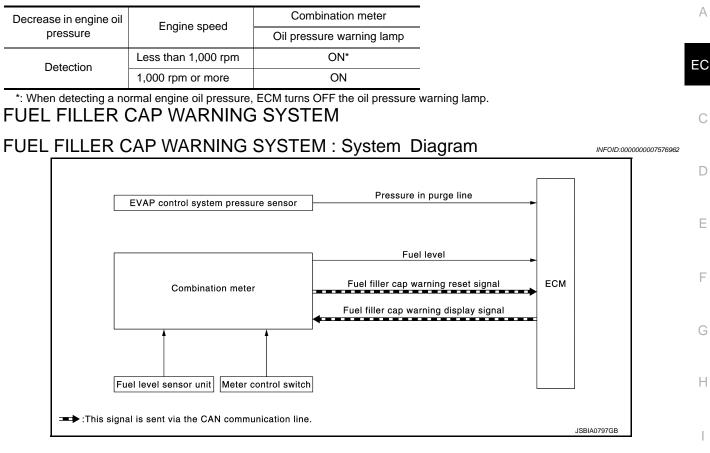
Sensor	Input signal to ECM	ECM function	Actuator
Engine oil pressure sensor	Engine pressure	Engine protection control	
Crankshaft position sensor (POS)	Engine speed	Oil pressure warning lamp signal	Combination meter Oil pressure warning lamp
Engine oil temperature sensor	Engine oil temperature	FUel cut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

EC-50

< SYSTEM DESCRIPTION >



FUEL FILLER CAP WARNING SYSTEM : System Description

INFOID:000000007576963

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INPUT/OUTPUT SIGNAL CHART

Input

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

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

Output

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

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

SYSTEM DESCRIPTION

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

ECM judges a refueled state, based on a fuel level signal transmitted from the combination meter.

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

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

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

Reset Operation

< SYSTEM DESCRIPTION >

INFOID:000000007576964

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

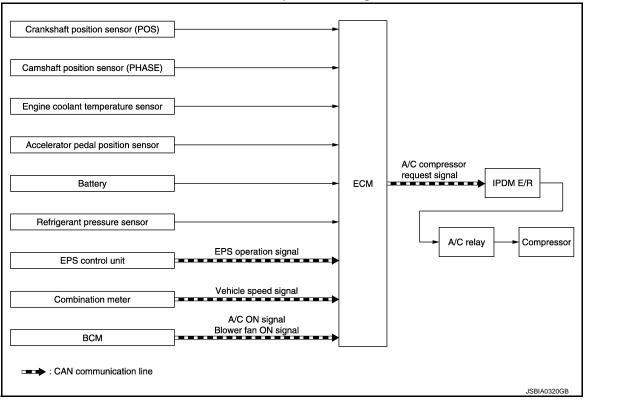
- Reset operation is performed by operating the meter control switch on the combination meter. Refer to <u>MWI-</u><u>18, "Switch Name and Function"</u>.
- When the reset operation is performed, the combination meter transmits a fuel filler cap warning reset signal to ECM via CAN communication. ECM transmits 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 Diagram



AIR CONDITIONING CUT CONTROL : System Description

INFOID:000000007576965

INPUT/OUTPUT SIGNAL CHART

< SYSTEM DESCRIPTION >

[MR16DDT]

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INFOID:000000007576966

Sensor	Input Signal to ECM		ECM function	Actuator	Α
Crankshaft position sensor (POS)	F	*			_
Camshaft position sensor (PHASE)	Engine speed [*]				
Engine coolant temperature sensor	Engine coolant	Engine coolant temperature			EC
Accelerator pedal position sensor	Refrigerant pressure				
Battery				IPDM E/R	С
Refrigerant pressure sensor				↓ Air conditioner relay	
EPS control unit	CAN commu- nication	EPS operation signal	cut control	↓ Compressor	D
Combination meter	CAN commu- nication	Vehicle speed signal			
ВСМ	CAN commu- nication	A/C ON signal			E

SYSTEM DESCRIPTION

This system improves engine operation when the air conditioner is used.

Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.

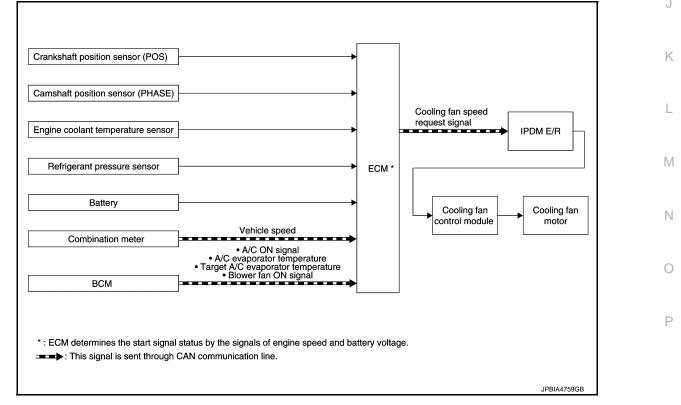
• When the engine coolant temperature becomes excessively high.

• When operating power steering during low engine speed or low vehicle speed.

- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

COOLING FAN CONTROL

COOLING FAN CONTROL : System Diagram



< SYSTEM DESCRIPTION >

COOLING FAN CONTROL : System Description

[MR16DDT]

INPUT/OUTPUT SIGNAL CHART

Sensor	Inpu	t signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	F	Engine speed [*]		
Camshaft position sensor (PHASE)	Engine speed			
Engine coolant temperature sensor	Engine coolant	Engine coolant temperature		
Refrigerant pressure sensor	Refrigerant pre	Refrigerant pressure		
Battery	Battery voltage	Battery voltage [*]		IPDM E/R
Combination meter	CAN commu- nication	Vehicle speed signal	Cooling fan control	↓ Cooling fan control mod- ule ↓ Cooling fan motor
BCM		A/C ON signal		
	CAN commu-	A/C evaporator temper- ature*		
	nication	Target A/C evaporator temperature*		
		Blower fan ON signal*		

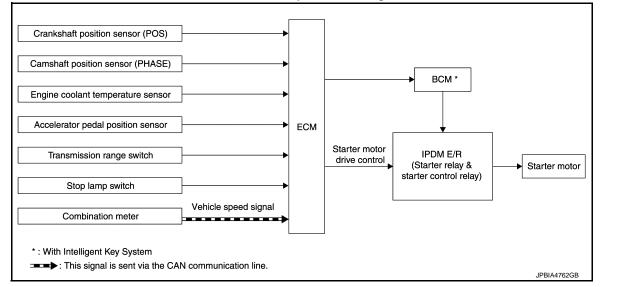
*: The ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, A/C ON signal and refrigerant pressure.

Cooling fan control signal is sent to IPDM E/R from ECM by CAN communication line. Then, IPDM E/R sends ON/OFF pulse duty signal to cooling fan control module. Corresponding to this ON/OFF pulse duty signal, cooling fan control module gives cooling fan motor operating voltage to cooling fan motors. Cooling fan speed is controlled by duty cycle of cooling fan motor operating voltage sent from cooling fan control module. **STARTER MOTOR DRIVE CONTROL**

STARTER MOTOR DRIVE CONTROL : System Diagram



STARTER MOTOR DRIVE CONTROL : System Description

INFOID:000000007576969

INFOID:000000007576968

INPUT/OUTPUT SIGNAL CHART

< SYSTEM DESCRIPTION >

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Sensor	In	Input signal to ECM		Actuator	А	
Crankshaft position sensor (POS)	Engine specified	ed				
Camshaft position sensor (PHASE)	Piston posit	Piston position		 BCM[*] IPDM E/R (Starter relay & start- er control relay) 		
Engine coolant temperature sensor	Engine coolar	Engine coolant temperature			EC	
Accelerator pedal position sensor	Accelerator pe	Accelerator pedal position				
Transmission range switch	Gear position	Gear position			С	
Stop lamp switch	Brake pedal p	Brake pedal position		er control relay)		
Combination meter	CAN commu- nication	CAN commu- nication Vehicle speed signal			D	

*: With Intelligent Key system

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: P or any position other than N
- Idle switch: ON (Accelerator pedal not depressed)
- Brake switch: ON (Brake pedal depressed)

Models with no Intelligent Key System transmit a control signal directly to IPDM E/R. On the other hand, models with the Intelligent Key System transmit a control signal to IPDM E/R by way of BCM via 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 Diagram INFOID:000000007576970 Crankshaft position sensor (POS) Camshaft position sensor (PHASE) Mass air flow sensor Engine coolant temperature sensor Κ Air fuel ratio (A/F) sensor 1 EVAP canister EVAP canister purge flow control purae volume ECM. Throttle position sensor control solenoid valve Accelerator pedal position sensor Batterv Fuel tank temperature sensor M EVAP control system pressure sensor Vehicle speed signal Combination meter Ν * : ECM determines the start signal status by the signals of engine speed and battery voltage. : This signal is sent via the CAN communication line. IPBIA4896GB

EVAPORATIVE EMISSION SYSTEM : System Description

INPUT/OUTPUT SIGNAL CHART

INFOID:000000007576971

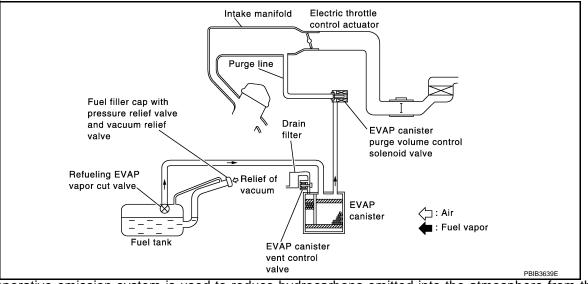
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< SYSTEM DESCRIPTION >

Sensor		Input signal to ECM		Actuator
Crankshaft position sensor (POS)	Engine	speed*		
Camshaft position sensor (PHASE)	Piston	position		
Mass air flow sensor	Amount o	of intake air	-	
Engine coolant temperature sensor	Engine co	polant temperature	-	
Air fuel ratio (A/F) sensor 1		f oxygen in exhaust gas ratio feedback signal)	_	
Throttle position sensor	Throttle p	osition	EVAP canister	EVAP canister purge vol- ume control solenoid valve
Accelerator pedal position sensor	Accelerat	or pedal position	purge flow control	
Battery	Battery ve	oltage*		
Fuel tank temperature sensor	Fuel temp	perature in fuel tank	-	
EVAP control system pressure sensor	Pressure	in purge line		
Combination meter	CAN commu- nication	Vehicle speed		

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

SYSTEM DESCRIPTION



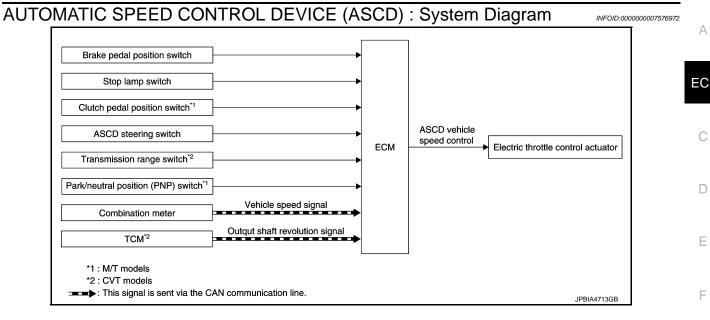
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

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. AUTOMATIC SPEED CONTROL DEVICE (ASCD)





AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description

INFOID:000000007576973

INPUT/OUTPUT SIGNAL CHART

< SYSTEM DESCRIPTION >

Sensor	Ir	put signal to ECM	ECM function	Actuator
Brake pedal position switch	Brake pedal or	poration		
Stop lamp switch		Jeration		
Clutch pedal position switch ^{*1}	Clutch pedal o	peration		
ASCD steering switch	ASCD steering	switch operation		
Transmission range switch ^{*2}	Gear position		ASCD vehicle speed control	Electric throttle control actuator
Park/neutral position (PNP) switch ^{*1}			control	
Combination meter	CAN commu- nication Vehicle speed signal			
TCM ^{*2}	CAN commu- nication	Output shaft revolution signal		

*1: M/T models

*2: CVT models

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/ N h (25 MPH) and 144 km/h (90 MPH).

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

Operation status of ASCD is indicated by CRUISE indicator and SET indicator in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.

Refer to <u>EC-60, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function"</u> for ASCD operating instructions.

NOTE:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. INTEGRATED CONTROL SYSTEM M

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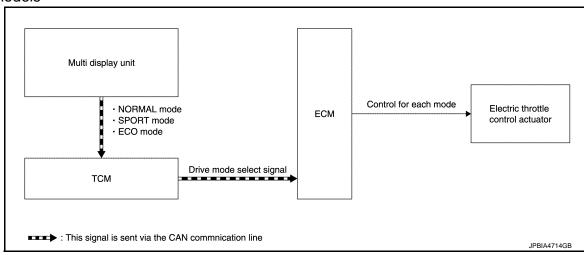
< SYSTEM DESCRIPTION >

INTEGRATED CONTROL SYSTEM : System Diagram

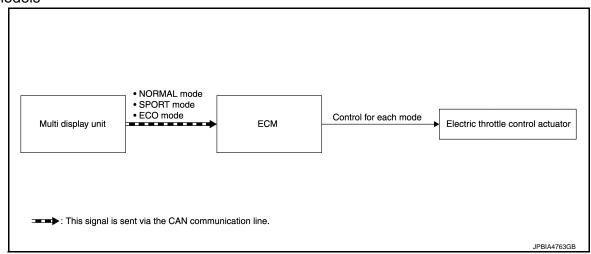
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[MR16DDT]

CVT models



M/T models



INTEGRATED CONTROL SYSTEM : System Description

INFOID:000000007576975

CVT models

System Description

TCM transmits a drive mode select signal to ECM via CAN communication, according to a NORMAL mode signal, SPORT mode signal, or ECO mode signal received from the multi display unit via CAN communication. ECM controls torque and throttle opening angle characteristics appropriate for each mode, based on a received drive mode select signal.

NOTE:

- Because of the multi display unit operation, the display may indicate that the mode is switching. However, the mode may not actually switch due to CAN communication error.
- When a CAN communication error occurs between ECM and TCM, the mode switches to NORMAL mode.

M/T models

System Description

ECM controls torque and throttle opening angle characteristics appropriate for each mode, based on a NOR-MAL mode signal, SPORT mode signal, or ECO mode signal received from the multi display unit via CAN communication.

NOTE:

• Because of the multi display unit operation, the display may indicate that the mode is switching. However, the mode may not actually switch due to CAN communication error.

< SYSTEM DESCRIPTION >

• When a CAN communication error occurs between ECM and the multi display unit, the mode switches to NORMAL mode.

Control By Mode

Mode	Control	EC
NORMAL mode	Offers a better balance of fuel economy and traveling performance.	
SPORT mode	Allows throttle opening angle change and torque control for obtaining reality and acceleration performance appropriate to a winding run.	С
ECO mode	Allows throttle opening angle change and torque control for assisting better fuel efficiency.	

CAN COMMUNICATION

CAN COMMUNICATION : System 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. Refer to LAN-28, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart", about CAN communication for detail.

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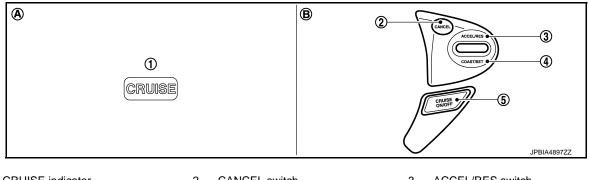
OPERATION

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

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

INEOID:000000007576977

SWITCHES AND INDICATORS



CRUISE indicator 1. COAST/SET switch

4

- CANCEL switch 2. ASCD MAIN switch
- 3. ACCEL/RES switch

On the combination meter Α.

5. B. On the steering wheel

SET SPEED RANGE

ASCD system can be set the following vehicle speed.

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

SET OPERATION

Press MAIN switch. (The CRUISE indicator in combination meter illuminates.)

When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 144 km/h (90 MPH), press COAST/SET switch.

ACCELERATE OPERATION

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

CANCEL OPERATION

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



OPERATION	
< SYSTEM DESCRIPTION > [MR16DDT]	
 When the ECM detects any of the following conditions, the ECM cancels the cruise operation and informs the driver by blinking CRUISE indicator lamp. Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE indicator lamp 	А
is blinked slowly. NOTE: Engine coolant temperature decreases to the normal operating temperature, CRUISE indicator lamp stop blinking and the cruise operation is able to work.	EC
 Malfunction for some self-diagnoses regarding ASCD control: CRUISE indicator will blink quickly. When ASCD MAIN switch is turned to OFF during the cruise control driving, all of ASCD operations is canceled and vehicle speed memory is erased. 	С
COAST OPERATION When the COAST/SET switch is pressed during the cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.	D
 RESUME OPERATION When the ACCEL/RES switch is pressed after the cancel operation other than pressing ASCD MAIN switch is performed, vehicle speed is return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions. 	Е
 Brake pedal is released Clutch pedal is released (M/T models) 	F
 Selector lever is in other than P and N positions (CVT models) Vehicle speed is greater than 40 km/h (25 MPH) and less than 144 km/h (90 MPH) 	G
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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 control module memory as a DTC. The diagnostic information can be obtained with the diagnostic tool (GST: Generic Scan Tool).

GST (Generic Scan Tool)

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When GST is connected with a data link connector equipped on the vehicle side, it will communicate with the control module equipped in the vehicle and then enable various kinds of diagnostic tests. Refer to <u>GI-51</u>. "<u>Description</u>".

NOTE:

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

INFOID:000000007576978

< SYSTEM DESCRIPTION >

DIAGNOSIS SYSTEM (ECM) DIAGNOSIS DESCRIPTION

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

EC INFOID:000000007576980

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

		MIL			DTC		1st trip DTC	
Items	1st trip 2nd 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-102, "DTC Index"</u> .)	_	×	_	_	×	_	_	_
Except above			_	×		×	×	—

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

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 L 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 M 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

For malfunctions in which 1st trip DTCs are displayed, refer to EC-102, "DTC Index". These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored Ν non-continuously are also displayed on CONSULT.

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

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to EC-120, "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. Ρ

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.

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INFOID:00000000757698

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< 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		
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

INFOID:000000007576982

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)
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"

< SYSTEM DESCRIPTION >

А This driving pattern satisfies with B and C patterns. This driving pattern EC satisfies with C but not B. NG This driving pattern NG OK NG Detection satisfies with B but not C. Detection Detection Detection <Driving Pattern> Vehicle 1st speed Trip Trip Trip Trip D NG OK NG NG IGN ON MIL MIL illuminates illuminates MIL turns off F MIL turns off ۲Ż в Нc 0 Ω 0 Counter DTC & DISPLAY NO DISPLAY Freeze NO DISPL Data> Н Frame Data *4 °3 DISPLAY DISPLAY Frame 1st trip CLEAR CLEAR Freeze Frame Freeze 6 Data DISPLAY DISPLAY 1st trip CLEAR CLEAF trip) DTC (1st 1 6 *8 ∞ DTC 80 С 79 5 Counter Κ trip) <(1st L JMBIA1417GB Μ *1: When the same malfunction is de-*2: MIL will turn OFF after vehicle is driv- *3: When the same malfunction is deen 3 times (pattern B) without any tected in two consecutive trips, MIL tected in two consecutive trips, the will light up. malfunctions. DTC and the freeze frame data will be stored in ECM. Ν *4: The DTC and the freeze frame data *6: The 1st trip DTC and the 1st trip *5: When a malfunction is detected for freeze frame data will be cleared at will not be displayed any longer after the first time, the 1st trip DTC and the the moment OK is detected. vehicle is driven 80 times (pattern C) 1st trip freeze frame data will be stored in ECM. without the same malfunction. (The DTC and the freeze frame data still remain in ECM.) *7: When the same malfunction is de-*8: 1st trip DTC will be cleared when ve-Ρ tected in the 2nd trip, the 1st trip hicle is driven once (pattern C) with-

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

is stored in ECM.

out the same malfunction after DTC

Driving Pattern B Refer to EC-67, "DIAGNOSIS DESCRIPTION : Driving Pattern".

freeze frame data will be cleared.

EC-65

< SYSTEM DESCRIPTION >

Driving Pattern C Refer to <u>EC-67. "DIAGNOSIS DESCRIPTION : Driving Pattern"</u>. Example: If the stored fragge frame data is as per the following:

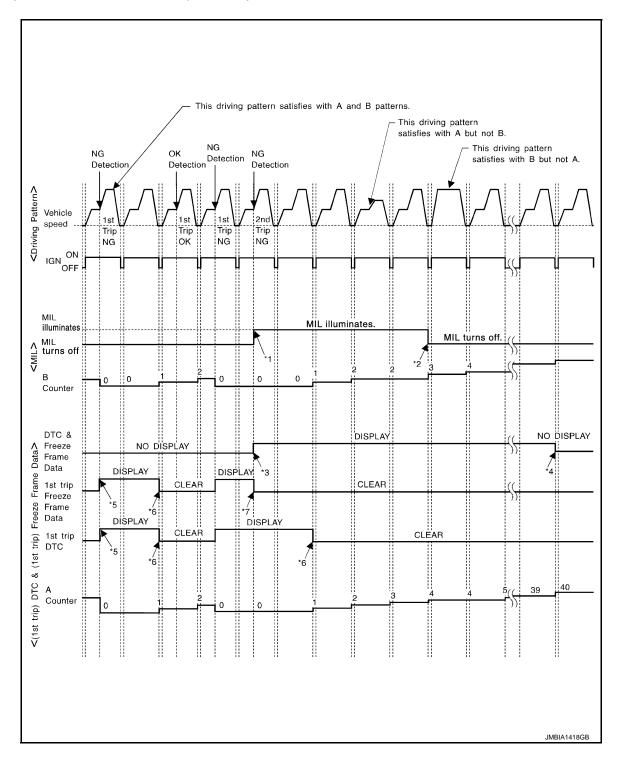
If the stored freeze frame data is as per the following:

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

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

Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than $70^{\circ}C$ ($158^{\circ}F$)

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



< SYSTEM DESCRIPTION >

DIAGNOSIS SYSTEM (ECM)

[MR16DDT]

tected in two consecutive trips, MIL	MIL will turn OFF after vehicle is driv- en 3 times (pattern B) without any malfunctions.	*3: When the same malfunction is de- tected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.	А
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	When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.	*6: 1st trip DTC will be cleared after vehi- cle is driven once (pattern B) without the same malfunction.	EC C
 still remain in ECM.) *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared. 			D
Explanation for Driving Patterns Except System"	pt for "Misfire <exhaust qual<="" td=""><td>ty Deterioration>", "Fuel Injection</td><td>E</td></exhaust>	ty Deterioration>", "Fuel Injection	E
Driving Pattern A Refer to <u>EC-67, "DIAGNOSIS DESCRIPT</u>	ION : Driving Pattern".		F
Driving Pattern B Refer to EC-67, "DIAGNOSIS DESCRIPT	ION : Driving Pattern".		
DIAGNOSIS DESCRIPTION : D		INFOID:00000007576983	G
CAUTION: Always drive at a safe speed.			Н
DRIVING PATTERN A Driving pattern A means a trip satisfying t • Engine speed reaches 400 rpm or more • Engine coolant temperature rises by 20 • Engine coolant temperature reaches 70	e. °C (36°F) or more after starting	the engine.	I
• The ignition switch is turned from ON to NOTE:	OFF.		J
 When the same malfunction is detected A. When the above conditions are satisfied pattern A. 			K
DRIVING PATTERN B Driving pattern B means a trip satisfying t • Engine speed reaches 400 rpm or more			L
 Engine coolant temperature reaches 70 Vehicle speed of 70 – 120 km/h (44 – 7 closed loop. 	°C (158°F) or more.	econds or more under the control of	Μ
• Vehicle speed of 30 - 60 km/h (19 - 3	7 MPH) is maintained for 10 s	econds or more under the control of	
 closed loop. Under the closed loop control condition speed of 4 km/h (2 MPH) or less with id 		2 seconds or more in total: Vehicle	Ν
 The state of driving at 10 km/h (7 MPH) A lapse of 22 minutes or more after eng NOTE: 		more in total.	0
 Drive the vehicle at a constant velocity. When the same malfunction is detected B. 	I regardless of driving condition	s, reset the counter of driving pattern	Ρ
 When the above conditions are satisfied pattern B. 	d without detecting the same ma	lfunction, reset the counter of driving	
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

EC-67

< 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.

DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code

INFOID:000000007576984

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

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

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

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

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

NOTE:

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

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

NOTE:

If permanent DTC is stored or MIL illuminates during the state emissions inspection, the vehicle is also returned to the customeruntested even though the SRT indicates "CMPLT" for all test items. therefore, it is important to check SRT ("CMPLT"), DTC (No DTCs) and permanent DTC (No permanent DTC) before the inspection.

SRT SET TIMING

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

		Example					
Self-diagn	osis result	Diagnosis	$\leftarrow ON \rightarrow$	$\begin{array}{rcl} & \text{Ignitio} \\ \text{OFF} & \leftarrow \text{ON} \rightarrow & \text{O} \end{array}$	n cycle $FF \leftarrow ON \rightarrow OF$	$F \leftarrow ON \rightarrow$	
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"	

< SYSTEM DESCRIPTION >

[MR16DDT]

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		Example								
Self-diagnosis result		Diagnosis	$F \leftarrow ON \rightarrow$	A						
NG exists	Case 3	P0400	ОК	ОК	—	_				
		P0402	_	—	_		EC			
		P1402	NG	_	NG	NG (Consecutive NG)	С			
		(1st trip) DTC	1st trip DTC	_	1st trip DTC	DTC (= MIL ON)	D			
		SRT of EGR	"INCMP"	"INCMP"	"INCMP"	"CMPLT"	D			

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 \Box "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)

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.

PERMANENT DTC SET TIMING

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

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< SYSTEM DESCRIPTION >

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-519, "Diagnosis Procedure"</u>.

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-130, "Work Procedure".						
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to EC-131, "Work Procedure".						
Idle air volume learning	ECM can learn the idle air volume. Refer to EC-132, "Work Procedure".						
Mixture ratio self-learning value clear	Mixture ratio self-learning value can be erased. Refer to EC-135, "Work Procedure".						

BULB CHECK MODE

Description

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

Operation Procedure

- 1. Turn ignition switch ON.
- The MIL on the instrument panel should stay ON. If it remains OFF, check MIL circuit. Refer to <u>EC-519, "Diagnosis Procedure"</u>.

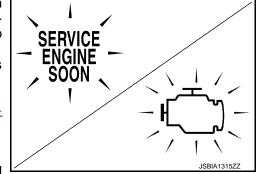
SRT STATUS MODE

Description

This function allows to read if ECM has completed the self-diagnoses of major emission control systems and components. For SRT, refer to <u>EC-68, "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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< SYSTEM DESCRIPTION >

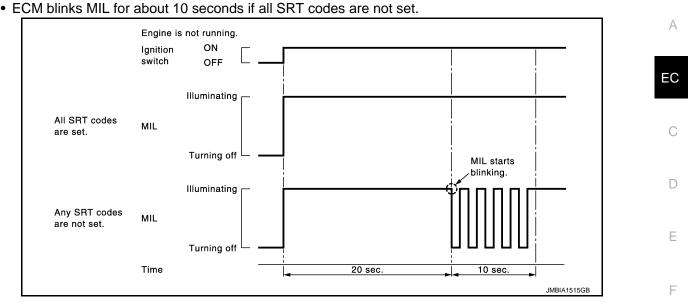
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MALFUNCTION WARNING MODE

Description

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

Operation Procedure

1.	Turn ignition switch ON.
2.	Check that MIL illuminates.
	If it remains OFF, check MIL circuit. Refer to EC-519, "Diagnosis Procedure

- 3. Start engine and let it idle.
 - For two trip detection logic diagnoses, ECM turns on MIL when it detects the same malfunction twice in the two consecutive driving cycles.
 - For 1st trip detection logic diagnoses, ECM turns on MIL when it detects a malfunction in one driving cycle.
 - ECM blinks MIL when it detects a malfunction that may damage the three way catalyst (misfire).

SELF-DIAGNOSTIC RESULTS MODE

Description

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

How to Set Self-diagnostic Results Mode

NOTE:

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

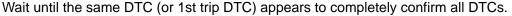
NOTE:

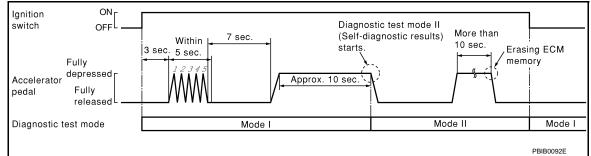
Do not release the accelerator pedal for 10 seconds if MIL starts blinking during this period. This blinking is displaying SRT status and is continued for another 10 seconds.

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

< SYSTEM DESCRIPTION >

NOTE:

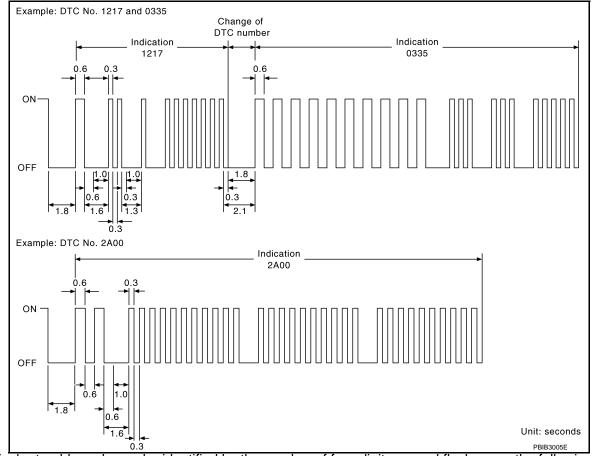




How to Read Self-diagnostic Results

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

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



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

Number	0	1	2	3	4	5	6	7	8	9	А	В	С	D	Е	F
Flashes	10	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16

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

The 100th-digit numeral and lower digit numerals consist of a 0.3-seconds ON and 0.3-seconds OFF cycle. A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared. A change from one trouble code to another occurs at an interval of 1.8-seconds OFF.

< 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-102</u>, "<u>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.	Ε
Discussed in translation of the sector	

- 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

FUNCTION

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

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

WORK SUPPORT MODE

Work Item

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< SYSTEM DESCRIPTION >

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Work item	Condition	Usage
IDLE AIR VOL LEARN	The idle air volume that keeps the engine within the specified range is memorized in ECM.	When learning the idle air volume
EVAP SYSTEM CLOSE	 Close the EVAP canister vent control valve in order to make EVAP system close under the following conditions. Ignition switch ON Engine not running Ambient temperature is above 0°C (32°F) No vacuum and no high pressure in EVAP system Fuel tank temperature is more than 0°C (32°F) Within 10 minutes after starting "EVAP SYSTEM CLOSE" When trying to execute "EVAP SYSTEM CLOSE" under the condition except above, CONSULT will discontinue it and display appropriate instruction. NOTE: When starting engine, CONSULT may display "Battery voltage is low. Charge battery", even in using charged bat- tery. 	When detecting EVAP vapor leak point of EVAP system
FUEL PRESSURE RELEASE	Crank a few times after engine stalls.	When releasing fuel pressure from fuel line
TARGET IGN TIM ADJ*	Idle condition	When adjusting target ignition tim- ing
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
G SENSOR CALIBRATION	Park the vehicle on a flat road.Adjust pressure in all tires to the specified value.	Calibrates G sensor.
CLSD THL POS LEARN	Ignition on and engine stopped.	When learning the throttle valve closed position

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

SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-102, "DTC Index".

How to Read DTC and 1st Trip DTC

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

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

How to Erase DTC and 1st Trip DTC

NOTE:

- If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
- If the DTC is not for CVT related items (see EC-102, "DTC Index"), skip step 1.
- 1. Erase DTC in TCM. Refer to TM-103, "CONSULT Function (TRANSMISSION)".
- 2. Select "ENGINE" with CONSULT.
- 3. Select "SELF-DIAG RESULTS".
- 4. Touch "ERASE". (DTC in ECM will be erased.)

Freeze Frame Data and 1st Trip Freeze Frame Data

< SYSTEM DESCRIPTION >

[MR16DDT]

Freeze frame data item*	Description							
DIAG TROUBLE CODE [PXXXX]	The engine control component part/control system has a trouble code the is displayed as PXXXX. (Refer to <u>EC-102, "DTC Index"</u> .)							
FUEL SYS-B1	• "Fuel injection system status" at the moment a malfunction is detected is displayed.							
FUEL SYS-B2	 One of the following mode is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment) Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control Mode5: Open loop - has not yet satisfied condition to go to closed loop 							
CAL/LD VALUE [%]	The calculated load value at the moment a malfunction is detected is displayed.							
COOLANT TEMP [°C] or [°F]	The engine coolant temperature at the moment a malfunction is detected is displayed.							
L-FUEL TRM-B1 [%]	"Long-term fuel trim" at the moment a malfunction is detected is displayed.							
L-FUEL TRM-B2 [%]	• The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.							
S-FUEL TRM-B1 [%]	"Short-term fuel trim" at the moment a malfunction is detected is displayed.							
S-FUEL TRM-B2 [%]	• The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel sched- ule.							
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed.							
VEHICL SPEED [km/h] or [mph]	The vehicle speed at the moment a malfunction is detected is displayed.							
ABSOL TH·P/S [%]	The throttle valve opening angle at the moment a malfunction is detected is displayed.							
B/FUEL SCHDL [msec]	The base fuel schedule at the moment a malfunction is detected is displayed.							
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed.							
INT MANI PRES [kPa]								
COMBUST CONDI- TION	• These items are displayed but are not applicable to this model.							

DATA MONITOR MODE

Monitored Item

 \times : Applicable

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		Monitor Ite	m Selection			
Monitored item	Unit	ECU IN- PUT SIG- NALS	MAIN SIGNALS	Description	Remarks	N
ENG SPEED	rpm	×	×	Indicates the engine speed comput- ed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	 Accuracy becomes poor if engine speed drops below the idle rpm. If the signal is interrupted while the engine is running, an abnormal value may be indicated. 	N
MAS A/F SE-B1	V	×	×	The signal voltage of the mass air flow sensor is displayed.	 When the engine is stopped, a certain value is indicated. When engine is running specification range is indicated in "SPEC". 	P
B/FUEL SCHDL	msec	×	×	"Base fuel schedule" indicates the fuel injection pulse width pro- grammed into ECM, prior to any learned on board correction.	When engine is running specification range is indicated in "SPEC".	

< SYSTEM DESCRIPTION >

		Monitor Ite	m Selection		
Monitored item	Unit	ECU IN- PUT SIG- NALS	MAIN SIGNALS	Description	Remarks
A/F ALPHA-B1	%			The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	 When the engine is stopped, a certain value is indicated. When engine is running specification range is indicated in "SPEC". This data also includes the data for the air-fuel ratio learning control.
COOLAN TEMP/S	°C or °F	×	×	The engine coolant temperature (de- termined by the signal voltage of the engine coolant temperature sensor) is displayed.	When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine cool- ant temperature determined by the ECM is displayed.
A/F SEN1 (B1)	V	×	×	The A/F signal computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed.	
HO2S2 (B1)	V	×	×	The signal voltage of the heated ox- ygen sensor 2 is displayed.	
HO2S2 MNTR(B1)	RICH / LEAN		×	 Display of heated oxygen sensor 2 signal: RICH: means the amount of oxy- gen after three way catalyst is rel- atively small. LEAN: means the amount of oxy- gen after three way catalyst is rel- atively large. 	When the engine is stopped, a certain value is indicated.
VHCL SPEED SE	km/h or mph	×	×	The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BATTERY VOLT	V			The power supply voltage of ECM is displayed.	
ACCEL SEN 1	V			The accelerator pedal position sen- sor signal voltage is displayed.	ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from
ACCEL SEN 2				sor signar voltage is displayed.	ECM terminal voltage signal.
TP SEN 1-B1 TP SEN 2-B1	V	×	×	The throttle position sensor signal voltage is displayed.	TP SEN 2-B1 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
FUEL T/TMP SE	°C or °F			The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.	
EVAP SYS PRES	V			The signal voltage of EVAP control system pressure sensor is dis- played.	
FUEL LEVEL SE	V	×		The signal voltage of the fuel level sensor is displayed.	
START SIGNAL	ON/ OFF			Indicates start signal status [ON/ OFF] computed by the ECM accord- ing to the signals of engine speed and battery voltage.	After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS	ON/ OFF	×	×	Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG	ON/ OFF	×	×	Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	

< SYSTEM DESCRIPTION >

		Monitor Ite	m Selection		
Monitored item	Unit	ECU IN- PUT SIG- NALS	MAIN SIGNALS	Description	Remarks
PW/ST SIGNAL	ON/ OFF	×	×	[ON/OFF] condition of the power steering system (determined by the signal sent from EPS control unit) is indicated.	
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. 	
IGNITION SW	ON/ OFF	×	×	Indicates [ON/OFF] condition from ignition switch signal.	
HEATER FAN SW	ON/ OFF	×		Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW	ON/ OFF			Indicates [ON/OFF] condition from the stop lamp switch signal.	
IGN TIMING	BTD C		×	Indicates the ignition timing comput- ed by ECM according to the input signals.	When the engine is stopped, a certain value is indicated.
COMBUSTION	_			These items are displayed but are not applicable to this model.	
CAL/LD VALUE	%			"Calculated load value" indicates the value of the current airflow divided by peak airflow.	
MASS AIRFLOW	g/s			Indicates the mass airflow computed by ECM according to the signal volt- age of the mass airflow sensor.	
PURG VOL C/V	%			 Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. The opening becomes larger as the value increases. 	
INT/V TIM(B1)	°CA			Indicates [°CA] of intake camshaft advance angle.	
EXHV TIM B1	°CA			Indicates [°CA] of exhaust camshaft advance angle.	
INT/V SOL(B1)	%			 The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. The advance angle becomes larg- er as the value increases. 	
AIR COND RLY	ON/ OFF			The air conditioner relay control con- dition (determined by ECM accord- ing to the input signals) is indicated.	
FUEL PUMP RLY	ON/ OFF			Indicates the fuel pump relay control condition determined by ECM ac- cording to the input signals.	

< SYSTEM DESCRIPTION >

		Monitor Ite	m Selection		
Monitored item	Unit	ECU IN- PUT SIG- NALS	MAIN SIGNALS	Description	Remarks
VENT CONT/V	ON/ OFF			 The control condition of the EVAP canister vent control valve (deter- mined by ECM according to the in- put signals) is displayed. ON: Closed OFF: Open 	
THRTL RELAY	ON/ OFF			Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
HO2S2 HTR (B1)	ON/ OFF			Indicates [ON/OFF] condition of heated oxygen sensor 2 heater de- termined by ECM according to the input signals.	
ALT DUTY SIG	ON/ OFF			 The control condition of the power generation voltage variable con- trol (determined by ECM accord- ing 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 comput- ed from the input speed sensor sig- nal.	
VEHICLE SPEED	km/h or mph			The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
IDL A/V LEARN	YET/ CM- PLT			 Display the condition of Idle Air Volume Learning YET: Idle air volume learning has not been performed yet. CMPLT: Idle air volume learning has already been performed suc- cessfully. 	
TRVL AFTER MIL	km/h or mph			Distance traveled while MIL is activated.	
ENG OIL TEMP	°C or °F			The engine oil temperature (deter- mined by the signal voltage of the engine oil temperature sensor) is displayed.	
A/F S1 HTR(B1)	%			 Air fuel ratio (A/F) sensor 1 heater control value computed by ECM according to the input signals. The current flow to the heater becomes larger as the value increases. 	
VHCL SPEED SE	km/h or mph			The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
SET VHCL SPD	km/h or mph			The preset vehicle speed is dis- played.	
MAIN SW	ON/ OFF			Indicates [ON/OFF] condition from ASCD MAIN switch signal.	

< SYSTEM DESCRIPTION >

		Monitor Ite	m Selection			
Monitored item	Unit	ECU IN- PUT SIG- NALS	MAIN SIGNALS	Description	Remarks	A
CANCEL SW	ON/ OFF			Indicates [ON/OFF] condition from CANCEL switch signal.		EC
RESUME/ACC SW	ON/ OFF			Indicates [ON/OFF] condition from ACCEL/RES switch signal.		С
SET SW	ON/ OFF			Indicates [ON/OFF] condition from COAST/SET switch signal.		
BRAKE SW1	ON/ OFF			Indicates [ON/OFF] condition from brake pedal position switch signal.		D
BRAKE SW2	ON/ OFF			Indicates [ON/OFF] condition of stop lamp switch signal.		E
VHCL SPD CUT	NON/ CUT			 Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off. 		F
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. 		Η
AT OD MONITOR	ON/ OFF			Indicates [ON/OFF] condition of CVT O/D according to the input signal from the TCM.	For M/T models, always "OFF" is dis- played.	J
AT OD CANCEL	ON/ OFF			Indicates [ON/OFF] condition of CVT O/D cancel request signal.	For M/T models, always "OFF" is displayed.	
CRUISE LAMP	ON/ OFF			Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.		K
SET LAMP	ON/ OFF			NOTE: The item is indicated, but not used.		L
FAN DUTY	%			Indicates a command value for cool- ing fan. The value is calculated by ECM based on input signals.		M
ALT DUTY	%			Indicates the duty ratio of the power generation command value. The ra- tio is calculated by ECM based on the battery current sensor signal.		Ν
BAT CUR SEN	mV			The signal voltage of battery current sensor is displayed.		0
A/F ADJ-B1	_			Indicates the correction of a factor stored in ECM. The factor is calculat- ed from the difference between the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 signal.		Ρ
P/N POSI SW	ON/ OFF	×	×	Indicates [ON/OFF] condition from the park/neutral position (PNP) signal.		

< SYSTEM DESCRIPTION >

		Monitor Ite	m Selection		
Monitored item	Unit	ECU IN- PUT SIG- NALS	MAIN SIGNALS	Description	Remarks
INT/A TEMP SE	°C or °F	×	×	The intake air temperature (deter- mined by the signal voltage of the in- take air temperature sensor1) is indicated.	
AC PRESS SEN	V			The signal voltage from the refriger- ant pressure sensor is displayed.	
FUEL PRES SEN	MPa			Indicates the fuel rail pressure com- puted by ECM according to the input signals.	
TURBO BST SEN	V			The turbocharger boost sensor sig- nal voltage is displayed.	
ATOM PRES SEN	V			The atmospheric pressure sensor signal voltage is displayed.	
FUEL INJ TIM	deg			Indicates the fuel injection timing computed by ECM according to the input signals.	
FUEL INJ B1	msec			ECM-calculated injection pulse width of the fuel injector on the Bank 1 side.	
EVAP LEAK DIAG	YET/ CM- PLT			 Indicates the condition of EVAP leak diagnosis. YET: EVAP leak diagnosis has not been performed yet. CMPLT: EVAP leak diagnosis has been performed successfully. 	
EVAP DIAG READY	ON/ OFF			 Indicates the ready condition of EVAP leak diagnosis. ON: Diagnosis has been ready condition. OFF: Diagnosis has not been ready condition. 	
BAT TEMP SEN	V			The signal voltage from the battery temperature sensor is displayed.	
THRTL STK CNT B1	_			NOTE: The item is indicated, but not used.	
HO2 S2 DIAG1(B1)	INC- MP/ CM- PLT			 Indicates DTC P0139 self-diagnosis (delayed response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
HO2 S2 DIAG2(B1)	INC- MP/ CM- PLT			 Indicates DTC P0139 self-diagnosis (slow response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
H/P FUEL PUMP DEG	deg			Displays ECM-calculated fuel dis- charge position of the high pressure fuel pump.	
FUEL PRES SEN V	mV			The signal voltage of FRP sensor is displayed.	
EOP SENSOR	mV			The signal voltage of EOP sensor is displayed.	

< SYSTEM DESCRIPTION >

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		Monitor Ite	m Selection			^
Monitored item	Unit	ECU IN- PUT SIG- NALS	MAIN SIGNALS	Description	Remarks	A
ECM TEMP 1	°C or			The ECM temperature is indicated.		EC
ECM TEMP 2	°F			The Low temperature is indicated.		
BOOST S/V DUTY	%			The turbocharger boost control sole- noid valve control condition (detem- ined by ECM according to the input signal) is indicated.		С
G SENSOR	mV			The signal voltage of G sensor is displayed.		D

NOTE:

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

Test Item

Test item	Condition	Judgement	Check item (Remedy)
VENT CONTROL/V	 Ignition switch ON (Engine stopped) Turn solenoid valve ON and OFF with the CONSULT and listen to operating sound. 	Solenoid valve makes an operating sound.	 Harness and connectors EVAP canister vent control solenoid valve
ENG COOLANT TEMP	 Engine: Return to the original trouble condition Change the engine coolant temperature using CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	 Harness and connectors Engine coolant temperature sensor Fuel injector
FUEL INJECTION	 Engine: Return to the original trouble condition Change the amount of fuel injection using CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	 Harness and connectors Fuel injector Air fuel ratio (A/F) sensor 1
FUEL/T TEMP SEN	Change the fuel tank temperature u	sing CONSULT.	
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 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 connectorsFuel pump relay
IGNITION TIMING	 Engine: Return to the original trouble condition Timing light: Set Retard the ignition timing using CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	Perform Idle Air Volume Learning.
FAN DUTY CON- TROL [*]	 Ignition switch: ON Change duty ratio using CON- SULT. 	Cooling fan speed changes.	 Harness and connectors Cooling fan motor Cooling fan relay Cooling fan control module IPDM E/R

< SYSTEM DESCRIPTION >

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Test item	Condition	Judgement	Check item (Remedy)
ALTERNATOR DUTY	 Ignition switch: ON Change duty ratio using CON- SULT. 	Battery voltage changes.	Harness and connectorsAlternatorIPDM E/R
POWER BALANCE	 Engine: After warming up, idle the engine. A/C switch OFF Shift lever: P or N (CVT), Neutral (M/T) Cut off each fuel injector signal one at a time using CONSULT. 	Engine runs rough or dies.	 Harness and connectors Compression Fuel injector Power transistor Spark plug Ignition coil

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

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

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

PERMANENT DTC STATUS Mode

How to display permanent DTC status

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

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

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

CAUTION:	ATION : PERMANENT DTC STATUS						
PERMANENT DTC	DRIVING PATTERN B	DRIVING PATTERN D					
XXXX	XXXX INCMP INCMP						
XXXX	XXXX CMPLT INCMP						
XXXX	XXXX INCMP CMPLT						
xxxx	CMPLT	INCMP					
ХХХХ		INCMP					
хххх	XXXX INCMP INCMP						
	The previous trip information is displayed	·					

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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:

< SYSTEM DESCRIPTION >

This mode is not used in regions that permanent DTCs are not regulated by law. DTC WORK SUPPORT Mode

Test mode	Test item	Corresponding DTC No.	Reference page	-0
EVAPORATIVE SYS-	PURG VOL CN/V P1444	P0443	<u>EC-322</u>	EC
TEM	PURG FLOW P0441	P0441	<u>EC-317</u>	
	HO2S2 (B1) P1146	P0138	<u>EC-245</u>	С
HO2S2	HO2S2 (B1) P1147	P0137	<u>EC-239</u>	-
	HO2S2 (B1) P0139	P0139	<u>EC-252</u>	-
	A/F SEN1 (B1) P1278/P1279	P0133	<u>EC-234</u>	D
A/F SEN1	A/F SEN1 (B1) P1276	P0130	<u>EC-224</u>	-

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ECU DIAGNOSIS INFORMATION ECM

Reference Value

INFOID:000000007576989

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VALUES ON THE DIAGNOSIS TOOL

Remarks:

• Specification data are reference values.

• Specification data are output/input values which are detected or supplied by the ECM at the connector.

* Specification data may not be directly related to their components signals/values/operations.

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

Monitor Item	C	Values/Status	
ENG SPEED	Run engine and compare CONSULT	Almost the same speed as the tachometer indication.	
MAS A/F SE-B1	See EC-151, "Diagnosis Procedure"		
B/FUEL SCHDL	See EC-151, "Diagnosis Procedure"		
A/F ALPHA-B1	See EC-151, "Diagnosis Procedure"		
COOLAN 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	00 rpm quickly after the following conditions en 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 3,00 are met. Engine: After warming up After keeping engine speed betwee idle for 1 minute under no load 	$LEAN \leftarrow \rightarrow RICH$	
VHCL SPEED SE	Turn drive wheels and compare CON tion.	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	0.6 - 0.9 V
ACCEL SEN I	(Engine stopped)	Accelerator pedal: Fully depressed	4.0 - 4.8 V
ACCEL SEN 2 ^{*1}	Ignition switch: ON	Accelerator pedal: Fully released	0.3 - 4.7 V
ACCEL SEN 2	(Engine stopped)	Accelerator pedal: Fully depressed	1.95 - 2.4 V
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 1-B1	(Engine stopped)Selector lever: D (CVT), 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*	(Engine stopped)Selector lever: D (CVT), 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 0.5 - 4.6 V
FUEL LEVEL SE	Ignition switch: ON		Depending on fuel level of fuel tank.
START SIGNAL	Ignition switch: $ON \rightarrow START \rightarrow ON$	Ignition switch: $ON \rightarrow START \rightarrow ON$	
CLSD THL POS	Ignition switch: ON	Accelerator pedal: Fully released	ON
CLOD INL PUS	(Engine stopped)	Accelerator pedal: Slightly depressed	OFF

< ECU DIAGNOSIS INFORMATION >

Monitor Item	C	Condition	Values/Status
	Engine: After warming up tale the	Air conditioner switch: OFF	OFF
AIR COND SIG	Engine: After warming up, idle the engine	Air conditioner switch: ON (Compressor operates.)	ON
PW/ST SIGNAL	Engine: After warming up, idle the	Steering wheel: Not being turned	OFF
WIST SIGNAL	engine	Steering wheel: Being turned	ON
-OAD SIGNAL		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
GNITION SW	Ignition switch: $ON \rightarrow OFF \rightarrow ON$		$ON\toOFF\toON$
	Engine: After warming up, idle the	Heater fan switch: ON	ON
HEATER FAN SW	engine	Heater fan switch: OFF	OFF
		Brake pedal: Fully released	OFF
BRAKE SW	Ignition switch: ON	Brake pedal: Slightly depressed	ON
	Engine: After warming up	Idle	5° - 15° BTDC
GN TIMING	 Selector lever: P or N (CVT), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	30° - 50° BTDC
COMBUSTION		_	These items are displayed but are not applicable to this model.
	Engine: After warming up	Idle	5 - 35 %
CAL/LD VALUE	 Selector lever: P or N (CVT), Neutral (M/T) Air conditioner switch: OFF No load 	2,500 rpm	5 - 35 %
MASS AIRFLOW	 Engine: After warming up Selector lever: P or N (CVT), Neutral (M/T) Air conditioner switch: OFF No load 	Idle 2,500 rpm	1.0 - 5.0 g/s 2.0 - 10.0 g/s
PURG VOL C/V	 Engine: After warming up Selector lever: P or N (CVT), Neutral (M/T) 	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0 - 10 %
	Air conditioner switch: OFFNo load	2,000 rpm	0 - 20 %
	Engine: After warming up	Idle	–5° - 5°CA
NT/V TIM(B1)	 Selector lever: P or N (CVT), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	Approx. 0° - 20°CA
	Engine: After warming up	Idle	–5° - 5°CA
EXH/V TIM B1	 Selector lever: P or N (CVT), Neutral (M/T) Air conditioner switch: OFF No load 	Around 2,500 rpm while the engine speed is rising	Approx. 0° - 30°CA
	Engine: After warming up	Idle	0 %
NT/V SOL(B1)	 Selector lever: P or N (CVT), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	Approx. 0% - 60 %
	Engine: After warming up idle the	Air conditioner switch: OFF	OFF
AIR COND RLY	Engine: After warming up, idle the engine	Air conditioner switch: ON	ON
		(Compressor operates)	0.1

< ECU DIAGNOSIS INFORMATION >

Monitor Item	(Condition	Values/Status
VENT CONT/V	Ignition switch: ON		OFF
FUEL PUMP RLY	For 1 seconds after turning ignition switch: ONEngine running or cranking		ON
	Except above		OFF
THRTL RELAY	Ignition switch: ON		ON
HO2S2 HTR (B1)	- Engine: After warming up	after the following conditions are met. en 3,500 and 4,000 rpm for 1 minute and at	ON
	Engine speed: Above 3,600 rpm		OFF
	Power generation voltage variable	control: Operating	ON
ALT DUTY SIG	Power generation voltage variable	control: Not operating	OFF
I/P PULLY SPD	Vehicle speed: More than 20 km/h	(12 MPH)	Almost the same speed as the tachometer indication
VEHICLE SPEED	Turn drive wheels and compare CC tion.	NSULT value with the speedometer indica-	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
IDE AVV LEARIN		Idle air volume learning has already been performed successfully.	CMPLT
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has illuminated.	0 - 65,535 km (0 - 40,723 miles)
ENG OIL TEMP	Engine: After warming up		More than 70°C (158°F)
A/F S1 HTR(B1)	Engine: After warming up, idle the e (More than 140 seconds after starti		4 - 100 %
SET VHCL SPD	Engine: Running	ASCD: Operating	The preset vehicle speed is displayed
MAIN SW	Ignition switch: ON	MAIN switch: Pressed	ON
MAIN SW		MAIN switch: Released	OFF
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	ON
CANCEL OW	Ignition switch. ON	CANCEL switch: Released	OFF
RESUME/ACC SW	Ignition switch: ON	ACCEL/RES switch: Pressed	ON
RESUME/ACC SW	Ignition switch. ON	ACCEL/RES switch: Released	OFF
SET SW	Ignition switch: ON	COAST/SET switch: Pressed	ON
SET SW	Ignition switch. ON	COAST/SET switch: Released	OFF
BRAKE SW1		Brake pedal: Fully released	ON
(Brake pedal posi- tion switch)	Ignition switch: ON	Brake pedal: Slightly depressed	OFF
BRAKE SW2	Ignition switch: ON	Brake pedal: Fully released	OFF
(Stop lamp switch)	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 Ignition switch: ON	MAIN switch: Pressed at the 1st time \rightarrow	OFF ON $\rightarrow OFF$
SET LAMP	NOTE:		
	The item is indicated, but not used.		0 400.00
FAN DUTY	Engine: Running		0 - 100 %

< ECU DIAGNOSIS INFORMATION >

Monitor Item	C	Values/Status	
ALT DUTY	Engine: Idle		0 - 80 %
BAT CUR SEN	 Engine speed: Idle Battery: Fully charged^{*2} Selector lever: P or N (CVT), Neu Air conditioner switch: OFF No load 	tral (M/T)	Approx. 2,600 - 3,500 mV
A/F ADJ-B1	Engine: Running		-0.450 - 0.330
P/N POSI SW	Ignition switch: ON	Selector lever: P or N (CVT), Neutral (M/T)	ON
		Selector lever: Except above	OFF
NT/A TEMP SE	Ignition switch: ON		Indicates intake air tempera- ture
AC PRESS SEN	Engine: IdleBoth A/C switch and blower fan st	witch: ON (Compressor operates)	1.0 - 4.0 V
	Engine: After warming up Selector lower D or N (C)(T)	Idle	Approx. 2.74 MPa
FUEL PRES SEN	 Selector lever: P or N (CVT), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	Approx. 3.0 MPa
	 Engine speed: Idle Selector lever: D (CVT), Neutral (M/T) Fuel: Premium gasoline 	 The accelerator pedal is depressed to a half stroke position or more. The readings of boost in the multi-func- tion meter are the same as the ambient pressure or more. Engine speed: More than 3,000 rpm 	3.07 - 3.15 V
TURBO BST SEN	 Engine speed: Idle Selector lever: D (CVT), Neutral (M/T) Fuel: Regular gasoline 	 The accelerator pedal is depressed to a half stroke position or more. The readings of boost in the multi-func- tion meter are the same as the ambient pressure or more. Engine speed: More than 3,000 rpm 	2.91 - 2.99 V
ATOM PRES SEN	Ignition switch: ON	-	1.80 - 4.80 V
FUEL INJ TIM	 Engine: After warming up Selector lever: P or N (CVT), Neutral (M/T) Air conditioner switch: OFF 	ldle 2,000 rpm	Approx. 30 deg Approx. 30 deg
	No load		
FUEL INJ B1	 Engine: After warming up Selector lever: P or N (CVT), Neutral (M/T) Air conditioner switch: OFF 	Idle 2,000 rpm	Approx. 0.8 msec Approx. 1.1 msec
EVAP LEAK DIAG	No load 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 Selector lever: P or N (CVT), Neutral (M/T) Air conditioner switch: OFF No load 	Idle	Indicates the temperature around the battery.
THRTL STK CNT B1	NOTE: The item is indicated, but not used.	_	
	DTC P0139 self-diagnosis (delayed	response) has not been performed yet.	INCMP
HO2 S2 DIAG1(B1)	DTC P0139 self-diagnosis (delayed cessfully.	response) has already been performed suc-	CMPLT

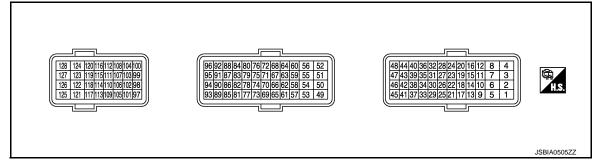
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Monitor Item		Condition	Values/Status
	DTC P0139 self-diagnosis (slow response) has not been performed yet.		INCMP
HO2 S2 DIAG2(B1)	DTC P0139 self-diagnosis (slow re cessfully.	sponse) has already been performed suc-	CMPLT
	Engine: After warming up	Idle	Approx. 255 - 275 deg
H/P FUEL PUMP DEG	 Selector lever: P or N (CVT), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	Approx. 255 - 275 deg
	Engine: After warming up	Idle	Approx. 1,140 - 1,460 mV
FUEL PRES SEN V Neutral (M/T)	Air conditioner switch: OFF	Revving engine from idle to 4,000 rpm quickly	Approx. 1,300 - 2,900 mV
	Engine: After warming up	Idle	Approx. 1,450 mV
EOP SENSOR	 Selector lever: P or N (CVT), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	Approx. 2,850 mV
ECM TEMP 1	Engine: After coolingIgnition switch: ON		Indicates the temperature around the ECM.
ECM TEMP 2	Engine: After coolingIgnition switch: ON		Indicates the temperature around the ECM.
		Idle	0 %
BOOST S/V DUTY	Engine: After warming up	 The accelerator pedal is depressed to a half stroke position or more. Engine speed: Below 3,000 rpm 	100 %
		The accelerator pedal is depressed to a half stroke position or more.Engine speed: More than 3,000 rpm	30 - 60 %
G SENSOR	Vehicle is level		Approx. 2,500 mV

*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 terminal voltage, confirm that the battery is fully charged. Refer to PG-88, "How to Handle Battery".

TERMINAL LAYOUT



PHYSICAL VALUES

NOTE:

- ECM is located in the engine room left side near battery.
- Connect a break-out box (EG17550000) and harness adapter (EG17550400) between the ECM and ECM harness connector.
- Use extreme care not to 2 pins at one time.
- Data is for comparison and may not be exact.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT.

	ninal No. re color)	Description		0	Value	А
+	-	Signal name	Input/ Output	Condition	(Approx.)	EC
1 (B)	_	ECM ground (Fuel injector)	_	_		20
2 (B)	_	ECM ground (Fuel injector)	_	_	_	С
3 (G)	1	Fuel injector No. 1, 4 (HI)	Output	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	BATTERY VOLTAGE (11 - 14 V) ★ 100mSec/div	D
4 (Y)	(B)	Fuel injector No. 2, 3 (HI)		[Engine is running] • Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14 V) ★ 100mSec/div	G
5 (R) 6 (BR)	1	Fuel injector No. 1 (LO) Fuel injector No. 2 (LO)	Output	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	BATTERY VOLTAGE (11 - 14 V) ★ 100mSec/div	I J K
7 (W) 8 (R)	(B)	Fuel injector No. 3 (LO) Fuel injector No. 4 (LO)	Output	[Engine is running] • Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14 V) ★ 100mSec/div	L M N
9 (W)		Sensor ground (Mass air flow sensor, in- take air temperature sensor1)	_		_	0
10 (LG)	_	Sensor ground (Engine coolant tempera- ture sensor)		_	_	Ρ
11 (P)		Sensor ground (Engine oil temperature sensor)				

	minal No. ire color)	Description		Condition	Value
+	-	Signal name	Input/ Output	Condition	(Approx.)
12 (BR)	_	Sensor ground (Refrigerant pressure sensor, EVAP control sys- tem pressure sensor)	_	_	_
				[Ignition switch: ON] • Engine stopped	0.4 V
13 (G)	9 (W)	Mass air flow sensor	Input	[Engine is running]Warm-up conditionIdle speed	0.9 - 1.2 V
				[Engine is running]Warm-up conditionEngine is revving from idle to about 4,000 rpm	0.9 - 1.2 to 2.4 V (Check for linear voltage rise in response to en- gine being increased to about 4,000 rpm.)
14 (L)	10 (LG)	Engine coolant tempera- ture sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.
15 (L)	12 (BR)	EVAP control system pressure sensor	Input	[Ignition switch: ON]	0.5 - 4.6 V
17 (Y)	9 (W)	Intake air temperature sensor 1	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.
18	44			[Engine is running]Warm-up conditionIdle speed	1.14 - 1.46 V
(GR)	(SB)	Fuel rail pressure sensor	Input	[Engine is running]Warm-up conditionRevving engine from idle to 4,000 rpm quickly	1.3 - 2.9 V
19 (P)	12 (BR)	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
21 (W)	127 (B/Y)	A/F sensor 1	Input	[Ignition switch: ON]	2.2 V
22 (Y)	11 (P)	Engine oil temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine oil temperature.
23 (W)	12 (BR)	Sensor power supply (Refrigerant pressure sensor, EVAP control sys- tem pressure sensor)	_	[Ignition switch: ON]	5.0 V
25 (B)	127 (B/Y)	A/F sensor 1	Input	[Engine is running] • Engine speed is 2,000 rpm	1.8 V Output voltage varies with air fuel ratio.
29 (W)	33 (R)	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

< ECU DIAGNOSIS INFORMATION >

	iinal No. e color)	Description		Condition	Value
+	-	Signal name	Input/ Output	Condition	(Approx.)
33 (R)		Sensor ground (Heated oxygen sensor 2)	_	_	_
35 (—)	_	Sensor ground (Knock sensor)	_	_	_
36 (W)	35 (—)	Knock sensor	Input	[Engine is running] • Idle speed	2.5 V
38 (B)	_	Shield	_	_	_
39 (R)	44 (SB)	Sensor power supply (Fuel rail pressure sensor, turbocharger boost sen- sor, engine oil pressure sensor)	_	[Ignition switch: ON]	5.0 V
41	44	Turbocharger boost sen-	loout	[Engine is running]Warm-up conditionIdle speed	1.9 V
(W)	(SB)	SOF	Input	[Engine is running]Warm-up conditionEngine speed is 2,000 rpm	2.0 V
43	44	Engine oil pressure sen-	Input	[Engine is running]Warm-up conditionIdle speed	5mSec/div
(G)	(SB)	SOF		[Engine is running]Warm-up conditionEngine speed is 2,000 rpm	2.7 V★ 5mSec/div
44 (SB)	_	Sensor ground (Fuel rail pressure sensor, turbocharger boost sen- sor, engine oil pressure sensor)			
49 (G)	_	Fuel injector driver power supply 1	Input	[Engine is running]Warm-up conditionIdle speed	BATTERY VOLTAGE (11 - 14 V)
50 (B)	_	ECM ground (High pressure fuel pump)		_	_
51 (GR)	127 (B/Y)	Throttle control motor (Open)	Output	 [Ignition switch: ON] Engine stopped Selector lever: D (CVT), 1st (M/T) Accelerator pedal: Fully depressed 	3.2 V★ 1mSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓

	minal No. re color)	Description		Condition	Value							
+	_	Signal name	Input/ Output	Condition	(Approx.)							
52 (BR)	127 (B/Y)	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	1.8 V★ 5mSec/div							
53 (BR)	_	Fuel injector driver power supply 2	Input	[Engine is running]Warm-up conditionIdle speed	BATTERY VOLTAGE (11 - 14 V)							
54 (R)	_	High pressure fuel pump driver power supply	Input	[Engine is running]Warm-up conditionIdle speed	BATTERY VOLTAGE (11 - 14 V)							
55	50	High pressure fuel pump	Output	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	BATTERY VOLTAGE (11 - 14 V) ★ 20mSec/div							
(BR)	(B)	(HĬ)									[Engine is running] • Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14 V) ★ 20mSec/div 20mSec/div 5V/div
56	127	High pressure fuel pump	Output	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	BATTERY VOLTAGE (11 - 14 V) ★ 20mSec/div							
(Y)	(B/Y)	(LO)		[Engine is running] • Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14 V) ★ 20mSec/div							
58 (G)	_	Sensor power supply [Crankshaft position sen- sor (POS)]		[Ignition switch: ON]	5 V							

[MR16DDT]

	minal No. ire color)	Description		Condition	Value	А		
+	-	Signal name	Input/ Output	Condition	(Approx.)			
59 (L)	_	Sensor ground [Camshaft position sen- sor (PHASE), exhaust valve timing control posi- tion sensor]	_		_	EC C		
60 (W)	_	Sensor ground [Crankshaft position sen- sor (POS)]		_	_	D		
62 (B)	_	Sensor power supply (Throttle position sensor)	_	[Ignition switch: ON]	5 V			
63	59	Camshaft position sensor	Inout	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	1.0 - 2.0★ 10mSec/div	F		
(BR)	(L)	(PHASE)	Input -			[Engine is running] • Engine speed is 2,000 rpm	1.0 - 2.0★ 10mSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	H
64 (R)	60 (W)	Crankshaft position sen- sor (POS)	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	4.0 V★ 5mSec/div 2V/div JPBIA4728ZZ 4.0 V★	J K L		
				[Engine is running] • Engine speed: 2,000 rpm	5mSec/div	M		
66 (SB)	127 (B/Y)	Starter relay control	Output	 [Engine is running] Warm-up condition Idle speed [Engine is running] Warm-up condition Selector lever: D position Brake pedal: Slightly depressed Engine speed: Less than 1,500 rpm 	BATTERY VOLTAGE (11 - 14 V) 0 V (At the time of starter motor drive)	O		

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< ECU DIAGNOSIS INFORMATION >

Terminal No.

Description (Wire color) Value Condition (Approx.) Input/ Signal name + Output 1.0 - 2.0★ [Engine is running] 50mSec/div Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle 2V/div JPBIA4730ZZ 67 59 Exhaust valve timing con-Input (L) (LG) trol position sensor 1.0 - 2.0★ 50mSec/div [Engine is running] • Engine speed is 2,000 rpm 2V/div JPBIA4731ZZ Sensor power supply 68 (Battery current sensor, 5 V [Ignition switch: ON] battery temperature sen-(Y) sor, G sensor) 127 EVAP canister vent con-BATTERY VOLTAGE 69 Output [Ignition switch: ON] (B/Y) trol valve (11 - 14 V) (L) Sensor power supply [Camshaft position sen-72 sor (PHASE), exhaust [Ignition switch: ON] 5 V (GR) valve timing control position sensor] [Engine is running] BATTERY VOLTAGE • Warm-up condition (11 - 14 V) · Idle speed 73 127 Turbocharger boost con-Output (BR) (B/Y) trol solenoid valve [Engine is running] · Warm-up condition 8.0 V • Engine speed is 2,000 rpm Sensor ground 74 (Throttle position sensor (R) 1, 2) [Ignition switch: ON] • Engine stopped More than 0.36 V • Selector lever: D (CVT), 1st (M/T) · Accelerator pedal: Fully released 75 74 Input Throttle position sensor 1 (G) (R) [Ignition switch: ON] Engine stopped Less than 4.75 V • Selector lever: D (CVT), 1st (M/T) · Accelerator pedal: Fully depressed [Ignition switch: ON] Engine stopped Less than 4.75 V Selector lever: D (CVT), 1st (M/T) Accelerator pedal: Fully released 76 74 Throttle position sensor 2 Input (W) (R) [Ignition switch: ON] Engine stopped More than 0.36 V Selector lever: D (CVT), 1st (M/T) · Accelerator pedal: Fully depressed

< ECU DIAGNOSIS INFORMATION >

	ninal No. re color)	Description		Condition	Value	A
+	_	Signal name	Input/ Output	Condition	(Approx.)	
77 (Y)	127 (B/Y)	Throttle control motor re- lay	Output	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)	E
79 (BG)	87 (BR)	Battery temperature sen- sor	Input	[Ignition switch: ON] [Engine is running] • Battery temperature: 25°C (°F) • Idle speed	0 - 1.0 V 3.3 V	(
80 (G)	87 (BR)	Battery current sensor	Input	[Engine is running] • Battery: Fully charged* • Idle speed	2.6 - 3.5 V	
				[Engine is running]Warm-up conditionIdle speed	0 V	E
81 (W)	127 (B/Y)	Intake valve timing control solenoid valve	Output	[Engine is running]Warm-up conditionWhen revving engine up to 2,000rpm Quickly	BATTERY VOLTAGE (11 - 14 V) ★	F
82 (R) 86 (LG)	127	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 - 0.3 V★ 100mSec/div	
90 (P) 94 (SB)	(B/Y)	Ignition signal No. 3 Ignition signal No. 4	Output	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	0.2 - 0.5 V★ 100mSec/div	l
83 (G)	87 (BR)	G sensor	Input	[Engine is running]Warm-up conditionIdle speed	2.5 V	1
84 (P)	127 (B/Y)	Fuel tank temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with fuel tank temperature	(
85 (G)	127 (B/Y)	Exhaust valve timing con- trol solenoid valve	Output	 [Engine is running] Warm-up condition Idle speed [Engine is running] Warm-up condition Engine speed: 2,000 rpm 	0 V BATTERY VOLTAGE (11 - 14 V)	
87 (BR)	_	Sensor ground (Battery current sensor, battery temperature sen- sor, G sensor)				

< ECU DIAGNOSIS INFORMATION >

	ninal No. re color)	Description		Condition	Value
+	-	Signal name	Input/ Output	Condition	(Approx.)
88 (V)	44 (SB)	Intake air temperature sensor 2	Input	[Engine is running] • Warm-up condition • Idle speed	0 - 4.8 V Output voltage varies with intake air temperature.
				[Ignition switch: OFF]	3.6 V
92	127		.	[Ignition switch: ON]	0 V
(R)	(B/Y)	Cranking request signal	Output	[Engine is running]Warm-up conditionIdle speed	BATTERY VOLTAGE (11 - 14 V)
95	127 (B.M)	EVAP canister purge vol- ume control solenoid	Output	[Engine is running]Idle speedAccelerator pedal: Not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div € 10V/div JMBIA0327GB
(L)	(L) (B/Y) valve		 [Engine is running] Engine speed: About 2,000 rpm (More than 100 seconds after start- ing engine.) 	10 V 50mSec/div 50mSec/div 10V/div JMBIA0328GB	
99 (P)	_	CAN communication line (CAN-L)	Input/ Output	_	_
100 (L)	_	CAN communication line (CAN-H)	Input/ Output	_	_
101 (V)	_	Sensor power supply (Accelerator pedal posi- tion sensor 1)		[Ignition switch: ON]	5 V
102	105	Accelerator pedal posi-	Input	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully released	0.6 - 0.9 V
(R)	(GR)	tion sensor 1	mput	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully depressed	3.9 - 4.7 V
103 (BR)	127 (B/Y)	PNP signal	Input	[Ignition switch: ON] • Selector lever: P or N (CVT), Neutral (M/T)	BATTERY VOLTAGE (11 - 14 V)
(511)				[Ignition switch: ON] Selector lever: Except above 	0 V
104 (R)	127 (B/Y)	Data link connector	Input/ Output	[Ignition switch: ON] • CONSULT or GST: Disconnected	10.5 V
105 (GR)	_	Sensor ground (Accelerator pedal posi- tion sensor 1)		_	_
106 (Y)	127 (B/Y)	Power supply for ECM (Backup)	Input	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)

< ECU DIAGNOSIS INFORMATION >

	inal No. e color)	Description		Condition	Value
+	_	Signal name	Input/ Output	Condition	(Approx.)
108	127	Clutch pedal position	Input	[Ignition switch: ON] • Clutch pedal: Fully released	0 V
(GR)	(B/Y)	switch	mpar	[Ignition switch: ON] • Clutch pedal: Fully depressed	BATTERY VOLTAGE (11 - 14 V)
109	127	Ignition switch	Input	[Ignition switch: OFF]	0 V BATTERY VOLTAGE
(O)	(B/Y)			[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	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)	_	_	_
112 BR)	127 (B/Y)	ECM relay (Self shut-off)	Output	[Engine is running][Ignition switch: OFF]A few seconds after turning ignition switch OFF	0 - 1.0 V
DI()		 [Ignition switch: OFF] More than a few seconds after turn- ing ignition switch OFF 	[Ignition switch: OFF]More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)	
115	127	Stop lamp switch	Input	[Ignition switch: OFF]Brake pedal: Fully released	0 V
SB)	(B/Y)		input	[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)
116	127	Brake pedal position		[Ignition switch: OFF] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)
(G)	(B/Y)	switch	Input	[Ignition switch: ON] • Brake pedal: Slightly depressed	0 V
117 (Y)	127 (B/Y)	Fuel pump relay	Output	 [Ignition switch: ON] For 1 second after turning ignition switch ON [Engine is running] 	0 - 1.0 V
118 (O)	_	Sensor power supply (Accelerator pedal posi- tion sensor 2)	_	[Ignition switch: ON]	5 V
119	120	Accelerator pedal posi-	Input	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully released	0.3 - 0.6 V
BR)	(Y)	tion sensor 2	mput	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully depressed	1.95 - 2.4 V
120 (Y)	_	Sensor ground (Accelerator pedal posi- tion sensor 2)		_	_
I21 (G)	127 (B/Y)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

	minal No. re color)	Description		Condition	Value	
+	_	Signal name	Input/ Output	Condition	(Approx.)	
122 (GR)	127 (B/Y)	Throttle control motor power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	
123 (B/Y)	_	ECM ground	_	_	_	
124 (B/Y)	—	ECM ground	_	_	_	
125 (L)	127 (B/Y)	A/F sensor 1 heater	Input	 [Engine is running] Warm-up condition Idle speed (More than 140 seconds after start- ing engine) 	2.9 - 8.8 V★ 100mSec/div ÷ 5V/div	
126 (W)	33 (R)	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 [Ignition switch: ON] Engine stopped [Engine is running] 	10 V★ 50mSec/div 10V/div JMBIA0325GB BATTERY VOLTAGE (11 - 14 V)	
127 (B/Y)		ECM ground		Engine speed: Above 3,600 rpm		

Fail Safe

INFOID:000000007576990

NON DTC RELATED ITEM

Detected items	Engine operating condition in fail-safe mode	Remarks	Reference page
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-519, "Compo-
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

DTC No.	Detected items	Engine operating condition in fail safe mode	
P0011	Intake valve timing control	The signal is not energized to the intake valve timing control solenoid valve and the valve control does not function.	
P0014	Exhaust valve timing con- trol	The signal is not energized to the exhaust valve timing control magnet retarder and the magnet retarder control does not function.	

< ECU DIAGNOSIS INFORMATION >

TC No.	Detected items	Engine opera	ating condition in fail safe mode				
P0045 P0048	Turbocharger boost control solenoid valve	Sets the duty ratio of the turbocharg the boost to the lower limit.	per boost control solenoid valve to 0%, and decreases				
P0047	_	The ECM controls the electric throttle control actuator and restricts the torque.					
P0087 P0090	FRP control system	Engine torque is limited or engine speed is limited.					
P0088	_	Engine speed is limited.					
P0101 P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more tha	n 2,400 rpm due to the fuel cut.				
P0117 P0118	Engine coolant tempera- ture sensor circuit	Engine coolant temperature will be c CONSULT displays the engine cool	determined by ECM based on the following conditions. lant temperature decided by ECM.				
		Condition	Engine coolant temperature decided (CONSULT display)				
		Just as ignition switch is turned ON or START	40°C (104°F)				
		Approx. 4 minutes or more after engine starting	80°C (176°F)				
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)				
		When the fail safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.					
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.					
P0190	FRP sensor	Engine speed is limited.High pressure fuel pump is activated at maximum discharge pressure.					
P0196 P0197 P0198	Engine oil temperature sensor	Exhaust valve timing control does r	not function.				
P0201 P0202 P0203 P0204	Injector	 Engine torque is limited. Fuel injection shut-off of malfunction cylinder. Mixture ratio feedback control does not function. Idle engine speed is increased. 					
P0234	Turbocharger system	The ECM controls the electric throt	tle control actuator and restricts the torque.				
P0237 P0238	Turbocharger boost sensor	Sets the duty ratio of the turbocharg the boost to the lower limit.	ger boost control solenoid valve to 0%, and decreases				
P0500	Vehicle speed sensor	The cooling fan operates (Highest)	while engine is running.				
P0524	Engine oil pressure	 ECM illuminates oil pressure war Engine speed will not rise more t Fail-safe is canceled when ignition 	· · ·				
P0605	ECM	(When ECM calculation function is malfunctioning:) ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.					
P0607		Engine speed will not rise more that	n 3,500 rpm due to the fuel cut.				
P062B		 Engine torque is limited. Idle engine speed is increased. Fuel injector power supply shut-of High fuel pressure limitation. 	off.				
P0643	Sensor power supply	ECM stops the electric throttle cont fixed opening (approx. 5 degrees) b	rol actuator control, throttle valve is maintained at a				

< ECU DIAGNOSIS INFORMATION >

DTC No.	Detected items	Engine opera	ating condition in fail safe mode		
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		
P1197	Out of gas	Engine torque is limited.			
P2100 P2103	Throttle control motor relay	ECM stops the electric throttle cont fixed opening (approx. 5 degrees) b	rol actuator control, throttle valve is maintained at a by the return spring.		
P2101	Electric throttle control function	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 ac- tuator	 (When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm. 			
			in fail safe mode is not in specified range:) ontrol actuator by regulating the throttle opening to 20		
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle engine stalls. The engine can restart in the Neutral position, and engine speed will not exceed or more.			
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening 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 norm condition. So, the acceleration will be poor.			

DTC Inspection Priority Chart

INFOID:000000007576991

[MR16DDT]

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

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Priority	Detected items (DTC)	
1	U0101 U0122 U1001 CAN communication line	
	P0096 P0097 P0098 Intake air temperature sensor 2	
	 P0101 P0102 P0103 Mass air flow sensor 	
	P0111 P0112 P0113 Intake air temperature sensor 1	
	 P0116 P0117 P0118 Engine coolant temperature sensor 	
	 P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor 	
	P0128 Thermostat function	
	 P0197 P0198 Engine oil temperature sensor 	
	P0327 P0328 Knock sensor	
	 P0335 Crankshaft position sensor (POS) 	
	 P0340 Camshaft position sensor (PHASE) 	
	 P0460 P0461 P0462 P0463 Fuel level sensor 	
	P0500 P0501 P2159 P2162 Vehicle speed sensor	
	P0520 Engine oil pressure sensor	
	P0603 P0605 P0607 P0611 P062B ECM	
	P0643 Sensor power supply	
	P0705 Transmission range switch	
	P0850 Park/neutral position (PNP) switch	
	• P1197 Out of gas [*]	
	P1550 P1551 P1552 P1553 P1554 Battery current sensor	
	P1556 P1557 Batter temperature sensor	
	• P158A ECM	
	P159A P159B P159C P159D G sensor	
	• P1610 - P1615 NATS	
	P1650 P1651 P1652 Starter motor relay	
	 P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor 	

ECM

< ECU DIAGNOSIS INFORMATION >

Priority	Detected items (DTC)
Priority	Detected items (DTC)
2	 P0031 P0032 Air fuel ratio (A/F) sensor 1 heater P0037 P0038 Heated oxygen sensor 2 heater P0045 P0047 P0048 Turbocharger boost control solenoid valve P0075 Intake valve timing control solenoid valve P0078 Exhaust valve timing control solenoid valve P0130 P0131 P0132 P0133 P2A00 Air fuel ratio (A/F) sensor 1 P0137 P0138 P0139 Heated oxygen sensor 2 P0237 P0238 Turbocharger boost sensor P0441 EVAP control system purge flow monitoring P0443 P0444 P0445 EVAP canister purge volume control solenoid valve P0710 P0715 P0720 P0740 P0744 P0745 P0746 P0776 P0778 P0840 P1740 P1777 P1778 CVT related sensors, solenoid valves and switches P1078 Exhaust valve timing position sensor P1451 Pressure sensor P1217 Engine over temperature (OVERHEAT) P1805 Brake switch P2100 P2103 Throttle control motor relay P2118 Throttle control function
3	 P0011 Intake valve timing control P0014 Exhaust valve timing control P0087 P0088 P0090 FRP control system P0171 P0172 Fuel injection system function P0201 - P0204 Injector P0234 P2263 Turbocharger system P0300 - P0304 Misfire P0420 Three way catalyst function P0442 P0456 EVAP control system (Small leak, very small leak) P0455 EVAP control system (Gross leak) P0506 P0507 Idle speed control system P050A P050E P1423 P1424 Cold start control P0524 Engine oil pressure P1148 Closed loop control P1524 ASCD steering switch P1574 ASCD brake switch P1574 ASCD vehicle speed sensor P2119 Electric throttle control actuator

NOTE:

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

DTC Index

INFOID:000000007576992

×:Applicable —	-: Not applicable
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DTC ^{*1}		Items	SRT			Permanent	Reference
CONSULT GST ^{*2}	ECM ^{*3}	(CONSULT screen terms)	code	Trip	MIL	DTC group ^{*4}	page
U0101	0101	LOST COMM (TCM)	—	1	×	В	<u>EC-161</u>
U0122	0122	VDC MDL	—	2	×	В	<u>EC-162</u>
U1001	1001 ^{*5}	CAN COMM CIRCUIT	—	2	—	—	<u>EC-163</u>
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	_	_	Flashing ^{*9}	_	_
P0011	0011	INT/V TIM CONT-B1	×	2	×	В	<u>EC-164</u>
P0014	0014	EXH/V TIM CONT-B1	—	2	×	В	<u>EC-167</u>
P0031	0031	A/F SEN1 HTR (B1)	—	2	×	В	<u>EC-171</u>
P0032	0032	A/F SEN1 HTR (B1)	—	2	×	В	<u>EC-171</u>

< ECU DIAGNOSIS INFORMATION >

DTC ^{*1}		Items	SRT									Permanent	Reference	А
CONSULT GST ^{*2}	ECM ^{*3}	(CONSULT screen terms)	code	Trip	MIL	DTC group ^{*4}	page	1.						
P0037	0037	HO2 HTR (B1)		2	×	В	<u>EC-174</u>	EC						
P0038	0038	HO2 HTR (B1)	_	2	×	В	<u>EC-174</u>							
P0045	0045	TC BOOST SOL/V	_	2	×	В	<u>EC-177</u>	_						
P0047	0047	TC/SC BOOST CONT A		1	×	В	<u>EC-177</u>	С						
P0048	0048	TC/SC BOOST CONT A	_	1	×	В	<u>EC-177</u>	_						
P0075	0075	INT/V TIM V/CIR-B1		2	×	В	<u>EC-179</u>	D						
P0078	0078	EX V/T ACT/CIRC-B1		2	×	В	EC-182							
P0087	0087	LOW FUEL PRES	_	2	×	A or B	EC-185	-						
P0088	0088	HIGH FUEL PRES		2	×	A or B	<u>EC-185</u>	E						
P0090	0090	FUEL PUMP		2	×	В	<u>EC-185</u>	_						
P0096	0096	IAT SENSOR 2 B1		2	×	В	<u>EC-188</u>	_						
P0097	0097	IAT SENSOR 2 B1	_	2	×	В	<u>EC-190</u>	- F						
P0098	0098	IAT SENSOR 2 B1		2	×	В	<u>EC-190</u>	-						
P0101	0101	MAF SEN/CIRCUIT-B1		2	×	В	<u>EC-194</u>	G						
P0102	0102	MAF SEN/CIRCUIT-B1		1	×	В	<u>EC-199</u>	_						
P0103	0103	MAF SEN/CIRCUIT-B1		1	×	В	<u>EC-199</u>	-						
P0111	0111	IAT SENSOR 1 B1		2	×	A	<u>EC-204</u>	- H						
P0112	0112	IAT SEN/CIRCUIT-B1		2	×	В	EC-206	-						
P0113	0113	IAT SEN/CIRCUIT-B1		2	×	В	EC-206	-						
P0116	0116	ECT SEN/CIRC		2	×	Α	EC-208	_						
P0117	0117	ECT SEN/CIRC		1	×	В	EC-210	_						
P0118	0118	ECT SEN/CIRC		1	×	В	EC-210	J						
P011C	011C	CAT/IAT CRRLTN B1		2	×	В	EC-212	_						
P0122	0122	TP SEN 2/CIRC-B1		1	×	В	EC-214	-						
P0123	0123	TP SEN 2/CIRC-B1		1	×	В	EC-214	K						
P0125	0125	ECT SENSOR	_	2	×	В	EC-217	-						
P0127	0127	IAT SENSOR-B1		2	×	В	EC-219	L						
P0128	0128	THERMSTAT FNCTN		2	×	A	EC-221	_						
P0130	0130	A/F SENSOR1 (B1)	×	2	×	A	EC-224	-						
P0131	0131	A/F SENSOR1 (B1)		2	×	В	EC-228	M						
P0132	0132	A/F SENSOR1 (B1)		2	×	В	EC-231	_						
P0133	0133	A/F SENSOR1 (B1)	×	2	×	A	EC-234	N						
P0137	0137	HO2S2 (B1)	×	2	×	A	EC-239	-						
P0138	0138	HO2S2 (B1)	×	2	×	Α	EC-245	-						
P0139	0139	HO2S2 (B1)	×	2	×	A	EC-252	- 0						
P0171	0171	FUEL SYS-LEAN-B1		2	×	В	EC-258	-						
P0172	0172	FUEL SYS-RICH-B1		2	×	В	EC-262	P						
P0181	0181	FTT SENSOR		2	×	A and B	EC-266	_						
P0182	0182	FTT SEN/CIRCUIT		2	×	В	EC-270	_						
P0183	0183	FTT SEN/CIRCUIT		2	×	В	EC-270	-						
P0190	0190	FUEL PRES SEN/CIRC		2	×	В	EC-273	_						
P0191	0191	FRP SENSOR A		2	×	A	EC-277	_						

< ECU DIAGNOSIS INFORMATION >

DTC ^{*1}		14	ODT			Permanent	Deference
CONSULT	ECM ^{*3}	Items (CONSULT screen terms)	SRT code	Trip	MIL	DTC group ^{*4}	Reference page
GST ^{*2}	0192	FRP SEN/CIRC		2	×	В	<u>EC-273</u>
P0193	0193	FRP SEN/CIRC		2	×	В	<u>EC-273</u>
P0196	0196	EOT SENSOR		2	×	A and B	<u>EC-281</u>
P0197	0197	EOT SEN/CIRC		2	×	B	<u>EC-285</u>
P0198	0198	EOT SEN/CIRC		2	×	В	<u>EC-285</u>
P0201	0201	INJECTOR CIRC-CYL1		2	×	B	<u>EC-287</u>
P0202	0202	INJECTOR CIRC-CYL2		2	×	В	EC-287
P0203	0203	INJECTOR CIRC-CYL3		2	×	B	<u>EC-287</u>
P0204	0204	INJECTOR CIRC-CYL4		2	×	B	<u>EC-287</u>
P0222	0222	TP SEN 1/CIRC-B1		1	×	В	<u>EC-288</u>
P0223	0222	TP SEN 1/CIRC-B1		1	× ×	B	<u>EC-288</u>
P0234	0223	TC SYSTEM-B1		1	× ×	B	<u>EC-200</u> <u>EC-291</u>
P0234	0234	TC BOOST SEN/CIRC-B1		2	× ×	В	<u>EC-291</u>
P0238	0237	TC BOOST SEN/CIRC-B1		2	× ×	В	<u>EC-294</u>
P0300	0200	MULTI CYL MISFIRE		1 or 2	~	B	EC-297
P0301	0300	CYL 1 MISFIRE		1 or 2	× or —	В	<u>EC-297</u>
P0302	0302	CYL 2 MISFIRE		1 or 2	× or —	В	<u>EC-297</u>
P0302	0302	CYL 3 MISFIRE		1 or 2	× or —	В	<u>EC-297</u>
P0304	0303	CYL 4 MISFIRE		1 or 2		В	<u>EC-297</u>
P0304	0304	KNOCK SEN/CIRC-B1		2	× or —	D	<u>EC-297</u> <u>EC-303</u>
P0328	0327	KNOCK SEN/CIRC-B1		2			EC-303
P0335	0335	CKP SEN/CIRCUIT		2	×	В	<u>EC-305</u>
P0340	0340	CMP SEN/CIRC-B1		2	× ×	B	<u>EC-308</u>
P0420	0420	TW CATALYST SYS-B1	×	2	× ×	A	<u>EC-300</u> <u>EC-312</u>
P0441	0420	EVAP PURG FLOW/MON	×	2	× ×	A	<u>EC-317</u>
P0443	0443	PURG VOLUME CONT/V		2	×	A	<u>EC-322</u>
P0444	0444	PURG VOLUME CONT/V		2	×	В	<u>EC-327</u>
P0445	0445	PURG VOLUME CONT/V		2	×	В	<u>EC-327</u>
P0447	0447	VENT CONTROL VALVE		2	×	B	<u>EC-330</u>
P0448	0448	VENT CONTROL VALVE		2	×	B	<u>EC-334</u>
P0451	0451	EVAP SYS PRES SEN		2	×	A	EC-338
P0452	0452	EVAP SYS PRES SEN		2	×	В	EC-342
P0453	0453	EVAP SYS PRES SEN	_	2	×	A	EC-345
P0456	0456	EVAP VERY SML LEAK	×*6	2	×	A	<u>EC-349</u>
P0460	0460	FUEL LEV SEN SLOSH	× —	2		A	EC-355
P0460	0460	FUEL LEVEL SENSOR		2	×	B	
P0461	0461	FUEL LEVEL SENJOR		2	×	В	EC-356
P0462	0462	FUEL LEVEL SEN/CIRC		2	×	В	<u>EC-358</u> <u>EC-358</u>
F 0403	0403			۷	×	D	<u>EC-358</u> <u>EC-359</u> (CVT)
P0500	0500	VEHICLE SPEED SEN A ^{*7}	—	2	×	В	<u>EC-360</u> (M/T)
P0501	0501	VEHICLE SPEED SEN A		2	×	В	<u>EC-363</u>
P0506	0506	ISC SYSTEM		2	×	В	<u>EC-364</u>

< ECU DIAGNOSIS INFORMATION >

DTC ^{*1}		14	0.07.	SRT	Perma	Permanent	Deferrere	A
CONSULT GST ^{*2}	ECM ^{*3}	Items (CONSULT screen terms)	code	Trip	MIL	DTC group ^{*4}	Reference page	A
P0507	0507	ISC SYSTEM	_	2	×	В	<u>EC-366</u>	EC
P050A	050A	COLD START CONTROL	_	2	×	A	<u>EC-368</u>	
P050E	050E	COLD START CONTROL	_	2	×	A	EC-368	-
P0520	0520	EOP SENSOR/SWITCH	_	2	_	_	EC-370	С
P0524	0524	ENGINE OIL PRESSURE		1	_	_	<u>EC-374</u>	-
P0603	0603	ECM BACK UP/CIRCUIT ^{*8}	_	2	×	В	<u>EC-377</u>	D
P0605	0605	ECM		1 or 2	× or —	В	<u>EC-379</u>	
P0607	0607	ECM	_	1 (CVT) 2 (M/T)	× (CVT) — (M/T)	В	<u>EC-381</u>	E
P0611	0611	FIC MODULE	—	2	×	В	EC-382	-
P062B	062B	ECM	—	2	×	В	<u>EC-383</u>	_
P0643	0643	SENSOR POWER/CIRC	_	1	×	В	<u>EC-384</u>	F
P0705	0705	T/M RANGE SENSOR A	_	2	×	В	<u>TM-141</u>	-
P0710	0710	FLUID TEMP SENSOR A	_	1	×	В	<u>TM-144</u>	G
P0715	0715	INPUT SPEED SENSOR A	_	2	×	В	<u>TM-147</u>	_
P0720	0720	OUTPUT SPEED SENSOR ^{*7}		2	×	В	<u>TM-150</u>	-
P0740	0740	TORQUE CONVERTER		2	×	В	<u>TM-154</u>	H
P0744	0744	TORQUE CONVERTER		2	×	В	<u>TM-157</u>	-
P0745	0745	PC SOLENOID A		2	×	В	<u>TM-159</u>	-
P0746	0746	PC SOLENOID A	_	1	×	В	<u>TM-161</u>	_
P0776	0776	PC SOLENOID B	_	2	×	В	<u>TM-163</u>	-
P0778	0778	PC SOLENOID B	_	2	×	В	<u>TM-165</u>	J
P0840	0840	FLUID PRESS SEN/SW A	_	2	×	В	<u>TM-170</u>	-
P0850	0850	P-N POS SW/CIRCUIT	—	2	×	В	EC-386	K
P1078	1078	EXH TIM SEN/CIRC-B1	—	2	×	В	<u>EC-390</u>	
P1148	1148	CLOSED LOOP-B1	_	1	×	A	EC-394	-
P1197	1197	FUEL RUN OUT	_	2	_	_	<u>EC-395</u>	L
P1212	1212	TCS/CIRC	_	2	_	_	<u>EC-397</u>	=
P1217	1217	ENG OVER TEMP	_	1	×	В	<u>EC-398</u>	M
P1225	1225	CTP LEARNING-B1	—	2	—	—	<u>EC-401</u>	
P1226	1226	CTP LEARNING-B1	—	2	—	—	<u>EC-402</u>	_
P1423	1423	COLD START CONTROL	—	2	×	В	<u>EC-403</u>	Ν
P1424	1424	COLD START CONTROL	—	2	×	В	<u>EC-403</u>	_
P1451	1451	TC/SC PRES-EVAP PRES		2	×	В	<u>EC-405</u>	0
P1550	1550	BAT CURRENT SENSOR	—	2	—	—	<u>EC-408</u>	0
P1551	1551	BAT CURRENT SENSOR	_	2	—	—	<u>EC-411</u>	_
P1552	1552	BAT CURRENT SENSOR	-	2	_	_	<u>EC-411</u>	Ρ
P1553	1553	BAT CURRENT SENSOR	—	2	_	_	<u>EC-414</u>	_
P1554	1554	BAT CURRENT SENSOR	—	2	_	_	<u>EC-417</u>	_
P1556	1556	BAT TMP SEN/CIRC	-	2	—	—	<u>EC-421</u>	_
P1557	1557	BAT TMP SEN/CIRC	-	2	_		<u>EC-421</u>	_
P1564	1564	ASCD SW	—	1	—	—	<u>EC-423</u>	-

< ECU DIAGNOSIS INFORMATION >

DTC ^{*1}	1	Items	SRT			Permanent	Reference
CONSULT GST ^{*2}	ECM ^{*3}	(CONSULT screen terms)	code	Trip	MIL	DTC group ^{*4}	page
P1572	1572	ASCD BRAKE SW	_	1	—	—	<u>EC-426</u>
P1574	1574	ASCD VHL SPD SEN	_	1	—	—	<u>EC-431</u>
P158A	158A	G SENSOR	_	1	_	—	EC-433
P159A	159A	G SENSOR	_	2	—	—	EC-434
P159B	159B	G SENSOR	_	2	×	В	EC-438
P159C	159C	G SENSOR	_	2	×	В	<u>EC-434</u>
P159D	159D	G SENSOR	_	2	×	В	EC-434
P1610	1610	LOCK MODE	_	2	_	—	<u>SEC-139</u>
P1611	1611	ID DISCORD, IMMU-ECM	_	2	_	—	<u>SEC-140</u>
P1612	1612	CHAIN OF ECM-IMMU	_	2	—	—	<u>SEC-141</u>
P1614	1614	CHAIN OF IMMU-KEY	_	2	—	—	<u>SEC-142</u>
P1615	1615	DIFFERENCE OF KEY	_	2	_	—	<u>SEC-145</u>
P1650	1650	STR MTR RELAY 2	_	2	×	В	<u>EC-443</u>
P1651	1651	STR MTR RELAY	_	2	×	В	<u>EC-446</u>
P1652	1652	STR MTR SYS COMM		1	×	В	<u>EC-449</u>
P1740	1740	SLCT SOLENOID		2	×	В	<u>TM-187</u>
P1777	1777	STEP MOTOR		1	×	В	<u>TM-189</u>
P1778	1778	STEP MOTOR	_	2	×	В	<u>TM-192</u>
P1805	1805	BRAKE SW/CIRCUIT	—	2	_	—	<u>EC-451</u>
P2100	2100	ETC MOT PWR-B1	_	1	×	В	EC-453
P2101	2101	ETC FNCTN/CIRC-B1	_	1	×	В	<u>EC-455</u>
P2103	2103	ETC MOT PWR	_	1	×	В	<u>EC-453</u>
P2118	2118	ETC MOT-B1	—	1	×	В	<u>EC-458</u>
P2119	2119	ETC ACTR-B1	_	1	×	В	EC-460
P2122	2122	APP SEN 1/CIRC	_	1	×	В	<u>EC-462</u>
P2123	2123	APP SEN 1/CIRC	—	1	×	В	<u>EC-462</u>
P2127	2127	APP SEN 2/CIRC		1	×	В	<u>EC-465</u>
P2128	2128	APP SEN 2/CIRC		1	×	В	<u>EC-465</u>
P2135	2135	TP SENSOR-B1		1	×	В	<u>EC-468</u>
P2138	2138	APP SENSOR		1	×	В	<u>EC-471</u>
P2159	2159	VEHICLE SPEED SEN B		2	×	В	EC-363
P2162	2162	VEHICLE SPEED SEN A-B		2	×	В	<u>EC-475</u>
P2263	2263	TC SYSTEM-B1		2	×	В	<u>EC-477</u>
P2A00	2A00	A/F SENSOR1 (B1)		2	×	A	<u>EC-481</u>

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

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

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

*4: Refer to EC-144, "Description".

*5: The troubleshooting for this DTC needs CONSULT.

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

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

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

*9: When the ECM is in the mode that displays SRT status, MIL may blink. For details, Refer to EC-70, "On Board Diagnosis Function".

EC-106

Test Value and Test Limit

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

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

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

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

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[MR16DDT]

INFOID:000000007576993

		Self-diagnostic test item			e and Test mit		
Item	OBD-		DTC		display)	D evelopment	
	MID			TID	Unitand Scaling ID	Description	
			P0131	83H	0BH	Minimum sensor output voltage for test cycle	
			P0131	84H	0BH	Maximum sensor output voltage for test cycle	
			P0130	85H	0BH	Minimum sensor output voltage for test cycle	
			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	89H	84H	The amount of shift in air fuel ratio	
			P2A00	8AH	84H	The amount of shift in air fuel ratio	
			P0130	8BH	0BH	Difference in sensor output voltage	
	01H	Air fuel ratio (A/F) sensor 1 (Bank 1)	P0133	8CH	83H	Response gain at the limited frequency	
			P014C	8DH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1	
			P014C	8EH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1	
			P014D	8FH	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1	
HO2S			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	
			P0138	07H	0CH	Minimum sensor output voltage for test cycle	
	02H	Heated oxygen sensor 2	P0137	08H	0CH	Maximum sensor output voltage for test cycle	
	0211	(Bank 1)	P0138	80H	0CH	Sensor output voltage	
		-	P0139	81H	0CH	Difference in sensor output voltage	
			P0139	82H	11H	Rear O2 sensor delay response diag- nosis	
			P0143	07H	0CH	Minimum sensor output voltage for test cycle	
	03H	Heated oxygen sensor 3 (Bank 1)	P0144	08H	0CH	Maximum sensor output voltage for test cycle	
			P0146	80H	0CH	Sensor output voltage	
			P0145	81H	0CH	Difference in sensor output voltage	

< ECU DIAGNOSIS INFORMATION >

				li	e and Test mit display)		A
Item	OBD- MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description	EC
			P0151	83H	0BH	Minimum sensor output voltage for test cycle	С
			P0151	84H	0BH	Maximum sensor output voltage for test cycle	0
			P0150	85H	0BH	Minimum sensor output voltage for test cycle	D
			P0150	86H	0BH	Maximum sensor output voltage for test cycle	E
			P0153	87H	04H	Response rate: Response ratio (lean to rich)	
			P0153	88H	04H	Response rate: Response ratio (rich to lean)	F
			P2A03	89H	84H	The amount of shift in air fuel ratio	
			P2A03	8AH	84H	The amount of shift in air fuel ratio	G
			P0150	8BH	0BH	Difference in sensor output voltage	
	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P0153	8CH	83H	Response gain at the limited frequency	
			P014E	8DH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1	Η
			P014E	8EH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1	
			P014F	8FH	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1	
HO2S			P014F	90H	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1	J
			P015C	91H	01H	O2 sensor delayed response - Rich to lean bank 2 sensor 1	K
			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	L
			P015D	94H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1	M
			P0158	07H	0CH	Minimum sensor output voltage for test cycle	
		Heated oxygen sensor 2	P0157	08H	0CH	Maximum sensor output voltage for test cycle	Ν
	06H	(Bank 2)	P0158	80H	0CH	Sensor output voltage	
			P0159	81H	0CH	Difference in sensor output voltage	0
			P0159	82H	11H	Rear O2 sensor delay response diag- nosis	
			P0163	07H	0CH	Minimum sensor output voltage for test cycle	Ρ
	07H	Heated oxygen sensor 3 (Bank2)	P0164	08H	0CH	Maximum sensor output voltage for test cycle	
			P0166	80H	0CH	Sensor output voltage	
			P0165	81H	0CH	Difference in sensor output voltage	

< ECU DIAGNOSIS INFORMATION >

ltom -	OBD-					
ltom -		. Self-diagnostic test item	DTC -		nit display)	
	MID			TID	Unitand Scaling ID	Description
			P0420	80H	01H	O2 storage index
2	21H	Three way catalyst function	P0420	82H	01H	Switching time lag engine exhaust in- dex value
2	210	(Bank1)	P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
CATA-		-	P2423	84H	84H	O2 storage index in HC trap catalyst
LYST			P0430	80H	01H	O2 storage index
0 ,	22H	Three way catalyst function	P0430	82H	01H	Switching time lag engine exhaust in- dex value
	2211	(Bank2)	P2424	83H	0CH	Difference in 3rd O2 sensor output voltage
		-	P2424	84H	84H	O2 storage index in HC trap catalyst
			P0400	80H	96H	Low flow faults: EGR temp change rate (short term)
		EGR function	P0400	81H	96H	Low flow faults: EGR temp change rate (long term)
EGR SYSTEM ^{3⁻}	31H		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
			P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
3	35H	VVT Monitor (Bank1)	P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
		_	P100A	84H	10H	VEL slow response diagnosis
VVT			P1090	85H	10H	VEL servo system diagnosis
SYSTEM			P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
30	36H	H VVT Monitor (Bank2)	P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
			P100B	84H	10H	VEL slow response diagnosis
			P1093	85H	10H	VEL servo system diagnosis

< ECU DIAGNOSIS INFORMATION >

	000			li	e and Test mit display)	
Item	OBD- MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description
	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	3BH	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)
EVAP			P0456	80H	05H	Leak area index (for more than 0.02 inch)
SYSTEM	3CH	EVAP control system leak (Very small leak)	P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
			P0456	82H	FDH	Internal pressure of EVAP system at the end of monitoring
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control valve close
	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
			P0411	80H	01H	Secondary air injection system incor- rect flow detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary air injection system insufficient flow
			P2445	82H	01H	Secondary air injection system pump stuck off
SEC- OND- ARY AIR	71H	Secondary air system	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
			P0171 or P0172	80H	2FH	Long term fuel trim
	81H	Fuel injection system function (Bank 1)	P0171 or P0172	81H	24H	The number of lambda control clamped
FUEL			P117A	82H	03H	Cylinder A/F imbalance monitoring
SYSTEM			P0174 or P0175	80H	2FH	Long term fuel trim
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	81H	24H	The number of lambda control clamped
			P117B	82H	03H	Cylinder A/F imbalance monitoring

< ECU DIAGNOSIS INFORMATION >

					e and Test mit					
Item	OBD-	Self-diagnostic test item	DTC	(GST display)		Description				
nem	MID			TID	Unitand Scaling ID	Description				
			P0301	80H	24H	Misfiring counter at 1000 revolution of the first cylinder				
			P0302	81H	24H	Misfiring counter at 1000 revolution of the second cylinder				
			P0303	82H	24H	Misfiring counter at 1000 revolution of the third cylinder				
			P0304	83H	24H	Misfiring counter at 1000 revolution of the fourth cylinder				
			P0305	84H	24H	Misfiring counter at 1000 revolution of the fifth cylinder				
			P0306	85H	24H	Misfiring counter at 1000 revolution of the sixth cylinder				
	A1H		P0307	86H	24H	Misfiring counter at 1000 revolution of the seventh cylinder				
				P0308	87H	24H	Misfiring counter at 1000 revolution of the eighth cylinder			
			P0300	88H	24H	Misfiring counter at 1000 revolution of the multiple cylinders				
MISFIRE				P0301	89H	24H	Misfiring counter at 200 revolution of the first cylinder			
MIGI INE		1H Multiple cylinder misfires	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				

< ECU DIAGNOSIS INFORMATION >

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Item	OBD-	Self-diagnostic test item	DTC	(GST	display)	Description	
	MID			TID	Unitand Scaling ID		EC
	A2H	No. 1 cylinder misfire	P0301	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	C
			P0301	0CH	24H	Misfire counts for last/current driving cycles	_
	АЗН	No. 2 cylinder misfire	P0302	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	
			P0302	0CH	24H	Misfire counts for last/current driving cycles	E
	A4H	No. 3 cylinder misfire	P0303	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	F
			P0303	0CH	24H	Misfire counts for last/current driving cycles	C
	A5H	No. 4 cylinder misfire	P0304	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	-
			P0304	0CH	24H	Misfire counts for last/current driving cycles	
MISFIRE	A6H	No. 5 cylinder misfire	P0305	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	I
			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	ŀ
			P0306	0CH	24H	Misfire counts for last/current driving cycles	
	A8H	No. 7 cylinder misfire	P0307	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	L
			P0307	0CH	24H	Misfire counts for last/current driving cycles	N
	A9H	No. 8 cylinder misfire	P0308	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	ľ
			P0308	0CH	24H	Misfire counts for last/current driving cycles	C

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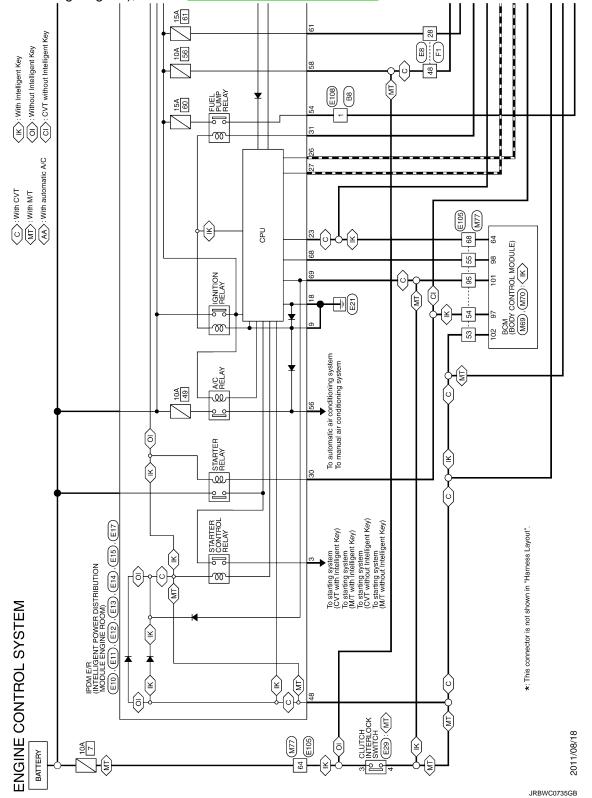
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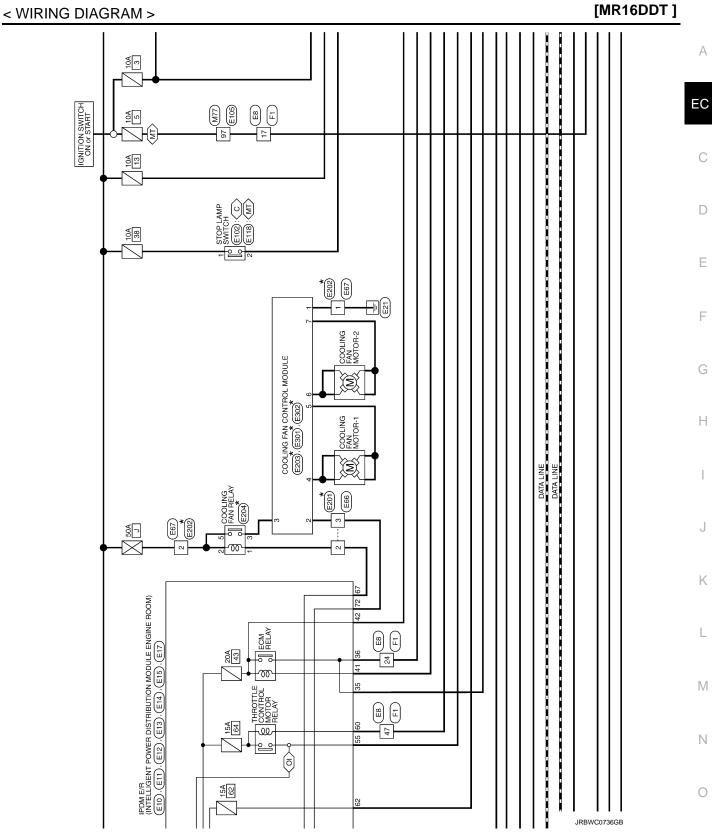
WIRING DIAGRAM ENGINE CONTROL SYSTEM

Wiring Diagram

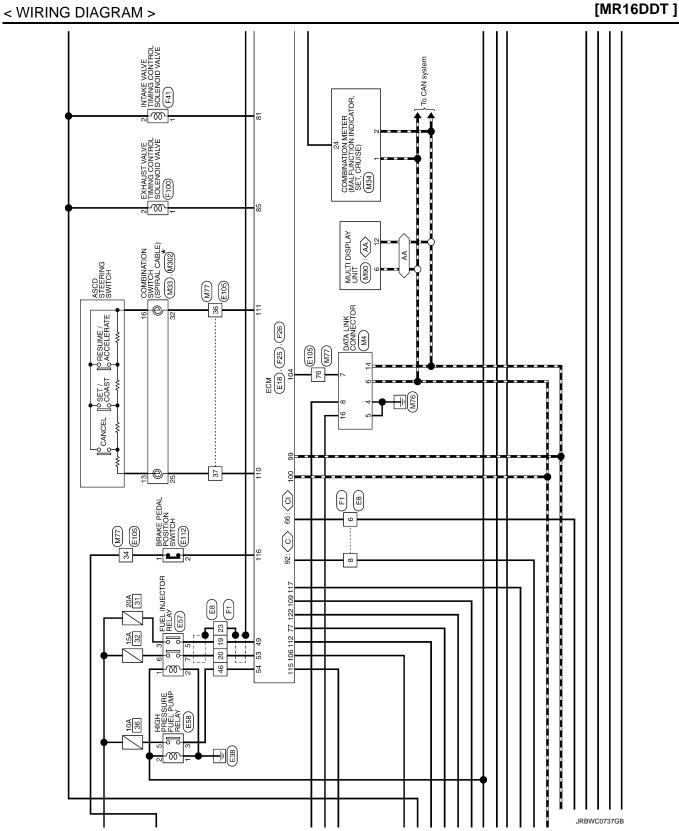
For connector terminal arrangements, harness layouts, and alphabets in a \bigcirc (option abbreviation; if not described in wiring diagram), refer to <u>GI-12</u>, "<u>Connector Information</u>".





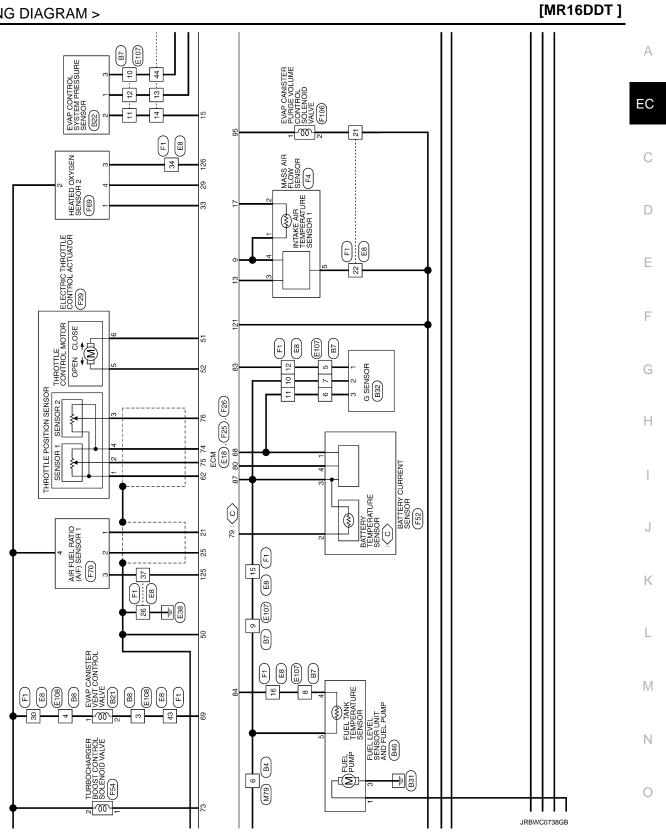


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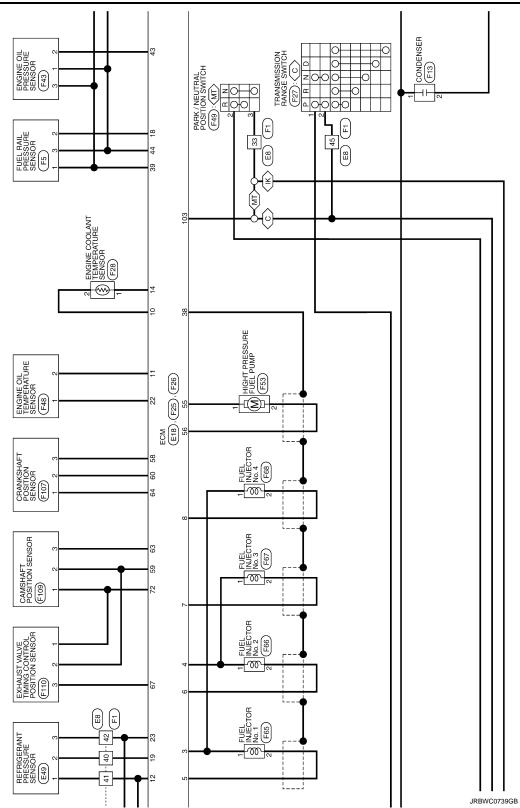
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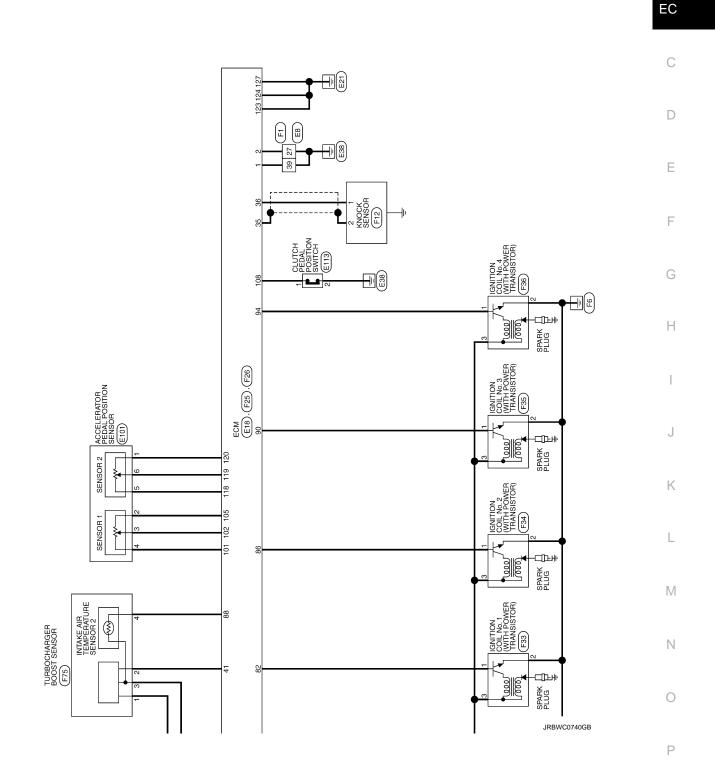
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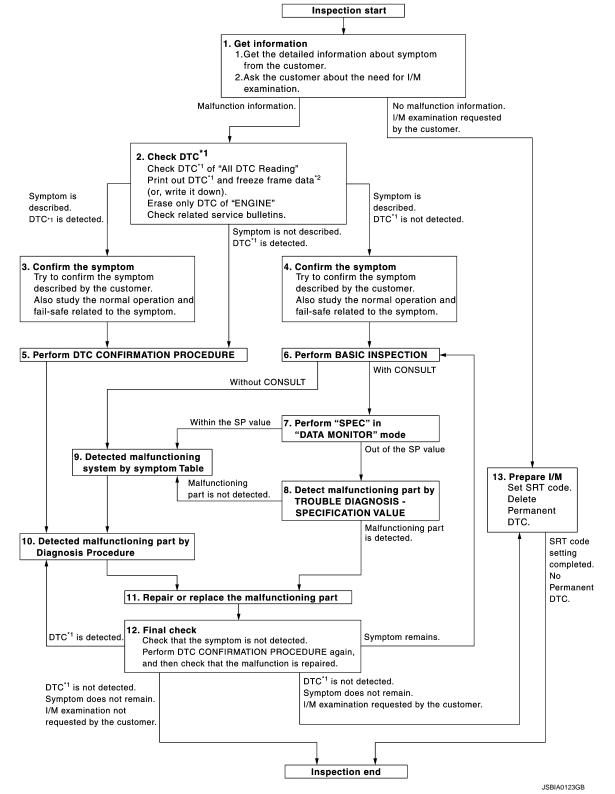




BASIC INSPECTION DIAGNOSIS AND REPAIR WORKFLOW

Work Flow





DETAILED FLOW

Revision: 2011 October

INFOID:000000007576995

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EC-120

< BASIC INSPECTION >

1.GET INFORMATION FOR SYMPTOM	1
 Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the "Diagnostic Work Sheet". (Refer to <u>EC-123</u>, "<u>Diagnostic</u> <u>Work Sheet</u>".) 	/-
 Ask if the customer requests I/M examination. 	E
Malfunction information, obtained>>GO TO 2. No malfunction information, but a request for I/M examination>>GO TO 13. 2.CHECK DTC	(
	_
 Check DTC. Perform the following procedure if DTC is displayed. Record DTC and freeze frame data. (Print them out with CONSULT or GST.) Erase only DTC of "ENGINE". 	
(E) With CONSULT: "How to Erase DTC and 1st Trip DTC" in EC-73, "CONSULT Function".	E
 Without CONSULT: "How to Erase Self-diagnostic Results" in <u>EC-70. "On Board Diagnosis Function"</u>. Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Matrix Chart is useful. Refer to <u>EC-520, "Symptom Table"</u>.) Check related service bulletins for information. 	F
Are any symptoms described and any DTCs detected?	
Symptom is described, DTC is detected>>GO TO 3. Symptom is described, DTC is not detected>>GO TO 4. Symptom is not described, DTC is detected>>GO TO 5.	(
3. CONFIRM THE SYMPTOM	ŀ
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-527</u> , " <u>Description</u> " and <u>EC-98</u> , " <u>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.	ļ
>> GO TO 5.	
4.CONFIRM THE SYMPTOM	k
Try to confirm the symptom described by the customer. Also study the normal operation and fail-safe related to the symptom. Refer to Refer to <u>EC-520</u> , " <u>Symptom</u> <u>Table</u> " and <u>EC-98</u> , " <u>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.	Ĺ
	Ν
>> GO TO 6.	
5.PERFORM DTC CONFIRMATION PROCEDURE	
Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then check that DTC is detected again.	Γ
If two or more DTCs are detected, refer to <u>EC-100. "DTC Inspection Priority Chart"</u> and determine trouble diagnosis order. NOTE:	C
 Freeze frame data is useful if the DTC is not detected. Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check. 	F
If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIR- MATION PROCEDURE.	
Is DTC detected?	
YES >> GO TO 10. NO >> Check according to <u>GI-43, "Intermittent Incident"</u> .	

< BASIC INSPECTION >

[MR16DDT]

6.PERFORM BASIC INSPECTION

Perform EC-125, "Work Procedure".

Do you have CONSULT?

YES >> GO TO 7.

NO >> GO TO 9.

7.PERFORM SPEC IN DATA MONITOR MODE

(I) With CONSULT

Check that "MAS A/F SE-B1", "MAS A/F SE-B2", "B/FUEL SCHDL", "A/F ALPHA-B1" and "A/F ALPHA-B2" are within the SP value using "SPEC" in "DATA MONITOR" mode with CONSULT. Refer to <u>EC-150. "Component Function Check"</u>.

Is the measurement value within the SP value?

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

8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-151, "Diagnosis Procedure".

Is a malfunctioning part detected?

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

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to <u>EC-520. "Symptom Table"</u> based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptoms.

>> 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 <u>GI-46</u>, "<u>Circuit Inspection</u>".

Is a malfunctioning part detected?

YES >> GO TO 11.

NO >> Monitor input data from related sensors or check voltage of related ECM terminals using CON-SULT. Refer to <u>EC-84, "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.
 With CONSULT: "How to Erase DTC and 1st Trip DTC" in <u>EC-73, "CONSULT Function"</u>.
 Without CONSULT: "How to Erase Self-diagnostic Results" in <u>EC-70, "On Board Diagnosis Function"</u>.

>> 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.

YES-2 >> Symptom remains: GO TO 6.

< BASIC INSPECTION >

- NO-1 >> No request for I/M examination from the customer: Before returning the vehicle to the customer, always erase unnecessary DTC in ECM and TCM ()With CONSULT: Refer to "How to Erase DTC and 1st Trip DTC" in EC-73, "CONSULT Function", Without CONSULT: Refer to "How to Erase Self-diagnostic Results" in EC-70, "On Board Diagnosis Function"). If the completion of SRT is needed, drive vehicle under the specific driving pattern. Refer to EC-139, "SRT Set Driving EC 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-138, "Description", 1.
- Erase permanent DTCs. Refer to EC-144, "Description".

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

Utilize a diagnostic worksheet like the WORKSHEET SAMPLE below in order to organize all the information for troubleshooting. Some conditions may cause the MIL to illuminate or blink, and DTC to be detected. Examples:

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

• Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

	1 🖬
KEY POINTS	
 WHAT Vehicle & engine model WHEN Date, Frequencies WHERE Road conditions HOW Operating conditions, Weather conditions, Symptoms 	F

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< BASIC INSPECTION >

Road conditions

Driving conditions

Malfunction indicator lamp

Customer name MR/MS		Model & Year	VIN				
Engine #		Trans.	Mileage				
Incident Date		Manuf. Date	In Service Date				
Fuel and fuel	filler cap	 Vehicle ran out of fuel causing misfire Fuel filler cap was left off or incorrectly 	/ screwed on.				
	☐ Startability	 Impossible to start No combust Partial combustion affected by th Partial combustion NOT affected Possible but hard to start Other 	nrottle position I by throttle position				
Symptoms	🗌 Idling	□ No fast idle □ Unstable □ High idle □ Low idle □ Others []					
Symptoms	Driveability	Stumble Surge Knock Lack of power Intake backfire Exhaust backfire Others []					
	Engine stall	At the time of start While idling While accelerating While dece	lerating				
Incident occurrence		□ Just after delivery □ Recently □ 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				

In suburbs

0

U While idling

10

Not turned on

Highway

U While turning (RH/LH)

20

U While cruising

At racing

30

40

Off road (up/down)

50

60 MPH

MTBL0017

🗌 In town

Not affected
 At starting

Vehicle speed

Turned on

While accelerating

U While decelerating

[MR16DDT]

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< BASIC INSPECTION >

BASIC INSPECTION

Work

		А
Work Procedure	INFOID:000000007576997	
1.INSPECTION START		EC
 Check service records for any recent repairs that may indicate a r scheduled maintenance. Open engine hood and check the following: Harness connectors for improper connections Wiring harness for improper connections, pinches and cut Vacuum hoses for splits, kinks and improper connections Hoses and ducts for leaks Air cleaner clogging Gasket Confirm that electrical or mechanical loads are not applied. Headlamp switch is OFF. Air conditioner switch is OFF. Steering wheel is in the straight-ahead position, etc. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge. Ensure engine stays below 1,000 rpm. 	related malfunction, or a current need for	C D E F
	120 270 SEF976U	H
5. Run engine at about 2,000 rpm for about 2 minutes under no		J
 S. Run engine at about 2,000 rpm for about 2 minutes under no load. 6. Make sure that no DTC is displayed with CONSULT or GST. <u>Is any DTC detected?</u> YES >> GO TO 2. NO >> GO TO 3. 		K
	× 1000 r/min	Μ

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. Ν

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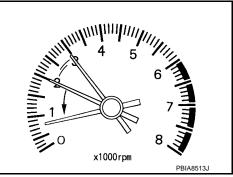
BASIC INSPECTION

< BASIC INSPECTION >

- 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-528</u>. "Inspection".
 For specification, refer to <u>EC-535</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-130, "Work Procedure".

>> GO TO 5.

5.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform <u>EC-131, "Work Procedure"</u>.

>> GO TO 6.

6.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-132, "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-528. "Inspection"</u>. For specification, refer to <u>EC-535, "Idle Speed"</u>.

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the Following.

• Check camshaft position sensor (PHASE) and circuit. Refer to EC-308, "DTC Logic".

Check crankshaft position sensor (POS) and circuit. Refer to <u>EC-305, "DTC Logic"</u>.

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 NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to <u>SEC-37, "ECM : Work Procedure"</u>.

>> GO TO 4.

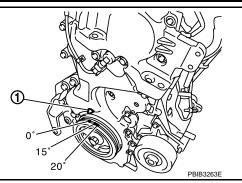
10.CHECK IGNITION TIMING

1. Run engine at idle.

BASIC INSPECTION

< BASIC INSPECTION >

- Check ignition timing with a timing light. For procedure, refer to <u>EC-529</u>, "Inspection" For specification, refer to <u>EC-535</u>, "Ignition Timing".
 - 1 : Timing indicator
- Is the inspection result normal?
- YES >> INSPECTION END.
- NO >> GO TO 11.



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11.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- 1. Stop engine.
- 2. Perform <u>EC-130, "Work Procedure"</u>.

>> GO TO 12.

12.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-131, "Work Procedure".

>> GO TO 13.

13.PERFORM IDLE AIR VOLUME LEARNING

Perform <u>EC-132, "Work Procedure"</u>.

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-528, "Inspection"</u>.
 For specification, refer to <u>EC-535, "Idle Speed"</u>.

Is the inspection result normal?

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

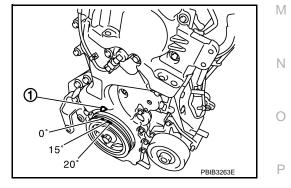
15. CHECK IGNITION TIMING AGAIN

- 1. Run engine at idle.
- Check ignition timing with a timing light. For procedure, refer to <u>EC-529</u>, "Inspection". For specification, refer to <u>EC-535</u>, "Ignition Timing".

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-72. "Exploded View".

Is the inspection result normal?

YES >> GO TO 17.

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

BASIC INSPECTION

< BASIC INSPECTION >

17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-308, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-305. "DTC Logic".

Is the inspection result normal?

YES >> GO TO 18.

NO >> Repair or replace. Then GO TO 4

18.CHECK ECM FUNCTION

- 1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
- 2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to <u>SEC-37, "ECM : Work Procedure"</u>.

>> GO TO 4.

ADDITIONAL SERVICE WHEN REPLACING ECM

ADDITIONAL SERVICE WHEN REPLACING ECM		
< BASIC INSPECTION >	[MR16DDT]	
ADDITIONAL SERVICE WHEN REPLACING ECM		٨
Description	INFOID:000000007576998	A
When replacing ECM, this procedure must be performed.		EC
Work Procedure	INFOID:000000007576999	
1. PERFORM INITIALIZATION OF NVIS (NATS) SYSTEM AND REGISTRATION OF ALL NV TION KEY IDS	'IS (NATS) IGNI-	С
Refer to <u>SEC-37, "ECM : Work Procedure"</u> .		D
>> GO TO 2.		
2. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING		E
Refer to EC-130, "Work Procedure".		
>> GO TO 3.		F
3. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING		
Refer to EC-131, "Work Procedure".		G
>> GO TO 4.		
4. PERFORM IDLE AIR VOLUME LEARNING		Н
Refer to EC-132, "Work Procedure".		
>> GO TO 5.		I
5.PERFORM G SENSOR CALIBRATION		
Refer to EC-134, "Work Procedure".		J
>> END		V
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		I
		M
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ACCELERATOR PEDAL RELEASED POSITION LEARNING

< BASIC INSPECTION >

ACCELERATOR PEDAL RELEASED POSITION LEARNING

Description

INFOID:000000007577000

[MR16DDT]

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:000000007577001

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:000000007577003

1.start	D
With CONSULT	
 Turn ignition switch ON. Select "CLSD THL POS LEARN" in "WORK SUPPORT" mode of "ENGINE" using CONSULT. 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.	
Without CONSULT	F
1. Start the engine. NOTE:	
 Engine coolant temperature is 25°C (77°F) or less before engine starts. Warm up the engine. 	G
NOTE: Raise engine coolant temperature until it reaches 65°C (149°F) or more.	
 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. 	Н
	1
>> END	
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INFOID:000000007577002

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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 12.9 V (At idle)
- Engine coolant temperature: 70 100°C (158 212°F)
- Selector lever : P or N (CVT), Neutral (M/T)
- Electric load switch: OFF (Air conditioner, headlamp, rear window defogger) 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
- (B)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-130. "Work Procedure".
- 2. Perform Throttle Valve Closed Position Learning. Refer to EC-131, "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 <u>EC-130, "Work Procedure"</u>.
- 2. Perform Throttle Valve Closed Position Learning. Refer to EC-131, "Work Procedure".
- 3. Start engine and warm it up to normal operating temperature.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
- 6. Repeat the following procedure quickly five times within 5 seconds.
- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.

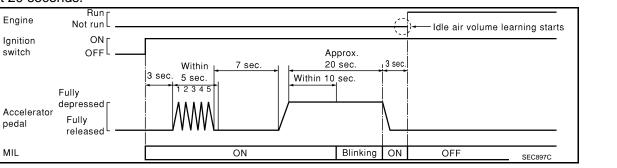
INFOID:000000007577004

INFOID:000000007577005

IDLE AIR VOLUME LEARNING

< BASIC INSPECTION >

- 7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 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 F 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-535, "Idle Speed" and EC-535, "Ignition Timing". Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 5. Н 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 Κ Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident. It is useful to perform "TROUBLE DIAGNOSIS - SPECIFICATION VALUE". Refer to EC-150, "Description". L 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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G SENSOR CALIBRATION

< BASIC INSPECTION >

G SENSOR CALIBRATION

Description

INFOID:000000007577006

[MR16DDT]

ECM stores calibration data (inherent characteristic value) of G sensor to provide accurate control. Therefore, it is required to perform calibration of G sensor after the following work is performed.

- · Removal/installation or replacement of G sensor
- Replacement of ECM

Work Procedure

INFOID:000000007577007

1.PREPARATION BEFORE CALIBRATION PROCEDURE

- 1. Park the vehicle on a level surface.
- Adjust air pressure of all tires to the specified pressure. WT-50, "Tire Air Pressure". 2.

>> GO TO 2.

2.PERFORM CALIBRATION

(P)With CONSULT

Turn ignition switch ON. 1. **CAUTION:** Never start engine.

- Select "Work Support" mode in "ENGINE. 2.
- Select "G SENSOR CALIBRATION". 3.
- 4. Touch "Start". **CAUTION:**

Never swing the vehicle during "G sensor calibration".

Is "COMPLETED" displayed?

- YES >> END
- NO >> Perform steps 1 and 2 again.

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

< BASIC INSPECTION >

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

Description

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

Work Procedure

1.start

•••		
(B)	With CONSULT	
1.		D
2.		
3.	5 <i>,</i> 5	
	With GST	E
1.	Start engine and warm it up to normal operating temperature.	
2.	•	
3. ⊿	Disconnect mass air flow sensor harness connector.	F
4. 5.	Restart engine and let it idle for at least 5 seconds. Stop engine and reconnect mass air flow sensor harness connector.	
6.	Select Service \$03 with GST. Make sure DTC P0102 is detected.	
7.		G
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	>> END	
	>> END	Н
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INFOID:000000007577008

INFOID:000000007577009

< BASIC INSPECTION >

FUEL PRESSURE

Work Procedure

FUEL PRESSURE RELEASE

1.FUEL PRESSURE RELEASE

With CONSULT

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

Without CONSULT

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

>> END

FUEL PRESSURE CHECK

CAUTION:

- Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.
- The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.
- Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains 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 F15 models do not have fuel return system.

1.FUEL PRESSURE CHECK

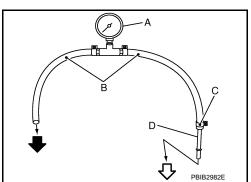
- 1. Release fuel pressure to zero.
- Prepare fuel hose for fuel pressure check (B) and fuel tube adapter [SST: KV10120000] (D), then connect fuel pressure gauge (A).
 - : To quick connector
 - To high pressure fuel pump
 - C : Clamp

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.



FUEL PRESSURE

< BASIC INSPECTION >

- Connect fuel hose for fuel pressure check (1) to high pressure fuel pump with clamp (2) as shown in the figure.
 CAUTION:
 - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
 - Apply proper amount of gasoline between top of the high pressure fuel pump (3) and spool (4).
 - Insert fuel hose for fuel pressure check until it touches the spool on high pressure fuel pump.
 - 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 torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

- 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.
- After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
- 5. Connect fuel tube adapter to quick connector.
 - A : Fuel pressure gauge
 - B : Fuel hose for fuel pressure check
- 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 500 kPa (5.1 kg/cm², 73 psi

Is the inspection result normal?

YES	>> INSPECTION END

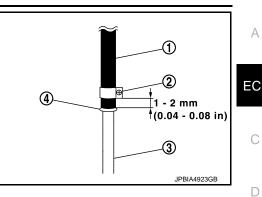
NO >> GO TO 2.

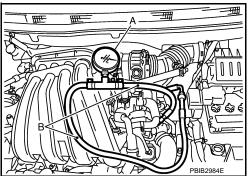
2.CHECK FUEL HOSES

- 1. Check the following.
- Fuel hoses for clogging
- Fuel filter for clogging
- Low pressure fuel pump
- Fuel pressure regulator for clogging

Is the inspection result normal?

- YES >> Replace fuel pressure regulator.
- NO >> Repair or replace error-detected parts.





[MR16DDT]

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< BASIC INSPECTION >

HOW TO SET SRT CODE

Description

INFOID:000000007577011

[MR16DDT]

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 Priority ^{*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	P0133
		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.

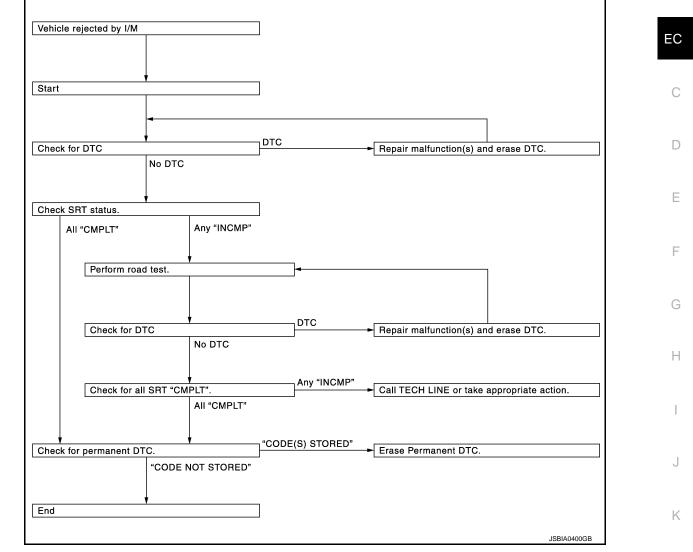
SRT SERVICE PROCEDURE

< BASIC INSPECTION >

[MR16DDT]

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





SRT Set Driving Pattern

CAUTION:

INFOID:000000007577012

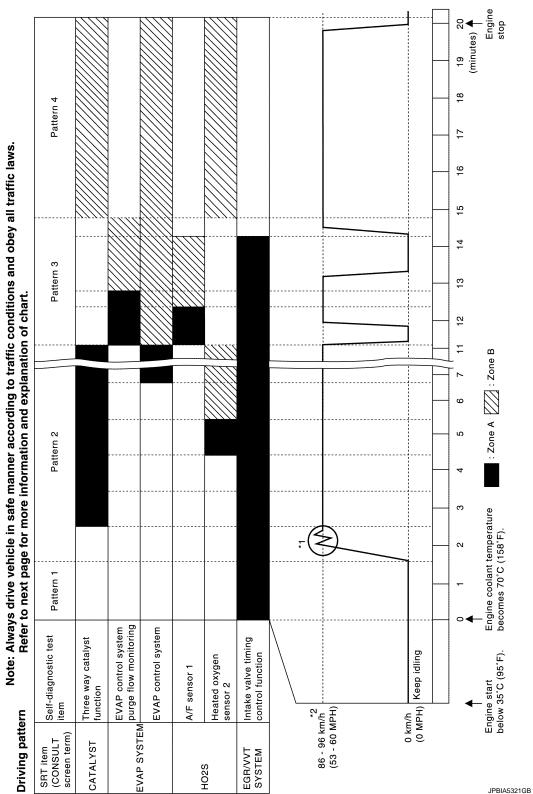
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< BASIC INSPECTION >

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



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

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

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

EC-140

HOW TO SET SRT CODE	
< BASIC INSPECTION > [MR16DDT]
*: Normal conditions - Sea level - Flat road - Ambient air temperature: 20 – 30°C (68 – 86°F)	A
NOTE: Diagnosis is performed as quickly as possible under normal conditions. However, under other condition diagnosis may also be performed. [For example: ambient air temperature other than 20 – 30°C (68 – 86°F)]	
Work Procedure	⁷⁰¹³ C
1.снеск отс	_
Check DTC. <u>Is any DTC detected?</u>	D
YES >> Repair malfunction(s) and erase DTC. Refer to <u>EC-102, "DTC_Index"</u> . NO >> GO TO 2.	Е
2.CHECK SRT STATUS	
With CONSULT Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT. Without CONSULT	F
Perform "SRT status" mode with <u>EC-70, "On Board Diagnosis Function"</u> . With GST Select Service \$01 with GST.	G
Is SRT code(s) set?	
YES >> GO TO 11. NO-1 >> With CONSULT: GO TO 3. NO-2 >> Without CONSULT: GO TO 4.	Н
3. DTC CONFIRMATION PROCEDURE	
 Select "SRT WORK SUPPORT" in "DTC & SRT CONFIRMATION" mode with CONSULT. For SRT(s) that is not set, perform the corresponding "DTC CONFIRMATION PROCEDURE" according the "Performance Priority" in the "SRT ITEM" table. Refer to <u>EC-138</u>, "<u>Description</u>". Check DTC. 	to J
Is any DTC detected?	K
YES >> Repair malfunction(s) and erase DTC. Refer to <u>EC-102, "DTC Index"</u> . NO >> GO TO 10.	K
4.PERFORM ROAD TEST	L
 Check the "Performance Priority" in the "SRT ITEM" table. Refer to <u>EC-138, "Description"</u>. Perform the most efficient SRT set driving pattern to set the SRT properly. Refer to <u>EC-139, "SRT Set Driving Pattern"</u>. 	<u>v-</u> M
In order to set all SRTs, the SRT set driving pattern must be performed at least once.	1 1 1
>> GO TO 5.	Ν
5.PATTERN 1	
 Check the vehicle condition; Engine coolant temperature is -10 to 35°C (14 to 95°F). Fuel tank temperature is more than 0°C (32°F). 	0
 Start the engine. Keep engine idling until the engine coolant temperature is greater than 70°C (158°F) NOTE: 	Ρ
ECM terminal voltage is follows; Engine coolant temperature 	
- –10 to 35°C (14 to 95°F): 3.0 – 4.3 V - 70°(158°F): Less than 4.1 V	
• Fuel tank temperature: Less than 1.4 V Refer to EC-84 "Reference Value"	

• Fuel tank temperature: Less than Refer to <u>EC-84, "Reference Value"</u>.

< BASIC INSPECTION >

>> GO TO 6.

6.PATTERN 2

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

NOTE:

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

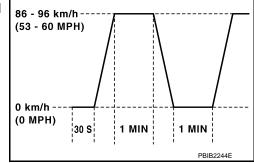
>> GO TO 7.

7.PATTERN 3

• Operate vehicle following the driving pattern shown in the figure.

- Release the accelerator pedal during deceleration of vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).

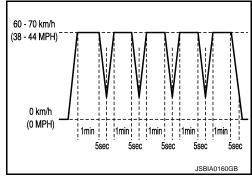
>> GO TO 8.



8. PATTERN 4

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

>> GO TO 9.



9. PATTERN 5

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

>> GO TO 10.

10.CHECK SRT STATUS

```
    With CONSULT
    Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT.
    Without CONSULT
    Perform "SRT status" mode with EC-70, "On Board Diagnosis Function".
    With GST
    Select Service $01 with GST.
    Is SRT(s) set?
    YES >> GO TO 11.
    NO >> Call TECH LINE or take appropriate action.
    11.CHECK PERMANENT DTC
```

< BASIC INSPECTION >	[MR16DDT]	
NOTE: Permanent DTC cannot be checked with a tool other than CONSULT or GST. With CONSULT Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT. With GST		
Select Service \$0A with GST. Is permanent DTC(s) detected?		
YES >> Proceed to <u>EC-150</u> , " <u>Description</u> ". NO >> END		

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< BASIC INSPECTION >

HOW TO ERASE PERMANENT DTC

Description

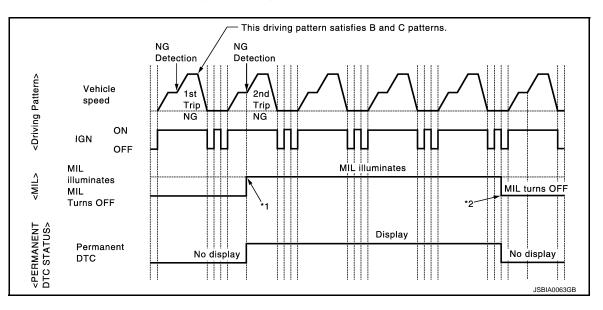
INFOID:000000007577014

[MR16DDT]

OUTLINE

When a DTC is stored in ECM

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



*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate. *2: MIL will turn off after vehicle is driven 3 times (driving pattern B) without any malfunctions.

When a DTC is not stored in ECM

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

 \times : Applicable —: Not applicable

Croup*	Group* Perform "DTC CONFIRMATION PROCE- DURE" for applicable DTCs.	Driving	Reference	
Gloup		В	D	Reference
А	×	_	—	<u>EC-145</u>
В		×	×	<u>EC-147</u>

*: For group, refer to <u>EC-102, "DTC Index"</u>.

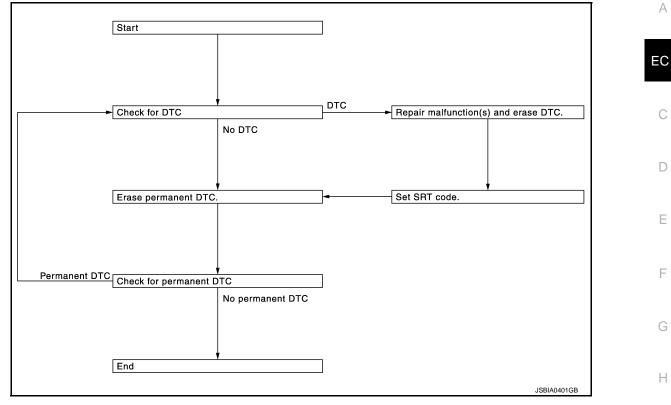
PERMANENT DTC ITEM

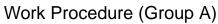
For permanent DTC items, MIL turns ON. Refer to EC-102, "DTC Index".

< BASIC INSPECTION >

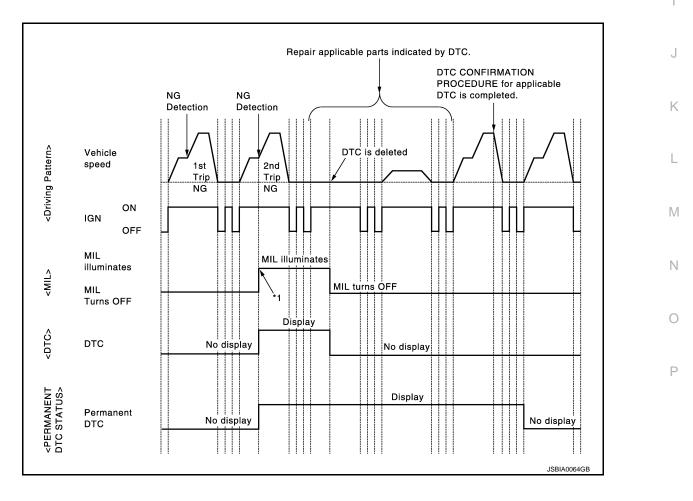
[MR16DDT]

PERMANENT DTC SERVICE PROCEDURE









Revision: 2011 October

< BASIC INSPECTION >

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

1. СНЕСК DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to <u>EC-70, "On Board Diagnosis Function"</u>, <u>EC-73,</u> <u>"CONSULT Function"</u>.

NO >> GO TO 2.

2. CHECK PERMANENT DTC

With CONSULT

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

With GST

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Select Service \$0A with GST.

Is any permanent DTC detected?

YES >> GO TO 3.

NO >> END

3.PERFORM DTC CONFIRMATION PROCEDURE

Perform "DTC CONFIRMATION PROCEDURE" for DTCs which are the same as permanent DTCs stored in ECM. Refer to EC-102, "DTC Index".

>> GO TO 4.

4.CHECK PERMANENT DTC

With CONSULT

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

With GST

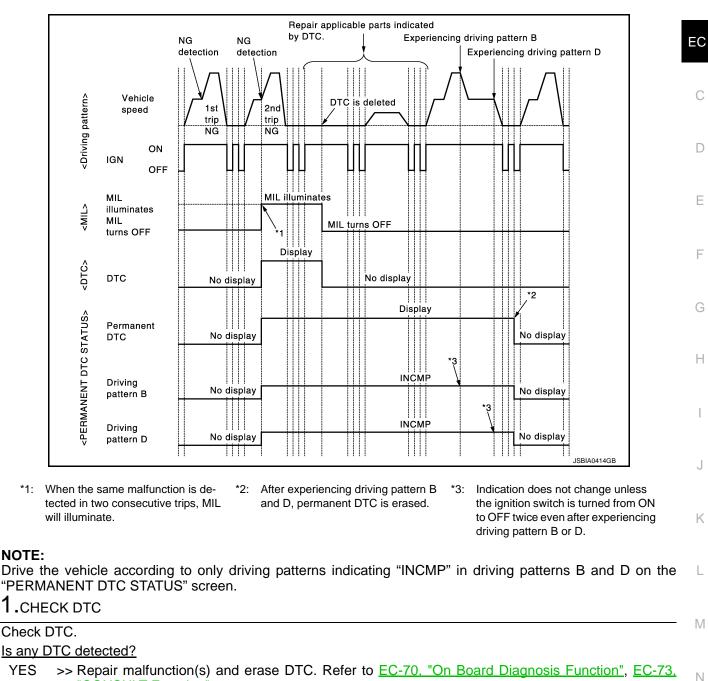
- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Select Service \$0A with GST.
- Is any permanent DTC detected?
- YES >> GO TO 1.
- NO >> END

< BASIC INSPECTION >

Work Procedure (Group B)



[MR16DDT]



"CONSULT Function".

NO >> GO TO 2.

2. CHECK PERMANENT DTC

(B) 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.

Ρ

< BASIC INSPECTION >

- 4. Turn ignition switch ON.
- 5. Select Service \$0A with GST.

Is any permanent DTC detected?

YES >> GO TO 3. NO >> END

3.DRIVE DRIVING PATTERN B

CAUTION:

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

With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- Use "PERMANENT DTC WORK SUPPORT" mode with CONSULT to drive the vehicle according to driving pattern B. Refer to <u>EC-73</u>, "<u>CONSULT Function</u>", <u>EC-67</u>, "<u>DIAGNOSIS DESCRIPTION</u> : <u>Driving Pat-</u> <u>tern</u>".

With GST

- 1. Start engine and warm it up to normal operating temperature.
- Drive the vehicle according to driving pattern B. Refer to <u>EC-67, "DIAGNOSIS DESCRIPTION : Driving</u> <u>Pattern"</u>.

>> GO TO 4.

4.CHECK PERMANENT DTC

() With CONSULT

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

With GST

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Select Service \$0A with GST.

Is any permanent DTC detected?

YES >> GO TO 5. NO >> END

5. DRIVE DRIVING PATTERN D

CAUTION:

• Always drive at a safe speed.

• Never erase self-diagnosis results.

• If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B and D is reset.

Drive the vehicle according to driving pattern D. Refer to <u>EC-67, "DIAGNOSIS DESCRIPTION : Driving Pat-</u><u>tern"</u>.

>> GO TO 6.

6.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.

< BASIC INSPECTION >	[MR16DDT]	
 Select "PERMANENT DTC STATUS" mode with CONSULT. With GST Turn ignition switch OFF and wait at least 10 seconds. 		A
 Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Select Service \$0A with GST. 		EC
Is any permanent DTC detected? YES >> GO TO 1. NO >> END		С
		D
		E
		F
		G
		Н
		I
		J
		K
		L
		Μ
		Ν
		0
		Ρ

< DTC/CIRCUIT DIAGNOSIS >

DTC/CIRCUIT DIAGNOSIS TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:000000007577017

INFOID:000000007577018

[MR16DDT]

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.

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 <u>EC-125, "Work Procedure"</u>.
- Select "B/FUEL SCHDL", "A/F ALPHA-B1" and "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 3. Make sure that monitor items are within the SP value.
- Is the inspection result normal?
- YES >> END
- NO >> Proceed to EC-151, "Diagnosis Procedure".

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

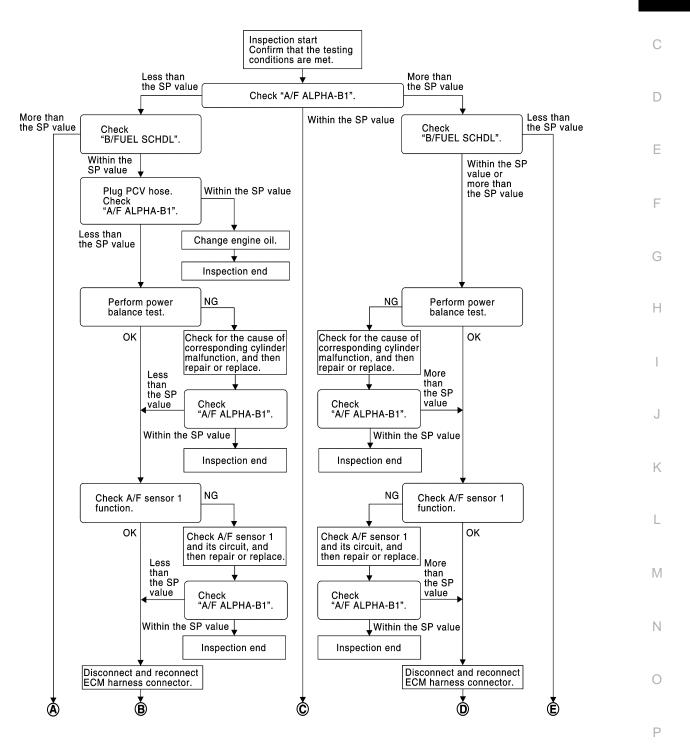
[MR16DDT]

INFOID:000000007577019

А

EC

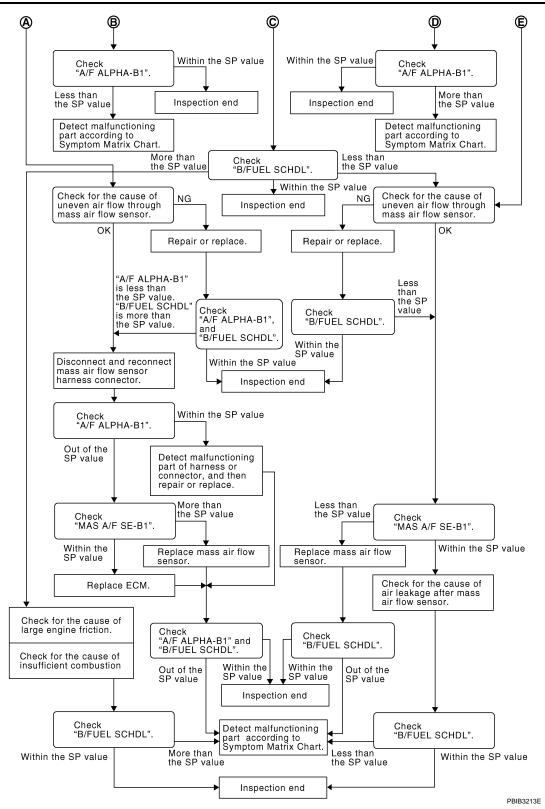
OVERALL SEQUENCE



JSBIA1063GB

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]



DETAILED PROCEDURE

1.CHECK "A/F ALPHA-B1"

()With CONSULT

- 1. Start engine.
- 2. Confirm that the testing conditions are met. Refer to EC-150, "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.

EC-152

< DTC/CIRCUIT DIAGNOSIS > [MR16DDT]	
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.	А
Is the measurement value within the SP value?	
YES >> GO TO 14.	EC
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"	С
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?	D
YES >> GO TO 4. NO >> More than the SP value: GO TO 16.	_
3.CHECK "B/FUEL SCHDL"	E
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?	F
YES >> GO TO 6.	
NO-1 >> More than the SP value: GO TO 6. NO-2 >> Less than the SP value: GO TO 22.	G
4.CHECK "A/F ALPHA-B1"	
1. Stop the engine.	Н
 Disconnect PCV hose, and then plug it. Start engine. 	
 Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value. 	I
Is the measurement value within the SP value?	
YES >> GO TO 5. NO >> GO TO 6.	J
5. CHANGE ENGINE OIL	
1. Stop the engine.	Κ
2. Change engine oil.	
NOTE: This symptom may occur when a large amount of gasoline is mixed with engine oil because of driving	I
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 con- dition.	
	M
>> INSPECTION END	
6.PERFORM POWER BALANCE TEST	Ν
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.	
 Make sure that the each cylinder produces a momentary engine speed drop. <u>Is the inspection result normal?</u> 	0
YES >> GO TO 9.	
<u>NO</u> >> GO TO 7.	
7.DETECT MALFUNCTIONING PART	Ρ
Check the following.	
 Ignition coil and its circuit (Refer to <u>EC-498, "Component Function Check"</u>.) Fuel injector and its circuit (Refer to <u>EC-485, "Component Function Check"</u>.) 	
3. Intake air leakage	
 Low compression pressure (Refer to <u>EM-15, "Inspection"</u>.) <u>Is the inspection result normal?</u> 	

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Replace fuel injector and then GO TO 8.
- NO >> Repair or replace malfunctioning part and then GO TO 8.

8.CHECK "A/F ALPHA-B1"

1. Start engine.

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

Is the measurement value within the SP value?

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

9.CHECK A/F SENSOR 1 FUNCTION

Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1.

- For DTC P0130, refer to <u>EC-224, "DTC Logic"</u>.
 For DTC P0131, refer to <u>EC-228, "DTC Logic"</u>.
- For DTC P0132, refer to EC-231, "DTC Logic".
- For DTC P0133, refer to <u>EC-234, "DTC Logic"</u>.

Is any DTC detected?

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

10.CHECK A/F SENSOR 1 CIRCUIT

Perform DIAGNOSTIC PROCEDURE according to corresponding DTC.

>> 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 indication is within 2 the SP value.

Is the measurement value within the SP value?

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

12. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

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

>> GO TO 13.

13.CHECK "A/F ALPHA-B1"

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

Is the measurement value within the SP value?

- YES >> INSPECTION END
- NO >> Detect malfunctioning part according to EC-520, "Symptom Table".

14.CHECK "B/FUEL SCHDL"

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

Is the measurement value within the SP value?

YES >> INSPECTION END

NO-1 >> More than the SP value: GO TO 15.

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

15. DETECT MALFUNCTIONING PART

TROUBLE DIAGNOSIS - SPECIFICATION VALUE	
< DTC/CIRCUIT DIAGNOSIS >	[MR16DDT]
 Check for the cause of large engine friction. Refer to the following. Engine oil level is too high Engine oil viscosity 	A
 Belt tension of power steering, alternator, A/C compressor, etc. is excessive Noise from engine Noise from transmission, etc. 	EC
 2. Check for the cause of insufficient combustion. Refer to the following. Valve clearance malfunction Intake valve timing control function malfunction 	С
 Camshaft sprocket installation malfunction, etc. >> Repair or replace malfunctioning part, and then GO TO 27. 	D
16. CHECK INTAKE SYSTEM	
Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.Crushed air ductsMalfunctioning seal of air cleaner element	E
 Uneven dirt of air cleaner element Improper specification of intake air system Is the inspection result normal? 	F
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"	G
Select "A/F ALPHA-B1" and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and each indication is within the SP value.	make sure that H
<u>Is the measurement value within the SP value?</u> YES >> INSPECTION END NO >> "B/FUEL SCHDL" is more, "A/F ALPHA-B1" is less than the SP value: GO TO 18.	I
18. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTO)R
 Stop the engine. Disconnect mass air flow sensor harness connector. Check pin terminal and connector for damage and then reconnect it again. 	J K
>> GO TO 19.	
19. CHECK "A/F ALPHA-B1"	L
 Start engine. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the ind the SP value. 	lication is within
<u>Is the measurement value within the SP value?</u> YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to <u>Logic</u> ". Then GO TO 26.	
NO >> GO TO 20. 20.CHECK "MAS A/F SE-B1"	Ν
Select "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indicat SP value.	tion is within the $$ $$ $$
<u>Is the measurement value within the SP value?</u> YES >> GO TO 21.	Р
NO >> More than the SP value: Replace mass air flow sensor, and then GO TO 26. 21. REPLACE ECM	
 Replace ECM. Refer to <u>EC-534, "Removal and Installation"</u>. Perform <u>EC-129, "Work Procedure"</u>. 	

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

22. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

Is the inspection result normal?

YES >> GO TO 24.

NO >> Repair or replace malfunctioning part, and then GO TO 23.

23.CHECK "B/FUEL SCHDL"

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

Is the measurement value within the SP value?

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

Is the measurement value within the SP value?

YES >> GO TO 25.

NO >> Less than the SP value: Replace mass air flow sensor, and then GO TO 27.

25.CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.

- Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks of PCV valve
- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts
- Malfunctioning seal of intake air system, etc.

>> GO TO 27.

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

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

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to <u>EC-520, "Symptom Table"</u>.

27.CHECK "B/FUEL SCHDL"

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

Is the measurement value within the SP value?

- YES >> INSPECTION END
- NO >> Detect malfunctioning part according to <u>EC-520, "Symptom Table"</u>.

< DTC/CIRCUIT DIAGNOSIS >

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

1.CHECK FUSE

Check that the following fuse is not fusing.

Locatio	n Fus	e No.	Capacity	
IPDM E	/P #	43	20 A	
		[£] 62	15 A	
s the fuse fu	sing?			
	Replace the fuse	after repairing th	ne applicable ci	cuit.
-	GO TO 2.			
Z .CHECK G	ROUND CONNE			
	tion switch OFF.			
			terer to <u>GI-46.</u>	<u>Circuit Inspection"</u> .
	<u>tion result norma</u> GO TO 3.	<u>1 (</u>		
	Repair or replace	around connect	tion.	
-	CM GROUND C	-		
	ect ECM harness			
	e continuity betw		ess connector a	d ground.
	+			
	ECM		Continuity	
Connector	Terminal	-		
For	1			
F25	2			
	123	Ground	Existed	
E18	124	-		
	127	-		
s the inspec	tion result norma	l?	<u></u>	
		_		
YES >> (GO TO 4.			
NO >> I	Repair or replace		oarts.	
NO >> I			oarts.	
NO >> I 4.CHECK E	Repair or replace	PPLY (MAIN)-I	oarts.	
NO >> I 4.CHECK E 1. Reconne 2. Turn ign	Repair or replace CM POWER SU ect ECM harness tion switch ON.	PPLY (MAIN)-I connector.		
NO >> I 4.CHECK E 1. Reconne 2. Turn ign	Repair or replace CM POWER SU ect ECM harness	PPLY (MAIN)-I connector.		nals.
NO >> I 4.CHECK E 1. Reconne 2. Turn ign	Repair or replace CM POWER SU ect ECM harness tion switch ON. le voltage betwee	PPLY (MAIN)-I connector.		inals.
NO >> I 4.CHECK E 1. Reconne 2. Turn ign	Repair or replace CM POWER SU ect ECM harness tion switch ON. he voltage betwee ECM	PPLY (MAIN)-I connector.	s connector terr	nals.
NO >> I 4.CHECK E 1. Reconne 2. Turn ign	Repair or replace CM POWER SU ect ECM harness tion switch ON. he voltage betwee ECM +	PPLY (MAIN)-I connector.		nals.
NO >> I 4.CHECK E 1. Reconne 2. Turn ign 3. Check th	Repair or replace CM POWER SU ect ECM harness tion switch ON. te voltage betwee ECM + Terminal	PPLY (MAIN)-I connector. en ECM harness	s connector terr	inals.

5. CHECK ECM POWER SUPPLY (MAIN)-II

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

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А

EC

< DTC/CIRCUIT DIAGNOSIS >

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

ECM					
Connector	+	_	Condition	Voltage (Approx.)	
Connector	Terminal				
E18	121	127	After turning ignition switch OFF, battery voltage will ex- ist for a few seconds	Drop to 0 V	

Is the inspection result normal?

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

6. CHECK ECM POWER SUPPLY (MAIN) CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connectors.

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	
E18	121	E14	35	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.

7. CHECK ECM RELAY CONTROL SIGNAL

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

ECM					
Connector	+	-	Condition	Voltage (Approx.)	
Connector	Terminal			(*********	
			Ignition switch ON	0 V	
E18	112	127	Turn ignition switch OFF and wait at least 10 sec- onds.	Battery voltage	

Is the inspection result normal?

YES >> Check Intermittent Incident. Refer to GI-43, "Intermittent Incident".

NO >> GO TO 8.

$\textbf{8.} \mathsf{CHECK} \texttt{ECM} \texttt{RELAY} \texttt{CONTROL} \texttt{SIGNAL} \texttt{CIRCUIT}$

- 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	
E18	112	E14	41	Existed

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

		-	SUPPLY	AND GR		[MR16DDT]
< DTC/CIRC						נושטטראואן
Is the inspect YES >>			or to DCS 21	"Romoval (and Installation".	А
		place error-d			and mstallation.	
9.CHECK I	• •		•	-		
	ition switch (EC
		etween ECM	l harness co	nnector term	iinals.	
	ECM					С
	+	_	Con	dition	Voltage (Approx.)	
Connector	Terr	minal				D
E 40	100	407	Ignition switch	h OFF	0 V	
E18	109	127	Ignition switch	h ON	Battery voltage	-
Is the inspec	ction result n	ormal?				E
	GO TO 11.					
	GO TO 10.					F
IU.CHEC	K IGNITION	SWITCH SIG	GNAL CIRCU	JIT		
	ition switch		-1			
		rness conne R harness c				G
				connector ar	nd IPDM E/R harness con	nector.
						Н
	+		_			
E	СМ	IPDN	/I E/R	Continuity		
Connector	Terminal	Connector	Terminal		_	
E18	109	E15	62	Existed		
5. Also che	eck harness	for short to g	pround and to	o power.		J
-	ction result n	ormal?				
		trouble diag			rcuit.	
	• •	place error-d	•			K
		ER SUPPLY	· ·			
Check the ve	oltage betwe	en ECM har	ness connec	ctor terminals	3.	L
	FOM					
	ECM			H =		
Connector	+	-	VOI	tage		M
		minal	Datta		-	
E18	106	127	Battery	voltage		Ν
Is the inspec			nt Defente	CI 42	mittant Incident"	IN
	GO TO 12.	nittent inclde	ent. Refer to	<u>GI-43, "Inter</u>	mittent Incident".	
-		ER SUPPLY	(BACK-UP)) CIRCUIT		0
	ition switch		(. ,	,		
		rness conne	ctor.			Р
		R harness c				
4. Check t	ne continuity	between EC	JM namess (connector ar	nd IPDM E/R harness con	nector.

< DTC/CIRCUIT DIAGNOSIS >

+		-		
ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E18	106	E14	42	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.

< DTC/CIRCUIT DIAGNOSIS >

U0101 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

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INFOID:000000007577023

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L

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DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (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 ig 2. Check Is DTC det		ait at least 3 seconds.		- H	

YES >> Proceed to EC-161, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

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

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INFOID:000000007577021

[MR16DDT]

U0122 VEHICLE DYNAMICS CONTROL MODULE

< DTC/CIRCUIT DIAGNOSIS >

U0122 VEHICLE DYNAMICS CONTROL MODULE

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:000000007577025

[MR16DDT]

INFOID:000000007577024

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U0122	VDC MDL (Lost communication with vehi- cle dynamics control module)	When ECM is not transmitting or receiving CAN communication signal of OBD (emis- sion related diagnosis) with ABS actuator and electric unit (control unit) for 2 seconds or more.	CAN communication line between ECM and ABS actuator and electric unit (con- trol unit) (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

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

Diagnosis Procedure

INFOID:000000007577026

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

< 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:000000007577028 D

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause	
U1001	01 CAN COMM CIRCUIT (CAN communication line) When ECM is not transmitting or receiving CAN communication signal other than OBD (emission related diagnosis) for 2 seconds or more. Harness or connectors (CAN communication line is open or shorted)			
DTC COI	NFIRMATION PROCE	DURE		
1.PERFC	ORM DTC CONFIRMATI	ON PROCEDURE		
2. Chec	ignition switch ON and w k 1st trip DTC. <u>DTC detected?</u>	ait at least 3 seconds.		
YES >	>> Proceed to <u>EC-163, "I</u> >> INSPECTION END	<u>Diagnosis Procedure"</u> .		
Diagnos	sis Procedure		INFOID:00000007577029	
Perform the trouble diagnosis for CAN communication system. Refer to <u>LAN-15, "Trouble Diagnosis Flow</u> <u>Chart"</u> .				

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P0011 IVT CONTROL

< DTC/CIRCUIT DIAGNOSIS > P0011 IVT CONTROL

DTC Logic

INFOID:000000007577030

DTC DETECTION LOGIC **NOTE**:

If DTC P0011 is displayed with DTC P0075, first perform the trouble diagnosis for EC-384, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition Possible cause	
P0011	INT/V TIM CONT-B1 (Intake valve timing control performance)	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 10 V and 16 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 2. Start engine and warm it up to 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
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	P or N position (CVT) Neutral position (M/T)

- 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 EC-165, "Diagnosis Procedure".

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

()With CONSULT

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

P0011 IVT CONTROL

ENG SPEED	1,200 - 3,175 rpm (A constant rotation is maintained.)	
COOLAN TEMP/S	More than 60°C (140°F)	
Selector lever	D position (CVT) 1st or 2nd position (M/T)	
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)	
CAUTION: Always drive 2. Check 1st trip With GST	e at a safe speed. o DTC.	
	dure "With CONSULT" above.	
	<u>etected?</u> eed to <u>EC-165, "Diagnosis Procedure"</u> . ECTION END	
Diagnosis Pro		INFOID:000000007577031
	RESSURE WARNING LAMP	
1. Start engine.		
 Check oil provide the provided of the provided of	essure warning lamp and confirm it is not illur arning lamp illuminated? k the engine oil level. Refer to <u>LU-7, "Inspection</u> "	
NO >> GO T		
2.CHECK INTAR	KE VALVE TIMING CONTROL SOLENOID VALV	PBIA8559J
Check the intake	valve timing control solenoid valve. Refer to EC-	166, "Component Inspection".
Is the inspection		
YES >> GO T		
• ·	ace intake valve timing control solenoid valve. Re	fer to <u>EM-72, "Exploded View"</u> .
	NKSHAFT POSITION SENSOR (POS)	
	haft position sensor (POS). Refer to <u>EC-307, "Co</u>	pmponent Inspection".
Is the inspection		
YES >> GO T NO >> Repla	「O 4. ace crankshaft position sensor (POS). Refer to <u>E</u>	M-110 "Exploded View"
A '	SHAFT POSITION SENSOR (PHASE)	A TTO, EXPIONED VIEW.
Is the inspection	naft position sensor (PHASE). Refer to <u>EC-310. "(</u>	
YES >> GO T		
	ace camshaft position sensor (PHASE). Refer to	EM-84, "Exploded View".
5.CHECK CAME		
Check the followi		

Check the following.

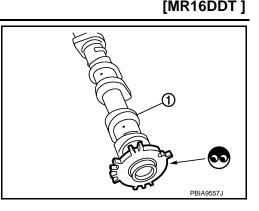
P0011 IVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

- Accumulation of debris to the signal plate of camshaft (1) 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-85, "Removal and Installation"</u>.



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-73, "Removal and Installation"</u>.

NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to EM-88, "Inspection", "INSPECTION AFTER INSTALLATION".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".
- NO >> Clean lubrication line.

Component Inspection

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

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

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	Giouna	(Continuity should not exist)	

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace intake valve timing control solenoid valve. Refer to EM-72, "Exploded View".

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve. Refer to EM-72. "Exploded View".

2. 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:

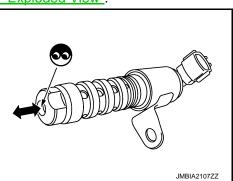
Always replace O-ring when intake valve timing control solenoid valve is removed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake valve timing control solenoid valve. Refer to EM-72, "Exploded View".

EC-166



INFOID:000000007577032

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-182, "DTC Logic"</u>.
- If DTC P0014 is displayed with P1078, first perform trouble diagnosis for P1078. Refer to <u>EC-390</u>, <u>"DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause	E
P0014	EXH/V TIM CONT-B1 (Exhaust valve timing control performance)	There is a gap between angle of target and phase-control angle degree.	 Crankshaft position sensor (POS) Camshaft position sensor (PHASE) Exhaust valve timing control position sensor Exhaust 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 exhaust valve timing control 	F

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

(B) 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.
- 3. Maintain the following conditions for at least 6 consecutive seconds. Hold the accelerator pedal as steady as possible.

ENG SPEED	1,200 - 2,000 rpm (A constant rotation is maintained.)			
COOLAN TEMP/S	More than 60°C (140°F)			
Selector lever P or N position (CVT) Neutral position (M/T)				
5. Check 1st trip D	 Let engine idle for 10 seconds. Check 1st trip DTC. 			
With GST Follow the procedure "With CONSULT" above.				
Is 1st trip DTC detected?				

YES >> Proceed to EC-168. "Diagnosis Procedure"

NO >> GO TO 3.

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< DTC/CIRCUIT DIAGNOSIS >

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT

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

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

CAUTION:

Always drive at a safe speed.

3. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

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

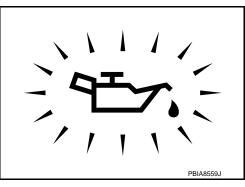
Diagnosis Procedure

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-166, "Component Inspection"</u>. Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-72, "Exploded View".

${ m 3.}$ CHECK CRANKSHAFT POSITION SENSOR (POS)

Check the crankshaft position sensor (POS). Refer to <u>EC-307. "Component Inspection"</u>. Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace crankshaft position sensor (POS). Refer to <u>EM-110, "Exploded View"</u>.

4.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR

Check the exhaust valve timing control position sensor. Refer to EC-310, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace exhaust valve timing control position sensor. Refer to EM-84, "Exploded View".

5.CHECK CAMSHAFT (EXH)

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P0014 EVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

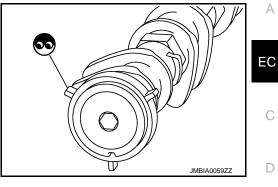
[MR16DDT]

Check the following.

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

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to <u>EM-85, "Removal and Installation"</u>.



6. CHECK TIMING CHAIN INSTALLATION

		AIION				
Check service records for any recent repairs that may cause timing chain misaligned.						
Are there any service records that may cause timing chain misaligned?						
		llation. Refer to EM-73, "Rem	oval and Installation".			
NO >> GO TO				F		
7.CHECK LUBRI						
Refer to <u>EM-88, "Ir</u>				G		
Is the inspection re				G		
	intermittent incide	ent. Refer to <u>GI-43, "Intermitte</u>	<u>nt Incident"</u> .			
_				Н		
Component Ins	spection		INF0ID:00000007577035			
1. CHECK EXHAU	JST VALVE TIMIN	G CONTROL SOLENOID VA	LVE-I	I		
1. Turn ignition s						
		control solenoid valve harnes				
3. Check resistar	ice between exhai	ust valve liming control solend	bid valve terminals as per the following.	J		
Exhaust valve timing	control solenoid valve					
+		Resistance		Κ		
Tern	ninal					
1	2	7.0 - 7.7 Ω [at 20°C (68°F)]				
1		Ω		L		
2	Ground	(Continuity should not exist)				
Is the inspection re	sult normal?			M		
YES >> GO TO						
NO >> Replac	ce exhaust valve ti	iming control solenoid valve. I	Refer to EM-72, "Exploded View".			
2.CHECK EXHAL	JST VALVE TIMIN	G CONTROL SOLENOID VA	LVE-II	Ν		
1. Remove exhai	ust valve timing co	ntrol solenoid valve. Refer to	EM-72, "Exploded View".			
		ust valve timing control solen		0		
	is 1 and 2, and tr s as shown in the f	nen interrupt it. Check that t	ne	0		
CAUTION:		iguroi				
		ously for 5 seconds or mo		Ρ		
	y result in damag I solenoid valve.	e to the coil in exhaust val	ve			
NOTE:						
Always replace O-ring when exhaust valve timing control						
solenoid valve is removed.						

Is the inspection result normal?

YES >> INSPECTION END

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P0014 EVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-72, "Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

P0031, P0032 A/F SENSOR 1 HEATER

DTC Logic

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INFOID:000000007577037

INFOID:000000007577036

[MR16DDT]

DTC DET	FECTION LOGIC		E			
DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause			
P0031	A/F SEN 1 HTR (B1) (Air fuel ratio (A/F) sensor 1 heater control circuit low)	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)	 Harness or connectors (A/F sensor 1 heater circuit is open or shorted.) A/F sensor 1 heater 			
P0032	A/F SEN 1 HTR (B1) (Air fuel ratio (A/F) sensor 1 heater control circuit high)	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.)	 Harness or connectors (A/F sensor 1 heater circuit is short- ed.) A/F sensor 1 heater 			
DTC CO	NFIRMATION PROCE	EDURE				
1.PREC	ONDITIONING					
before con 1. Turn i 2. Turn i 3. Turn i TESTING	 Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than between 11 V at 					
>> GO TO 2.						
2.PERFORM DTC CONFIRMATION PROCEDURE						
 Start engine and let it idle for at least 10 seconds. Check 1st trip DTC. 						
	Is 1st trip DTC detected?					
YES >	YES >> Proceed to EC-171, "Diagnosis Procedure".					

Diagnosis Procedure

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

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.

- 2. Turn ignition switch ON.
- 3. Check the voltage between A/F sensor 1 harness connector and ground.

	+			
A/F se	ensor 1	_	Voltage	
Connector Terminal				
F70	4	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2. CHECK A/F SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT

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

P0031, P0032 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

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		
F70	3	E18	125	Existed

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

Is the inspection result normal?

YES >> GO TO 3.

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

3.CHECK A/F SENSOR 1 HEATER

Check the A/F sensor 1 heater. Refer to EC-172, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> GO TO 4.

4.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to <u>EM-41, "Exploded View"</u>. CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

Component Inspection

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.

A/F s	ensor 1	
+	-	Resistance
Ter	minal	
	4	1.8 - 2.44 Ω [at 20°C (68°F)]
3	1	
	2	∞ Ω
4	1	(Continuity should not exist)
	2	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1. Refer to <u>EM-41, "Exploded View"</u>. 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.

INFOID:000000007577038

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

 Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

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< DTC/CIRCUIT DIAGNOSIS >

P0037, P0038 HO2S2 HEATER

DTC Logic

INFOID:000000007577039

[MR16DDT]

DTC DETECTION LOGIC

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

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

- YES >> Proceed to EC-174, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007577040

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.

	+			
НО	2S2	_	Voltage	
Connector	Terminal			
F69	2	Ground	Battery voltage	

P0037, P0038 HO2S2 HEATER

< DTC/CIRCU	IT DIAGN		JU37, FUU	зо п0232	HEATER	[MR16DDT]
Is the inspectio						
	D TO 2.					A
NO >> Re	pair or rep	lace error-d	letected par	ts.		
2. СНЕСК НО	2S2 OUTF	PUT SIGNA	L CIRCUIT			EC
1. Turn ignitic						
		ness conne		se connoctor (and ECM harness conne	ctor
5. Check the	continuity					CIOI.
+			_			
HO2S2	2	F	СМ	Continuity		
Connector	Terminal	Connector	Terminal			D
F69	3	E18	126	Existed		
4. Also check	harness f	or short to g	ground and s	short to power		E
Is the inspectio						
YES >> GO	D TO 3.					-
•	• •		letected par			F
3. СНЕСК НЕ	ATED OXY	GEN SENS	SOR 2 HEA	ΓER		
Check the heat	ted oxygen	sensor 2 h	eater. Refer	to <u>EC-175, "(</u>	Component Inspection".	G
Is the inspection						
	eck interm	ittent incide	ent. Refer to	<u>GI-43, "Intern</u>	nittent Incident".	Н
4.REPLACE						П
	_					
Replace heater	a oxygen s	ensor 2. Re	eter to <u>EX-5.</u>	"Exploded VI	<u>ew"</u> .	1
	sensor w	hich has b	een droppe	d from a hei	ght of more than 0.5 m	(19.7 in) onto a hard
surface such			•			
					eads using Oxygen Se approved Anti-seize L	
service tool)						
						K
>> IN:	SPECTION	I END				
Component	Inspecti	ion				INFOID:000000007577041
1. СНЕСК НЕ						L
			SUR 2 HEA	IER		
 Turn ignitic Disconnec 			or 2 (HO2S2	?) harness cor	nector	M
				as per the fol		
						Ν
+	-					TN IN
Heated oxy	gen sensor 2		Resi	stance		
Terr	minal					0
2	3		3.3 - 4.4 Ω [a	at 25°C (77°F)]		
	1					Р
1	3					P
	4			Ω		
	1		(Continuity sl	nould not exist)		
4	2					
	3					

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

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

2.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to <u>EX-5, "Exploded View"</u>.

- CAUTION:
- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

P0045, P0047, P0048 TC BOOST CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

P0045, P0047, P0048 TC BOOST CONTROL SOLENOID VALVE

DTC Logic

INFOID:000000007577042

[MR16DDT]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0045	TC BOOST SOL/V (Turbocharger boost control solenoid valve circuit open)	ECM detected the turbocharger boost control solenoid valve circuit is open.	
P0047	TC/SC BOOST CONT A (Turbocharger boost control solenoid valve circuit low in- put)	ECM detected the turbocharger boost control solenoid valve circuit is short to ground.	 Harness or connectors (Turbocharger boost control solenoid valve circuit is open or shorted.) Turbocharger boost control solenoid valve
P0048	TC/SC BOOST CONT A (Turbocharger boost control solenoid valve circuit high input)	ECM detected the turbocharger boost control solenoid valve circuit is short to power.	
DTC CONF	IRMATION PROCEDU	JRE	
1.PRECON	IDITIONING		
before condi 1. Turn ign 2. Turn ign 3. Turn ign	irmation Procedure has ucting the next test. ition switch OFF and wai ition switch ON. ition switch OFF and wai	it at least 10 seconds.	always perform the following procedure
_	M DTC CONFIRMATION	N PROCEDURE	
	ition switch ON and wait	at least 5 seconds.	
<u>s 1st trip DT</u> YES >>	st trip DTC. <u>"C detected?</u> Proceed to <u>EC-177, "Dia</u> INSPECTION END	gnosis Procedure".	
	Procedure		INFOID:00000000757704
		ST CONTROL SOLENOID VA	LVE POWER SUPPLY
2. Disconn		ontrol solenoid valve harness	connector.
	ition switch ON. he voltage between turbo	ocharger boost control solenoid	d valve harness connector and ground.
	+		
- · ·	er boost control sole-		

-	oost control sole- valve	_	Voltage
Connector Terminal			
F54	F54 2		Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

Revision: 2011 October

EC-177

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P0045, P0047, P0048 TC BOOST CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

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

+				
0	r boost control id valve	IPDM E/R		Continuity
Connector	Terminal	Connector Terminal		
F54	2	E14	36	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.

${f 3.}$ CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT

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

+		-		
0	r boost control id valve	ECM		Continuity
Connector	Terminal	Connector Terminal		
F54	1	F26	73	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 TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Check the turbocharger boost control solenoid valve. Refer to EC-178. "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".

NO >> Replace turbocharger boost control solenoid valve. Refer to EM-37, "Exploded View".

Component Inspection

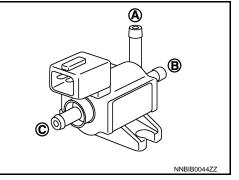
INFOID:000000007577044

[MR16DDT]

1.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

- 1. Turn ignition switch OFF
- 2. Disconnect turbocharger boost control solenoid valve harness connector.
- 3. Disconnect hoses connected to turbocharger boost control solenoid valve.
- 4. Check air passage continuity of turbocharger boost control solenoid valve as per the following conditions.

Condition	Air passage con- tinuity between (A) and (B)	Air passage con- tinuity between (A) and (C)
12 V direct current supply between terminals 1 and 2	Existed	Not existed
No supply	Not existed	Existed
Is the inspection result normal?		Existed



YES >> INSPECTION END

NO >> Replace turbocharger boost control solenoid valve. Refer to EM-37, "Exploded View".

EC-178

P0075 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

P0075 IVT CONTROL SOLENOID VALVE

DTC Logic

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INFOID:000000007577045

[MR16DDT]

DTC DETECTION LOGIC

	Trouble diagnosis name				
DTC No.	((Trouble diagnosis con- tent))	DTC	detecting condition		Possible cause
P0075	INT/V TIM V/CIR-B1 (Intake valve timing con- trol solenoid valve circuit)		oltage is sent to the ECN valve timing control sole		 Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) Intake valve timing control solenoid valve
отс со	NFIRMATION PROC	EDURE			
1.PREC	ONDITIONING				
before coi 1. Turn i 2. Turn i	onfirmation Procedure nducting the next test. gnition switch OFF and gnition switch ON. gnition switch OFF and	l wait at least	10 seconds.	d, alw	vays perform the following procedure
>	> GO TO2.				
~	ORM DTC CONFIRMA	TION PROCE	DURE		
	engine and let it idle fo k 1st trip DTC.	5 seconds.			
· ·	DTC detected?				
	Proceed to <u>EC-179.</u> INSPECTION END	<u>"Diagnosis P</u>	rocedure".		
Diagnos	sis Procedure				INFOID:00000007577046
1.CHEC	K INTAKE VALVE TIMI	NG CONTRO) SOLENOID VAL	/F PO	WER SUPPLY
1. Turn i 2. Disco	gnition switch OFF. nnect intake valve timi gnition switch ON.				
		ntake valve ti	ming control solence	oid valv	ve harness connector and ground.
	+ ontrol solenoid valve	_	Voltage		
Connec			Voltago		
F41	2	Ground	Battery voltage		
Is the insp	pection result normal?				
NO >	>> GO TO 3. >> GO TO 2.				
		NG CONTRO	L SOLENOID VAL	/E PO	WER SUPPLY CIRCUIT
2. Disco	-			ness c	connector and IPDM E/R harness con-

Revision: 2011 October

P0075 IVT CONTROL SOLENOID VALVE

+		+		
IVT control s	olenoid valve	IPDM E/R		Continuity
Connector	Terminal	Connector Terminal		
F41	2	E14	36	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 INTAKE VALVE TIMING CONTROL SOLENOID VALVE GROUND CIRCUIT

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

+		+		
IVT control s	olenoid valve	ECM		Continuity
Connector	Terminal	Connector Terminal		
F41	1	F26	81	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 INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Check the intake valve timing control solenoid valve. Refer to EC-180, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace intake valve timing control solenoid valve.

Component Inspection

INFOID:000000007577047

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

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

Intake valve timing control solenoid valve		
+	_	Resistance
Terminal		
1	2	6.7 - 7.7 Ω [at 20°C (68°F)]
1	Ground	${}^\infty \Omega$ (Continuity should not exist)
2		

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace intake valve timing control solenoid valve. Refer to EM-72, "Exploded View".

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve. Refer to EM-72. "Exploded View".

P0075 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

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 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:

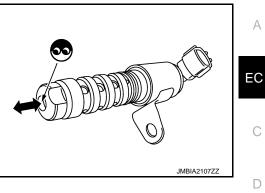
Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve. NOTE:

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-72, "Exploded View"</u>.



P0078 EVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

P0078 EVT CONTROL SOLENOID VALVE

DTC Logic

INFOID:000000007577048

[MR16DDT]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0078	EX V/T ACT/CIRC-B1 (Exhaust valve timing control sole- noid valve circuit)	An improper voltage is sent to the ECM through exhaust valve timing control solenoid valve.	 Harness or connectors (Exhaust valve timing control solenoid valve circuit is open or shorted.) Exhaust valve timing control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

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

>> GO TO2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

- YES >> Proceed to EC-182, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007577049

1.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.

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

	+		
EVT control s	solenoid valve	-	Voltage
Connector	Connector Terminal		
F100 2		Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

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

1. Turn ignition switch OFF.

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

EC-182

P0078 EVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

+		+	
EVT control solenoid valve IPDM		IPDM E/R	Continuity
	minal Connec	-	
	2 E14		Existed
	rness for short		
s the inspection r		to ground	
		uiagnosis for po [،]	ower supply circuit.
		or-detected part	
3. CHECK EXHA	JST VALVE TI	MING CONTRO	OL SOLENOID VALVE GROUND CIRCUIT
	CM harness co		solenoid valve harness connector and ECM harness connec-
+		+	
EVT control solenoio	l valve	ECM	Continuity
Connector Ter	minal Connec	tor Terminal	
F100	1 F26	85	Existed
4. CHECK EXHA Check the exhaus	r or replace err UST VALVE TI t valve timing c		rts. OL SOLENOID VALVE I valve. Refer to <u>EC-180, "Component Inspection"</u> .
	k intermittent in		o <u>GI-43, "Intermittent Incident"</u> . ol solenoid valve.
Component In	spection		INFOID:000000007577050
1. CHECK EXHA	UST VALVE TI	MING CONTRC	OL SOLENOID VALVE-I
1. Turn ignition s	witch OFF. Aust valve tin	ning control sole	enoid valve harness connector. ming control solenoid valve terminals as per the following.
Exhaust valve timing		alve	
Exhaust valve timing +	control solenoid v	alve	Resistance
Exhaust valve timing + Terr	control solenoid v minal	alve Ro	
Exhaust valve timing + Tern 1	control solenoid v	alve Ro	Ω [at 20°C (68°F)]
Exhaust valve timing + Terr	control solenoid v minal	alve Re 7.0 - 7.7 C	
Exhaust valve timing + 1 1 2 Is the inspection re	control solenoid v 	alve Re 7.0 - 7.7 C	Ω [at 20°C (68°F)] ∞ Ω
Exhaust valve timing + Tern 1 1 2 Is the inspection ro YES >> GO To NO >> Repla	control solenoid v 	Alve Re 7.0 - 7.7 C (Continuity ve timing contro	Ω [at 20°C (68°F)] ∞ Ω

P0078 EVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

 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:

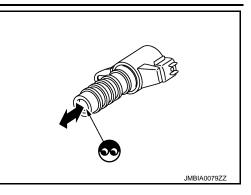
Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in exhaust valve timing control solenoid valve. NOTE:

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-72, "Exploded View".



P0087, P0088, P0090 FRP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

P0087, P0088, P0090 FRP CONTROL SYSTEM

DTC Logic

DTC DETECTION LOGIC

NOTE:

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

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause	D
	LOW FUEL PRES (High fuel pressure too low)	 Fuel rail pressure does not reach 1.3 MPa (13 bar, 13.3 kg/cm², 188.5 psi) at engine cold start [water tempera- ture 5°C (41°F) –40C° (104°F)]. Fuel rail pressure remains at 8.5 MPa 		E
P0087		(85 bar, 86.7 kg/cm ² , 1232.8 psi) or less for 1 second or more during en- gine idle condition after cold start [wa- ter temperature 5°C (41°F) –40C° (104°F)].		
		 The following condition continues for 5 seconds or more after engine start (regardless of water temperature): Target fuel pressure – Actual fuel pressure ≥ 2.7 MPa (27 bar, 27.5 kg/ cm², 392 psi) 		Н
		Fuel rail pressure remains at more then 12 5 MPs (125 har 127 5 kg/	Harness or connectors	I
P0088	HIGH FUEL PRES	than 12.5 MPa (125 bar, 127.5 kg/ cm ² , 1813.0 psi) for 1 second or more during engine idle condition after cold start [water temperature 5°C (41°F) – 40C° (104°F)].	(The fuel pump circuit is open or shorted.)Fuel system	J
10000	(High fuel pressure too high)	The following condition continues for 5 seconds or more after engine start (regardless of water temperature): Actual fuel pressure – Target fuel pressure ≥ 2.7 MPa (27 bar, 27.5 kg/		K
		cm ² , 392 psi) • Fuel rail pressure remains at 1.1	-	L
P0090	FUEL PUMP (High pressure fuel pump per-	 MPa (11 bar, 11.2 kg/ cm², 159.5 psi) or less for 5 seconds or more during engine rev. Fuel rail pressure remains at 		M
	formance)	18.5MPa (185 bar, 188.7 kg/cm ² , 2682.5 psi) or more for 0.3 seconds or more during engine rev.		Ν

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

EC-185

[MR16DDT]

INFOID:000000007577051

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< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

2. PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Check that the fuel tank is 1/8 full of fuel.
- 2. Warm up the engine to the normal operating temperature and keep the engine speed at idle for 10 seconds.

NOTE:

Warm up the engine until "COOLAN TEMP/S" on "DATA MONITOR" mode of "ENGINE" using CONSULT reaches at least 70°C (158°F).

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-186, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

- 1. Cool the engine until the engine coolant temperature reaches 60°C (140°F) or less.
- 2. Start the engine and wait at least 40 seconds.
- 3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-186, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007577052

1.PERFORM THE HIGH PRESSURE FUEL PUMP COMPONENT INSPECTION

Perform the high pressure fuel pump component inspection. Refer to EC-186. "Component Inspection".

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace the fuel pump. <u>FL-5, "2WD : Exploded View"</u> (2WD) or <u>FL-9, "AWD : Exploded View"</u> (AWD).

2.CHECK FUEL LEAKAGE

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

Is the inspection result normal?

- YES >> Check that the fuel system has no breakage, bend, and crush. Refer to FL-4, "Inspection".
- NO >> Repair or Replace the error-detected parts.

Component Inspection

INFOID:000000007577053

1.CHECK HIGH PRESSURE FUEL PUMP-I

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

High pressure fuel pump					
+	-	Condition Resistance		Resistance	
Terminal					
1	2	Temperature °C (°F)	20 - 30 (68 - 86)	0.46 - 0.51 Ω	

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace high pressure fuel pump. Refer to <u>EM-46, "Exploded View"</u>.

2.CHECK HIGH PRESSURE FUEL PUMP-II

With CONSULT

- T. Reconnect high pressure fuel pump harness connector.
- 2. Start the engine.

EC-186

P0087, P0088, P0090 FRP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

3. Check "FUEL PRES SEN" in "DATA MONITOR" of "ENGINE" using CONSULT.

Data monitor item	Condition	Voltage (Approx.)
FUEL PRES SEN V	Engine speed: idle	1,140 – 1,460 mV
I OLLI INLO OLINIV	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,300 – 2,900 mV

Without CONSULT

1. Start the engine.

2. Check fuel rail pressure sensor signal voltage.

+				Value (Approx.)	
Fuel rail pressure sensor		_	Condition		
Connector	Terminal			(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
			Engine speed: idle	1.14 – 1.46 V	
F5	2	Ground	Engine speed: Revving engine from idle to 4,000 rpm quickly	1.3 – 2.9 V	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace high pressure fuel pump. Refer to <u>EM-46, "Exploded View"</u>.

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< DTC/CIRCUIT DIAGNOSIS >

P0096 IAT SENSOR 2

DTC Logic

INFOID:000000007577054

[MR16DDT]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0096	IAT SENSOR 2 B1 [Intake air temperature (IAT) sensor 2 circuit range/perfor- mance]	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor 1, IAT sensor 2, ECT sensor, FTT sensor, and EOT sensor) shows that the volt- age signal of the IAT sensor 2 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 2 circuit) IAT sensor 2

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-189, "Component Function Check".

NOTE:

Use the component function check to check the overall function of the IAT sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to EC-189, "Diagnosis Procedure".

3.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 60 minutes.
- 2. Move the vehicle to a cool place.
- NOTE:

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

3. Turn ignition switch OFF and soak the vehicle for 12 hours. CAUTION:

Never turn ignition switch ON during soaking. NOTE:

The vehicle must be cooled with the food open.

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

Never turn ignition switch OFF during idling.

EC-188

P0096 IAT SENSOR 2

		P005	16 IA I 5E	NSOR 2	
< DTC/CIRC		NOSIS >			[MR16DDT]
5. Check 1s	st trip DTC.				
s 1st trip DT	C detected	<u>?</u>			
YES >> F	Proceed to	<u>EC-189, "Diagnosis P</u>	<u>ocedure"</u> .		
NO >> I	NSPECTIO	N END			
Componer	nt Functio	on Check			INFOID:00000007577055
I.CHECK IN	NTAKE AIR	TEMPERATURE (IAT) SENSOR 2	2	
•	tion switch				
		arger boost sensor ha etween turbocharger b			
J. CHECKIE		etween turbocharger b	0031 3611301		
Turbocharger	boost sensor				
+	_	Condition		Resistance (kΩ)	
Term	inal	Condition			
3	4	Temperature [°C (°F)]	25 (77)	1.80 – 2.20	
s the inspect			_== ()		
		nittent incident. Refer	to GI-43 "In	termittent Incident"	
		EC-189, "Diagnosis Pi		<u>termitterit melderit</u> .	
		-			
Diagnosis	FIUCEUU				INFOID:00000007577056
	NTAKE AIR	TEMPERATURE (IAT) SENSOR 2	2	
		ature sensor 2. Refer			
s the inspect	•				<u></u> .
		nittent incident. Refer	to GI-43. "In	termittent Incident".	
NO >> F	Replace tui	rbocharger boost se			sensor 2). Refer to EM-30.
	Exploded V	<u>'iew"</u> .			
Componer	nt Inspec	tion			INFOID:000000007577057
1					
I .CHECK IN	NTAKE AIR	TEMPERATURE SEM	ISOR 2		
	tion switch				
		arger boost sensor ha etween turbocharger b			
		stween tabeenarger b	0000 0011001		
Turbocharge	r boost sensor	r			
+	_	 Conditi	on	Resistance (kΩ)	
	ninals				
3	4	Temperature [°C (°F)]	25 (77)	1.80 - 2.20	
			25 (11)	1.00 - 2.20	
s the inspect					
	NSPECTIO Replace tur		sor (with in	take air temperatur	e sensor 2). Refer to EM-27,
	Exploded V				2 301301 27. Refer to <u>LIVI-27.</u>

< DTC/CIRCUIT DIAGNOSIS >

P0097, P0098 IAT SENSOR 2

DTC Logic

INFOID:000000007577058

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0097	IAT SENSOR 2 B1 (Intake air temperature sensor 2 circuit low input)	ECM detects the following status continuous- ly for 5 seconds or more: A voltage signal transmitted from the intake air temperature sensor 2 is 0.085 V or less.	Harness or connectors (Intake air temperature sensor 2 cir- cuit is open or shorted.) (Turbocharger boost sensor circuit is
P0098	IAT SENSOR 2 B1 (Intake air temperature sensor 2 circuit high input)	ECM detects the following status continuous- ly for 5 seconds or more: A voltage signal transmitted from the intake air temperature sensor 2 is 4.84 V or more.	 open or shorted.) (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Crankshaft position sensor circuit is open or shorted.) (Crankshaft position sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) Intake air temperature sensor 2 Turbocharger boost sensor Battery current sensor G sensor Crankshaft position sensor Exhaust valve timing control position sensor Exhaust valve timing control position sensor Exhaust valve timing control position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

TEST 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 at least 5 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to <u>EC-190, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK INTAKE AIR TEMPERATURE SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.

EC-190

2012 JUKE

INFOID:000000007577059

P0097, P0098 IAT SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

2. Disconnect turbocharger boost sensor harness connector.

3. Turn ignition switch ON.

4. Check the voltage between turbocharger boost sensor harness connector terminals.

	Turbocharger b	oost sensor			
Connector	+	+ – Voltage (Approx.)			
Connector		Terminal		(TT -)	
F75	1		3	5 V	
s the inspection	on result norr	<u>nal?</u>			_
	D TO 2. D TO 4.				
2.CHECK INT	AKE AIR TE	MPERATURE	E SENSOR 2	2 SIGNAL CIRC	CUIT
	on switch OF				
		ess connector. etween turboc		t sensor harnes	s connector and ECM harness connector.
	,				
+			-		-
Turbocharger	poost sensor	E	СМ	Continuity	
Connector Terminal Con		Connector	Terminal		
F75	4	F26	88	Existed	-
I. Also check	harness for	short to grou	nd and shor	to power.	_
s the inspectic		-		•	
	D TO 3.				
		ce error-deteo	cted parts.		
3. CHECK INT	AKE AIR TE	MPERATURE		2	
				192, "Compone	nt Inspection"
s the inspectic					<u>In moposition</u> .
			Refer to GI-4	3, "Intermittent	Incident".
					emperature sensor 2). Refer to EM-27,
<u>"E</u>	xploded View	<u>v"</u> .			
CHECK INT	AKE AIR TE	MPERATURE	E SENSOR 2	2 POWER SUP	PLY CIRCUIT-II
Check the volta	age between	turbocharger	boost sense	or harness conr	nector terminal and ground.
	0	Ū			, and the second s
	+			Voltage	-
	ger boost sense		-	(Approx.)	
Connector	Termi	nal			_
F75	1	(Ground	5 V	
s the inspection	on result norr	nal?			
	D TO 5.				
	D TO 7.				
b. CHECK INT	AKE AIR TE	MPERATURE	E SENSOR 2	2 GROUND CIF	RCUIT
	on switch OF				
		ess connector.			
				t sensor harnes	s connector and ECM harness connector.

[MR16DDT]

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P0097, P0098 IAT SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

	+		_	
Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector Terminal		
F75	3	F25 44		Existed

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

E	CM	Ground	Continuity	
Connector	Terminal	Giodila		
F25	1			
	2			
	123	Ground	Existed	
E18	124			
	127			

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".

NO >> Repair or replace error-detected parts.

7.CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connectors and each sensor harness connectors

3. Check harness connector for short to power and short to ground, between the following terminals.

EC	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
		FRP sensor	F5	1
F25 39	39	EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
F26 -	68 72	Battery current sensor	F52	1
		G sensor	B32	3
		CMP sensor	F109	1
		EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is the inspection result normal?

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

NO >> Repair or replace error-detected parts.

Component Inspection

1. CHECK INTAKE AIR TEMPERATURE SENSOR 2

1. Turn ignition switch OFF.

2. Disconnect turbocharger boost sensor harness connector.

3. Check resistance between turbocharger boost sensor terminals as follows.

INFOID:000000007577060

P0097, P0098 IAT SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

Turbocharge	er boost sensor			
+	-	Co	ndition	Resistance (k Ω)
Ter	minals			
3	4	Temperature [°C (°F)] 25 (77)	1.80 – 2.20
	ction result nor			
	INSPECTION		/ ·// ·	
NO >>	<u>"Exploded Vie</u>	ocnarger boost	sensor (with in	take air temperatur

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P0101 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0101 MAF SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0101 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0101	MAF SEN/CIRCUIT-B1 [Mass air flow (MAF) sensor cir- cuit range/performance]	 A high voltage from the sensor is sent to ECM under light load driving condition. A low voltage from the sensor is sent to ECM under heavy load driving condition. 	 Harness or connectors (MAF sensor circuit is open or short- ed.) Intake air leaks MAF sensor EVAP control system pressure sensor Intake air temperature 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.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and warm it up to normal operating temperature.
- 2. Drive the vehicle for at least 5 seconds under the following conditions: CAUTION:

Always drive vehicle at safe speed.

Selector lever	Suitable position
Vehicle speed	40 km/h (25 MPH) or more

NOTE:

- The gear must be fixed while driving the vehicle.
- Keep the accelerator pedal as steady as possible during cruising.

Check 1st trip DTC.

Is 1st trip DTC detected?

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

Diagnosis Procedure

1.CHECK INTAKE SYSTEM

Check the following for connection.

- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

Is the inspection result normal?

YES >> GO TO 2.

2.CHECK MASS AIR FLOW (MAF) SENSOR POWER SUPPLY

EC-194

INFOID-000000007577062

INFOID:000000007577061

P0101 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch OFF.

- 2. Disconnect MAF sensor harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between MAF sensor harness connector and ground.

	+		
MAF	sensor	_	Voltage
Connector	Terminal		
F4	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. CHECK MASS AIR FLOW (MAF) SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector.

3. Check the continuity between MAF sensor harness connector and IPDM E/R harness connector.

-	÷	-	_	
MAF	sensor	IPDN	/I E/R	Continuity
 Connector	Terminal	Connector	Terminal	
F4	5	E14	35	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.

4.CHECK MAF SENSOR GROUND 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	
-	F4	4	F25	9	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.

 ${f 5.}$ CHECK MAF SENSOR INPUT SIGNAL CIRCUIT

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

+				
MAF	sensor	ECM		Continuity
Connector	Terminal	Connector Terminal		
F4	3	F25 13		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

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< DTC/CIRCUIT DIAGNOSIS >

6.CHECK INTAKE AIR TEMPERATURE SENSOR 1

Check the intake air temperature sensor 1. Refer to EC-207. "Component Inspection".

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Replace MAF sensor (with intake air temperature sensor 1). Refer to EM-25. "Exploded View".

7.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to <u>EC-341, "Component Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-26, "2WD : Exploded View"</u>.

8.CHECK MAF SENSOR

Check the MAF sensor. Refer to EC-196. "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".

NO >> Replace MAF sensor. Refer to EM-25, "Exploded View".

Component Inspection

1.CHECK MASS AIR FLOW SENSOR-I

With CONSULT

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

Monitor item	Condition	MAS A/F SE-B1
	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temper- ature.)	0.9 - 1.2 V
MAS A/F SE-BT	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.0 V
	Idle to about 4,000 rpm	0.9 - 1.2 V to Approx. 2.4 V*

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

Without CONSULT

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

	ECM			
Connector	+	_	Condition	Voltage
Connector	Terminal			
			Ignition switch ON (Engine stopped.)	Approx. 0.4 V
F25	13	9	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2 V
FZJ			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.0 V
			Idle to about 4,000 rpm	0.9 - 1.2 V to Ap- prox. 2.4 V*

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P0101 MAF SENSOR

FR /	104		DT	ъ.
- I IV	181	nIJ	DT	
L		~	-	а.

DTC/CIRCU	IT DIAGNOSIS	S >				[MR16DDT]	
*: Check for I	inear voltage rise ir	n response to eng	ine being increased to	o about 4,000 rpm.			
	n result normal						А
	SPECTION EN D TO 2.	D					
		OF UNEVEN	AIR FLOW THRO	OUGH MASS A	IR FLOW SENSO	DR	EC
	on switch OFF.						
Crushed a			hrough mass air f nt	low sensor. Re	fer to the following	g.	С
Uneven di	rt of air cleaner	element					D
• •	n result normal	-	in parts				L
YES >> GO	D TO 4.	_					
•	D TO 3.						E
CHECK MA	SS AIR FLOW	SENSOR-II					
With CONSU	JLT eplace malfunc	tioning port					F
			perating temperat	ure.			
			ONITOR" mode o	of "ENGINE".			(
. Select "MA	\S A/F SE-B1" a	and check indi	cation.				
Monitor item		Condition		MAS A/	F SE-B1		
Monitor item	Ignition switch O	Condition N (Engine stopped	d.)		F SE-B1 k. 0.4 V		ŀ
	_	N (Engine stoppe	d.) al operating temper-	Approx			ŀ
Monitor item	Idle (Engine is wa ature.)	N (Engine stopper armed-up to norm		Appro: 0.9 -	x. 0.4 V		ŀ
	Idle (Engine is wa ature.) 2,500 rpm (Engir	N (Engine stopped armed-up to norm ne is warmed-up to	al operating temper-	Appro: 0.9 - 1.5 -	k. 0.4 V 1.2 V		ŀ
MAS A/F SE-B1 *: Check for I	Idle (Engine is wa ature.) 2,500 rpm (Engir temperature.) Idle to about 4,00 inear voltage rise in	N (Engine stopped armed-up to norm ne is warmed-up to 00 rpm	al operating temper-	Appro: 0.9 - 1.5 - 0.9 - 1.2 V to	<. 0.4 V 1.2 V 2.0 V Approx. 2.4 V*		
MAS A/F SE-B1 *: Check for I Without CON . Repair or r . Start engin	Idle (Engine is wa ature.) 2,500 rpm (Engir temperature.) Idle to about 4,00 inear voltage rise ir NSULT eplace malfunctie and warm it u	N (Engine stopped armed-up to norm ne is warmed-up to 00 rpm n response to eng tioning part. up to normal op	al operating temper- o normal operating	Appro: 0.9 - 1.5 - 0.9 - 1.2 V to o about 4,000 rpm. ure.	<. 0.4 V 1.2 V 2.0 V Approx. 2.4 V*		
MAS A/F SE-B1 *: Check for I Without CON . Repair or r . Start engin	Idle (Engine is wa ature.) 2,500 rpm (Engir temperature.) Idle to about 4,00 inear voltage rise ir NSULT eplace malfunctie and warm it u	N (Engine stopped armed-up to norm ne is warmed-up to 00 rpm n response to eng tioning part. up to normal op	al operating temper- o normal operating ine being increased to perating temperat	Appro: 0.9 - 1.5 - 0.9 - 1.2 V to o about 4,000 rpm. ure.	<. 0.4 V 1.2 V 2.0 V Approx. 2.4 V*		H J L
MAS A/F SE-B1 *: Check for I Without COI . Repair or r . Start engin . Check the	Idle (Engine is wa ature.) 2,500 rpm (Engir temperature.) Idle to about 4,00 inear voltage rise ir NSULT eplace malfunc ine and warm it u voltage betwee	N (Engine stopped armed-up to norm ne is warmed-up to 00 rpm n response to eng tioning part. up to normal op	al operating temper- o normal operating ine being increased to perating temperat	Appro: 0.9 - 1.5 - 0.9 - 1.2 V to o about 4,000 rpm. ure. ground.	<. 0.4 V 1.2 V 2.0 V Approx. 2.4 V*		
MAS A/F SE-B1 *: Check for I Without CON . Repair or r . Start engin	Idle (Engine is wa ature.) 2,500 rpm (Engir temperature.) Idle to about 4,00 inear voltage rise ir NSULT eplace malfunc te and warm it u voltage betwee ECM +	N (Engine stopped armed-up to norm ne is warmed-up to 00 rpm n response to eng tioning part. up to normal op	al operating temper- o normal operating ine being increased to perating temperat as connector and	Appro: 0.9 - 1.5 - 0.9 - 1.2 V to o about 4,000 rpm. ure. ground.	<. 0.4 V 1.2 V 2.0 V Approx. 2.4 V*		
MAS A/F SE-B1 *: Check for I Without COI . Repair or r . Start engin . Check the	Idle (Engine is wa ature.) 2,500 rpm (Engir temperature.) Idle to about 4,00 inear voltage rise ir NSULT eplace malfunc te and warm it u voltage betwee ECM +	N (Engine stopped armed-up to norm he is warmed-up to 00 rpm h response to eng tioning part. up to normal op in ECM harnes	al operating temper- o normal operating ine being increased to perating temperat as connector and	Appro: 0.9 - 1.5 - 0.9 - 1.2 V to o about 4,000 rpm. ure. ground.	<. 0.4 V 1.2 V 2.0 V Approx. 2.4 V*		ŀ
MAS A/F SE-B1 *: Check for I Without CON Repair or r Start engin Check the Connector	Idle (Engine is wa ature.) 2,500 rpm (Engir temperature.) Idle to about 4,00 inear voltage rise ir NSULT replace malfunc re and warm it u voltage betwee ECM + Ter	N (Engine stopper armed-up to norm he is warmed-up to 20 rpm n response to eng tioning part. up to normal op en ECM harnes 	al operating temper- o normal operating ine being increased to perating temperat as connector and Conc Ignition switch ON	Appro: 0.9 - 1.5 - 0.9 - 1.2 V to o about 4,000 rpm. ure. ground. dition	<. 0.4 V 1.2 V 2.0 V Approx. 2.4 V* Voltage		ŀ
MAS A/F SE-B1 *: Check for I Without COI . Repair or r . Start engin . Check the	Idle (Engine is wa ature.) 2,500 rpm (Engir temperature.) Idle to about 4,00 inear voltage rise ir NSULT eplace malfunc te and warm it u voltage betwee ECM +	N (Engine stopped armed-up to norm he is warmed-up to 00 rpm h response to eng tioning part. up to normal op in ECM harnes	al operating temper- o normal operating ine being increased to berating temperat is connector and Conc lgnition switch ON stopped.) Idle (Engine is war	Approx 0.9 - 1.5 - 0.9 - 1.2 V to o about 4,000 rpm. ure. ground. dition l (Engine med-up to normal ature.) e is warmed-up to	<. 0.4 V 1.2 V 2.0 V Approx. 2.4 V* Voltage Approx. 0.4 V		

Is the inspection result normal?

YES >> INSPECTION END

4. CHECK MASS AIR FLOW SENSOR-III

With CONSULT

1. Turn ignition switch OFF.

P0101 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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

Monitor item	Condition	MAS A/F SE-B1
	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temper- ature.)	0.9 - 1.2 V
MAS AF SE-DI	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.0 V
	Idle to about 4,000 rpm	0.9 - 1.2 V to Approx. 2.4 V*

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

Without CONSULT

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

	ECM			
Connector	+	_	Condition	Voltage
Connector	Terr	minal		
			Ignition switch ON (Engine stopped.)	Approx. 0.4 V
F25	13	9	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2 V
F23	15	9	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.0 V
			Idle to about 4,000 rpm	0.9 - 1.2 V to Ap- prox. 2.4 V*

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Clean or replace mass air flow sensor. Refer to EM-25, "Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

P0102, P0103 MAF SENSOR

DTC Logic

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[MR16DDT]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0102	MAF SEN/CIRCUIT-B1 (Mass air flow sensor circuit low input)	An excessively low voltage from the 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
P0103	MAF SEN/CIRCUIT-B1 (Mass air flow sensor 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
	NFIRMATION PROCE	DURE	
1.PREC	ONDITIONING		
before co 1. Turn 2. Turn 3. Turn	nducting the next test. ignition switch OFF and ignition switch ON.	has been previously conducted, alwa wait at least 10 seconds. wait at least 10 seconds.	iys perform the following procedure
P0102 :	>> GO TO 2.		
~	>> GO TO 3.		
		ON PROCEDURE FOR DTC P0102	
	engine and wait at least k DTC.	5 seconds.	
<u>Is DTC de</u>			
	> Proceed to <u>EC-199, "</u> >> INSPECTION END	Diagnosis Procedure".	
^		ON PROCEDURE FOR DTC P0103-I	
	ignition switch ON and w k DTC.	vait at least 5 seconds.	
<u>Is DTC de</u>			
	>> Proceed to <u>EC-199, "I</u> >> GO TO 4.	Diagnosis Procedure".	
		ON PROCEDURE FOR DTC P0103-II	
	engine and wait at least k DTC.	5 seconds.	
Is DTC de			
	>> Proceed to <u>EC-199, "I</u> >> INSPECTION END	<u>Diagnosis Procedure"</u> .	
	sis Procedure		INFOID:000000007577065
	CTION START		
	he detected DTC.		
	<u>C is detected?</u>		
P0102 :	>> GO TO 2.		

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P0103 >> GO TO 3.

EC

< DTC/CIRCUIT DIAGNOSIS >

2. CHECK INTAKE SYSTEM

Check the following for connection.

- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold

Is the inspection result normal?

YES >> GO TO 3.

NO >> Reconnect the parts. Refer to EM-25, "Exploded View".

3.CHECK MAF SENSOR POWER SUPPLY

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

-	+		
MAF	sensor	_	Voltage
Connector	Terminal	*	
F4	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.CHECK MAF SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector.
- 3. Check the continuity between MAF sensor harness connector and IPDM E/R harness connector.

+				
MAF	sensor	IPDN	M E/R	Continuity
Connector	Terminal	Connector	Terminal	
F4	5	E14	35	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 MAF SENSOR GROUND 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	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F4	4	F25	9	Existed

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK MAF SENSOR INPUT SIGNAL CIRCUIT

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

EC-200

< DTC/CIRCUIT DIAGNOSIS >

+			_				
MAF set	nsor	E	СМ	Continuity			
Connector	Terminal	Connector	Terminal				
F4	3	F25	13	Existed			
. Also chec		-	ground and	to power.			
the inspection		ormal?					
	O TO 7. epair open	circuit or sh	ort to arour	nd or short to r	oower in harnes	ss or connectors.	
.CHECK MA	• •		0				
heck the MA	F sensor.	Refer to EC-	196, "Com	ponent Inspec	tion".		
s the inspection							
					mittent Incident		
			ensor. Refe	r to <u>EM-25, "E</u>	Exploded View".		
Componen	t Inspec	tion					INFOID:000000007577066
CHECK MA	ASS AIR F	LOW SENS	OR-I				
_							
With CONS . Turn igniti		OFF.					
. Reconnec	t all harne	ss connecto					
. Start engil . Connect C	ne and wa	rm it up to no and select "l	ormal opera	ating temperat	ure. of "ENGINE"		
		-B1" and ch					
Monitor item		Co	ondition		MAS A/	F SE-B1	
	Ignition sv	vitch ON (Engir	ne stopped.)		Approx	x. 0.4 V	
	Idle (Engi ature.)	ne is warmed-u	p to normal op	perating temper-	0.9 -	1.2 V	
MAS A/F SE-B1	,	n (Engine is wai	rmed-up to no	rmal operating			
	temperatu		•		1.5 -	2.0 V	
	Idle to ab	out 4,000 rpm			0.9 - 1.2 V to	Approx. 2.4 V*	
	-	e rise in respon	se to engine b	being increased to	o about 4,000 rpm.		
Without CO . Turn igniti		OFF					
		ss connecto	rs disconne	cted.			
				ating temperat			
. Check the	vollage b		i namess c	onnector and	grouna.		
	EC	Л					
	+		_	Cond	dition	Voltage	
Connector		Terminal					
			1	gnition switch ON	I (Engine	Approx. 0.4 V	
				stopped.)		7, pp107. 0.4 V	
		1		dle (Engine is war	rmed-up to normal	00 101/	
						0.9 - 1.2 V	
F25	13		9	operating tempera	ature.)		
F25	13		9	operating tempera	ature.) e is warmed-up to	0.9 - 1.2 V 1.5 - 2.0 V	
F25	13		9 2 r	operating tempera 2,500 rpm (Engine	ature.) e is warmed-up to temperature.)		

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

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

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

2. Check for the cause of uneven air flow through mass air flow sensor

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK MASS AIR FLOW SENSOR-II

()With CONSULT

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

Monitor item	Condition	MAS A/F SE-B1
	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temper- ature.)	0.9 - 1.2 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.0 V
	Idle to about 4,000 rpm	0.9 - 1.2 V to Approx. 2.4 V*

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

Without CONSULT

- 1. Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Check the voltage between ECM harness connector and ground.

	ECM			
Connector	+	_	Condition	Voltage
Connector	Terr	minal		
			Ignition switch ON (Engine stopped.)	Approx. 0.4 V
F25	13	9	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2 V
125	15	9	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.0 V
			Idle to about 4,000 rpm	0.9 - 1.2 V to Ap- prox. 2.4 V*

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4.CHECK MASS AIR FLOW SENSOR-III

()With CONSULT

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

EC-202

< DTC/CIRCUIT DIAGNOSIS >

- 4. Connect CONSULT and select "DATA MONITOR" mode of "ENGINE".
- 5. Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	MAS A/F SE-B1
	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temper- ature.)	0.9 - 1.2 V
MAS AF SE-BI	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.0 V
	Idle to about 4,000 rpm	0.9 - 1.2 V to Approx. 2.4 V*

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

- Without CONSULT
- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Check the voltage between ECM harness connector and ground.

	ECM			
Connector	+	-	Condition	Voltage
Connector	Connector Terminal			
			Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	13	0	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2 V
F25	15	9	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.0 V
			Idle to about 4,000 rpm	0.9 - 1.2 V to Ap- prox. 2.4 V*

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Clean or replace mass air flow sensor. Refer to EM-25, "Exploded View".

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[MR16DDT]

P0111 IAT SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

P0111 IAT SENSOR 1

DTC Logic

INFOID:000000007577067

[MR16DDT]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0111	IAT SENSOR 1 B1 [Intake air temperature (IAT) sensor 1 circuit range/perfor- mance]	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor 1, IAT sensor 2, ECT sensor, FTT sensor, and EOT sensor) shows that the volt- age signal of the IAT sensor 1 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 1 circuit) IAT sensor 1

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-205, "Component Function Check".

NOTE:

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

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to EC-205, "Diagnosis Procedure".

3.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 60 minutes.
- 2. Move the vehicle to a cool place.
- NOTE:
- Cool the vehicle in an environment of ambient air temperature between –10°C (14°F) and 35°C (95°F).
- 3. Turn ignition switch OFF and soak the vehicle for 12 hours. CAUTION:

Never turn ignition switch ON during soaking. NOTE:

The vehicle must be cooled with the food open.

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

Never turn ignition switch OFF during idling.

P0111 IAT SENSOR 1

	FUI		INJUK I		
< DTC/CIRCUIT DIAC	GNOSIS >			[MR16DDT]	
5. Check 1st trip DTC).				
Is 1st trip DTC detecte	<u>d?</u>				А
YES >> Proceed to NO >> INSPECTI	O <u>EC-205, "Diagnosis P</u> ON END	rocedure".			
Component Funct	tion Check			INFOID:00000007577068	EC
1. CHECK INTAKE AI	R TEMPERATURE (IAT) SENSOR	1		C
	h OFF. air flow sensor harness between mass air flow s		nals as follows.		D
Mass air flow sensor					
+ –	Condition		Resistance (k Ω)		Е
Terminal					
1 2	Temperature [°C (°F)]	25 (77)	1.800 - 2.200		
Is the inspection result	normal?				F
	ermittent incident. Refer		ntermittent Incident".		
NO >> Proceed to	D <u>EC-205, "Diagnosis P</u>	rocedure".			G
Diagnosis Proced	ure			INFOID:00000007577069	
1.CHECK INTAKE AI	R TEMPERATURE (IAT) SENSOR	1		Н
Check intake air tempe	erature sensor 1. Refer	to <u>EC-205,</u> "(Component Inspecti	on".	
Is the inspection result	normal?				
	ermittent incident. Refer nass air flow sensor (wi			r 1). Refer to <u>EM-25, "Exploded</u>	I
Component Inspe	ction				J
Component inspe	CION			INFOID:00000007577070	
1.CHECK INTAKE AI	R TEMPERATURE SEN	NSOR 1			К
1. Turn ignition switch					
	air flow sensor harness between mass air flow s		nals as per the follo	wing	
					L
Mass air flow sensor					
+ –	Condition	Resistar	nce (kΩ)		M
Terminals					
1 2 T	emperature [°C (°F)] 25	(77) 1.800 ·	- 2.200		
Is the inspection result	normal?				Ν
YES >> INSPECTI					
NO >> Replace m <u>View"</u> .	nass air flow sensor (wi	th intake air	temperature senso	r 1). Refer to <u>EM-25, "Exploded</u>	0
					Ρ

P0112, P0113 IAT SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

P0112, P0113 IAT SENSOR 1

DTC Logic

INFOID:000000007577071

[MR16DDT]

DTC DETECTION LOGIC

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

>> 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-206, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007577072

1.CHECK INTAKE AIR TEMPERATURE SENSOR 1 POWER SUPPLY

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

	+) (alta ma
MAF	sensor	_	Voltage (Approx.)
Connector	Terminal		
F4	2	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK INTAKE AIR TEMPERATURE SENSOR 1 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.

EC-206

P0112, P0113 IAT SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

	+	_			
MAF	sensor	EC	M	Continuity	
Connector	Terminal	Connector	Terminal	,	
F4	2	F25	17	Existed	
. Also che	eck harness	for short to g	round.		
•	ction result r				
		trouble diagn		er supply circ	
-	•	•	•	».)r 1 grouni	
			JKL SLNSC		
	ition switch ect ECM ha	OFF. Iness connec	tor.		
				ensor harness	onnector and ECM harness connector.
	+ sensor	EC	· ΝΛ	Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
F4	1	F25	9	Existed	
	-	for short to p	-		
ls the inspec		-	0101.		
•	GO TO 4.				
		place error-de	etected parts	S.	
4. снеск і	NTAKE AIR	TEMPERATU	JRE SENSC)R 1	
Check the in	take air tem	perature sens	sor 1. Refer	to <u>EC-207, "C</u>	nponent Inspection".
Is the inspec	ction result r	ormal?			
				<u>GI-43, "Interm</u>	
	Replace ma View".	iss air flow se	ensor (with ir	ntake air temp	ature sensor 1). Refer to EM-25. "Exploded
Compone		tion			
Jompone	in inspec	lion			INFOID:0000000757707.
1.снеск і	NTAKE AIR	TEMPERATI	JRE SENSC)R 1	
	ition switch				
2. Disconn	iect mass ai	r flow sensor			
3. Check r	esistance be	etween mass	air flow sens	sor terminals a	per the following.
	v sensor				
Mass air flov	_	Conditi	on	Resistance (kg	
Mass air flov +		••••••			
+	als				
		nperature [°C (°F	F)] 25 (77)	1.800 - 2.200	
+ Termina 1	2 Ter	nperature [°C (°F	F)] 25 (77)	1.800 - 2.200	
+ Termina 1 Is the inspec	2 Ter	ormal?	F)] 25 (77)	1.800 - 2.200	
+ Termina 1 Is the inspec YES >>	2 Ter ction result r INSPECTIC	ormal? N END			ature sensor 1). Refer to <u>EM-25, "Exploded</u>
+ Termina 1 Is the inspec YES >> NO >>	2 Ter ction result r INSPECTIC	ormal? N END			ature sensor 1). Refer to <u>EM-25, "Exploded</u>

P0116 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0116 ECT SENSOR

DTC Logic

INFOID:000000007577074

[MR16DDT]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0116	ECT SEN/CIRC [Engine coolant temperature (ECT) sensor circuit range/per- formance]	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor 1, IAT sensor 2, ECT sensor, FTT sensor, and EOT sensor) shows that the volt- age 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-209, "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-209, "Diagnosis Procedure".

3.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 60 minutes.
- 2. Move the vehicle to a cool place.
- NOTE:

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

3. Turn ignition switch OFF and soak the vehicle for 12 hours. CAUTION:

Never turn ignition switch ON during soaking. NOTE:

The vehicle must be cooled with the food open.

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

Never turn ignition switch OFF during idling.

DTC/CI	IRCUIT I	DIAGNOSIS >			[MR16DDT]
5. Chec	k 1st trip	DTC.			
s 1st trip	DTC det	ected?			
YES >	>> Proce	ed to <u>EC-209, "Diac</u>	nosis Proce	edure".	
NO >	>> INSPE	ECTION END			
Compor	nent Fu	unction Check			INFOID:00000007577075
.CHEC	K ENGIN	IE COOLANT TEMI	PERATURE	(ECT) SENSOR	
		witch OFF.			
		CT sensor harness of sensor. Refer to <u>CC</u>		ded View".	
. Chec	k resista	ince between ECT	sensor ter		9
with h	hot water	as shown in the fig	ure.		
- - - - - - - - - -		1			sa ≤ 5 T m n n n n n n n n n n n n n n n n n n
	sensor				
+	-	Conditior	ו	Resistance (k Ω)	
ierm	ninal		20 (69)	2.27 2.62	
1	2	Temperature [°C	20 (68) 50 (122)	2.37 – 2.63	
•	2	(°F)]	90 (194)	0.236 - 0.260	
			90 (194)	0.230 - 0.200	
YES > NO >	>> Check	esult normal? intermittent incider ed to <u>EC-209, "Diac</u> cedure	nt. Refer to <u>(</u>		JMBIA0080ZZ t Incident".
YES NO Diagnos	>> Check >> Proce sis Proc	t intermittent incider ed to <u>EC-209, "Diac</u>	nt. Refer to <u>(</u> gnosis Proce	<u>edure"</u> .	t Incident".
YES NO Diagnos	>> Check >> Proce sis Proc	k intermittent incider ed to <u>EC-209, "Diac</u> Cedure IE COOLANT TEMI	nt. Refer to <u>(</u> gnosis Proce PERATURE	edure". (ECT) SENSOR	t Incident".
YES > NO > Diagnos .CHECI	>> Check >> Proce sis Proce K ENGIN CT senso	c intermittent incider ed to <u>EC-209, "Diac</u> Cedure	nt. Refer to <u>(</u> gnosis Proce PERATURE	edure". (ECT) SENSOR	t Incident".
YES > NO > Diagnos .CHECI Check EC s the insp YES >	>> Check >> Proce sis Proce K ENGIN CT senso pection re >> Check	c intermittent incider ed to <u>EC-209, "Diac</u> Cedure IE COOLANT TEMI r. Refer to <u>EC-209,</u> esult normal? c intermittent incider	nt. Refer to <u>(</u> gnosis Proce PERATURE "Componen nt. Refer to <u>(</u>	edure". (ECT) SENSOR <u>t Inspection"</u> . GI-43, "Intermittent	t Incident".
YES > NO > Diagnos .CHECI Check EC s the insp YES >	>> Check >> Proce sis Proce K ENGIN CT senso pection re >> Check	c intermittent incider ed to <u>EC-209, "Diac</u> Cedure IE COOLANT TEMI r. Refer to <u>EC-209,</u> esult normal?	nt. Refer to <u>(</u> gnosis Proce PERATURE "Componen nt. Refer to <u>(</u>	edure". (ECT) SENSOR <u>t Inspection"</u> . GI-43, "Intermittent	t Incident".
YES > NO > Diagnos .CHECI Check EC s the insp YES > NO >	>> Check >> Proce sis Proce K ENGIN CT senso pection re >> Check >> Repla	c intermittent incider ed to <u>EC-209, "Diac</u> Cedure IE COOLANT TEMI r. Refer to <u>EC-209,</u> esult normal? c intermittent incider	nt. Refer to <u>(</u> gnosis Proce PERATURE "Componen nt. Refer to <u>(</u>	edure". (ECT) SENSOR <u>t Inspection"</u> . GI-43, "Intermittent	t Incident".
YES > NO > Diagnos .CHECI check EC s the insp YES > NO > Compor	>> Check >> Proce sis Proce K ENGIN CT senso pection re >> Check >> Repla nent In	c intermittent incider ed to <u>EC-209, "Diac</u> Cedure IE COOLANT TEMI r. Refer to <u>EC-209,</u> <u>esult normal?</u> c intermittent incider ce ECT sensor. Ref spection	nt. Refer to <u>(</u> gnosis Proce PERATURE "Componen nt. Refer to <u>(</u> fer to <u>CO-23</u>	edure". (ECT) SENSOR <u>t Inspection"</u> . GI-43. "Intermittent , "Exploded View".	<u>t Incident"</u> . INFOID:00000007577076
YES > NO > Diagnos .CHECI Check EC s the insp YES > NO > Compor	>> Check >> Proce sis Proce K ENGIN CT senso pection re >> Check >> Repla nent In K ENGIN	c intermittent incider ed to <u>EC-209, "Diac</u> Cedure IE COOLANT TEMI r. Refer to <u>EC-209,</u> <u>esult normal?</u> c intermittent incider ce ECT sensor. Ref Spection IE COOLANT TEMI	nt. Refer to <u>(</u> gnosis Proce PERATURE "Componen nt. Refer to <u>(</u> fer to <u>CO-23</u>	edure". (ECT) SENSOR <u>t Inspection"</u> . GI-43. "Intermittent , "Exploded View".	<u>t Incident"</u> . INFOID:00000007577076
YES > NO > Diagnos .CHECI Check EC s the insp YES > NO > Compor .CHECI	>> Check >> Proce sis Proce K ENGIN CT senso pection re >> Check >> Repla nent In K ENGIN ignition s	c intermittent incider ed to <u>EC-209, "Diac</u> Cedure IE COOLANT TEMI r. Refer to <u>EC-209, esult normal?</u> c intermittent incider ce ECT sensor. Ref Spection IE COOLANT TEMI witch OFF.	nt. Refer to <u>(</u> perature) PERATURE "Componen nt. Refer to <u>(</u> fer to <u>CO-23</u> PERATURE	edure". (ECT) SENSOR <u>t Inspection"</u> . GI-43. "Intermittent , "Exploded View".	<u>t Incident"</u> . INFOID:00000007577076
YES > NO > Diagnos .CHECI Check EC s the insp YES > NO > COMPOR .CHECI . Turn i . Disco . Remo	>> Check >> Proce sis Proce K ENGIN CT senso pection re >> Check >> Repla nent In K ENGIN ignition s onnect EC ove ECT	intermittent incider ed to <u>EC-209, "Diac</u> Cedure IE COOLANT TEMI r. Refer to <u>EC-209,</u> <u>esult normal?</u> intermittent incider ce ECT sensor. Ref spection IE COOLANT TEMI witch OFF. CT sensor harness of sensor.	nt. Refer to <u>c</u> perature "Componen nt. Refer to <u>c</u> fer to <u>CO-23</u> PERATURE connector.	edure". (ECT) SENSOR <u>t Inspection"</u> . <u>GI-43. "Intermittent</u> , "Exploded View". (ECT) SENSOR	<u>t Incident"</u> . <u>INFOID:000000007577076</u> <u>t Incident"</u> .
YES > NO > Diagnos .CHECl Check EC s the insp YES > NO > COMPOR .CHECl . Turn i . Disco . Remo . Check	>> Check >> Proce sis Proce K ENGIN CT senso pection re >> Check >> Repla nent In K ENGIN ignition s ponnect EC ove ECT k resista	intermittent incider ed to <u>EC-209, "Diac</u> Cedure IE COOLANT TEMI r. Refer to <u>EC-209,</u> <u>esult normal?</u> intermittent incider ce ECT sensor. Ref Spection IE COOLANT TEMI witch OFF. CT sensor harness of sensor. unce between ECT	nt. Refer to <u>Consis Proce</u> PERATURE "Componen nt. Refer to <u>Co-23</u> PERATURE connector.	edure". (ECT) SENSOR <u>t Inspection"</u> . <u>GI-43. "Intermittent</u> , "Exploded View". (ECT) SENSOR	<u>t Incident"</u> . <u>INFOID:000000007577076</u> <u>t Incident"</u> .
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YES > NO > Diagnos .CHECI Check EC s the insp YES > NO > Compor .CHECI . Turn i . Disco . Remo . Check with h	>> Check >> Proce sis Proce K ENGIN CT senso pection re >> Check >> Repla nent In K ENGIN ignition s ponnect EC ove ECT ck resista hot water	intermittent incider ed to <u>EC-209, "Diac</u> Cedure IE COOLANT TEMI r. Refer to <u>EC-209,</u> <u>esult normal?</u> intermittent incider ce ECT sensor. Ref Spection IE COOLANT TEMI witch OFF. CT sensor harness of sensor. unce between ECT	nt. Refer to <u>Conosis Proce</u> PERATURE <u>"Componen</u> nt. Refer to <u>CO-23</u> PERATURE connector. sensor ter ure.	edure". (ECT) SENSOR t Inspection". GI-43. "Intermittent . "Exploded View". (ECT) SENSOR minals by heating Resistance	<u>t Incident"</u> . <u>INFOID:000000007577076</u> <u>t Incident"</u> .
YES > NO > Diagnos .CHECI theck EC the insp YES > NO > COMPOR .CHECI . Turn i . Disco . Remo . Checl with h	>> Check >> Proce sis Proce K ENGIN CT senso pection re >> Check >> Repla nent In K ENGIN ignition s ponnect EC ove ECT ck resista hot water	A intermittent incider red to <u>EC-209, "Diac</u> Cedure IE COOLANT TEMI r. Refer to <u>EC-209,</u> <u>esult normal?</u> A intermittent incider CE ECT sensor. Ref Spection IE COOLANT TEMI witch OFF. CT sensor harness of sensor. ance between ECT as shown in the fig	nt. Refer to <u>Conosis Proce</u> PERATURE <u>"Componen</u> nt. Refer to <u>CO-23</u> PERATURE connector. sensor ter ure.	edure". (ECT) SENSOR <u>t Inspection"</u> . <u>GI-43. "Intermittent</u> . "Exploded View". (ECT) SENSOR minals by heating	<u>t Incident"</u> . <u>INFOID:000000007577076</u> <u>t Incident"</u> .
YES > NO > Diagnos .CHECI check EC s the insp YES > NO > COMPOR .CHECI . Turn i . Disco . Remo . Checl with h ECT s +	>> Check >> Proce sis Proce K ENGIN CT senso pection re >> Check >> Repla nent In K ENGIN ignition s ponnect EC ove ECT ck resista hot water	A intermittent incider red to <u>EC-209, "Diac</u> Cedure IE COOLANT TEMI r. Refer to <u>EC-209,</u> <u>esult normal?</u> A intermittent incider CE ECT sensor. Ref Spection IE COOLANT TEMI witch OFF. CT sensor harness of sensor. ance between ECT as shown in the fig	nt. Refer to <u>Conosis Proce</u> PERATURE <u>"Componen</u> nt. Refer to <u>CO-23</u> PERATURE connector. sensor ter ure.	edure". (ECT) SENSOR t Inspection". GI-43. "Intermittent . "Exploded View". (ECT) SENSOR minals by heating Resistance	<u>t Incident"</u> . <u>INFOID:000000007577076</u> <u>t Incident"</u> .
YES > NO > Diagnos CHECI Check EC s the insp YES > NO > Compor CHECI . Turn i . Disco . Remo . CHECI . Turn i . Disco . Remo . Chec . the chec	>> Check >> Proce sis Proce K ENGIN CT senso pection re >> Check >> Repla nent In K ENGIN ignition s ponnect EC ove ECT ck resista hot water	A intermittent incider red to <u>EC-209</u> , "Diac Cedure IE COOLANT TEMI r. Refer to <u>EC-209</u> , esult normal? A intermittent incider ce ECT sensor. Ref Spection IE COOLANT TEMI witch OFF. CT sensor harness of sensor. ance between ECT as shown in the fig	nt. Refer to (pnosis Proce PERATURE "Componen nt. Refer to (fer to <u>CO-23</u> PERATURE connector. sensor ter ure. ion 20 (68)	edure". (ECT) SENSOR t Inspection". GI-43, "Intermittent , "Exploded View". (ECT) SENSOR minals by heating Resistance (kΩ)	<u>t Incident"</u> . <u>INFOID:000000007577076</u> <u>t Incident"</u> .

P0116 ECT SENSOR

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor. Refer to EM-96, "Exploded View".

P0117, P0118 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0117, P0118 ECT SENSOR

DTC Logic

INFOID:000000007577078

[MR16DDT]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0117	ECT SEN/CIRC (Engine coolant tempera- ture sensor circuit low input)	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 circuit high in- put)	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-210, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007577079

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.

FCT	+ sensor	_	Voltage
Connector	Terminal		(Approx.)
F28	1	Ground	5 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 >

+									
		-							
ECT sens	sor	EC		Continuity					
	Terminal	Connector	Terminal						
F28	1	F25	14	Existed					
		for short to g	round.						
<u>the inspectio</u> YES >> Pe		<u>ormar?</u> trouble diagn	osis for nov	ver supply ci	cuit				
		place error-de			cun.				
3. CHECK ENG		OLANT TEM	PERATURE	SENSOR G	ROUND	CIRCL	ЛТ		
. Turn ignitio									
2. Disconnect	ECM ha	rness connec							
B. Check the	continuity	between EC	I sensor na	arness conne	ctor and	ECIMIN	arness co	nnector.	
+		_							
ECT sens	sor	EC	M	Continuity					
Connector	Terminal	Connector	Terminal						
F28	2	F25	10	Existed					
. Also check	harness	for short to g	round to po	wer.					
<u>s the inspectio</u>	<u>n result n</u>	ormal?							
) TO 4.								
NO >> Re	pair or re	place error-de	•						
NO >> Re LCHECK ENG	pair or re GINE CO	OLANT TEM	PERATURE	SENSOR					
NO >> Re CHECK ENC Check the engi	pair or re GINE CO ne coolar	OLANT TEM	PERATURE	SENSOR	<u>9. "Com</u>	ponent	Inspection	<u>ו"</u> .	
NO >> Re .CHECK ENG Check the enging the inspection	pair or re GINE CO ne coolar n result n	OLANT TEM	PERATURE e sensor. Re	E SENSOR efer to <u>EC-20</u>				<u>ז"</u> .	
NO >> Re CHECK ENC Check the enging the inspection YES >> Ch	pair or re GINE CO ne coolar <u>n result n</u> eck interr	OLANT TEM nt temperature ormal? nittent incider	PERATURE e sensor. Ro nt. Refer to	E SENSOR efer to <u>EC-20</u> <u>GI-43, "Interr</u>	nittent In	cident"			
NO >> Re CHECK ENC Check the enging the inspection YES >> Ch NO >> Re	pair or re GINE CO ne coolar <u>n result n</u> eck interr place eng	OLANT TEM nt temperature ormal? nittent incider gine coolant te	PERATURE e sensor. Ro nt. Refer to	E SENSOR efer to <u>EC-20</u> <u>GI-43, "Interr</u>	nittent In	cident"		<u>ew"</u> .	
NO >> Re CHECK ENG Check the engineration Sthe inspection YES >> Ch NO >> Re Component	pair or re GINE CO ne coolar <u>n result n</u> eck interr place eng Inspec	OLANT TEM nt temperature ormal? nittent incider gine coolant to tion	PERATURE e sensor. Re nt. Refer to emperature	ESENSOR efer to <u>EC-20</u> <u>GI-43, "Interr</u> sensor. Refe	nittent In er to <u>EM-</u>	cident"		<u>ew"</u> .	INFOID:00000000757
NO >> Re 1. CHECK ENG Check the enging <u>s the inspection</u> YES >> Ch	pair or re GINE CO ne coolar <u>n result n</u> eck interr place eng Inspec	OLANT TEM nt temperature ormal? nittent incider gine coolant to tion	PERATURE e sensor. Re nt. Refer to emperature	ESENSOR efer to <u>EC-20</u> <u>GI-43, "Interr</u> sensor. Refe	nittent In er to <u>EM-</u>	cident"		<u>ew"</u> .	INFOID:00000000757
NO >> Re 1. CHECK ENG Check the enging Sthe inspection YES >> Ch NO >> Re Component 1. CHECK ENG I. Turn ignition	pair or re GINE CO ne coolar <u>n result n</u> eck interr place eng Inspec GINE CO	OLANT TEM ormal? nittent incider gine coolant to tion OLANT TEM	PERATURE e sensor. Re nt. Refer to emperature PERATURE	ESENSOR efer to <u>EC-20</u> <u>GI-43, "Interr</u> sensor. Refe	nittent In er to <u>EM-</u>	cident"		<u>ew"</u> .	INFOID:00000000757
NO >> Re 1. CHECK ENG Check the enging s the inspection YES >> Ch NO >> Re Component 1. CHECK ENG 1. Turn ignition 2. Disconnect	pair or re GINE CO ne coolar <u>n result n</u> eck interr place eng Inspec GINE CO n switch of ECT ser	OLANT TEM ormal? nittent incider gine coolant to tion OLANT TEM OFF. nsor harness	PERATURE e sensor. Re nt. Refer to emperature PERATURE	ESENSOR efer to <u>EC-20</u> <u>GI-43, "Interr</u> sensor. Refe	nittent In er to <u>EM-</u>	cident"		<u>ew"</u> .	INFOID:00000000757
NO >> Re CHECK ENG Check the enginer Sthe inspection YES >> Ch NO >> Re Component CHECK ENG Turn ignition Disconnect Remove EG	pair or re GINE CO ne coolar neck interr place eng Inspec GINE CO st ECT ser CT senso	OLANT TEM ormal? nittent incider gine coolant to tion OLANT TEM OFF. nsor harness r.	PERATURE e sensor. Re nt. Refer to emperature PERATURE connector.	E SENSOR efer to <u>EC-20</u> <u>GI-43, "Interr</u> sensor. Refe	nittent In er to <u>EM-</u> SOR	cident"		<u>ew"</u> .	INFOID:00000000757
NO >> Re CHECK ENG Check the enginer Sthe inspection YES >> Check The inspection YES >> Check ENG COMPONENT CHECK ENG CHECK	pair or re GINE CO ne coolar <u>n result n</u> eck interr place eng Inspec GINE CO n switch of ECT ser CT senso istance b	OLANT TEM ormal? nittent incider gine coolant to tion OLANT TEM OFF. nsor harness	PERATURE e sensor. Re nt. Refer to emperature PERATURE connector.	E SENSOR efer to <u>EC-20</u> <u>GI-43, "Interr</u> sensor. Refe	nittent In er to <u>EM-</u> SOR	cident"		<u>ew"</u> .	INFOID:00000000757
NO >> Re CHECK ENG Check the enginer Sthe inspection YES >> Check The inspection YES >> Check ENG COMPONENT CHECK ENG CHECK	pair or re GINE CO ne coolar <u>n result n</u> eck interr place eng Inspec GINE CO n switch of ECT ser CT senso istance b	OLANT TEM ormal? nittent incider gine coolant to tion OLANT TEM OFF. nsor harness or.	PERATURE e sensor. Re nt. Refer to emperature PERATURE connector.	E SENSOR efer to <u>EC-20</u> <u>GI-43, "Interr</u> sensor. Refe	nittent In er to <u>EM-</u> SOR	cident"		<u>ew"</u> .	INFOID:00000000757
NO >> Re 1. CHECK ENG Check the enging s the inspection YES >> Check The second NO >> Re Component 1. CHECK ENG CHECK EN	pair or re GINE CO ne coolar <u>n result n</u> eck interr place eng Inspec GINE CO n switch of ECT ser CT senso istance b	OLANT TEM ormal? nittent incider gine coolant to tion OLANT TEM OFF. nsor harness or.	PERATURE e sensor. Re nt. Refer to emperature PERATURE connector.	E SENSOR efer to <u>EC-20</u> <u>GI-43, "Interr</u> sensor. Refe E (ECT) SENS rminals by h	nittent In er to EM-s SOR	cident"		<u>ew"</u> .	INFOID:00000000757
NO >> Re 1. CHECK ENG Check the enging sthe inspection YES >> Check in the second	pair or re GINE CO ne coolar <u>n result n</u> eck interr place eng Inspec GINE CO n switch of ECT ser CT senso istance b	OLANT TEM ormal? nittent incider gine coolant to tion OLANT TEM OFF. nsor harness or.	PERATURE e sensor. Re nt. Refer to emperature PERATURE connector. sensor te ure.	E SENSOR efer to <u>EC-20</u> <u>GI-43, "Interr</u> sensor. Refe	nittent In er to EM-s SOR	cident"		<u>ew"</u> .	INFOID:00000000757
NO >> Re 1 .CHECK ENG Check the enging s the inspection YES >> Check Test NO >> Re Component 1 .CHECK ENG CHECK ENG CHECK ENG CHECK Test NO Check Test with hot wat ECT sensor	pair or re GINE CO ne coolar <u>n result n</u> eck interr place eng Inspec GINE CO n switch of ECT ser CT senso istance b	OLANT TEM ot temperature ormal? nittent incider gine coolant to tion OLANT TEM OFF. osor harness r. petween ECT own in the fig	PERATURE e sensor. Re nt. Refer to emperature PERATURE connector. sensor te ure.	E SENSOR efer to <u>EC-20</u> <u>GI-43, "Interr</u> sensor. Refe E (ECT) SEN rminals by h Resista (kΩ)	nittent In or to EM-s SOR	cident"		<u>ew"</u> .	INFOID:0000000757
NO >> Re 1. CHECK ENG S the inspectio YES >> Ch NO >> Re Component 1. CHECK ENG 1. Turn ignitio 2. Disconnect 3. Remove EG 4. Check res with hot wa ECT sensor + Terminal	pair or re GINE CO ne coolar n result n eck interr place eng Inspec GINE CO stance b istance b istance b	OLANT TEM ormal? nittent incider gine coolant to tion OLANT TEM OFF. nsor harness r. between ECT own in the fig Condit	PERATURE e sensor. Re ent. Refer to emperature PERATURE connector. sensor te ure. 20 (68)	E SENSOR efer to <u>EC-20</u> <u>GI-43, "Interr</u> sensor. Refe E (ECT) SENS rminals by h Resista (kΩ) 2.37 - 2	nittent In er to EM-s SOR	cident"		<u>ew"</u> .	INFOID:00000000757
NO >> Re 1. CHECK ENG S the inspectio YES >> Ch NO >> Re Component 1. CHECK ENG 1. Turn ignitio 2. Disconnect 3. Remove EG 4. Check res with hot wa ECT sensor +	pair or re GINE CO ne coolar n result n eck interr place eng Inspec GINE CO stance b istance b istance b	OLANT TEM ot temperature ormal? nittent incider gine coolant to tion OLANT TEM OFF. osor harness r. petween ECT own in the fig	PERATURE e sensor. Re ent. Refer to emperature PERATURE connector. sensor te ure. 20 (68)	E SENSOR efer to EC-20 GI-43, "Interr sensor. Refe E (ECT) SENS rminals by h Resista (kΩ) 2.37 - 2 0.68 - 1	nittent In er to EM-s SOR neating	cident"		<u>ew"</u> .	INFOID:00000000757

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor. Refer to EM-96, "Exploded View".

P011C IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P011C IAT SENSOR

DTC Logic

DTC DETECTION LOGIC

INFOID:000000007577081

[MR16DDT]

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P011C	CAT/IAT CRRLTN B1 (Charge air temperature/Intake air temperature correlation)	 ECM detects a state that the temperature difference between intake air temperature sensor 1 and 2 remains 20°C (36°F) or less continuously for 5 seconds or more. ECM detects a state that the difference between the temperature of intake air temperature sensor 2 and its estimated temperature calculated by ECM from intake air temperature 1 and turbocharger boost sensor remains 106°C (191°F) or more continuously for 5 seconds or more. 	 Harness or connectors (High or low resistance in the intake air temperature sensor 1 circuit) (High or low resistance in the intake air temperature sensor 2 circuit) Intake air temperature sensor 1 Intake air temperature 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.

TEST 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 at least 5 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to <u>EC-212, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007577082

1.CHECK INTAKE AIR TEMPERATURE SENSOR 2

Check intake air temperature sensor 2. Refer to <u>EC-213</u>. "Component Inspection (Intake Air Temperature Sensor 2)".

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace turbocharger boost sensor (with intake air temperature sensor 2). Refer to <u>EM-30</u>, <u>"Exploded View"</u>.

2. CHECK INTAKE AIR TEMPERATURE SENSOR 1

Check intake air temperature sensor 1. Refer to <u>EC-213</u>, "Component Inspection (Intake Air Temperature Sensor 1)".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.
- NO >> Replace mass air flow sensor (with intake air temperature sensor 1). Refer to <u>EM-25</u>, "<u>Exploded</u> <u>View</u>".

<pre>P011C IA < DTC/CIRCUIT DIAGNOSIS ></pre>	T SENSOR [MR16DDT]	
Component Inspection (Intake Air Temper		
1. CHECK INTAKE AIR TEMPERATURE SENSOR 1		А
 Turn ignition switch OFF. Disconnect mass air flow sensor harness connect Check resistance between mass air flow sensor t 	stor.	EC
Mass air flow sensor 1 + – Condition Terminal	Resistance (kΩ)	C
1 2 Temperature [°C (°F)] 25 (77)	1.80 – 2.20	_
Is the inspection result normal? YES >> INSPECTION END NO >> Replace mass air flow sensor (with intake <u>View"</u> .	e air temperature sensor 1). Refer to EM-25. "Exploded	Е
Component Inspection (Intake Air Temper	rature Sensor 2) INFOID:00000007577084	F
1. CHECK INTAKE AIR TEMPERATURE SENSOR 2	2	G
 Turn ignition switch OFF. Disconnect turbocharger boost sensor harness co Check resistance between turbocharger boost se 		Н
Turbocharger boost sensor		
+ – Condition	Resistance (kΩ)	
3 4 Temperature [°C (°F)] 25 (77	7) 1.80 – 2.20	
Is the inspection result normal?	<u></u>	J
YES >> INSPECTION END NO >> Replace turbocharger boost sensor (wi <u>"Exploded View"</u> .	ith intake air temperature sensor 2). Refer to <u>EM-30,</u>	K
		L
		M
		Ν
		0
		Ρ

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-384, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0122	TP SEN 2/CIRC-B1 (Throttle position sensor 2 circuit low input)	An excessively low voltage from the TP sensor 2 is sent to ECM.	 Harness or connectors (TP sensor 2 circuit is open or shorted.)
P0123	TP SEN 2/CIRC-B1 (Throttle position sensor 2 circuit high input)	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 DTC.

Is DTC detected?

- YES >> Proceed to EC-214, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007577086

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 actuator		Voltage (Approx.)	
Connector	Terminal		× 11 - 7	
F29 1		Ground	5 V	

Is the inspection result normal?

YES >> GO TO 3.

2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

EC-214

INFOID:000000007577085

P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Turn ignition switch OFF.

- 1. Disconnect ECM harness connector. 2.
- Check the continuity between electric throttle control actuator harness connector and ECM harness con-3. nector.

	+	-			
Electric throttle control actuator		ECM		Continuity	
Connector	Connector Terminal		Terminal		
F29	1	F26	62	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.

${ m 3.}$ 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 con-3. nector.

	+			
	le control actu- tor	ECM		Continuity
Connector	Terminal	Connector Terminal		
F29	4	F26	74	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

${f 4.}$ CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT

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

	+			
	le control actu- tor	ECM		Continuity
Connector	Terminal	Connector Terminal		
F29	3	F26	76	Existed

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

<u>Is the ir</u>	nspection result nor	<u>mal?</u>
YES	>> GO TO 5.	

NO >> Repair or replace error-detected parts.

5. CHECK THROTTLE POSITION SENSOR

Check the throttle position sensor. Refer to EC-215, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".

>> Replace electric throttle control actuator. Refer to EM-27, "Exploded View". NO

Component Inspection

1.CHECK THROTTLE POSITION SENSOR

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P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform "Throttle Valve Closed Position Learning". Refer to EC-131, "Work Procedure".
- Turn ignition switch ON.
 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					
Connector	+	-	Condition		Voltage
Connector	Terminal				
	75	74	Accelerator pedal	Fully released	More than 0.36V
F26				Fully depressed	Less than 4.75V
Γ20	76			Fully released	Less than 4.75V
	70			Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to EM-27, "Exploded View".

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>208, "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-210, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0125	ECT SENSOR (Insufficient engine coolant temperature for closed loop fuel control)	 Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. Engine coolant temperature is insufficient for closed loop fuel control. 	 Harness or connectors (High resistance in the circuit) Engine coolant temperature sensor Thermostat
DTC CON	FIRMATION PROCE	DURE	
1.PRECO	NDITIONING		
before con 1. Turn ig 2. Turn ig 3. Turn ig	ducting the next test. Inition switch OFF and v Inition switch ON. Inition switch OFF and v	has been previously conducted, always vait at least 10 seconds. vait at least 10 seconds.	s perform the following procedure
•	> GO TO 2.		
Z.CHECK	ENGINE COOLANT TE	EMPERATURE SENSOR FUNCTION	
 Select Check With GS 	nition switch ON. "DATA MONITOR" mod that "COOLAN TEMP/S	e of "ENGINE" using CONSULT. s" is above 10°C (50°F). ULT" above.	
	<u>5°C (41°F)?</u>		
	> INSPECTION END > GO TO 3.		
	RM DTC CONFIRMATI	ON PROCEDURE	
	NSULT ngine and run it for 65 n 1st tip DTC.	ninutes at idle speed.	
If "COOLA	AN TEMP/S" indication he test result will be O	n increases to more than 10°C (50°F) K.	within 65 minutes, stop engine
	not to overheat engin	е.	
With GS Follow the	procedure "With CONS	ULT" above.	
<u>Is 1st trip D</u>	DTC detected?		
	Proceed to <u>EC-218, "E</u> INSPECTION END	Diagnosis Procedure".	

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EC

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INFOID:000000007577088

[MR16DDT]

P0125 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check the engine coolant temperature sensor. Refer to EC-218, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace engine coolant temperature sensor. Refer to <u>CO-23, "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-43, "Intermittent Incident"</u>.
- NO >> Repair or replace thermostat. Refer to CO-21, "Removal and Installation".

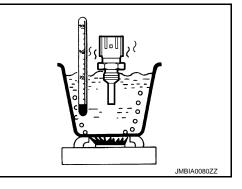
Component Inspection

INFOID:000000007577090

$1. \mathsf{CHECK} \text{ Engine coolant temperature (ect) sensor}$

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

ECT sensor + –		Condition		Resistance (kΩ)
			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>EM-96, "Exploded View"</u>.

INFOID:000000007577089

P0127 IAT SENSOR

DTC Logic

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EC

INFOID:000000007577091

[MR16DDT]

DTC DETECTION LOGIC

Trouble diagnosis na DTC No. (Trouble diagnosis co tent)		Possible cause
P0127 IAT SENSOR-B1 (Intake air temperatu 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 1 circuit is open or shorted) Intake air temperature sensor 1
DTC CONFIRMATION PRO	OCEDURE	
1.PRECONDITIONING		
before conducting the next tes	and wait at least 10 seconds.	ays perform the following procedure
This test may be conducted	with the drive wheels lifted in the shop , it is unnecessary to lift the vehicle.	or by driving the vehicle. If a road
>> GO TO 2.		
2.PERFORM DTC CONFIRM	IATION PROCEDURE	
 Turn ignition switch ON. Select "DATA MONITOR" 	emperature is less than 96°C (205°F) mode of "ENGINE" using CONSULT.	
 Check the engine coolant If the engine coolant tem engine. NOTE: 	temperature. perature is not less than 96°C (205°F), tur	n ignition switch OFF and cool down
Perform the following steps 2. Turn ignition switch ON. 3. Select "DATA MONITOR"	before engine coolant temperature is abov mode of "ENGINE" using CONSULT	e 96°C (205°F).
 Start engine. Hold vehicle speed at mo CAUTION: Always drive vehicle at 	re than 70 km/h (43 MPH) for 100 consecu a safe speed.	tive seconds.
6. Check 1st trip DTC.		
With GST Follow the procedure "With Colling to the pr	ONSULT" above.	
Is 1st trip DTC detected?		
YES >> Proceed to EC-21	9, "Diagnosis Procedure".	
NO >> INSPECTION EN	D	
NO >> INSPECTION EN	D	INFOID:00000007577092
		INFOID:000000007577092

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".

EC-219

P0127 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace mass air flow sensor (with intake air temperature sensor 1). Refer to <u>EM-25</u>, "<u>Exploded</u> <u>View</u>".

Component Inspection

INFOID:000000007577093

[MR16DDT]

1. CHECK INTAKE AIR TEMPERATURE SENSOR 1

1. Turn ignition switch OFF.

2. Disconnect mass air flow sensor harness connector.

3. Check resistance between mass air flow sensor terminals as per the following.

Mass air flow sensor + –		Condition		Resistance (kΩ)
1	2	Temperature [°C (°F)]	25 (77)	1.800 - 2.200

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace mass air flow sensor (with intake air temperature sensor 1). Refer to <u>EM-25, "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, P0304. Refer to <u>EC-297, "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.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0128	THERMSTAT FNCTN [Coolant thermostat (coolant temperature below thermosta regulating temperature)]	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	 Thermostat Leakage from sealing portion of thermostat Engine coolant temperature sensor
	NFIRMATION PROCEI	DURE	
NOTE:	ual bafara and during the	following proceedure	
4	uel before and during the ONDITIONING-I	Tollowing procedure.	
	nducting the next test.	as been previously conducted, always	s perform the following procedure
1. Turn	ignition switch OFF and w	vait at least 10 seconds.	
	ignition switch ON. ignition switch OFF and v	ait at least 10 seconds	
:	>> GO TO 2.		
2.prec	ONDITIONING-II		
) With C	ONSULT		
1. Turn	ignition switch ON.		
2. Chec	k the following conditions		
Ambient te	emperature	-10°C (14°F) or more	
A/C switch		OFF	
Blower far	n switch	OFF	
3. Selec	ct "DATA MONITOR" mod	e of "ENGINE" using CONSULT.	
4. Chec	k the following conditions		
COOLAN	TEMD/S	10°C 52°C (14 126°E)	
		–10°C – 52°C (14 – 126°F)	
	ndition satisfied? >> GO TO 3.		
	>> 1. Satisfy the condition	on.	
h	2. GO TO 3.		
5. PERF	ORM DTC CONFIRMATIO	DN PROCEDURE-I	
With C			
	engine. the vehicle until the follo	wing condition is satisfied.	
CAU	TION:	-	
	ys drive vehicle at safe	speed.	

STEP 1

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P0128 THERMOSTAT FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

Drive the vehicle under the conditions instructed below until the difference between "COOLAN TEMP/S" and "FUEL T/TMP SE" becomes at least 23°C (41°F).

COOLAN TEMP/S	65°C (149°F) or less
FUEL T/TMP SE	Less than the value calculated by sub- tracting 23°C (41°F) from "COOLAN TEMP/S".*

*.	
•	Example

COOLAN TEMP/S	FUEL T/TMP SE
70°C (158°F)	47°C (117°F) or less
65°C (149°F)	42°C (108°F) or less
60°C (140°F)	37°C (99°F) or less

STEP 2

Drive the vehicle at 50 km/h (32 MPH) or more with the difference between "COOLAN TEMP/S" and "FUEL T/TMP SE" maintained at 23°C (41°F) or more.

NOTE:

Keep the accelerator pedal as steady as possible during cruising.

STEP 3

Drive the vehicle at 50 km/h (32 MPH) or more until "COOLAN TEMP/S" increases by 6°C (11°F). **NOTE:**

Keep the accelerator pedal as steady as possible during cruising.

Is the condition satisfied?

YES >> GO TO 4.

NO >> GO TO 1.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

(B) With CONSULT

T. Drive the vehicle until the following condition is satisfied.

COOLAN TEMP/S

65°C (149°F) or more

CAUTION:

Always drive vehicle at safe speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-222, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007577095

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check the engine coolant temperature sensor. Refer to EC-222, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace engine coolant temperature sensor. Refer to <u>CO-23, "Exploded View"</u>.

2. CHECK THERMOSTAT

Check the thermostat. Refer to CO-22, "Inspection".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace thermostat. Refer to <u>CO-21, "Removal and Installation"</u>.

Component Inspection

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Revision: 2011 October

INFOID:000000007577096

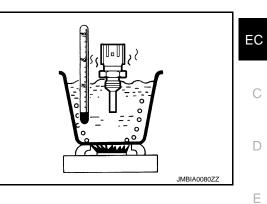
P0128 THERMOSTAT FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

- 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.

Engine coolant tem- perature sensor + –		Condition		Resistance (k Ω)	
					Terminal
				T (192	20 (68)
1	2	Temperature [°C (°F)]	50 (122)		
		· / /	90 (194)	0.236 - 0.260	



Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace engine coolant temperature sensor. Refer to <u>CO-23, "Exploded View"</u>.



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P0130 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

P0130 A/F SENSOR 1

DTC Logic

INFOID:000000007577097

[MR16DDT]

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.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0130 [Air	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1	A) The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in the range other than approx. 2.2 V.	 Harness or connectors (A/F sensor 1 circuit is open or shorted.)
	circuit]	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

(D) With CONSULT

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

Is 1st trip DTC detected?

- YES >> Proceed to EC-225, "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-225, "Diagnosis Procedure"</u>.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-I

- 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	1,150 - 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 (M/T)

P0130 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS > [MR16DDT]	
If "TESTING" is not displayed after 20 seconds, retry from step 2. CAUTION:	ļ
Always drive vehicle at a safe speed.	
Is "TESTING" displayed on CONSULT screen?	
YES >> GO TO 5. NO >> Check A/F sensor 1 function again. GO TO 3.	E
5. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-II	
Release accelerator pedal fully. NOTE:	(
Never apply brake during releasing the accelerator pedal.	Γ
Which does "TESTING" change to?	
COMPLETED>>GO TO 6. OUT OF CONDITION>>Retry DTC CONFIRMATION PROCEDURE. GO TO 4.	
6. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-III	E
Touch "SELF-DIAG RESULT"	,
<u>Which is displayed on CONSULT screen?</u> YES >> INSPECTION END	F
NO >> Proceed to <u>EC-225, "Diagnosis Procedure"</u> .	
7. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B	(
Perform Component Function Check. Refer to <u>EC-225, "Component Function Check"</u> . NOTE:	
Use component function check to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.	ŀ
Is the inspection result normal?	
YES >> INSPECTION END	
NO >> Proceed to <u>EC-225, "Diagnosis Procedure"</u> .	
Component Function Check	,
1.PERFORM COMPONENT FUNCTION CHECK	
With GST	k
 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 gear position. Shift the selector lever to the D position (CVT) or 5th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (31 MPH). CAUTION: 	l
Always drive vehicle at a safe speed.	Ν
NOTE: Never apply brake during releasing the accelerator pedal.	Ν
4. Repeat steps 2 to 3 for five times.	
5. Stop the vehicle and turn ignition switch OFF.	ľ
 Wait at least 10 seconds and restart engine. Repeat steps 2 to 3 for five times. 	
8. Stop the vehicle.	
9. Check 1st trip DTC.	(
Is 1st trip DTC detected?	
YES >> Proceed to <u>EC-225, "Diagnosis Procedure"</u> . NO >> INSPECTION END	F
Diagnosis Procedure	
1. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY	
1. Turn ignition switch OFF.	
 Disconnect A/F sensor 1 harness connector. Turn ignition switch ON. 	

P0130 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

4. Check the voltage between A/F sensor 1 harness connector and ground.

	+		
A/F se	ensor 1	-	Voltage
Connector	Terminal	*	
F70	4	Ground	Battery voltage

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	IPDN	/I E/R	Continuity
Connector	Terminal	Connector	Terminal	
F70	4	E14	36	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 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	A/F sensor 1		ECM	
Connector	Terminal	Connector	Terminal	
F70	1	F25	21	Existed
170	2	125	25	LXISIGU

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		
F70	1	Ground	Not existed
170	2	Giouna	NOL EXISTED

	+		
E	СМ	-	Continuity
Connector	Terminal	*	
F25	21	Ground	Not existed
125	25	Ground	NOT EXISTED

5. Also check harness for short to power. Is the inspection result normal?

IMR	16D	DT]
L	100	

YES >> GO TO 4. NO >> Repair or replace error-detected parts.	А
4. CHECK INTERMITTENT INCIDENT	
Perform GI-43. "Intermittent Incident".	
Is the inspection result normal?	EC
YES >> GO TO 5.	
NO >> Repair or replace error-detected parts.	С
5.REPLACE AIR FUEL RATIO (A/F) SENSOR 1	
Replace air fuel ratio (A/F) sensor 1. Refer to EM-41, "Exploded View".	
• Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard	D
surface such as a concrete floor; use a new one.	
• Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).	E
	F
>> INSPECTION END	
	0
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	Ρ

P0131 A/F SENSOR 1

DTC Logic

INFOID:000000007577100

[MR16DDT]

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately low.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0131	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 circuit low voltage]	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0 V.	 Harness or connectors (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

(B) 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-229, "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.
- 2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine. CAUTION:

Always drive vehicle at a safe speed.

3. Maintain the following conditions for about 20 consecutive seconds.

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

NOTE:

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

• If this procedure is not completed within 1 minute after restarting engine at step 1, return to step

Check 1st trip DTC.

With GST

DIC/CIRC		NOSIS >					[MR16DDT	1
ollow the pr	ocedure "W	ith CONSU	LT" above.					_
<u>1st trip DT</u>	C detected	<u>?</u>						
		<u> EC-229, "Dia</u>	agnosis Pr	<u>ocedure"</u> .				_
NO >> I	NSPECTIO	N END						
liagnosis	Procedu	re					INFOID:0000000075771	
				POWER SUPP	ol V			
			SENSOR					
	tion switch ect A/F sens	orr. sor 1 harnes	s connect	or.				
. Turn igni	tion switch	ON.						
. Check th	ie voltage b	etween A/F	sensor 1 h	narness connecte	or and ground	1.		
A //	+			Voltone				
	sensor 1 Termi	nal	-	Voltage				
Connector			Cround	Detter uveltere				
F70	4		Ground	Battery voltage				
•	tion result n	ormal?						
	GO TO 3. GO TO 2.							
NU) >>(
-		ΔΤΙΟ (Δ/F) S	SENSOR 1					
CHECK A Turn igni Disconne	IR FUEL RA tion switch ect IPDM E/	OFF. 'R harness d	connector.	POWER SUPP		M E/R harnes	ss connector.	
CHECK A Turn igni Disconne	IR FUEL RA tion switch ect IPDM E the continuity	OFF. 'R harness d	connector.	POWER SUPP		M E/R harnes	ss connector.	
CHECK A Turn igni Disconno Check th	IR FUEL RA tion switch ect IPDM EA te continuity	OFF. /R harness c / between A	connector.			M E/R harnes	ss connector.	
CHECK A Turn igni Disconne Check th	IR FUEL RA tion switch ect IPDM EA te continuity	OFF. /R harness c / between A	connector. /F sensor -	1 harness conne		M E/R harnes	ss connector.	
CHECK A Turn igni Disconne Check th + A/F se	IR FUEL RA tion switch ect IPDM EA the continuity	OFF. (R harness of between A	Connector. /F sensor – M E/R	1 harness conne		M E/R harnes	ss connector.	
CHECK A Turn igni Disconne Check th A/F se Connector F70	IR FUEL RA tion switch ect IPDM E/ ne continuity nsor 1 Terminal 4	OFF. (R harness c between A IPD Connector	Connector. /F sensor – M E/R Termina 36	Continuity		Ͷ E/R harnes	ss connector.	_
CHECK A Turn igni Disconne Check th A/F se Connector F70 Also che	IR FUEL RA tion switch ect IPDM E/ ne continuity nsor 1 Terminal 4	OFF. (R harness of between A IPD Connector E14 for short to	Connector. /F sensor – M E/R Termina 36	Continuity		M E/R harne:	ss connector.	_
CHECK A Turn igni Disconne Check th A/F se Connector F70 Also che the inspec YES >> F	IR FUEL RA tion switch ect IPDM E/ ne continuity nsor 1 Terminal 4 ck harness tion result n Perform the	OFF. (R harness of between A IPD Connector E14 for short to ormal? trouble diag	connector. /F sensor – M E/R Termina 36 ground.	1 harness conne Continuity Existed	ector and IPDN	Ͷ E/R harnes	ss connector.	_
CHECK A Turn igni Disconne Check th A/F se Connector F70 Also che the inspec YES >> F	IR FUEL RA tion switch ect IPDM E/ ie continuity nsor 1 Terminal 4 ck harness tion result n Perform the Repair or re	OFF. (R harness of between A IPD Connector E14 for short to ormal? trouble diag place error-o	connector. /F sensor 	1 harness conne Continuity Existed	ector and IPDN	M E/R harne:	ss connector.	
CHECK A Turn igni Disconne Check th A/F se Connector F70 Also che the inspec YES >> F NO >> F	IR FUEL RA tion switch ect IPDM E/ ie continuity nsor 1 Terminal 4 ck harness tion result n Perform the Repair or re	OFF. (R harness of between A IPD Connector E14 for short to ormal? trouble diag	connector. /F sensor 	1 harness conne Continuity Existed	ector and IPDN	M E/R harnes	ss connector.	_
CHECK A Turn igni Disconne Check th A/F se Connector F70 Also che the inspec YES >> F NO >> F O.CHECK A Turn igni	IR FUEL RA tion switch ect IPDM E/ tie continuity nsor 1 Terminal 4 ck harness tion result n Perform the Repair or re /F SENSOF tion switch	OFF. (R harness of between A) IPD Connector E14 for short to ormal? trouble diag place error-o R 1 INPUT S OFF.	connector. /F sensor 	1 harness conne Continuity Existed	ector and IPDN	M E/R harnes	ss connector.	_
CHECK A Turn igni Disconne Check th A/F se Connector F70 Also che the inspec YES >> F NO >> F O.CHECK A Turn igni Disconne	IR FUEL RA tion switch ect IPDM E/ tion continuity nsor 1 Terminal 4 ck harness tion result n Perform the Repair or re /F SENSOF tion switch ect ECM ha	OFF. (R harness of between A, IPD Connector E14 for short to ormal? trouble diag place error-o R 1 INPUT S OFF. rness conne	connector. /F sensor 	1 harness conne Continuity Existed	ector and IPDN			_
CHECK A Turn igni Disconne Check th A/F se Connector F70 Also che the inspec YES >> F NO >> F O.CHECK A Turn igni Disconne	IR FUEL RA tion switch ect IPDM E/ tion continuity nsor 1 Terminal 4 ck harness tion result n Perform the Repair or re /F SENSOF tion switch ect ECM ha	OFF. (R harness of between A, IPD Connector E14 for short to ormal? trouble diag place error-o R 1 INPUT S OFF. rness conne	connector. /F sensor 	1 harness conne Continuity Existed	ector and IPDN			_
CHECK A Turn igni Disconne Check th A/F se Connector F70 Also che the inspec YES >> F NO >> F CHECK A Turn igni Disconne Check th	IR FUEL RA tion switch ect IPDM E/ tion continuity msor 1 Terminal 4 ck harness tion result n Perform the Repair or re /F SENSOF tion switch ect ECM has he continuity	OFF. (R harness of between A, IPD Connector E14 for short to ormal? trouble diag place error-o R 1 INPUT S OFF. rness conne	connector. /F sensor 	1 harness conne Continuity Existed	ector and IPDN			
CHECK A Turn igni Disconne Check th A/F se Connector F70 Also che the inspec YES >> F NO >> F O.CHECK A Turn igni Disconne	IR FUEL RA tion switch ect IPDM E/ he continuity msor 1 Terminal 4 ck harness tion result n Perform the Repair or re /F SENSOF tion switch ect ECM ha he continuity	OFF. (R harness of between A IPD Connector E14 for short to ormal? trouble diag place error-or R 1 INPUT S OFF. rness conne	connector. /F sensor - M E/R Termina 36 ground. ground. ground. GIGNAL CI ector. /F sensor -	1 harness conne Continuity Existed	ector and IPDN			
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CHECK A Turn igni Disconne Check th A/F se Connector F70 Also che the inspec YES >> F NO >> F CHECK A Turn igni Disconne Check th Turn igni	IR FUEL RA tion switch ect IPDM E/ he continuity msor 1 Terminal 4 ck harness tion result n Perform the Repair or re /F SENSOF tion switch ect ECM ha he continuity msor 1 Terminal	OFF. (R harness of between A IPD Connector E14 for short to ormal? trouble diag place error-or R 1 INPUT S OFF. rness conne	connector. /F sensor M E/R Termina 36 ground. ground. grosis for p detected p SIGNAL CI ector. /F sensor - CM Termina	1 harness conne Continuity Existed	ector and IPDN			
CHECK A Turn igni Disconne Check th A/F se Connector F70 Also che the inspec YES >> F NO >> F CHECK A Turn igni Disconne Check th A/F se	IR FUEL RA tion switch ect IPDM E/ tion continuity msor 1 Terminal 4 ck harness tion result n Perform the Repair or re /F SENSOF tion switch ect ECM have continuity	OFF. (R harness of between A, IPD Connector E14 for short to ormal? trouble diag place error-o R 1 INPUT S OFF. rness conne between A,	connector. /F sensor M E/R Termina 36 ground. ground. gnosis for p detected p SIGNAL CI ector. /F sensor - CM	1 harness conne Continuity Existed	ector and IPDN			_

P0131 A/F SENSOR 1

P0131 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

	+		
A/F se	ensor 1	_	Continuity
Connector	Terminal	•	
F70	1	Ground	Not existed
170	2	Gloand	Not existed

	+		
E	CM	_	Continuity
Connector	Terminal		
F25	E25 21		Not existed
125	25	Ground	Not existed

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

Perform GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1. Refer to EM-41, "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

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.

0	, ,		
DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0132	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 circuit high voltage]	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5 V.	 Harness or connectors (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	ducting the next test. gnition switch OFF and w gnition switch ON. gnition switch OFF and w CONDITION:		
>	> GO TO 2.		
~	A/F SENSOR FUNCTIO	DN	
	engine and warm it up to i	normal operating temperature.	
	∴"A/F SEN1 (B1)″ in "DAT ∴"A/F SEN1 (B1)" indicati	A MONITOR" mode of "ENGINE" using C on.	CONSULI.
With GS Follow the	T procedure "With CONSL		
	cation constantly approx.		
YES >	> Proceed to EC-232, "D		
•	> GO TO 3.		
	RM DTC CONFIRMATIC	IN PROCEDURE	
 With CC Turn iq Drive : CAUT 	gnition switch OFF, wait a and accelerate vehicle to	t least 10 seconds and then restart engin more than 40 km/h (25 MPH) within 20 s	e. econds after restarting engine.
Alway	s drive vehicle at a safe	e speed. Is for about 20 consecutive seconds.	
	D 4 000 4	2 200 mm	

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

Check 1st trip DTC.

With GST

INFOID:000000007577102

EC

А

P0132 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

Follow the procedure "With CONSULT" above.

Is 1st trip DTC is detected?

YES >> Proceed to EC-232, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007577103

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 se	ensor 1	_	Voltage
Connector	Terminal		
F70	4	Ground	Battery voltage

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	IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F70	4	E14	36	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 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	
F70	1	F25	21	Existed
170	2	125	25	LAISICU

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

P0132 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

athe inspection result normal? YES >> GO TO 4. NO >> Repair or replace error-detected parts. •.CHECK INTERMITTENT INCIDENT erform GI-43, "Intermittent Incident". • the inspection result normal? YES >> GO TO 5. NO >> Repair or replace error-detected parts. • REPLACE AIR FUEL RATIO (A/F) SENSOR 1 eplace air fuel ratio (A/F) sensor 1. Refer to EM-41, "Exploded View".					
Connector Terminal F70 1 Ground Not existed + - Connector Terminal F25 21 Ground Not existed F25 21 Ground Not existed * - Connector Terminal F25 21 Ground Not existed * - Connector result normal? YES > GO TO 4. NO >> Repair or replace error-detected parts. CHECK INTERMITTENT INCIDENT erform GI-43. "Intermittent Incident". .the inspection result normal? YES > GO TO 5. NO >> Repair or replace error-detected parts. REPLACE AIR FUEL RATIO (A/F) SENSOR 1 eplace air fuel ratio (A/F) sensor 1. Refer to EM-41. "Exploded View". AUTION: 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].					
F70 1 Ground Not existed + - Continuity $\overline{Connector}$ Terminal F25 21 Ground 25 25 0 Not existed F25 21 Ground Not existed F25 21 Ground Not existed XES > GO TO 4. NO >> Repair or replace error-detected parts. CHECK INTERMITTENT INCIDENT erform GI-43. "Intermittent Incident". the inspection result normal? YES > GO TO 5. NO >> Repair or replace error-detected parts. REPLACE AIR FUEL RATIO (A/F) SENSOR 1 eplace air fuel ratio (A/F) sensor 1. Refer to EM-41. "Exploded View". AUTION: Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).			-	Continuity	
F70 2 Ground Not existed + - Continuity Connector Terminal - F25 21 Ground Not existed F25 21 Ground Not existed · Also check harness for short to power. . the inspection result normal? YES >> GO TO 4. NO >> Repair or replace error-detected parts. . . <check incident<="" intermittent="" td=""> . erform GI-43. "Intermittent Incident". . the inspection result normal? YES YES >> GO TO 5. NO >> Repair or replace error-detected parts. . REPLACE AIR FUEL RATIO (A/F) SENSOR 1 eplace air fuel ratio (A/F) sensor 1. Refer to EM-41. "Exploded View". AUTION: 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]. J43897-18 or J43897-12]] and approved Anti-seize Lubricant (commercial service tool).</check>	Connector				
+ - Continuity Connector Terminal - F25 21 Ground Not existed F25 21 Ground Not existed . Also check harness for short to power. . the inspection result normal? YES > GO TO 4. NO >> Repair or replace error-detected parts. erform GI-43. "Intermittent Incident". . . the inspection result normal? . . YES > GO TO 5. . . VO >> Repair or replace error-detected parts. reform GI-43. "Intermittent Incident". . . .the inspection result normal? . . YES > GO TO 5. . . NO >> Repair or replace error-detected parts. . REPLACE AIR FUEL RATIO (A/F) SENSOR 1 . eplace air fuel ratio (A/F) sensor 1. Refer to EM-41. "Exploded View". . Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a h	F70		Ground	Not existed	
ECM - Continuity $Connector$ Terminal - Continuity F25 21 Ground Not existed F25 25 0 Not existed . Also check harness for short to power. . the inspection result normal? YES >> GO TO 4. NO >> Repair or replace error-detected parts. erform GI-43. "Intermittent Incident". YES >> GO TO 5. . . NO >> Repair or replace error-detected parts. YES >> GO TO 5. 					•
Connector Terminal F25 21 Ground Not existed F25 25 Ground Not existed Also check harness for short to power. the inspection result normal? YES >> GO TO 4. NO >> Repair or replace error-detected parts.		+			
F25 21 Ground Not existed Also check harness for short to power. the inspection result normal? (FS >> GO TO 4. VO >>> Repair or replace error-detected parts. .CHECK INTERMITTENT INCIDENT erform GI-43, "Intermittent Incident". the inspection result normal? YES >> GO TO 5. VO >>> Repair or replace error-detected parts. .REPLACE AIR FUEL RATIO (A/F) SENSOR 1 erplace air fuel ratio (A/F) sensor 1. Refer to EM-41, "Exploded View". AUTION: Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).	E	СМ	-	Continuity	
F25 Ground Not existed 25 Ground Not existed 25 25 Ground Not existed 25 25 Ground Not existed 26 25 Ground Not existed 26 25 Ground Not existed 26 26 OTO 4. Sepair or replace error-detected parts. 3 CHECK INTERMITTENT INCIDENT Erform GI-43. "Intermittent Incident". 27 ES > GO TO 5. NO >> Repair or replace error-detected parts. 3 REPLACE AIR FUEL RATIO (A/F) SENSOR 1 eplace air fuel ratio (A/F) sensor 1. Refer to EM-41, "Exploded View". AUTION: Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).	Connector	Terminal			
Also check harness for short to power. the inspection result normal? YES >> GO TO 4. NO >> Repair or replace error-detected parts. CHECK INTERMITTENT INCIDENT erform GI-43. "Intermittent Incident". the inspection result normal? YES >> GO TO 5. NO >> Repair or replace error-detected parts. REPLACE AIR FUEL RATIO (A/F) SENSOR 1 eplace air fuel ratio (A/F) sensor 1. Refer to EM-41, "Exploded View". AUTION: Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).	F25		Ground	Not existed	
the inspection result normal? YES >> GO TO 4. NO >> Repair or replace error-detected parts. •••CHECK INTERMITTENT INCIDENT erform GI-43. "Intermittent Incident". •••the inspection result normal? YES >> GO TO 5. NO >> Repair or replace error-detected parts. •••REPLACE AIR FUEL RATIO (A/F) SENSOR 1 eplace air fuel ratio (A/F) sensor 1. Refer to EM-41, "Exploded View". AUTION: Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).		-			
YES >> GO TO 4. NO >> Repair or replace error-detected parts. • CHECK INTERMITTENT INCIDENT erform GI-43, "Intermittent Incident". • the inspection result normal? YES >> GO TO 5. NO >> Repair or replace error-detected parts. • REPLACE AIR FUEL RATIO (A/F) SENSOR 1 eplace air fuel ratio (A/F) sensor 1. Refer to EM-41, "Exploded View". AUTION: Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).			•		
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erform <u>GI-43. "Intermittent Incident"</u> . <u>the inspection result normal?</u> YES >> GO TO 5. NO >> Repair or replace error-detected parts. D. REPLACE AIR FUEL RATIO (A/F) SENSOR 1 eplace air fuel ratio (A/F) sensor 1. Refer to <u>EM-41, "Exploded View"</u> . AUTION: Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).			error-detected p	oarts.	
the inspection result normal? YES >> GO TO 5. NO >> Repair or replace error-detected parts. .REPLACE AIR FUEL RATIO (A/F) SENSOR 1 eplace air fuel ratio (A/F) sensor 1. Refer to EM-41, "Exploded View". AUTION: Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).	1. CHECK INT		NCIDENT		
 YES >> GO TO 5. NO >> Repair or replace error-detected parts. REPLACE AIR FUEL RATIO (A/F) SENSOR 1 eplace air fuel ratio (A/F) sensor 1. Refer to EM-41, "Exploded View". AUTION: Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool). 	Perform <u>GI-43,</u>	"Intermittent In	cident".		
 NO >> Repair or replace error-detected parts. REPLACE AIR FUEL RATIO (A/F) SENSOR 1 eplace air fuel ratio (A/F) sensor 1. Refer to EM-41, "Exploded View". AUTION: Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool). 			<u>?</u>		
eplace air fuel ratio (A/F) sensor 1. Refer to <u>EM-41, "Exploded View"</u> . AUTION: Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).			orror datastad r	orto	
eplace air fuel ratio (A/F) sensor 1. Refer to <u>EM-41, "Exploded View"</u> . AUTION: Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).	_		-		
AUTION: Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).					led View!
surface such as a concrete floor; use a new one. Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).	CAUTION:	Tallo (A/F) Ser		EW-4T, EXPLO	
Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).					ight of more than 0.5 m (19.7 in) onto a hard
	Before insta [commercial	lling new sens service tool (sor, clean exha	aust system th	
>> INSPECTION END	Service (001)	•			
	>> IN\$	SPECTION EN	C		

P0133 A/F SENSOR 1

DTC Logic

INFOID:000000007577104

[MR16DDT]

DTC DETECTION LOGIC

To judge the malfunction of A/F sensor 1, this diagnosis measures response time of the A/F signal computed by ECM from the A/F sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the A/F sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0133	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 circuit slow response]	The response of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time.	 Harness or connectors (A/F sensor 1 circuit is open or shorted.) A/F sensor 1 A/F sensor 1 heater Fuel pressure Fuel injector Intake air leaks Exhaust gas leaks PCV Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle. Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 5.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

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. 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. Select "ENGINE" using CONSULT.
- 6. Select "A/F SEN1(B1) P1278/P1279" (for DTC P0133) of "A/F SEN1" in "DTC WORK SUPPORT" mode.
- 7. Touch "START".
- Is "COMPLETED" displayed on CONSULT screen?
- YES >> GO TO 3
- NO >> GO TO 4.

$\mathbf{3}$.PERFORM DTC CONFIRMATION PROCEDURE-II

Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT screen?

- OK >> INSPECTION END
- NG >> Proceed to EC-235, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. After perform the following procedure, "TESTING" will be displayed on the CONSULT screen.

P0133 A/F SENSOR 1

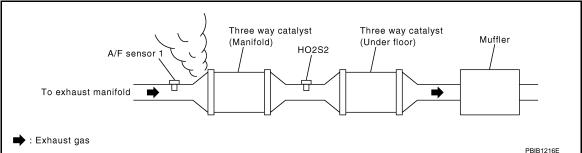
< DTC/CIRCUIT DIAGNOSIS >	[MR16DDT]
 Increase the engine speed up to between 4,000 and 5,000 rpm and maintain that speed fo Fully release accelerator pedal and then let engine idle for about 10 seconds. If "TESTING" is not displayed after 10 seconds, refer to <u>EC-225</u>, "<u>Component Function</u> Wait for about 20 seconds at idle as per the condition that "TESTING" is displayed on 	A Check".
 screen. Make sure that "TESTING" changes to "COMPLETED". If "TESTING" changed to "OUT OF CONDITION", refer to <u>EC-225. "Component Funct</u> Touch "SELF-DIAG RESULT". 	EC ion Check".
Which is displayed on CONSULT screen? OK >> INSPECTION END NG >> Proceed to EC-235, "Diagnosis Procedure".	С
5. CHECK AIR-FUEL RATIO SELF-LEARNING VALUE	D
 With GST Start engine and warm it up to normal operating temperature. Select Service \$01 with GST. Calculate the total value of "Short term fuel trim" and "Long term fuel trim" indications. 	E
$\begin{array}{llllllllllllllllllllllllllllllllllll$	F
6.DETECT MALFUNCTIONING PART	G
Check the following. Intake air leaks Exhaust gas leaks Incorrect fuel pressure Lack of fuel 	Н
 Fuel injector Incorrect PCV hose connection PCV valve Mass air flow sensor 	I
>> Repair or replace malfunctioning part.	J
7. PERFORM DTC CONFIRMATION PROCEDURE	К
 Turn ignition switch OFF and wait at least 10 seconds. Restart engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1m load. Let engine idle for 1 minute. 	inute under no ∟
 Increase the engine speed up to between 4,000 and 5,000 rpm and maintain that speed fo Fully release accelerator pedal and then let engine idle for about 1 minute. Check 1st trip DTC. 	r 10 seconds. M
Is 1st trip DTC detected? YES >> Proceed to EC-235, "Diagnosis Procedure". NO >> INSPECTION END	Ν
Diagnosis Procedure	INFOID:000000007577105
1.RETIGHTEN A/F SENSOR 1	0
Loosen and retighten the A/F sensor 1. Refer to EM-41, "Exploded View".	Р
>> GO TO 2. 2.CHECK EXHAUST GAS LEAK	F

1. Start engine and run it at idle.

P0133 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

2. Listen for an exhaust gas leak before three way catalyst 1.



Is exhaust gas leak detected?

YES >> Repair or replace.

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.

NO >> GO TO 4.

4.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- 1. Clear the mixture ratio self-learning value. Refer to EC-135, "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-258. "DTC Logic"</u> or <u>EC-262.</u> "<u>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		
F70	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.CHECK A/F SENSOR 1 INPUT SIGNAL 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	
F70	4	E14	36	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

EC-236

P0133 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

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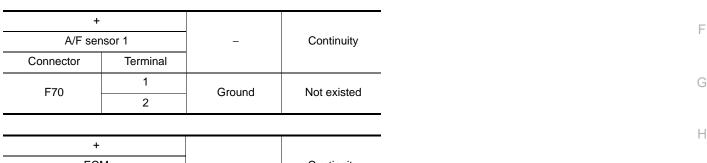
Ρ

NO >> Repair or replace error-detected parts. 7.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	
F70	1	F25	21	Existed
170	2	125	25	LAISIEU

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



ECM			-	Continuity
C	Connector	Terminal		
F25		21	Ground	Not existed
		25	Cround	NOT EXISTED

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

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

Check the air fuel ratio (A/F) sensor 1 heater. Refer to <u>EC-172, "Component Inspection"</u>. <u>Is the inspection result normal?</u> YES >> GO TO 9. NO >> GO TO 12. **9.**CHECK MASS AIR FLOW SENSOR Check the mass air flow sensor. Refer to <u>EC-196, "Component Inspection"</u>. Is the inspection result normal?

YES >> GO TO 10. NO >> Replace mass air flow sensor. Refer to <u>EM-25. "Exploded View"</u>.

10.CHECK PCV VALVE

Check the PCV valve. Refer to EC-533, "Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair or replace PCV valve. Refer to EM-57, "Exploded View".

11.CHECK INTERMITTENT INCIDENT

Perform GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace error-detected parts.

12.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-41. "Exploded View".

- CAUTION:
- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner (commercial service tool) and approved anti-seize lubricant (commercial service tool).

>> INSPECTION END

< 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.

			SEF259VA	E
				F
DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause	G
P0137	HO2S2 (B1) (Heated oxygen sensor 2 circuit low voltage)	The maximum voltage from the heated oxygen sensor 2 is not reached to the specified voltage.	Heated oxy/den sensor 2	Н

DTC	CONFIRMAT		
		101411100	

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT? YES >> GO TO 2.

NO >> GO TO 5.

2. PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- 6. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
- If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F). 7. Open engine hood.
- 8. Select "HO2S2 (B1) P1147" of "HO2S2" in "DTC WORK SUPPORT" mode of "ENGINE" using CONSULT.

EC-239

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OK

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Fuel injectorIntake air leaks

0.68V

9. Follow the instruction of CONSULT. NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

10. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Proceed to EC-241, "Diagnosis Procedure".

CAN NOT BE DIAGNOSED>>GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

- 1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- 2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-240, "Component Function Check".

NOTE:

Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-241, "Diagnosis Procedure".

Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector and ground as per the following condition.

	ECM			Voltage	
Connector	+	-	Condition		
Connector	Terminal				
F25	29	33	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure.	
	ation noovilt n		•	•	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground as per the following condition.

	ECM				
Connector	+	-	Condition	Voltage	
Connector	Terminal				
F25	29	33	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END NO >> GO TO 3. INFOID:000000007577107

< DTC/CIRCUIT DIAGNOSIS >

А

3.PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector and ground as per the following condition.

	ECM					_
Connector	+	-	С	ondition	Voltage	l l
Connector	Term	ninal				_
F25	29	33		80 km/h (50 MPH) in T), 4th gear position	The voltage should be above 0.68 V at least once during this procedure.	
s the inspec	tion result n	ormal?				-
	INSPECTIO			l V		
			agnosis Proce	<u>eaure</u> .		
Diagnosis	Procedu	re			11	NFOID:000000007577108
1 .CLEAR T		RE RATIO S	ELF-LEARNI	NG VALUE		
				efer to <u>EC-135, "W</u>	Vork Procedure".	
			es at idle spe		<u> </u>	
				o start engine?		
	Perform trou GO TO 2.	ıble diagnos	is for DTC P	0171. Refer to <u>EC</u>	<u>-258, "DTC Logic"</u> .	
11() >>(GUTUZ.					
-			ПΤ			
2.снеск н	102S2 GRO		JIT			
2.CHECK F	102S2 GRO	OFF.) harness connec	tor.	
2.CHECK H 1. Turn ign 2. Disconn 3. Disconn	IO2S2 GRO ition switch ect heated c ect ECM ha	OFF. oxygen sens rness conne	or 2 (HO2S2)) harness connec		
2.CHECK H 1. Turn ign 2. Disconn 3. Disconn	IO2S2 GRO ition switch ect heated c ect ECM ha	OFF. oxygen sens rness conne	or 2 (HO2S2)		tor. ECM harness connector.	
2.CHECK H 1. Turn igni 2. Disconno 3. Disconno 4. Check th	IO2S2 GRO ition switch (ect heated c ect ECM has ne continuity	OFF. oxygen sens rness conne	or 2 (HO2S2)			
2.CHECK H 1. Turn ign 2. Disconne 3. Disconne 4. Check th	IO2S2 GRO ition switch (ect heated c ect ECM hai he continuity	OFF. oxygen sens rness conne between H	or 2 (HO2S2) octor. O2S2 harnes	s connector and I		
2.CHECK H 1. Turn ign 2. Disconne 3. Disconne 4. Check th	IO2S2 GRO ition switch (ect heated c ect ECM has ne continuity	OFF. oxygen sens rness conne between H	or 2 (HO2S2)			
2.CHECK H 1. Turn igni 2. Disconne 3. Disconne 4. Check th HO2	IO2S2 GRO ition switch (ect heated c ect ECM has ne continuity + 2S2	OFF. oxygen sens rness conne between H	or 2 (HO2S2) octor. O2S2 harnes - CM	s connector and I		
2.CHECK H 1. Turn ign 2. Disconne 3. Disconne 4. Check th HO2 Connector F69	HO2S2 GRO ition switch (ect heated c ect ECM has ne continuity + 2S2 Terminal	OFF. bxygen sens rness conne between H between H E Connector F25	or 2 (HO2S2) octor. O2S2 harnes - CM Terminal 33	s connector and I		
2.CHECK H 1. Turn ign 2. Disconne 3. Disconne 4. Check th HO2 Connector F69	HO2S2 GRO ition switch (ect heated c ect ECM han ne continuity + 2S2 Terminal 1 eck harness	OFF. bxygen sens rness conne between H E Connector F25 for short to	or 2 (HO2S2) octor. O2S2 harnes - CM Terminal 33	s connector and I		
2.CHECK H 1. Turn ign 2. Disconne 3. Disconne 4. Check th HO2 Connector F69 5. Also che <u>s the inspec</u> YES >> 0	HO2S2 GRO ition switch (ect heated c ect ECM has ne continuity + 2S2 Terminal 1 eck harness tion result n GO TO 3.	OFF. oxygen sens rness conner between H Connector F25 for short to pormal?	or 2 (HO2S2) octor. O2S2 harnes - CM Terminal 33 power.	s connector and I Continuity Existed		
2.CHECK F 1. Turn ign 2. Disconne 3. Disconne 4. Check th HO2 Connector F69 5. Also che <u>s the inspec</u> YES >> 0 NO >> F	HO2S2 GRO ition switch (ect heated c ect ECM han the continuity + 2S2 Terminal 1 eck harness etion result n GO TO 3. Repair or rej	OFF. bxygen sens rness conner between H Connector F25 for short to ormal? place error-con	or 2 (HO2S2) octor. O2S2 harnes 	s connector and I Continuity Existed		
2.CHECK F 1. Turn igni 2. Disconne 3. Disconne 4. Check th HO: Connector F69 5. Also che <u>s the inspec</u> YES >> 0 NO >> F 3. CHECK F	HO2S2 GRO ition switch (ect heated c ect ECM han ne continuity + 2S2 Terminal 1 eck harness tion result n GO TO 3. Repair or rep HO2S2 INPL	OFF. Dygen sens rness conner between H Connector F25 for short to p ormal? place error-co JT SIGNAL (or 2 (HO2S2) octor. O2S2 harnes 	s connector and I Continuity Existed	ECM harness connector.	
2.CHECK F 1. Turn igni 2. Disconne 3. Disconne 4. Check th HO: Connector F69 5. Also che <u>s the inspec</u> YES >> 0 NO >> F 3. CHECK F	HO2S2 GRO ition switch (ect heated c ect ECM han ne continuity + 2S2 Terminal 1 eck harness tion result n GO TO 3. Repair or rep HO2S2 INPL	OFF. Dygen sens rness conner between H Connector F25 for short to p ormal? place error-co JT SIGNAL (or 2 (HO2S2) octor. O2S2 harnes 	s connector and I Continuity Existed		
2.CHECK H 1. Turn ign 2. Disconne 3. Disconne 4. Check th HO: Connector F69 5. Also che <u>s the inspec</u> YES >> 0 NO >> H 3.CHECK H 1. Check th	HO2S2 GRO ition switch (ect heated c ect ECM han ne continuity + 2S2 Terminal 1 eck harness tion result n GO TO 3. Repair or rep HO2S2 INPL ne continuity	OFF. Dygen sens rness conner between H Connector F25 for short to p ormal? place error-o JT SIGNAL (or 2 (HO2S2) octor. O2S2 harnes 	s connector and I Continuity Existed	ECM harness connector.	
2.CHECK H 1. Turn igni 2. Disconno 3. Disconno 4. Check th HO2 Connector F69 5. Also che s the inspec YES $>> 0$ NO $>> 1$ 3. CHECK H 1. Check th	HO2S2 GRO ition switch (ect heated c ect ECM han the continuity + 2S2 Terminal 1 eck harness etion result n GO TO 3. Repair or rep HO2S2 INPL the continuity	OFF. Dxygen sens rness conner between H Connector F25 for short to pormal? place error-of JT SIGNAL (between H	or 2 (HO2S2) octor. O2S2 harnes 	s connector and I Continuity Existed S.	ECM harness connector.	
2.CHECK H 1. Turn igni 2. Disconno 3. Disconno 4. Check th HO: Connector F69 5. Also che s the inspec YES $>> 0$ NO $>> 1$ 3.CHECK H 1. Check th HO: HO: HO: HO: HO: HO: HO: HO:	HO2S2 GRO ition switch (ect heated c ect ECM han ne continuity + 2S2 Terminal 1 eck harness tion result n GO TO 3. Repair or rep HO2S2 INPL ne continuity	OFF. Dxygen sens rness conner between He Connector F25 for short to pormal? place error-co JT SIGNAL (between He E	or 2 (HO2S2) octor. O2S2 harnes 	s connector and I Continuity Existed	ECM harness connector.	
2.CHECK H 1. Turn igni 2. Disconno 3. Disconno 4. Check th HO2 Connector F69 5. Also che s the inspec YES $>> 0$ NO $>> 1$ 3. CHECK H 1. Check th	HO2S2 GRO ition switch (ect heated c ect ECM han the continuity + 2S2 Terminal 1 eck harness etion result n GO TO 3. Repair or rep HO2S2 INPL the continuity	OFF. Dxygen sens rness conner between H Connector F25 for short to pormal? place error-of JT SIGNAL (between H	or 2 (HO2S2) octor. O2S2 harnes 	s connector and I Continuity Existed S.	ECM harness connector.	

	+			
НО	2S2	_	Continuity	
Connector	Terminal			
F69	F69 4		Not existed	

< DTC/CIRCUIT DIAGNOSIS >

E	+ CM	_	Continuity	
Connector	Terminal			
F25	F25 29		Not 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 HEATED OXYGEN SENSOR 2

Check the heated oxygen sensor 2. Refer to EC-242, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".

NO >> GO TO 5.

5. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

Component Inspection

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

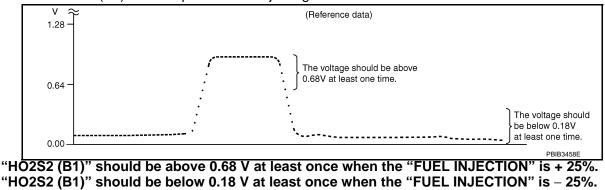
YES >> GO TO 2. NO

>> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

(P)With CONSULT

- 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.
- 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.
- 5. Let engine idle for 1 minute.
- Select "FUEL INJECTION" in "ACTIVE TEST" mode of "ENGINE" using CONSULT, and select "HO2S2 6. (B1)" as the monitor item with CONSULT.
- 7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



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< DTC/CIRCUIT DIAGNOSIS	; >
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Is the inspec YES >>	INSPECTIO GO TO 6.	ormal? N END	ISOR 2-I		А
Without C 1. Start eng 2. Turn ign 3. Start eng 4. Let engi	ONSULT gine and wa ition switch gine and kee ne idle for 1	rm it up to n OFF and wa p the engin minute.	normal operating temperature. ait at least 10 seconds. e speed between 3,500 and 4,0	000 rpm for at least 1 minute under no load. nd as per the following condition.	C D
	ECM				
	+	_	Condition	Voltage	_
Connector	Tern	ninal			E
F25	29	33	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.	F
Is the inspec	ction result n	ormal?			0
NO >>	INSPECTIO GO TO 4.				G
4.CHECK H	HEATED OX	YGEN SEN	ISOR 2-II		Н
Check the vo	oltage betwe	en ECM ha	irness connector and ground as	s per the following condition.	
	ECM				
Connector	+	-	Condition	Voltage	
Connector	Tern	ninal			.1
F25	29	33	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.	K
Is the inspec	tion result n	ormal?			
-	INSPECTIO GO TO 5.				L
			Inness connector and ground as	a par the following condition	
	onage beiwe		iness connector and ground as		M
	ECM				
	+	_	Condition	Voltage	Ν
Connector	Tern	ninal			
F25	29	33	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.	0
Is the inspec	ction result n	ormal?			Ρ
	INSPECTIO GO TO 6.	N END			
6.REPLAC	E HEATED (OXYGEN S	ENSOR 2		

< DTC/CIRCUIT DIAGNOSIS >

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

P0138 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.

MALFUNCTION A

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.

MALFUNCTION B

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)		DTC detecting condition	Possible cause
	H0252 (P4)	A)	An excessively high voltage from the sensor is sent to ECM.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2
P0138	HO2S2 (B1) (Heated oxygen sensor 2 circuit high voltage)	B)	The minimum voltage from the sensor is not reached to the specified voltage.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 Fuel pressure Fuel injector

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

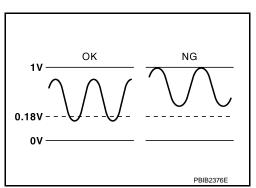
If DTC Confirmation Procedure has been previously conducted, always perform the following procedure performed on the performance of the performanc

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.



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< DTC/CIRCUIT DIAGNOSIS >

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 2 minutes.
- 5. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-247, "Diagnosis Procedure".
- NO-1 >> With CONSULT: GO TO 3.
- NO-2 >> Without CONSULT: GO TO 5.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

NOTE:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

- 1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- 6. Make sure that "COOLAN TEMP/S" indication is more than 70°C (158°F).
- If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F). 7. Open engine hood.
- 8. Select "HO2S2 (B1) P1146" of "HO2S2" in "DTC WORK SUPPORT" mode of "ENGINE" using CONSULT.
- 9. Follow the instruction of CONSULT.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

10. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT

OK >> INSPECTION END

NG >> Proceed to EC-247, "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 <u>EC-247, "Diagnosis Procedure"</u>.

NOTE:

Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to EC-247, "Diagnosis Procedure".

Component Function Check

INFOID:000000007577111

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT

- T. 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.

EC-246

< DTC/CIRCUIT DIAGNOSIS >

	ECM				
Connector	+	-	Condition	Voltage	
Connector	Terr	minal			
F25	29	33	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground as per the following condition.

					_
	ECM				- E
Connector	+	-	Condition	Voltage	
Connector	Terr	minal			F
F25	29	33	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure.	_
	ction result n				G
	INSPECTIC GO TO 3.	N END			
		NENT FUNC	TION CHECK-III		Н
Check the v	oltage betwe	een ECM ha	rness connector and ground as	s per the following condition.	
				1	
	ECM				
Connector	+ Torr	 minal	Condition	Voltage	1
F25	29	33	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure.	
Is the inspe	ction result r	ormal?			
	INSPECTIC Proceed to		agnosis Procedure".		L
Diagnosis			<u>, , , , , , , , , , , , , , , , , , , </u>	14	FOID:000000007577112
1.INSPEC	TION START	Г			M
Confirm the	detected ma	alfunction (A	or B). Refer to EC-245, "DTC	<u>Logic"</u> .	
	unction is de	tected?			Ν
	GO TO 2. GO TO 7.				
^	HO2S2 CON		OR WATER		0
	nition switch				
2. Disconr		oxygen sens	or 2 harness connector.		Ρ
Wate	er should n	ot exist.			
Is the inspe	ction result n	ormal?			

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

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3.CHECK HO2S2 GROUND CIRCUIT

1. Disconnect ECM harness connector.

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

+				
HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F69	1	F25	33	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.

+				
HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F69	4	F25	29	Existed

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

	+		
НО	2S2	-	Continuity
Connector	Terminal		
F69	4	Ground	Not existed

	+	-	
E	CM	-	Continuity
Connector	Terminal		
F25	29	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.

5.CHECK HEATED OXYGEN SENSOR 2

Check the heated oxygen sensor 2. Refer to EC-250, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43. "Intermittent Incident".

NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to <u>EX-5, "Exploded View"</u>. CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

< DTC/CIRCUIT DIAGNOSIS >

_	INSPECTIO					А
1 .CLEAR	THE MIXTUR	RE RATIO SE	ELF-LEARN	IING VALUE		
	ne mixture ra gine for at lea				35. "Work Procedure".	EC
	•		•	to start engir	ne?	
	-				to <u>EC-245, "DTC Logic"</u> .	С
	GO TO 8.	-			-	0
8. CHECK	HO2S2 GRC	UND CIRCL	JIT			
	nition switch nect heated o		or 2 harnes	s connector		D
3. Disconr	nect ECM ha	rness conne	ctor.			
4. Check t	he continuity	between H	D2S2 harne	ess connector	and ECM harness connector.	Е
	+		_			
)2S2	E	СМ	Continuity		F
Connector	Terminal	Connector	Terminal			
F69	1	F25	33	Existed	-	G
5. Also ch	eck harness	for short to g	ground and	to power.		0
· · · ·	ction result n	ormal?				
	GO TO 9. Repair or re	place error-c	letected par	ts		Н
•	HO2S2 INPL	•	•			
				ss connector	and ECM harness connector.	
	,					
	+		_			J
	02S2	E	CM	Continuity		
Connector	Terminal	Connector	Terminal	-	-	K
F69 2. Check	4	F25	29	Existed	or and ground, or ECM harness connector and	N.
ground.		y between r	10232 Hall		or and ground, or ECM harness connector and	
_						L
	+					
	HO2S2		-	Continuity		M
Connector			round	Not evicted	-	
F69	4	G	iround	Not existed		Ν
	+					14
	ECM		_	Continuity		
Connector		nal		-		0
F25	29	G	iround	Not existed	-	
3. Also ch	eck harness	for short to p	ower.		-	Ρ
-	ction result n	ormal?				
YES SS	GO TO 10					

YES >> GO TO 10.

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

10.CHECK HEATED OXYGEN SENSOR 2

Check the heated oxygen sensor 2. Refer to <u>EC-250, "Component Inspection"</u>. Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> GO TO 11.

11.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5. "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

Component Inspection

INFOID:000000007577113

1.INSPECTION START

Do you have CONSULT?

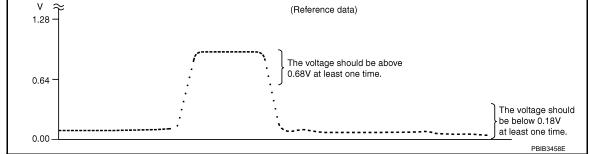
Do you have CONSULT?

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

2. CHECK HEATED OXYGEN SENSOR 2

(D)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.
- 7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to \pm 25%.



"HO2S2 (B1)" should be above 0.68 V at least once when the "FUEL INJECTION" is + 25%. "HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is – 25%.

Is the inspection result normal?

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

 $\mathbf{3.}$ CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector and ground as per the following condition.

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 4. .CHECK HEATED OXYGEN SENSOR 2-II theck the voltage between ECM harness connector and ground as per the following condition. ECM Voltage $connector + - Connector + - Connector Terminal Voltage F25 29 33 Keeping engine speed at idle for 10 minutes The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. Sthe inspection result normal? YES >> INSPECTION END NO >> GO TO 5. .CHECK HEATED OXYGEN SENSOR 2-III - - - the voltage between ECM harness connector and ground as per the following condition. - $	F25 s the inspe YES >> NO >>	Terminal 29 33 ection result normal? INSPECTION END GO TO 4.	Terminal 29 33 Revving up to 4,000 rpm under no load at least 10 times result normal? ECTION END	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V	
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Connector Terminal F25 29 33 Keeping engine speed at idle for 10 minutes The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. Sthe inspection result normal? YES >> INSPECTION END NO >> GO TO 5. O.CHECK HEATED OXYGEN SENSOR 2-III Check the voltage between ECM harness connector and ground as per the following condition.		ECM	СМ		
Terminal Terminal F25 29 33 Keeping engine speed at idle for 10 minutes The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. as the inspection result normal? YES >> INSPECTION END NO >> GO TO 5. Ocheck HEATED OXYGEN SENSOR 2-III Check the voltage between ECM harness connector and ground as per the following condition.	Connector	+ –	+ – Condition	Voltage	
F25 29 33 Keeping engine speed at idle for 10 minutes at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. at the inspection result normal? YES >> INSPECTION END NO >> GO TO 5. > CHECK HEATED OXYGEN SENSOR 2-III Setting between ECM harness connector and ground as per the following condition.	Connector	Terminal	Terminal		
YES >> INSPECTION END NO >> GO TO 5. CHECK HEATED OXYGEN SENSOR 2-III heck the voltage between ECM harness connector and ground as per the following condition.	F25	29 33	/9 .3.3	at least once during this procedure. The voltage should be below 0.18 V	
YES >> INSPECTION END NO >> GO TO 5. CHECK HEATED OXYGEN SENSOR 2-III heck the voltage between ECM harness connector and ground as per the following condition.	s the inspe	ection result normal?	esult normal?		
heck the voltage between ECM harness connector and ground as per the following condition.	NO >>				
		HEATED OXVGEN SE	O 5.		
ECM	back the v		O 5. ED OXYGEN SENSOR 2-III	us per the following condition	
	Check the v		O 5. ED OXYGEN SENSOR 2-III	as per the following condition.	
+ – Condition Voltage	Check the v		O 5. ED OXYGEN SENSOR 2-III between ECM harness connector and ground a	as per the following condition.	
Connector Terminal		ECM	O 5. ED OXYGEN SENSOR 2-III e between ECM harness connector and ground a		
F252933Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.	Check the v	ECM + –	O 5. ED OXYGEN SENSOR 2-III e between ECM harness connector and ground a CM + Condition		
s the inspection result normal?	Connector	ECM + – Terminal	O 5. ED OXYGEN SENSOR 2-III a between ECM harness connector and ground a CM + - Terminal 29 33 Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position	Voltage The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V	
	Connector F25	ECM + - Terminal 29 33	O 5. ED OXYGEN SENSOR 2-III a between ECM harness connector and ground a CM + - Terminal 29 33 Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	Voltage The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V	
	Connector F25 s the inspe YES >>	ECM ECM + - Terminal 29 33 ection result normal? NSPECTION END	O 5. ED OXYGEN SENSOR 2-III a between ECM harness connector and ground a CM + - Terminal 29 33 Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) result normal? ECTION END	Voltage The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V	
REPLACE HEATED OXYGEN SENSOR 2	Connector F25 S the inspe YES >> NO >>	ECM + - Terminal 29 33 ection result normal? NSPECTION END > GO TO 6.	TO 5. ED OXYGEN SENSOR 2-III a between ECM harness connector and ground a CM + - Terminal 29 33 Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) result normal? ECTION END TO 6.	Voltage The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V	
	Connector F25 <u>s the inspe</u> YES >> NO >>	ECM + - Terminal 29 33 ection result normal? NSPECTION END > GO TO 6.	TO 5. ED OXYGEN SENSOR 2-III a between ECM harness connector and ground a CM + - Terminal 29 33 Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) result normal? ECTION END TO 6.	Voltage The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V	
 Replace heated oxygen sensor 2. Refer to <u>EX-5, "Exploded View"</u>. AUTION: Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a har surface such as a concrete floor; use a new one. Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleane [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool). 	Connector F25 YES >> NO >> D.REPLAC Replace hea CAUTION: Discard a surface s Before in [commerce	ECM ECM + - Terminal 29 33 29 33 20100 result normal? INSPECTION END GO TO 6. CE HEATED OXYGEN Seated oxygen sensor 2. any sensor which has such as a concrete floor stalling new sensor, rcial service tool (J-43)	TO 5. ED OXYGEN SENSOR 2-III a between ECM harness connector and ground a CM + - Terminal 29 33 Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) result normal? ECTION END TO 6. ATED OXYGEN SENSOR 2 oxygen sensor 2. Refer to EX-5, "Exploded View" ensor which has been dropped from a height is a concrete floor; use a new one. ng new sensor, clean exhaust system thread	Voltage The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. to of more than 0.5 m (19.7 in) or ds using Oxygen Sensor Threa	d Cleaner

Revision: 2011 October

P0139 HO2S2

< 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.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0139	HO2S2 (B1) (Heated oxygen sensor 2 cir- cuit slow response)	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 EVAP 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 7.

2. PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

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

(D) 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.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 7. Let engine idle for 1 minute.
- 8. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
- 9. Drive the vehicle in a proper at 60 km/h (38MPH) and maintain the speed. CAUTION:

Always drive vehicle at a safe speed.

EC-252

INFOID:000000007577114

< DTC/CIRCUIT DIAGNOSIS	>>	
10. Release the accelerator p	edal fully at least 5 second	ds.
CAUTION:		
 Enable engine brake. Always drive carefully. 		
 Never apply brake whe 		itor pedal.
11. Repeat step 9 and 10 at le		
12. Check the following item of	of "DATA MONITOR".	
Data monitor item	Status	
HO2 S2 DIAG1 (B1)	CMPLT	
HO2 S2 DIAG2 (B1)	CIVIPLI	
s "CMPLT" displayed on CON	SULT screen?	
YES >> GO TO 6.		
		DTC confirmation procedure again.
NO-2: "CMPLT" is not display		·
4. PERFORM DTC WORK SU	JPPORT	
1. Open engine hood.		
		DRT" mode of "ENGINE" using CONSULT.
 Start engine and follow the NOTE: 	e instruction of CONSULI	aispiay.
It will take at most 10 min	utes until "COMPLETED"	s displayed.
s "COMPLETED" displayed o		
YES >> GO TO 6.		
NO >> GO TO 5.		
5. PERFORM DTC CONFIRM	1ATION PROCEDURE AC	JAIN
1. Turn ignition switch OFF a	and leave the vehicle in a	cool place (soak the vehicle).
2. Perform DTC confirmatior		
>> GO TO 3.		
6.PERFORM SELF-DIAGNO	SIS	
With CONSULT		
Perform ECM self-diagnosis.		
s DTC "P0139" detected?		
	4, "Diagnosis Procedure".	
NO >> INSPECTION EN		
PERFORM COMPONENT	FUNCTION CHECK	
Perform component function of	heck. Refer to EC-253, "C	Component Function Check".
NOTE:		
Use component function chec check, a 1st trip DTC might no		tion of the heated oxygen sensor 2 circuit. During this
Is the inspection result normal		
YES >> INSPECTION EN		
	54, "Diagnosis Procedure"	
	-	
Component Function C		INFOID:00000007577115
1. PERFORM COMPONENT	FUNCTION CHECK-I	
Without CONSULT 1. Start engine and warm it ι	up to normal operating terr	nperature.

- 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.

< DTC/CIRCUIT DIAGNOSIS >

5. Check the voltage between ECM harness connector and ground as per the following condition.

[MR16DDT]

< DTC/CIRCUIT DIAGNOSIS >

	ECM				
Connector	+	-	Condition	Voltage	
		minal			
F25	29	33	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground as per the following condition.

ECM					
Connector	+	_	Condition	Voltage	
Termi		ninal			
F25	29	33	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

3. PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector and ground as per the following condition.

	ECM + – Terminal				
Connector			Condition	Voltage	
Connector					
F25	29	33	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to <u>EC-241, "Diagnosis Procedure"</u>.

Diagnosis Procedure

INFOID:000000007577116

1.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-135, "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-258, "DTC Logic"</u> or <u>EC-262,</u> <u>"DTC Logic"</u>.

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.

< DTC/CIRCUIT DIAGNOSIS >

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	+				
-	HO	2S2	ECM		Continuity
-	Connector	Terminal	Connector	Terminal	
-	F69	1	F25	33	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.

	+		+ –		
HO	HO2S2		ECM		
Connector	Terminal	Connector	Terminal		
F69	4	F25	29	Existed	

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

HO2S2 – Continuity	
Connector Terminal	
F69 4 Ground Not existed	

	+			
E	ECM		Continuity	
Connector Terminal				
F25	29	Ground	Not 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 HEATED OXYGEN SENSOR 2

Check the heated oxygen sensor 2. Refer to <u>EC-256. "Component Inspection"</u>. Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>. NO >> GO TO 5.

5.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to <u>EX-5, "Exploded View"</u>. CAUTION:

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

• Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

1.INSPECTION START

Do you have CONSULT?

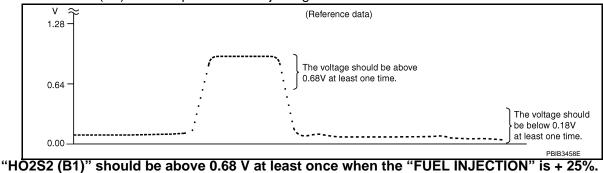
Do you have CONSULT?

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.
- 7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to \pm 25%.



"HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is – 25%.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

3.CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT

- 1. Start engine and warm it up to 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	Connector + – Terminal		Condition	Voltage
Connector				
F25	29	33	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
Is the inspec	tion result r	ormal?		

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4.CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground as per the following condition.

< DTC/CIRCUIT DIAGNOSIS >

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עוואוך		DT]	l

	ECM				
Connector	+	_	Condition	Voltage	
Connector	Terr	minal			
F25	29	33	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.	
s the inspe	ction result r	ormal?			
NO >>	INSPECTIC GO TO 5.				
D. CHECK	HEATED OX	YGEN SEN	ISOR 2-III		
heck the v	oltage betwe	en ECM ha	arness connector and ground as	s per the following condition.	
	5014		1		
	ECM		Condition	Valtara	
Connector	+ Tori	– ninal	Condition	Voltage	
F25	29	33	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.	
YES >> NO >> CREPLAC Replace hea CAUTION:		ON END OXYGEN S sensor 2. R	efer to EX-5, "Exploded View".	of more then 0.5 m (40.7 in) a	
YES >> NO >> D.REPLAC Replace hea AUTION: Discard a surface s Before in	INSPECTIC GO TO 6. E HEATED ated oxygen uch as a co stalling new cial service	ON END OXYGEN S sensor 2. R which has I ncrete floo v sensor, c	efer to <u>EX-5, "Exploded View"</u> . been dropped from a height o r; use a new one. lean exhaust system threads	of more than 0.5 m (19.7 in) c s using Oxygen Sensor Thre roved Anti-seize Lubricant (c	ad Clean
YES >> NO >> D.REPLAC CAUTION: Discard a surface s Before in [commerc service to	INSPECTIC GO TO 6. E HEATED ated oxygen uch as a co stalling new cial service	ON END OXYGEN S sensor 2. R which has I ncrete floo v sensor, c tool (J-438	efer to <u>EX-5, "Exploded View"</u> . been dropped from a height o r; use a new one. lean exhaust system threads	s using Oxygen Sensor Thre	ad Clean
YES >> NO >> D.REPLAC CAUTION: Discard a surface s Before in [commerc service to	INSPECTIC GO TO 6. E HEATED ated oxygen uch as a co stalling new cial service pol).	ON END OXYGEN S sensor 2. R which has I ncrete floo v sensor, c tool (J-438	efer to <u>EX-5, "Exploded View"</u> . been dropped from a height o r; use a new one. lean exhaust system threads	s using Oxygen Sensor Thre	ad Clean
YES >> NO >> D.REPLAC CAUTION: Discard a surface s Before in [commerc service to	INSPECTIC GO TO 6. E HEATED ated oxygen uch as a co stalling new cial service pol).	ON END OXYGEN S sensor 2. R which has I ncrete floo v sensor, c tool (J-438	efer to <u>EX-5, "Exploded View"</u> . been dropped from a height o r; use a new one. lean exhaust system threads	s using Oxygen Sensor Thre	ad Clean
YES >> NO >> REPLAC Ceplace hea AUTION: Discard a surface s Before in [commerc service to	INSPECTIC GO TO 6. E HEATED ated oxygen uch as a co stalling new cial service pol).	ON END OXYGEN S sensor 2. R which has I ncrete floo v sensor, c tool (J-438	efer to <u>EX-5, "Exploded View"</u> . been dropped from a height o r; use a new one. lean exhaust system threads	s using Oxygen Sensor Thre	ad Clean
YES >> NO >> D.REPLAC CAUTION: Discard a surface s Before in [commerc service to	INSPECTIC GO TO 6. E HEATED ated oxygen uch as a co stalling new cial service pol).	ON END OXYGEN S sensor 2. R which has I ncrete floo v sensor, c tool (J-438	efer to <u>EX-5, "Exploded View"</u> . been dropped from a height o r; use a new one. lean exhaust system threads	s using Oxygen Sensor Thre	ad Clean
YES >> NO >> D.REPLAC CAUTION: Discard a surface s Before in [commerc service to	INSPECTIC GO TO 6. E HEATED ated oxygen uch as a co stalling new cial service pol).	ON END OXYGEN S sensor 2. R which has I ncrete floo v sensor, c tool (J-438	efer to <u>EX-5, "Exploded View"</u> . been dropped from a height o r; use a new one. lean exhaust system threads	s using Oxygen Sensor Thre	ad Clean
YES >> NO >> D.REPLAC CAUTION: Discard a surface s Before in [commerc service to	INSPECTIC GO TO 6. E HEATED ated oxygen uch as a co stalling new cial service pol).	ON END OXYGEN S sensor 2. R which has I ncrete floo v sensor, c tool (J-438	efer to <u>EX-5, "Exploded View"</u> . been dropped from a height o r; use a new one. lean exhaust system threads	s using Oxygen Sensor Thre	ad Clean
YES >> NO >> D.REPLAC CAUTION: Discard a surface s Before in [commerc service to	INSPECTIC GO TO 6. E HEATED ated oxygen uch as a co stalling new cial service pol).	ON END OXYGEN S sensor 2. R which has I ncrete floo v sensor, c tool (J-438	efer to <u>EX-5, "Exploded View"</u> . been dropped from a height o r; use a new one. lean exhaust system threads	s using Oxygen Sensor Thre	ad Clean

< DTC/CIRCUIT DIAGNOSIS >

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:000000007577118

[MR16DDT]

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.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0171	FUEL SYS-LEAN-B1 (Fuel injection system too lean)	 Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.) 	 Intake air leaks A/F sensor 1 Fuel injector Exhaust gas leaks Incorrect fuel pressure Lack of fuel Mass air flow sensor Incorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to EC-135, "Work Procedure".

2. Start engine.

Is it difficult to start engine?

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

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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-259, "Diagnosis Procedure".

NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Start engine and let it idle for at least 5 minutes.

2. Check 1st trip DTC.

< DTC/CIR(CUIT DIAGNOSIS >	[MR16DDT]
s 1st trip D	TC detected?	
	Proceed to <u>EC-259, "Diagnosis Procedure"</u> . GO TO 5.	
-	RM DTC CONFIRMATION PROCEDURE-III	
	hition switch OFF and wait at least 10 seconds.	
2. Start en	gine.	
	n the following conditions for at least 10 consecutive minutes. e accelerator pedal as steady as possible.	
VHCL SP	PEED SE 50 - 120 km/h (31 - 75 MPH)	
CAUTIC		
	a drive vehicle at a safe speed. 1st trip DTC.	
	TC detected?	
	Proceed to EC-259, "Diagnosis Procedure".	
-	INSPECTION END	
Diagnosis	s Procedure	INFOID:000000007577119
1. СНЕСК В	EXHAUST GAS LEAK	
1. Start en	gine and run it at idle.	
2. Listen fo	or an exhaust gas leak before three way catalyst (manifold).	
	A/F sensor 1 HO2S2 (Under floor) M To exhaust manifold	luffler
	: Exhaust gas	
ls exhaust d	as leak detected?	PBIB1216E
-	Repair or replace error-detected parts.	
-	GO TO 2.	
Z.CHECK	FOR INTAKE AIR LEAK	
	or an intake air leak after the mass air flow sensor. PCV hose connection.	
	ak detected?	
YES >>	Repair or replace error-detected parts.	
-	GO TO 3.	
	A/F SENSOR 1 INPUT SIGNAL CIRCUIT	
	nition switch OFF. nect corresponding A/F sensor 1 harness connector.	
3. Disconn	nect ECM harness connector.	
4. Check t	he continuity between A/F sensor 1 harness connector and ECM harness of	connector.

	+		_	
A/F se	ensor 1	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F70	1	F25	21	Existed
170	2	123	25	LAISICU

< DTC/CIRCUIT DIAGNOSIS >

5. 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	*	
F70	1	Ground	Not existed
170	2	Giouna	NOL EXISTED

	+		
E	CM	-	Continuity
Connector	Terminal	*	
F25	21	Ground	Not existed
125	25	Glound	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-136, "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-51, "Exploded View".

Is the inspection result normal?

- YES >> Replace "fuel filter and fuel pump assembly". Refer to <u>FL-5, "2WD : Exploded View"</u> (2WD) or <u>FL-9, "AWD : Exploded View"</u> (AWD).
- 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 <u>EC-535, "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-535, "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-199, "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.

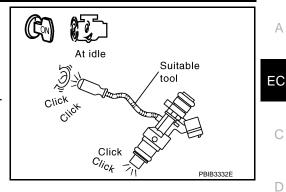
< DTC/CIRCUIT DIAGNOSIS >

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-485</u>, "Component Function Check".



[MR16DDT]

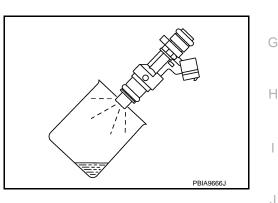
8. CHECK FUEL INJECTOR

- 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-51, "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-43, "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-</u> <u>51, "Removal and Installation"</u>.



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< DTC/CIRCUIT DIAGNOSIS >

P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:000000007577120

[MR16DDT]

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.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0172	FUEL SYS-RICH-B1 (Fuel injection system too rich)	 Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.) 	 A/F sensor 1 Fuel injector Exhaust gas leaks Incorrect fuel pressure Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Clear the mixture ratio self-learning value. Refer to EC-135, "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-263, "Diagnosis Procedure".
- NO >> Check exhaust and intake air leak visually.

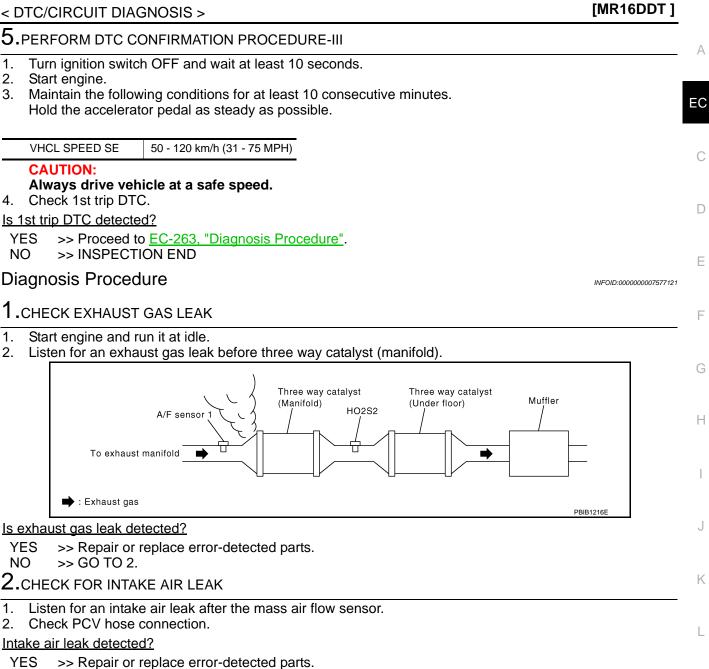
4.PERFORM DTC CONFIRMATION PROCEDURE-II

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

Is 1st trip DTC detected?

YES >> Proceed to EC-263, "Diagnosis Procedure".

NO >> GO TO 5.



NO >> GO TO 3.

${f 3.}$ 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.
- 4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

	+		_	
A/F se	ensor 1	E	CM	Continuity
Connector	Terminal	Connector	Terminal	
F70	1	F25	21	Existed
170	2	123	25	LAISIEU

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

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< DTC/CIRCUIT DIAGNOSIS >

	+		
A/F se	ensor 1	-	Continuity
Connector	Terminal		
F70	1	Ground	Not existed
170	2	Cround	Not existed

E	+ CM	_	Continuity
Connector	Terminal		
F25	21	Ground	Not existed
125	25	Cround	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-136. "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-51, "Exploded View".

Is the inspection result normal?

- YES >> Replace "fuel filter and fuel pump assembly". Refer to <u>FL-5</u>, "2WD : Exploded View" (2WD) or <u>FL-9</u>, "AWD : Exploded View" (AWD).
- 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-535, "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 <u>EC-535, "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-199, "DTC Logic"</u>.

7.CHECK FUNCTION OF FUEL INJECTOR

(B) 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.

[MR16DDT]

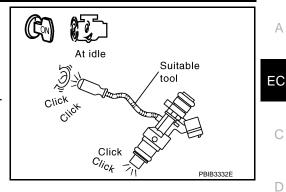
< DTC/CIRCUIT DIAGNOSIS >

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-485</u>, "Component Function Check".



[MR16DDT]

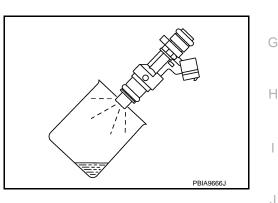
8. CHECK FUEL INJECTOR

- 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-51, "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-43, "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-</u> <u>51, "Removal and Installation"</u>.



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P0181 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0181 FTT SENSOR

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)		DTC detecting condition	Possible cause
		A)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from ECT sensor and intake air temperature sensor 1.	 Harness or connectors (FTT sensor circuit is open or shorted) FTT sensor Combination meter
P0181	FTT SENSOR [Fuel tank temperature (FTT) sensor circuit range/perfor- mance]	B)	The comparison result of signals trans- mitted to ECM from each temperature sensor (IAT sensor 1, IAT sensor 2, ECT sensor, EOT sensor, and FTT sensor) shows that the voltage signal of the FTT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	 Harness or connectors (High or low resistance in the FTT sensor circuit) FTT sensor

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 7.

NO >> GO TO 2.

2. PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-I

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

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-268, "Diagnosis Procedure".

NO >> GO TO 4.

4.CHECK ENGINE COOLANT TEMPERATURE

With CONSULT

I. Select "COOLAN TEMP/S" in "DATA MONITOR" of "ENGINE" using CONSULT.

2. Check "COOLAN TEMP/S" value.

With GST

Follow the procedure "With CONSULT" above.

<u>"COOLAN TEMP/S" less than 60°C (140°F)?</u>

YES >> INSPECTION END

NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-II

()With CONSULT

1. Cool engine down until "COOLAN TEMP/S" is less than 60°C (140°F).

EC-266

INFOID:000000007577122

P0181 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS > [N	MR16DDT]
e. Wait at least 10 seconds. अ. Check 1st trip DTC. ब्रेWith GST	
ollow the procedure "With CONSULT" above.	
1st trip DTC detected?	
YES >> Proceed to <u>EC-268, "Diagnosis Procedure"</u> . NO >> GO TO 6.	
PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)	
erform component function check. Refer to <u>EC-267, "Component Function Check"</u> . DTE:	
se the component function check to check the overall function of the FTT sensor circuit. During t at trip DTC might not be confirmed.	this check, a
the inspection result normal?	
 YES >> INSPECTION END IO >> Proceed to <u>EC-268. "Diagnosis Procedure"</u>. 	
PRECONDITIONING	
DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the follo re before conducting the next test.	wing proce-
Turn ignition switch OFF and wait at least 10 seconds.	
Turn ignition switch ON.	
0	
Turn ignition switch OFF and wait at least 10 seconds. ESTING CONDITION:	
Turn ignition switch OFF and wait at least 10 seconds. ESTING CONDITION: Before performing the following procedure, do not add fuel.	
Turn ignition switch OFF and wait at least 10 seconds.	t idle.
Turn ignition switch OFF and wait at least 10 seconds. ESTING 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 a	t idle.
Turn ignition switch OFF and wait at least 10 seconds. ESTING 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 a >> GO TO 8.	t idle.
Turn ignition switch OFF and wait at least 10 seconds. STING 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 a >> GO TO 8. PERFORM DTC CONFIRMATION PROCEDURE B	t idle.
Turn ignition switch OFF and wait at least 10 seconds. STING 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 a >> GO TO 8. PERFORM DTC CONFIRMATION PROCEDURE B Start engine and let it idle for 60 minutes.	t idle.
Turn ignition switch OFF and wait at least 10 seconds. STING 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 a >> GO TO 8. PERFORM DTC CONFIRMATION PROCEDURE B Start engine and let it idle for 60 minutes. Move the vehicle to a cool place. NOTE:	
Turn ignition switch OFF and wait at least 10 seconds. STING 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 a >> GO TO 8. PERFORM DTC CONFIRMATION PROCEDURE B Start engine and let it idle for 60 minutes. 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° Turn ignition switch OFF and soak the vehicle for 12 hours.	
Turn ignition switch OFF and wait at least 10 seconds. STING 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 a >> GO TO 8. PERFORM DTC CONFIRMATION PROCEDURE B Start engine and let it idle for 60 minutes. 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° Turn ignition switch OFF and soak the vehicle for 12 hours. CAUTION: Never turn ignition switch ON during soaking. NOTE:	
Turn ignition switch OFF and wait at least 10 seconds. STING 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 a >> GO TO 8. .PERFORM DTC CONFIRMATION PROCEDURE B Start engine and let it idle for 60 minutes. 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° Turn ignition switch OFF and soak the vehicle for 12 hours. CAUTION: Never turn ignition switch ON during soaking. NOTE: The vehicle must be cooled with the food open. Start engine and let it idle for 5 minutes or more.	
Turn ignition switch OFF and wait at least 10 seconds. STING 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 a >> GO TO 8. .PERFORM DTC CONFIRMATION PROCEDURE B Start engine and let it idle for 60 minutes. 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° Turn ignition switch OFF and soak the vehicle for 12 hours. CAUTION: Never turn ignition switch ON during soaking. NOTE: The vehicle must be cooled with the food open. Start engine and let it idle for 5 minutes or more. CAUTION: Never turn ignition switch OFF during idling.	
Turn ignition switch OFF and wait at least 10 seconds. STING 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 a >> GO TO 8. .PERFORM DTC CONFIRMATION PROCEDURE B Start engine and let it idle for 60 minutes. 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° Turn ignition switch OFF and soak the vehicle for 12 hours. CAUTION: Never turn ignition switch ON during soaking. NOTE: The vehicle must be cooled with the food open. Start engine and let it idle for 5 minutes or more. CAUTION: Never turn ignition switch OFF during idling. Check 1st trip DTC.	
Turn ignition switch OFF and wait at least 10 seconds. ISTING 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 a >> GO TO 8. PERFORM DTC CONFIRMATION PROCEDURE B Start engine and let it idle for 60 minutes. 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° Turn ignition switch OFF and soak the vehicle for 12 hours. CAUTION: Never turn ignition switch ON during soaking. NOTE: The vehicle must be cooled with the food open. Start engine and let it idle for 5 minutes or more. CAUTION: Never turn ignition switch OFF during idling. Check 1st trip DTC. 1st trip DTC detected? TES => Proceed to EC-268. "Diagnosis Procedure".	
Turn ignition switch OFF and wait at least 10 seconds. STING 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 a >> GO TO 8. .PERFORM DTC CONFIRMATION PROCEDURE B Start engine and let it idle for 60 minutes. 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° Turn ignition switch OFF and soak the vehicle for 12 hours. CAUTION: Never turn ignition switch ON during soaking. NOTE: The vehicle must be cooled with the food open. Start engine and let it idle for 5 minutes or more. CAUTION: Never turn ignition switch OFF during idling. Check 1st trip DTC. 1st trip DTC. 1st trip DTC. detected? (ES => Proceed to EC-268. "Diagnosis Procedure". IO => INSPECTION END	

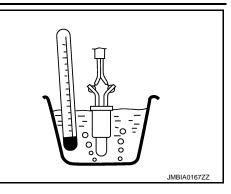
3. Remove fuel level sensor unit. Refer to FL-5, "2WD : Exploded View" (2WD), FL-9, "AWD : Exploded View"(AWD).

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	Condition		Resistance (kΩ)
+	-			
Terr	minal			
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-43, "Intermittent Incident"</u>.

NO >> Proceed to EC-268, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000007577124

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-266, "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 <u>MWI-20, "CONSULT Function"</u>.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Proceed to <u>MWI-43</u>, "Component Function Check".

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		()]		
B46 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.

	+				
Fuel level sensor unit and fuel pump		E	Continuity		
Connector	Terminal	Connector Terminal			
B46	4	F26	84	Existed	

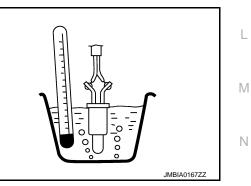
4. Also check harness for short to ground and to power.

EC-268

			1 0 101			
< DTC/CIR	CUIT DIAGN	NOSIS >			[MR16DDT]	
Is the inspe	ction result n	ormal?				
		trouble diag			rcuit.	А
_	•	place error-d	•	ts.		
D. CHECK	FTT SENSO	R GROUND	CIRCUIT			EC
	nition switch					LU
		tion meter ha			fuel pump harness connector and combination	
	arness conn				nuel pump namess connector and combination	С
	+					D
	ensor unit and	Combinat	ion meter	Continuity		D
-	pump			-		
Connector	Terminal	Connector	Terminal			Ε
B46	5	M34	24	Existed		
		for short to p	ower.			
-	ction result n	ormal?				F
	GO TO 6. Repair or re	place error-d	etected part	ts		
0	-	TEMPERAT	•			G
			, ,		ion"	
	ction result n	Refer to <u>EC-2</u>	<u>69, Comp</u>	<u>prent inspec</u>	<u></u> .	
			nt Referto	GL43 "Inter	mittent Incident".	Н
					fer to <u>FL-5, "2WD : Exploded View"(</u> 2WD), <u>FL-9,</u>	
		oded View"(A				I
Compone	ent Inspec	tion			INF0ID:00000007577125	1
1. CHECK	FUEL TANK	TEMPERAT	JRE (FTT)	SENSOR		. [
	nition switch		- (• • • • • • • • • • • • • • • • • • •			J
		l sensor unit	and fuel pu	mp harness	connector.	

- 3. Remove fuel level sensor unit. Refer to <u>FL-5, "2WD : Exploded View"</u>(2WD), <u>FL-9, "AWD : Exploded</u> View"(AWD).
- 4. Check resistance between fuel level sensor unit and fuel pump terminals by heating with hot water as shown in the figure.

Fuel level sensor unit and fuel pump		Qualities			
+	-	Condition		Resistance (k Ω)	
Terminal					
4	5	Temperature	20 (68)	2.3 – 2.7	
4	Э	[°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 FL-5, "2WD : Exploded View". Ο

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< DTC/CIRCUIT DIAGNOSIS >

P0182, P0183 FTT SENSOR

DTC Logic

INFOID:000000007577126

[MR16DDT]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0182	FTT SEN/CIRCUIT (Fuel tank temperature sen- sor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	 Harness or connectors (The FTT sensor circuit is open or shorted.)
P0183	FTT SEN/CIRCUIT (Fuel tank temperature sen- sor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	 Fuel tank temperature sensor Combination meter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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-270, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007577127

1.CHECK DTC WITH COMBINATION METER

Refer to <u>MWI-20, "CONSULT Function"</u>.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to <u>MWI-43</u>, "Component Function Check".

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 mp	_	Voltage (Approx.)	
Connector	Terminal			
B46	4	Ground	5 V	

Is the inspection result normal?

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

P0182, P0183 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

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$\overline{\mathbf{3.}}$ 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.

4	÷	-	_	
Fuel level sei fuel p		EC	CM	Continuity
Connector	Terminal	Connector	Terminal	
B46	4	F26	84	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 combination meter harness connector.
- Check the continuity between fuel level sensor unit and fuel pump harness connector and combination meter harness connector.

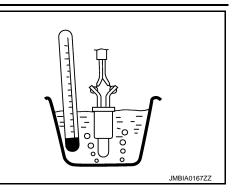
+		-	-			
Fuel level ser fuel p		Combinat	ion meter	Continuity		
Connector	Terminal	Connector	Terminal			
B46	5	M34	24	Existed		
4. Also cheo	ck harness f	for short to p	ower.			
Is the inspect	ion result no	ormal?				
	GO TO 5.					
-	• •	blace error-d	•			
5. CHECK FI	JEL IANK	IEMPERAL	URE (FII)	SENSOR		
Check the FT	T sensor. R	efer to EC-2	271, "Comp	onent Inspec	ion".	
Is the inspect	ion result no	ormal?				
					nittent Incident".	
		el level senso oploded View		fuel pump". F	efer to FL-5, "2WD : Exploded View"(2WD), FL-	
Componer	nt Inspect	ion			INFOID:000000007577128	
1.CHECK FI	JEL TANK	TEMPERAT		SENSOR		
			0.12 ()	02110011		
	tion switch (act fuel level		and fuel pu	ump harness	connector.	
					Exploded View"(2WD), FL-9, "AWD : Exploded	
<u>View"</u> (AV	VD).					

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 (k Ω)	
Terr	minal				
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 FL-5, "2WD : Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

P0190, P0192, P0193 FRP SENSOR

DTC Logic

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INFOID:000000007577129

[MR16DDT]

DTC DETECTION LOGIC

P0190(Fuel rail pressure sensor circuit low input and high in- put)Signal voltage from the fuel rail pressure sensor remains at more than 4.84 V / less than 0.2 V for 5 seconds or more.(Fuel rail shorted (Battery ed.)P0192FRP SEN/CIRC (Fuel rail pressure sensor circuit low input)Signal voltage from the fuel rail pressure sensor remains at less than 0.37 V for 5 seconds or more.(G sens (Camsh shorted (Exhaus circuit is (Acceler)P0193FRP SEN/CIRC (Fuel rail pressure sensor circuit high input)Signal voltage from the fuel rail pressure seconds or more.(Fuel rail pressure seconds or more.P0193FRP SEN/CIRC (Fuel rail pressure sensor circuit high input)Signal voltage from the fuel rail pressure sensor remains at more than 4.06 V for 5 seconds or more.Fuel rail seconds or more.	DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0192FRP SEN/CIRC (Fuel rail pressure sensor circuit low input)Signal voltage from the fuel rail pressure sensor remains at less than 0.37 V for 5 	P0190	(Fuel rail pressure sensor circuit low input and high in-	sensor remains at more than 4.84 V /	Harness or connectors (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or short-
P0193FRP SEN/CIRC (Fuel rail pressure sensor circuit high input)Signal voltage from the fuel rail pressure sensor remains at more than 4.06 V for 5 	P0192	(Fuel rail pressure sensor	sensor remains at less than 0.37 V for 5	ed.) (G sensor circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted.)
	P0193	(Fuel rail pressure sensor	sensor remains at more than 4.06 V for 5	 (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) Fuel rail pressure sensor Battery current sensor G sensor Camshaft position sensor Exhaust valve timing control position sensor Accelerator pedal position sensor Turbocharger boost sensor Exhaust valve timing control position sensor Engine oil pressure sensor

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

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- **TESTING CONDITION:**

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

>> GO TO 2.	IVI
2. PERFORM DTC CONFIRMATION PROCEDURE	
 Start the engine ON and wait at least 60 seconds. Check DTC or 1st trip DTC. 	Ν
Is DTC or 1st trip DTC detected?	\circ
YES >> Proceed to <u>EC-273, "Diagnosis Procedure"</u> . NO >> INSPECTION END	0
Diagnosis Procedure	Ρ

Turning the ignition switch ON with FRP sensor harness connector disconnected causes ECM to detect DTC P0190. Be sure to erase the DTC when the diagnosis procedure.

1.CHECK FUEL RAIL PRESSURE (FRP) SENSOR POWER SUPPLY-I

1. Turn ignition switch OFF.

2. Disconnect FRP sensor connector.

NOTE:

P0190, P0192, P0193 FRP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

3. Turn ignition switch ON.

4. Check the voltage between FRP sensor harness connector terminals.

	FRP sensor			
Connector	+	_	Voltage (Approx.)	
Connector	tern	ninal	(11 -)	
F5	1	3	5 V	
Inspection res	sult normal?			

Inspection result normal?

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

2. CHECK FRP SENSOR POWER SUPPLY-II

Check the voltage between FRP sensor harness connector and the ground.

	+		
FRP	sensor	-	Voltage (Approx.)
Connector	Terminal		
F5	1	Ground	5 V

Is inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check harness connector for short to power and short to ground, between the following terminals.

EC	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
		FRP sensor	F5	1
F25	39	EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
	68	Battery current sensor	F52	1
F26	00	G sensor	B32	3
F20	72	CMP sensor	F109	1
	12	EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is inspection result normal?

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

NO >> Repair or replace error-detected parts.

4. CHECK FRP SENSOR GROUND CIRCUIT

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

	+		_	
FRP	sensor	E	CM	Continuity
Connector	Terminal	Connector	Terminal	
F5	3	F25	44	Existed

4. Also check harness for short to power.

P0190, P0192, P0193 FRP SENSOR

[MR16DDT] < DTC/CIRCUIT DIAGNOSIS > Is inspection result normal? А YES >> GO TO 5. NO >> Repair or replace error-detected parts. 5. CHECK ECM GROUND CIRCUIT EC Check the continuity between ECM harness connector and the ground. ECM Ground Continuity Connector Terminal 1 F25 D 2 Ground Existed 123 E18 124 Е 127 Is inspection result normal? YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident". F NO >> Repair or replace error-detected parts. **6.**CHECK FRP SENSOR SIGNAL CIRCUIT 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between FRP sensor harness connector and ECM harness connector. Н + _ FRP sensor ECM Continuity Connector Terminal Connector Terminal F5 2 F25 18 Existed Also check harness for short to ground and to power. 4. Is inspection result normal? YES >> GO TO 7. Κ NO >> Repair or replace error-detected parts. 7.CHECK FRP SENSOR Check the FRP sensor. Refer to EC-275, "Component Inspection". L Is inspection result normal? YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident". >> Repair or replace error-detected parts. NO Μ **Component Inspection** INFOID:000000007577131 **1.**CHECK FRP SENSOR Ν (P)WITH CONSULT 1. Turn ignition switch OFF. Reconnect harness connector disconnected. 2. 3. Start the engine. Select "DATA MONITOR" mode of "ENGINE" using CONSULT. 4. Ρ

Check that the "FUEL PRES SEN V" indication. 5.

Monitor Item	Condition	Values/Status
	Engine speed: Idle	1,140 – 1,460 mV
FUEL PRES SEN V	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,300 – 2,900 mV

WITHOUT CONSULT

P0190, P0192, P0193 FRP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch OFF.

- 2. Reconnect harness connector disconnected.
- 3. Start the engine.
- 4. Check FRP sensor signal voltage.

	ECM			
Connector	+	-	Condition	Value (Approx.)
Connector	Tern	ninal		
F25	18	44	[Engine is running]Warm-up conditionIdle speed	1.14– 1.46 V
F23	10	44	[Engine is running]Warm-up conditionRevving engine from idle to 4,000 rpm quickly	1.3 – 2.9 V

Is the inspection result normal?

YES >> INSPECTION END.

NO >> Replace FRP sensor. Refer to EM-51, "Exploded View".

P0191 FRP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0191 FRP SENSOR

DTC Logic

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INFOID:000000007577132

DTC DETECTION LOGIC

- before conducting the next test.
- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- **TESTING CONDITION:**

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

_	>> GO TO 2.	M
2.	PERFORM DTC CONFIRMATION PROCEDURE	
1.	Start the engine and warm it up to the normal operating temperature. NOTE:	N
	Warm up the engine until "COOLAN TEMP/S" on "DATA MONITOR" of CONSULT reaches at least 70°C (158°F).	0
2.	Turn the ignition switch OFF and cool the engine until the engine coolant temperature reaches 35°C (95°F) or less.	
	CAUTION: • The difference between air temperature and engine coolant temperature must be 5°C (9°F) or	Ρ
	less.Do not turn ignition switch ON.	
3	Turn ignition switch ON and wait at least 60 seconds	

- v and wait at least 60 seconds. i um ignition sv
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-278, "Diagnosis Procedure".

< DTC/CIRCUIT DIAGNOSIS >

NO >> INSPECTION END

Diagnosis Procedure

NOTE:

Turning the ignition switch ON with FRP sensor harness connector disconnected causes ECM to detect DTC P0190. Be sure to erase the DTC when the diagnosis procedure.

1.CHECK FUEL RAIL PRESSURE (FRP) SENSOR POWER SUPPLY-I

1. Turn ignition switch OFF.

- 2. Disconnect FRP sensor connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between FRP sensor harness connector terminals.

	FRP sensor		
Connector	+	_	Voltage (Approx.)
Connector	tern	ninal	(- <i>)</i>
F5	1	3	5 V

Inspection result normal?

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

2. CHECK FRP SENSOR POWER SUPPLY-II

Check the voltage between FRP sensor harness connector and the ground.

	+		
FRP	sensor	_	Voltage (Approx.)
Connector	Terminal		
F5	1	Ground	5 V

Is inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

 ${\it 3.}$ check sensor power supply circuit

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check harness connector for short to power and short to ground, between the following terminals.

Connector F5 F43 F75	Terminal 1 3
F43	1 3
_	3
F75	4
.75	1
F52	1
B32	3
F109	1
F110	1
E101	5
	F110

Is inspection result normal?

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

NO >> Repair or replace error-detected parts.

4.CHECK FRP SENSOR GROUND CIRCUIT

P0191 FRP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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

	+	-		
FRP	sensor	ECM		Continuity
Connector	Terminal	Connector Terminal		
F5	3	F25	44	Existed

4. Also check harness for short to power.

Is inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and the ground.

EC	CM	Ground	Continuity
Connector	Terminal	Giouna	Continuity
F25	1		
F20 -	2		
	123	Ground	Existed
E18	124		
-	127		

Is inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Repair or replace error-detected parts.

6.CHECK FRP SENSOR SIGNAL CIRCUIT

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

3. Check the continuity between FRP sensor harness connector and ECM harness connector.

+				
FRP	sensor	ECM		Continuity
Connector	Terminal	Connector Terminal		
F5	2	F25	18	Existed

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

Is inspection result normal?

NO >> Repair or replace error-detected parts.

7.CHECK FRP SENSOR

Check the FRP sensor. Refer to EC-275, "Component Inspection	<u>.</u>
Is inspection result normal?	

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Repair or replace error-detected parts.

Component Inspection

1.CHECK FRP SENSOR

WITH CONSULT

1. Turn ignition switch OFF.

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P0191 FRP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

- 2. Reconnect harness connector disconnected.
- 3. Start the engine.
- 4. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 5. Check that the "FUEL PRES SEN V" indication.

Monitor Item	Condition	Values/Status
	Engine speed: Idle	1,140 – 1,460 mV
FUEL PRES SEN V	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,300 – 2,900 mV

WITHOUT CONSULT

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connector disconnected.
- 3. Start the engine.
- 4. Check FRP sensor signal voltage.

	ECM			
Connector	+	-	Condition	Value (Approx.)
Connector	Tern	ninal		(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
F25	18	44	[Engine is running]Warm-up conditionIdle speed	1.14– 1.46 V
Γ23	10	44	[Engine is running]Warm-up conditionRevving engine from idle to 4,000 rpm quickly	1.3 – 2.9 V

Is the inspection result normal?

YES >> INSPECTION END.

NO >> Replace FRP sensor. Refer to <u>EM-51, "Exploded View"</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-285, "DTC Logic"</u>.

P0196			DTC detecting condition	Possible cause
P0196		A)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from EOT sensor and intake air temperature sensor 1.	 Harness or connectors (EOT sensor circuit is open or short- ed) EOT sensor
	EOT SENSOR [Engine oil temperature (EOT) sensor circuit range/perfor- mance]	B)	The comparison result of signals trans- mitted to ECM from each temperature sensor (IAT sensor1, IAT sensor 2, ECT sensor, FTT sensor, and EOT sensor) shows that the signal voltage of the EOT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	 Harness or connectors (High or low resistance in the EOT sensor circuit) EOT sensor
	NFIRMATION PROCEDU	JRE		
.INSPE	CTION START			
dure befo 1. Turn i 2. Turn i 3. Turn i F ESTING	re conducting the next test. ignition switch OFF and wa ignition switch ON. ignition switch OFF and wa CONDITION:	it at l it at l		
	>> GO TO 3.			
>				
3.PERFO	ORM DTC CONFIRMATION		OCEDURE FOR MALFUNCTION	A-I
3. PERFO 1. Start (2. Turn i 3. Turn i 4. Turn i 5. Start (DRM DTC CONFIRMATION engine and warm it up to no ignition switch OFF and wa ignition switch ON. ignition switch OFF and wa engine and let it idle for 5 m	orma it at l it at l	l operating temperature. east 10 seconds. east 10 seconds.	A-I
3. PERFC 1. Start (2. Turn i 3. Turn i 4. Turn i 5. Start (5. Chec)	DRM DTC CONFIRMATION engine and warm it up to no ignition switch OFF and wa ignition switch ON. ignition switch OFF and wa engine and let it idle for 5 m k 1st trip DTC.	orma it at l it at l	l operating temperature. east 10 seconds. east 10 seconds.	A-I
3. PERFC 1. Start (2. Turn i 3. Turn i 4. Turn i 5. Start (6. Checl 1s 1st trip YES >	DRM DTC CONFIRMATION engine and warm it up to no ignition switch OFF and wa ignition switch ON. ignition switch OFF and wa engine and let it idle for 5 m	orma it at l it at l ninute	l operating temperature. east 10 seconds. east 10 seconds. es and 10 seconds.	A-I

If it is above 80°C (176°F), go to the following steps.

EC-281

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P0196 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

If it is below 80°C (176°F), warm engine up until "COOLAN TEMP/S" indicates more than 80°C (176°F). Then perform the following steps.

3. Turn ignition switch OFF and soak the vehicle in a cool place.

4. Turn ignition switch ON. NOTE:

Do not turn ignition switch OFF until step 8.5. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.

6. Check the following.

COOLAN TEMP/S	Below 40°C (104°F)
INT/A TEMP SE	Below 40°C (104°F)
Difference between "COOLAN TEMP/S" and "INT/A TEMP SE"	Within 6°C (11°F)

If they are within the specified range, perform the following steps.

If they are out of the specified range, soak the vehicle to meet the above conditions. Then perform the following steps.

NOTE:

• Do not turn ignition switch OFF.

- If it is supposed to need a long period of time, do not deplete the battery.
- 7. Start engine and let it idle for 5 minutes.
- 8. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Proceed to EC-283, "Diagnosis Procedure".

NO >> GO TO 5.

5.PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)

Perform component function check. Refer to EC-283. "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-283, "Diagnosis Procedure".

6.PRECONDITIONING

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

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

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

TESTING CONDITION:

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

>> GO TO 7.

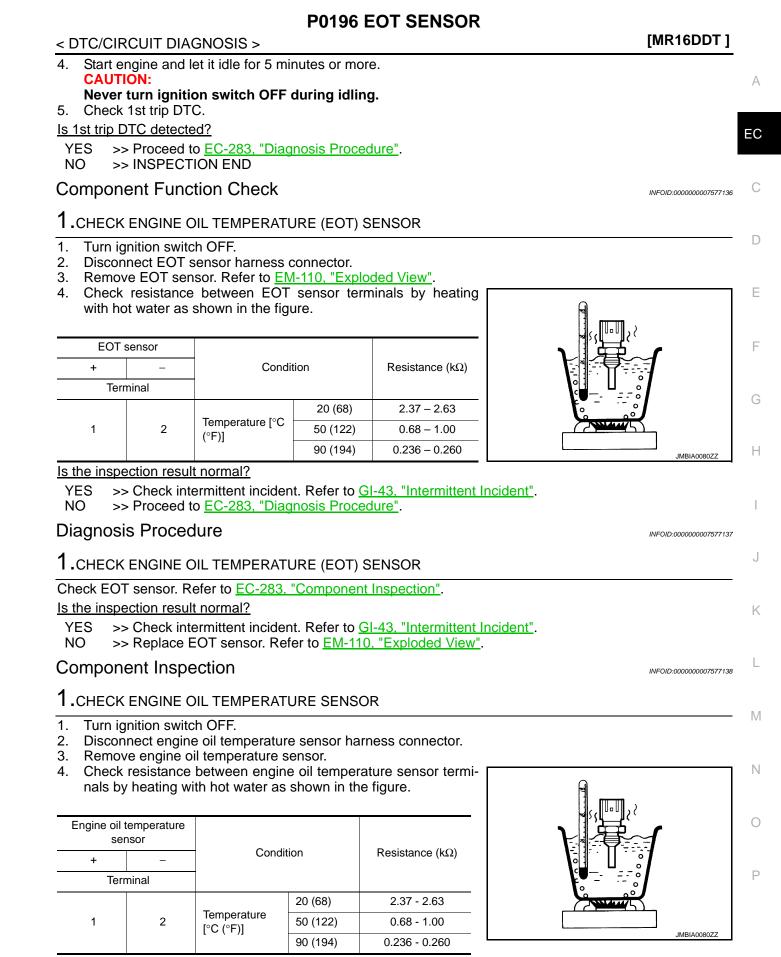
7.PERFORM DTC CONFIRMATION PROCEDURE B

- 1. Start engine and let it idle for 60 minutes.
- 2. Move the vehicle to a cool place.
- NOTE:

Cool the vehicle in an environment of ambient air temperature between –10°C (14°F) and 35°C (95°F). 3. Turn ignition switch OFF and soak the vehicle for 12 hours.

CAUTION: Never turn ignition switch ON during soaking. NOTE:

The vehicle must be cooled with the food open.



Is the inspection result normal?

YES >> INSPECTION END

P0196 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace engine oil temperature sensor. Refer to <u>EM-110, "Exploded View"</u>.

P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

DTC DETECTION LOGIC

P0197, P0198 EOT SENSOR

DTC Logic

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[MR16DDT]

DTC No.	Trouble diagnosis nam (Trouble diagnosis conte		TC Detecting Condition		Possible Cause	
P0197	EOT SEN/CIRC (Engine oil temperature sensor circuit low input)		vely low voltage from the engin ture sensor is sent to ECM.		Harness or connectors (EOT sensor circuit is open or shorted.)	
P0198	EOT SEN/CIRC An excessively high voltage from the engine • Engine oil tempera					
DTC CON	NFIRMATION PRO	CEDURE				
1.PRECO	ONDITIONING					
before cor 1. Turn i 2. Turn i	onfirmation Procedunducting the next test gnition switch OFF a gnition switch ON. gnition switch OFF a	nd wait at lea	st 10 seconds.	lway	s perform the following procedure	
•	> GO TO 2.					
	ORM DTC CONFIRM					
	engine and wait at lea	ist 5 seconds				
	DTC detected?					
	> Proceed to EC-28		Procedure".			
	> INSPECTION END					
	is Procedure				INFOID:00000007577140	
1.CHECK	K ENGINE OIL TEMP	ERATURE S	ENSOR POWER SUPPL	Y		
	gnition switch OFF.	oroturo (EOT) concer hornood connoo	tor		
3. Turn i	gnition switch ON.) sensor harness connec			
4. Check	the voltage betweer	EOT sensor	harness connector and g	roun	ıd.	
	+					
I	EOT sensor	_	Voltage (Approx.)			
Connect	or Terminal		(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
F43	3	Ground	5 V			
YES > NO >	ection result normal? > GO TO 3. > GO TO 2. < ENGINE OIL TEMF		ENSOR POWER SUPPL	Y CII	RCUIT	

1. Turn ignition switch OFF.

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

P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

+		-		
EOT s	ensor	ECM		Continuity
Connector	Terminal	Connector Terminal		
F43	3	F25	39	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

NO >> Repair or replace error-detected parts.

3. CHECK EOT SENSOR GROUND CIRCUIT

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

+	+		-	
EOT s	ensor	ECM		Continuity
Connector	Terminal	Connector Terminal		,
F43	1	F25	44	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK ENGINE OIL TEMPERATURE SENSOR

Check the engine oil temperature sensor. Refer to EC-283, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace engine oil temperature sensor. Refer to EM-110. "Exploded View".

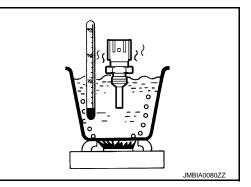
Component Inspection

INFOID:000000007577141

1.CHECK ENGINE OIL TEMPERATURE SENSOR

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

Engine oil temperature sensor					
+	_	Condition		Resistance (k Ω)	
Terminal					
			20 (68)	2.37 - 2.63	
1	2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00	
		L - (/J	90 (194)	0.236 - 0.260	



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil temperature sensor. Refer to EM-110, "Exploded View".

P0201, P0202, P0203, P0204 FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

P0201, P0202, P0203, P0204 FUEL INJECTOR

DTC Logic

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INFOID:000000007577142

[MR16DDT]

EC

DTC DETECTION LOGIC

	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause	
P0201	INJECTOR CIRC-CYL1 (No.1 fuel injector circuit)	ECM detects No. 1 injector circuit is open or shorted.	 The fuel injector circuit is open or shorted Fuel injector ECM 	
P0202	INJECTOR CIRC-CYL2 (No. 2 fuel injector circuit)	ECM detects No. 2 injector circuit is open or shorted.		
P0203	INJECTOR CIRC-CYL3 (No. 3 fuel injector circuit)	ECM detects No. 3 injector circuit is open or shorted.		
P0204	INJECTOR CIRC-CYL4 (No. 4 fuel injector circuit)	ECM detects No. 4 injector circuit is open or shorted.		
	FIRMATION PROCEDURE			
	NDITIONING	en previously conducted alw	vays perform the following procedure	
before cond 1. Turn ig 2. Turn ig 3. Turn ig FESTING (ducting the next test. nition switch OFF and wait at nition switch ON. nition switch OFF and wait at CONDITION:	least 10 seconds. least 10 seconds.		
Before per	forming the following proce	dure, conform that battery v	oltage is 11 V or more at idle.	
•	GO TO 2. RM DTC CONFIRMATION PR	OCEDURE		
2.PERFOR 1. Turn ig 2. Start th 3. Check	RM DTC CONFIRMATION PR nition switch OFF and wait at e engine and let it idle at lease 1st trip DTC.	least 10 seconds.		
2.PERFOR 1. Turn ig 2. Start th 3. Check <u>Is 1st trip D</u> YES >>	RM DTC CONFIRMATION PR nition switch OFF and wait at e engine and let it idle at lease	least 10 seconds. t 30 seconds.		
2.PERFOR 1. Turn ig 2. Start th 3. Check Is 1st trip D YES >> NO >>	RM DTC CONFIRMATION PR nition switch OFF and wait at e engine and let it idle at least 1st trip DTC. <u>TC detected?</u> Proceed to <u>EC-287, "Diagnos</u>	least 10 seconds. t 30 seconds.	INF0ID:00000007577143	
2.PERFOR 1. Turn ig 2. Start th 3. Check 1s 1st trip D YES >> NO >> Diagnosis	RM DTC CONFIRMATION PR nition switch OFF and wait at e engine and let it idle at least 1st trip DTC. <u>TC detected?</u> Proceed to <u>EC-287, "Diagnos</u> INSPECTION END	least 10 seconds. t 30 seconds. <u>sis Procedure"</u> .		
2.PERFOR 1. Turn ig 2. Start th 3. Check Is 1st trip D YES >> NO >> Diagnosis 1.PERFOR Perform tro Is inspectio YES >>	RM DTC CONFIRMATION PR nition switch OFF and wait at e engine and let it idle at least 1st trip DTC. <u>TC detected?</u> Proceed to <u>EC-287, "Diagnos</u> NSPECTION END s Procedure RM TROUBLE DIAGNOSIS F uble diagnosis for injector. Re <u>n result normal?</u>	least 10 seconds. t 30 seconds. <u>sis Procedure"</u> . OR INJECTOR fer to <u>EC-485, "Component Fu</u> Refer to <u>GI-43, "Intermittent Inc</u>	INFOID:000000007577143	

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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-308, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0222	TP SEN 1/CIRC-B1 (Throttle position sensor 1 circuit low input)	An excessively low voltage from the TP sensor 1 is sent to ECM.	 Harness or connectors (TP sensor 1 circuit is open or shorted.) Electric throttle control actuator (TP sensor 1)
P0223	TP SEN 1/CIRC-B1 (Throttle position sensor 1 circuit high input)	An excessively high voltage from the TP sensor 1 is sent to ECM.	

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-288, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007577145

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.

	+	_	Voltage (Approx.)
Electric throttle	control actuator		
Connector	Terminal		
F29	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

EC-288

INFOID:000000007577144

P0222, P0223 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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- 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	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	1	F26	62	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.

${ m 3.}$ CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT

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

	+			
Electric throttle control actu- ator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F26	74	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 THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT

 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		
F29	2	F26	75	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

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

5.CHECK THROTTLE POSITION SENSOR

Check the throttle position sensor. Refer to EC-290, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace electric throttle control actuator. Refer to <u>EM-27, "Exploded View"</u>.

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection

[MR16DDT]

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-131, "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					
Connector	+	_	С	Voltage	
Connector	Terr	ninal]		
	75		Accelerator	Fully released	More than 0.36V
F26		74		Fully depressed	Less than 4.75V
76	pedal	pedal	Fully released	Less than 4.75V	
	70			Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to EM-27, "Exploded View".

P0234 TC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

P0234 TC SYSTEM

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0234 is displayed with DTC P0237 or P0238, first perform the trouble diagnosis for DTC P0237 or P0238. Refer to <u>EC-294, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause	D
P0234	TC SYSTEM-B1 (Turbocharger overboost con- dition)	Turbocharger boost is higher than the target value.	 Turbocharger boost sensor Turbocharger boost control solenoid valve Exhaust manifold and turbocharger assembly Disconnection, looseness or improper connection of boost control actuator hose 	E

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-291, "Component Function Check".

NOTE:

Use component function check to check the overall function of the turbocharger system circuit. During this check, DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-292, "Diagnosis Procedure".

Component Function Check

1.CHECK BOOST CONTROL ACTUATOR HOSE

Check disconnection, looseness or improper connection of hose between turbocharger boost control solenoid valve and boost control actuator.

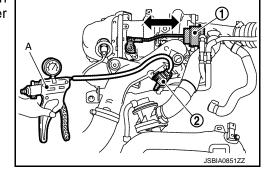
Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to EC-292, "Diagnosis Procedure".

2. PERFORM COMPONENT FUNCTION CHECK

- 1. Turn ignition switch OFF.
- 2. Disconnect turbocharger boost control solenoid valve harness connector.
- 3. Disconnect of hose between turbocharger boost control solenoid valve and compressor outlet pipe.
- 4. Install pressure pump to turbocharger boost control solenoid valve.
- Check that the rod of the boost control actuator activates when supplying pressure and battery voltage to the turbocharger boost control solenoid valve as per the following conditions.



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P0234 TC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

Turbocharger boost control solenoid valve	Operation	
Condition		
Supply pressure [73 kPa (730 mbar, 548 mmHg, 21.56 inHg)] with battery voltage to terminals 1 and 2	Boost control actuator rod operates	
Supply pressure [73 kPa (730 mbar, 548 mmHg, 21.56 inHg)] without battery voltage to terminals 1 and 2	Boost control actuator rod not operates	

CAUTION:

Do not supply pressure over 83 kPa (830 mbar, 623 mmHg, 24.51 inHg)

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-292, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000007577149

1. CHECK BOOST CONTROL ACTUATOR HOSE

Check disconnection, looseness or improper connection of hose between turbocharger boost control solenoid valve and boost control actuator.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.check turbocharger boost control solenoid valve power supply

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

	+		
	oost control sole- valve	-	Voltage
Connector Terminal			
F54	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

 ${\it 3.}$ check turbocharger boost control solenoid valve power supply circuit

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector.
- Check the continuity between turbocharger boost control solenoid valve harness connector and IPDM E/R harness connector.

+				
Turbocharger boost control solenoid valve		IPDM E/R		Continuity
Connector	Terminal	Connector Terminal		
F54	2	E14	36	Existed

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

Is the inspection result normal?

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

NO >> Repair or replace error-detected parts.

4.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT

EC-292

P0234 TC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

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

	+	-	-	
	r boost control bid valve	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	
F54	1	F26	73	Existed
4. Also che	eck harness	for short to p	ower.	
Is the inspec	<u>ction result n</u>	ormal?		
	GO TO 5.			
	D !			1 -

NO >> Repair or replace error-detected parts.

5.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Check the turbocharger boost control solenoid valve. Refer to EC-178, "Component Inspection".	
Is the inspection result normal?	
VES IN COTO 6	

YES >> GO TO 6.

NO >> Replace turbocharger boost control solenoid valve. Refer to <u>EM-37, "Exploded View"</u>. **6.**CHECK BOOST CONTROL ACTUATOR

Check the boost control actuator. Refer to EM-38, "Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace exhaust manifold and turbocharger assembly. Refer to <u>EM-37, "Exploded View"</u>.

7.CHECK TURBOCHARGER BOOST SENSOR

Check the turbocharger boost sensor. Refer to <u>EC-296, "Component Inspection"</u>. <u>Is the inspection result normal?</u>

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace turbocharger boost sensor. Refer to EM-30, "Exploded View".

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< DTC/CIRCUIT DIAGNOSIS >

P0237, P0238 TC BOOST SENSOR

DTC Logic

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DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0237	TC BOOST SEN/CIRC-B1 (Turbocharger boost sensor circuit low input)	An excessively low voltage from the turbocharger boost sensor is sent to ECM.	Harness or connectors (Turbocharger boost sensor circuit is open or shorted.)
P0238	TC BOOST SEN/CIRC-B1 (Turbocharger boost sensor circuit high input)	An excessively high voltage from the turbocharger boost sensor is sent to ECM.	 (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) Turbocharger boost sensor Fuel rail pressure sensor Battery current sensor G sensor Camshaft position sensor Exhaust valve timing control position sensor Accelerator pedal position sensor 2 Engine oil pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 5 seconds. 1.
- 2. Check 1st trip DTC.
- Is 1st trip DTC detected?
- >> Proceed to EC-294, "Diagnosis Procedure". YES
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007577151

1.CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY

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

P0237, P0238 TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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	+		Voltage (Approx.)	
Turbocharger	boost sensor	_		
Connector	Terminal		, , ,	
F75	1	Ground	5 V	

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK SENSOR POWER SUPPLY CIRCUIT

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

3. Check harness connector for short to power and short to ground, between the following terminals.

E	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
		FRP sensor	F5	1
F25	39	EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
F26 68	69	Battery current sensor	F52	1
		G sensor	B32	3
		CMP sensor	F109	1
	12	EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is inspection result normal?

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

NO >> Repair or replace error-detected parts.

3.CHECK TURBOCHARGER BOOST SENSOR GROUND CIRCUIT

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

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

	+			
Turbocharge	r boost sensor	E	Continuity	
Connector	Terminal	Connector		
F75	3	F25	44	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.

${f 4.}$ CHECK TURBOCHARGER BOOST SENSOR INPUT SIGNAL CIRCUIT

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

-	+			
Turbocharge	r boost sensor	ECM		Continuity
Connector	Terminal	Connector Terminal		
F75	2	F25	41	Existed

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

P0237, P0238 TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK TURBOCHARGER BOOST SENSOR

Check the turbocharger boost sensor. Refer to EC-296, "Component Inspection".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.
- NO >> Replace turbocharger boost sensor. Refer to EM-37, "Exploded View".

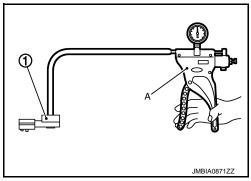
Component Inspection

INFOID:000000007577152

[MR16DDT]

1.CHECK TURBOCHARGER BOOST SENSOR

- 1. Turn ignition switch OFF.
- 2. Remove turbocharger boost sensor with its harness connector.
- Install pressure pump (A) to turbocharger boost sensor (1).
 CAUTION: When insert a pressure pump hose to the sensor, be careful to the damage of the sensor housing.
- 4. Turn ignition switch ON.
- 5. Check the voltage between ECM harness connector terminals as per the following conditions.



NOTE:

- Always calibrate the pressure pump gauge when using it.
- Inspection should be done at room temperature [10 30°C (50 86°F)].

ECM					
Connector	+ –		Condition [Pressure (Relative to at- mospheric pressure)]	Voltage (Approx.)	
Connector	Tern	ninal		(
F25	41 44		0 kPa (0 mbar, 0 mmHg, 0 inHg)	2.03 V	
125	71		40 kPa (400 mbar, 300 mmHg, 11.81 inHg)	2.67 V	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace turbocharger boost sensor. Refer to EM-37, "Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Logic

INFOID:000000007577153

[MR16DDT]

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.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause	
P0300	MULTI CYL MISFIRE (Multiple cylinder misfire detected)	Multiple cylinder misfire.	 Improper spark plug Insufficient compression 	J
P0301	CYL 1 MISFIRE (No.1 cylinder misfire detected)	No. 1 cylinder misfires.	Incorrect fuel pressureFuel Injector circuit is open or shorted	
P0302	CYL 2 MISFIRE (No. 2 cylinder misfire detected)	No. 2 cylinder misfires.	 Fuel injector Intake air leak Ignition signal circuit is open or shorted 	Κ
P0303	CYL 3 MISFIRE (No. 3 cylinder misfire detected)	No. 3 cylinder misfires.	Lack of fuel Signal plate	L
P0304	CYL 4 MISFIRE (No. 4 cylinder misfire detected)	No. 4 cylinder misfires.	A/F sensor 1 Incorrect PCV hose connection	_

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure $$\mathbb{N}$$ before conducting the next test.

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Restart engine and let it idle for about 15 minutes.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to <u>EC-298. "Diagnosis Procedure"</u>.

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< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Start engine and drive the vehicle 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 ±400 rpm		
Vehicle speed	Vehicle speed in the freeze frame data \pm 10 km/h (6 MPH)		
Engine coolant temperature (T)	When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).		
condition	When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).		

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 <u>EC-298</u>, "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?

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< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

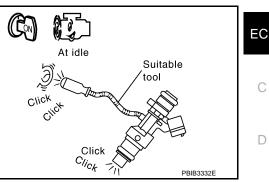
4.CHECK FUNCTION OF FUEL INJECTOR

- 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-485</u>, "Diagnosis Procedure".



5. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

- 1. Turn ignition switch OFF.
- 2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
 - NOTE:

Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

- 3. Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- 5. Turn ignition switch OFF.
- 6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 7. Remove ignition coil and spark plug of the cylinder to be checked.
- 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 9. Connect spark plug and harness connector to ignition coil.
- 10. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

• Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.

• It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken. NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is mal-functioning.

Is the inspection result normal?

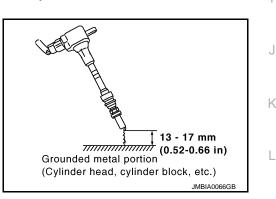
YES >> GO TO 9. NO >> GO TO 6.

6.CHECK FUNCTION OF IGNITION COIL-II

- 1. Turn ignition switch OFF.
- 2. Disconnect spark plug and connect a known-good spark plug.
- 3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?



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< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

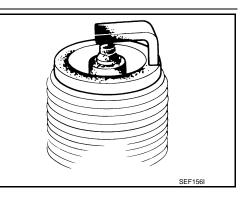
- YES >> GO TO 7.
- NO >> Check ignition coil, power transistor and their circuits. Refer to EC-498, "Diagnosis Procedure".

7.CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-23, "Inspection"</u>.
- NO >> Repair or clean spark plug. Then GO TO 8.



8. CHECK FUNCTION OF IGNITION COIL-III

- 1. Reconnect the initial spark plugs.
- 2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace spark plug(s) with standard type one(s). For spark plug type. Refer to <u>EM-22. "Removal</u> <u>and Installation"</u>.

9.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to <u>EM-15, "Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

10.CHECK FUEL PRESSURE

1. Install all removed parts.

- 2. Release fuel pressure to zero.
- 3. Install fuel pressure gauge and check fuel pressure. Refer to EC-136, "Work Procedure".

At idling: Approximately 500 kPa (5.1 kg/cm², 73 psi)

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly". Refer to FL-5, "2WD : Exploded View".

NO >> Repair or replace.

12. CHECK IGNITION TIMING

Check the following items.

For procedure, refer to EC-125, "Work Procedure"

For specification, refer to EC-535, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Follow the <u>EC-125, "Work Procedure"</u>.

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

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13. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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

		+				
	A/F sensor 1		ECM		Continuity	
-	Connector	Terminal	Connector Terminal			
	F70	1	F25	21	Existed	

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

	F				E
A/F se		_	Continuity		
Connector	Terminal	_	Continuity		_
F70	1	Ground	Not existed		F
		Crodina	Not onloted		
	ŀ				0
EC			Continuity		
Connector	Terminal	-			L
F25	21	Ground	Not existed		ŀ
6. Also check	harness for sh	ort to power.			
Is the inspection					ľ
	TO 14.				
			ound or short to	power in harness or connectors.	
14. CHECK A/	F SENSOR 1	HEATER			,
Check the A/F s	sensor 1 heate	r. Refer to EC-1	72, "Componen	Inspection".	
Is the inspection	n result norma	<u> ?</u>			ł
	TO 15.				
·			M-41, "Exploded	<u>l View"</u> .	
15. снеск м	ASS AIR FLO	W SENSOR			l
With CONSU					
Check "MASS A	AIRFLOW" in "	DATA MONITO	R" mode of "ENC	GINE" using CONSULT.	Ν
1.0 - 4.0	g/s :	at idling			
2.0 - 10.	-	at 2,500 rpm			
With GST	- Gra				ľ
Check mass air	flow sensor si	ional in Service	\$01 with GST.		
		g	••••••		(
1.0 - 4.0	g/s :	at idling			
2.0 - 10.	0 g/s :	at 2,500 rpm			
Is the measurer	ment value wit	hin the specifica	tion?		F
	TO 16.				
				onnections in the mass air flow sensor circuit or	
		<u>EC-199, "DTC L</u>	<u>ogic</u> .		
16. CHECK S					
	-		-520, "Symptom	<u>1 Table"</u> .	
Is the inspection	n result norma	<u> ?</u>			

Revision: 2011 October

< DTC/CIRCUIT DIAGNOSIS >

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 EC-62, "Diagnosis Description".

>> GO TO 18.

18. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

P0327, P0328 KS

< DTC/CIRCUIT DIAGNOSIS >

P0327, P0328 KS

DTC Logic

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[MR16DDT]

DTC DETECTION LOGIC

DTC No.	Trouble diagno (Trouble diagn tent)		DTC	detected condition	Possible cause			
P0327	KNOCK SEN/C (Knock sensor of input)	circuit low	An excessively lo sor is sent to ECI	w voltage from the knock sen- M.	Harness or connectors (Knock sensor circuit is open or short-			
P0328	P0328 KNOCK SEN/CIRC-B1 (Knock sensor circuit high input) An excessively high voltage from the knock sensor is sent to ECM. ed.) • Knock sensor							
DTC CON	FIRMATION	PROCED	DURE					
1.PRECO	NDITIONING							
If DTC Co	nfirmation Pro	ocedure h	as been prev	iously conducted, alwa	ys perform the following procedure			
before con	ducting the ne	xt test.						
	nition switch (nition switch (alt at least 10	seconds.				
3. Turn ig	nition switch (ait at least 10	seconds.				
	CONDITION:	following	procoduro o	onfirm that battory volt	tage is more than 10 V at idle.			
Perore her		Silowing	p.0000010, 0					
>>	> GO TO 2.							
-	RM DTC CON	FIRMATIC	ON PROCEDU	JRE				
	ngine and run							
	1st trip DTC.							
•	TC detected?	-						
	Proceed to <u>E</u> INSPECTION		iagnosis Proc	<u>edure"</u> .				
Diagnosi	s Procedu	e			INFOID:00000007577156			
1.снеск	KNOCK SEN	SOR GRC	UND CIRCUI	т				
	nition switch (
	nect knock se nect ECM har							
				narness connector and E	ECM harness connector.			
	+		_					
Knoc	k sensor		ECM	Continuity				
Connector	Terminal	Connector	Terminal					
F12	2	F25	35	Existed				
5. Also cł	neck harness f	for short to	power.					
•	ection result no	ormal?						
	> GO TO 2.		datastad part	C				
-	Repair or rep KNOCK SEN							
	KNOCK SEN	SOK INPL	JI SIGNAL CI	KUUII				

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

EC-303

P0327, P0328 KS

	+			
Knock sensor		ECM		Continuity
Connector	Terminal	Connector Terminal		
F12	1	F25 36		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 the knock sensor. Refer to EC-304, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".

NO >> Replace knock sensor. Refer to <u>EM-110, "Exploded View"</u>.

Component Inspection

INFOID:000000007577157

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	
+	-	Resistance
Tern	ninals	
1	2	Approx. 532 - 588 kΩ [at 20°C (68°F)]

CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones. <u>Is the inspection result normal?</u>

YES >> INSPECTION END

NO >> Replace knock sensor. Refer to <u>EM-110, "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-384, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0335	CKP SEN/CIRCUIT [Crankshaft position sensor (POS) circuit]	 The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. The crankshaft position sensor (POS) signal is not in the normal pattern during engine run- ning. 	 Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] Crankshaft position sensor (POS) Signal plate
	NFIRMATION PROCE	DURE	
	ONDITIONING		
before co 1. Turn	nducting the next test.	has been previously conducted, alway wait at least 10 seconds.	s perform the following procedure
3. Turn	ignition switch OFF and	wait at least 10 seconds.	
	CONDITION:	g procedure, confirm that battery volt	age is more than 10.5 V with igni-
tion swite		,	
tion Swite			
>	>> GO TO 2.	ION PROCEDURE	
2.PERFO	>> GO TO 2. ORM DTC CONFIRMAT engine and let it idle for a	at least 5 seconds.	
2.PERF0 1. Start If eng	>> GO TO 2. ORM DTC CONFIRMAT engine and let it idle for a jine does not start, crank		
2.PERFC 1. Start If eng 2. Chec	>> GO TO 2. ORM DTC CONFIRMAT engine and let it idle for a	at least 5 seconds.	
2.PERFO 1. Start If eng 2. Chec Is 1st trip YES	> GO TO 2. ORM DTC CONFIRMAT engine and let it idle for a gine does not start, crank k 1st trip DTC. DTC detected? > Proceed to EC-305, "	at least 5 seconds. c engine for at least 2 seconds.	
2.PERF0 1. Start If eng 2. Chec Is 1st trip YES NO 2	 > GO TO 2. ORM DTC CONFIRMAT engine and let it idle for a jine does not start, crank k 1st trip DTC. <u>DTC detected?</u> > Proceed to <u>EC-305. "</u> > INSPECTION END 	at least 5 seconds. c engine for at least 2 seconds.	
2.PERFO 1. Start If eng 2. Chec Is 1st trip YES NO Diagnos	 > GO TO 2. ORM DTC CONFIRMATIon of the engine and let it idle for the engine does not start, crank the form of the form of the engine does not start, crank the form of the engine does not start, crank the form of the form of the form of the engine does not start, crank the form of the form of the form of the engine does not start, crank the form of the form of the form of the engine does not start, crank the form of the form of the form of the engine does not start, crank the form of the engine does not start, crank the form of the form o	at least 5 seconds. a engine for at least 2 seconds. Diagnosis Procedure".	INF0/D:00000007577159
2.PERFC 1. Start If eng 2. Chec Is 1st trip YES NO Diagnos 1.CHEC	 > GO TO 2. ORM DTC CONFIRMATIon engine and let it idle for start, crank to the start, crank to the start, crank to the start of the sta	at least 5 seconds. c engine for at least 2 seconds. <u>Diagnosis Procedure</u> ". FION (CKP) SENSOR (POS) POWER S	UPPLY
2.PERFO 1. Start If eng 2. Chec Is 1st trip YES NO Diagnos 1.CHEC 1. Disco	 > GO TO 2. ORM DTC CONFIRMATIon engine and let it idle for a gine does not start, crank k 1st trip DTC. <u>DTC detected?</u> > Proceed to <u>EC-305, "</u> > INSPECTION END sis Procedure K CRANKSHAFT POSITionnect crankshaft positio 	at least 5 seconds. a engine for at least 2 seconds. Diagnosis Procedure".	UPPLY
2.PERFO 1. Start If eng 2. Chec Is 1st trip YES NO Diagnos 1.CHEC 1. Disco 2. Turn	 >> GO TO 2. ORM DTC CONFIRMAT engine and let it idle for a gine does not start, crank k 1st trip DTC. <u>DTC detected?</u> >> Proceed to <u>EC-305. "</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> ". FION (CKP) SENSOR (POS) POWER S	UPPLY or.
2.PERFO 1. Start If eng 2. Chec Is 1st trip YES NO Diagnos 1.CHEC 1. Disco 2. Turn	 >> GO TO 2. ORM DTC CONFIRMATIon engine and let it idle for a gine does not start, crank k 1st trip DTC. <u>DTC detected?</u> >> Proceed to <u>EC-305.</u> >> INSPECTION END sis Procedure K CRANKSHAFT POSITionnect crankshaft positio ignition switch ON. k the voltage between C 	at least 5 seconds. c engine for at least 2 seconds. Diagnosis Procedure". FION (CKP) SENSOR (POS) POWER S n (CKP) sensor (POS) harness connect	UPPLY or.
2.PERFO 1. Start If eng 2. Chec Is 1st trip YES NO 2 Diagnos 1.CHEC 1. Disco 2. Turn 3. Chec	 >> GO TO 2. ORM DTC CONFIRMATIon engine and let it idle for a gine does not start, crank k 1st trip DTC. <u>DTC detected?</u> >> Proceed to <u>EC-305. "</u> >> INSPECTION END sis Procedure K CRANKSHAFT POSITionnect crankshaft positio ignition switch ON. 	at least 5 seconds. c engine for at least 2 seconds. Diagnosis Procedure". FION (CKP) SENSOR (POS) POWER S n (CKP) sensor (POS) harness connect	UPPLY or.

F107	3	Ground
Is the inspection	n result normal?	?

Terminal

YES >> GO TO 3.

NO >> GO TO 2.

Connector

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INFOID:000000007577158

P0335 CKP SENSOR (POS)

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

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 sen	sor (POS)	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F107	3	F26	58	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 sen	sor (POS)	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F107	2	F26	60	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 sen	sor (POS)	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F107	1	F26	64	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 EC-307, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace crankshaft position sensor (POS). Refer to EM-110, "Exploded View".

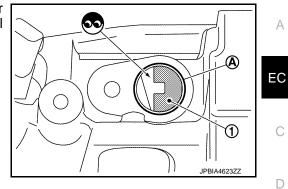
O.CHECK GEAR TOOTH

1. Remove crankshaft position sensor (POS). Refer to EM-110, "Exploded View".

P0335 CKP SENSOR (POS)

< DTC/CIRCUIT DIAGNOSIS >

2. Look into the mounting hole (A) of the crankshaft position sensor (POS) to check that there is no missing gear tooth in the signal plate (1).



Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-43. "Intermittent Incident".
- >> Replace the signal plate. Refer to EM-110, "Exploded View". NO

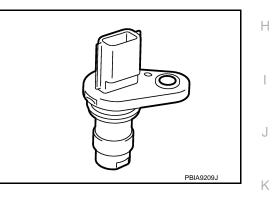
Component Inspection

1.CHECK CRANKSHAFT POSITION SENSOR (POS)-I

- 1. Turn ignition switch OFF.
- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect crankshaft position sensor (POS) harness connector.
- 4. Remove the sensor.
- 5. Visually check the sensor for chipping.
- Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace crankshaft position sensor (POS). Refer to EM-110, "Exploded View".



2. CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check the resistance between crankshaft position sensor (POS) terminals as per the following.

Crankshaft posit	ion sensor (POS)	
+	_	Resistance [at 25°C (77°F)]
Terminal	(Polarity)	
1	2	
I	3	Except 0 or $\infty \Omega$
2	3	
s the inspection	result normal?	·
	PECTION END	
NO >> Repl	lace crankshaft p	osition sensor (POS). Refer to

[MR16DDT]

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< DTC/CIRCUIT DIAGNOSIS >

P0340 CMP SENSOR (PHASE)

DTC Logic

INFOID:000000007577161

[MR16DDT]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0340	CMP SEN/CIRC-B1 [Camshaft position sen- sor (PHASE) circuit]	 The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. The cylinder No. signal is not sent to ECM during engine running. The cylinder No. signal is not in the normal pattern during engine running. 	 Harness or connectors (Camshaft position sensor circuit is open or shorted) (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) Camshaft (Intake) Starter motor Starting system circuit Dead (Weak) battery Fuel rail pressure sensor G sensor Exhaust valve timing control position sensor G sensor Exhaust valve timing control position sensor G sensor Exhaust valve timing control position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Start engine and let it idle for at least 5 seconds.
- If engine does not start, crank engine for at least 2 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-309, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

				VIP SENS	OR (PHA	3E)		
< DTC/CIRC				<u> </u>			[MR16DDT]	
	st trip DTC.		t more than 80	00 rpm for a	t least 5 seco	onds.		А
Is 1st trip DT	•							/ \
			"Diagnosis P	rocedure".				
NO >>	INSPECTIC	N END						EC
Diagnosis	Procedu	ire					INFOID:000000007577162	
1. CHECK S	STARTING	SYSTEM	1					С
Turn ignition	switch to S	TART po	osition.					
•		•	s the starter m	notor operate	<u>e?</u>			D
-	GO TO 2.			-				D
•		• •	em (Refer to <u>S</u>		,			
			ON (CMP) SE	NSOR (PH	ASE) POWE	R SUPPLY		E
0	ition switch		n (CMP) sens			poctor		
	ition switch				111111111111111111111111111111111111111			F
4. Check th	ne voltage b	etween (CMP sensor (PHASE) ha	rness conne	ctor and grou	nd.	
								0
	+	<u>``</u>		Voltage				G
CMP se	ensor (PHASE		-	(Approx.)				
F109	1	inai	Ground	5 V				Н
Is the inspec		ormal?	Ground	5.4				
	GO TO 4.	<u>iomar.</u>						I
•	GO TO 3.							
3.CHECK S	SENSOR PO	OWER S	UPPLY CIRC	UIT				
	ition switch							J
	ect ECM ha			er and shor	t to around. t	between the f	ollowing terminals.	
								K
EC	CM			Sensor				
Connector	Terminal		Name		Connector	Terminal		I
		FRP ser	nsor		F5	1		
F25	39	EOP ser	nsor		F43	3		
		Turboch	arger boost sens	or	F75	1		M
	68		current sensor		F52	1		
F26		G senso			B32	3		N
	72	CMP ser			F109	1		
			ntrol position sens	sor	F110	1		
E18	118	APP ser	nsor 2		E101	5		0
Is inspection			dio an ani-f-					
			diagnosis for ror-detected p		iy circuit.			Р
4	•	•	SE) GROUN					
			SL) GROON					

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

< DTC/CIRCUIT DIAGNOSIS >

+			_	
CMP sense	or (PHASE)	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F109	2	F26	59	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT

- 1. Disconnect ECM harness connector.
- 2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

	+ –			
CMP sense	or (PHASE)	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F109	3	F26	63	Existed

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Check the camshaft position sensor (PHASE). Refer to EC-310, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace camshaft position sensor (PHASE). Refer to EM-85, "Removal and Installation".

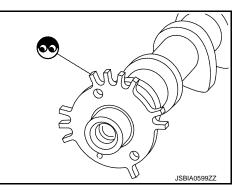
7.CHECK CAMSHAFT (INT)

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-43</u>, "Intermittent <u>Incident"</u>.
- NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-85, "Removal and Installation".



Component Inspection

INFOID:000000007577163

1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-I

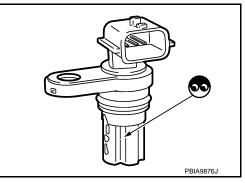
- 1. Turn ignition switch OFF.
- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect camshaft position sensor (PHASE) harness connector.
- 4. Remove the sensor.

< DTC/CIRCUIT DIAGNOSIS >

5. Visually check the sensor for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace camshaft position sensor (PHASE).



2.CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check the resistance camshaft position sensor (PHASE) terminals as per the following.

Camshaft position	on sensor (PHASE)	
+	-	Resistance [Ω at 25°C (77°F)]
Terminal	s (Polarity)	
1	2	
I	3	Except 0 or ∞
2	3	
the inspection res	sult normal?	

is the inspection result normal?

YES >> INSPECTION END

NO >> Replace camshaft position sensor (PHASE). Refer to EM-85, "Removal and Installation".

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< 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.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0420	TW CATALYST SYS-B1 (Catalyst system efficiency below threshold)	 Three way catalyst (manifold) does not operate properly. Three way catalyst (manifold) does not have enough oxygen storage capacity. 	 Three way catalyst (manifold) Exhaust tube Intake air leaks Fuel injector Fuel injector leaks Spark plug Improper ignition timing

DTC CONFIRMATION PROCEDURE

1.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 6.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

TESTING CONDITION:

Do not hold engine speed for more than the specified minutes below.

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 6. Let engine idle for 1 minute.
- 7. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 8. Check that "COOLAN TEMP/S" indicates more than 70°C (158°F).
- If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F). 9. Open engine hood.
- 10. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode of "ENGINE" using CON-SULT.
- 11. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.

EC-312

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(rear)

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SEF484YB

TWC (Manifold

three way catalyst)

ECM

A/F

1

sensor 1

: Exhaust gas

DOADO TUDEE WAY CATALVET EUNCTION

	P042	20 THREE WAY CATAL	YST FUNCTION	
< DTC/CIR	CUIT DIAGNOSIS	>	[N	IR16DDT]
12. Check	the indication of "CA	ATALYST".		
	splayed on CONSU	LT screen?		A
	> GO TO 5. > GO TO 3.			
•		ATION PROCEDURE-II		EC
2. Rev er will tak <u>Does the ir</u> YES >> NO >>	e approximately 5 m adication change to " > GO TO 5. > GO TO 4.	ninutes). ' <u>CMPLT"?</u>	NCMP" of "CATALYST" changes to	"CMPLT" (It C
4. PERFO	RM DTC CONFIRM	ATION PROCEDURE AGAIN		
	ngine and cool it dov m DTC confirmation	wn to less than 70°C (158°F). procedure again.		E
>>	> GO TO 2.			F
5.perfo	RM DTC CONFIRM	ATION PROCEDURE-III		
Check 1st	trip DTC.			G
<u>ls 1st trip D</u>	TC detected?			
	Proceed to <u>EC-314</u> INSPECTION END	4, "Diagnosis Procedure". D		Н
6.PERFO	RM COMPONENT F	FUNCTION CHECK		
	mponent function ch	neck. Refer to <u>EC-313, "Compor</u>	nent Function Check".	
			f the three way catalyst (manifold).	During this
	st trip DTC might not action result normal?			J
· · · · ·	> INSPECTION END			
		4, "Diagnosis Procedure".		
Compon	ent Function Ch	neck	INF	OID:000000007577165
1 .perfo	RM COMPONENT F	FUNCTION CHECK		I
Without	CONSULT			L
 1. Start e 2. Turn ig 	ngine and warm it up Inition switch OFF a	p to the normal operating tempe nd wait at least 10 seconds. he engine speed between 3,500	rature.) and 4,000 rpm for at least 1 minu	te under no $^{\mathbb{M}}$
	gine idle for 1 minute	Э.		K I
	engine hood. the voltage betweer	n ECM harness connector termi	nals as per the following condition.	Ν
				0
	ECM			0
Connector	+ -	Condition	Voltage (V)	
	Terminal			Р

F25	29	33	Keeping engine speed at 2500 rpm constant under no load	The voltage fluctuation cycle takes more than 5 seconds. • 1 cycle: $0.6 - 1.0 \rightarrow 0 - 0.3 \rightarrow 0.6 - 1.0$
-----	----	----	---	--

Is the inspection result normal?

YES >> INSPECTION END NO >> Proceed to <u>EC-314, "Diagnosis Procedure"</u>.

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

[MR16DDT]

CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dent.

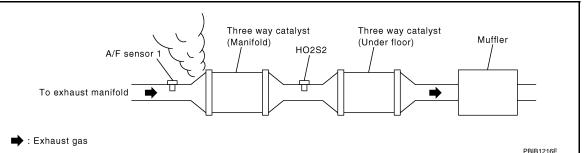
Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2. CHECK EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- 2. Listen for an exhaust gas leak before the three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace error-detected parts.

NO >> GO TO 3.

${f 3.}$ 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

Check the following items. Refer to EC-125, "Work Procedure". For specification, refer to EC-535, "Ignition Timing"

For specification, refer to EC-535, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Follow the EC-125, "Work Procedure".

5.CHECK FUEL INJECTOR

Check the fuel injector. Refer to EC-485, "Component Function Check".

Is the inspection result normal?

NO >> Perform EC-485, "Diagnosis Procedure".

6. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

- 1. Turn ignition switch OFF.
- Remove fuel pump fuse in IPDM E/R to release fuel pressure. 2. NOTE:

Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

3. Start engine.

7.

- After engine stalls, crank it two or three times to release all fuel pressure. 4.
- 5. Turn ignition switch OFF.
- 6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils. Remove ignition coil and spark plug of the cylinder to be checked.

EC-314

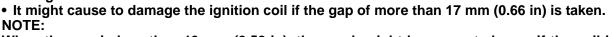
< DTC/CIRCUIT DIAGNOSIS >

- 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.



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-II

- 1. Turn ignition switch OFF.
- 2. Disconnect spark plug and connect a known-good spark plug.
- 3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

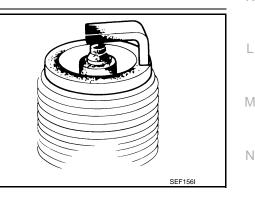
YES >> GO TO 8.

NO >> Check ignition coil, power transistor and their circuits. Refer to EC-498. "Diagnosis Procedure".

8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc. Refer to <u>EM-23, "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-23</u>, "Inspection".
- NO >> Repair or clean spark plug. Refer to <u>EM-57, "Exploded</u> <u>View"</u>. Then GO TO 9



9. CHECK FUNCTION OF IGNITION COIL-III

- 1. Reconnect the initial spark plugs.
- 2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

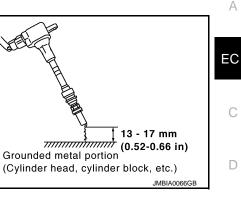
Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-22, "Removal</u> <u>and Installation"</u>.

EC-315

[MR16DDT]



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< DTC/CIRCUIT DIAGNOSIS >

10. CHECK FUEL INJECTOR

- 1. Turn ignition switch OFF.
- Remove fuel injector assembly. Refer to <u>EM-51, "Exploded View"</u>. Keep fuel hose and all fuel injectors connected to fuel tube.
- Disconnect all ignition coil harness connectors.
- 4. Reconnect all fuel injector harness connectors disconnected.
- 5. Turn ignition switch ON.

Does fuel drip from fuel injector?

- YES >> GO TO 11.
- NO >> Replace the fuel injector(s) from which fuel is dripping. Refer to EM-51, "Exploded View".

11.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the trouble fixed?

- YES >> INSPECTION END
- NO >> Replace three way catalyst assembly. Refer to <u>EM-32</u>, "<u>2WD</u> : <u>Exploded View</u>" (2WD), <u>EM-34</u>, <u>"AWD : Exploded View</u>" (AWD).

P0441 EVAP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

P0441 EVAP CONTROL SYSTEM

DTC Logic

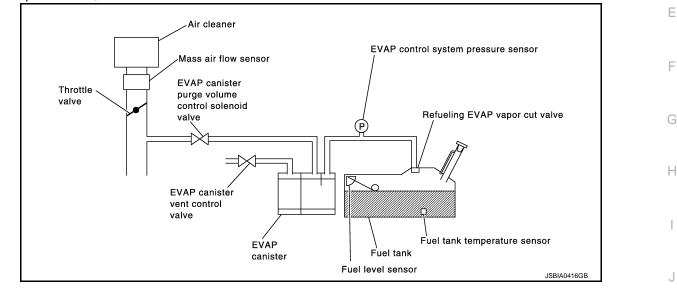
DTC DETECTION LOGIC

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.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause	K
P0441	EVAP PURG FLOW/MON (EVAP control system incor- rect purge flow)	EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	 EVAP canister purge volume control solenoid valve stuck closed EVAP control system pressure sensor and the circuit Loose, disconnected or improper connection of rubber tube Blocked rubber tube Cracked EVAP canister EVAP canister purge volume control solenoid valve circuit Accelerator pedal position sensor Blocked purge port EVAP canister vent control valve 	L M

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. P

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< DTC/CIRCUIT DIAGNOSIS >

2.PERFORM DTC CONFIRMATION PROCEDURE-I

WITH CONSULT

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and let it idle for at least 70 seconds.
- Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode of "ENGINE" using CONSULT.
- 7. Touch "START".

Is "COMPLETED" displayed on CONSULT screen?

YES >> GO TO 4.

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

Selector lever	Suitable position
VHCL SPEED SE	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,300 rpm
B/FUEL SCHDL	1.0 - 6.5 msec
COOLAN TEMP/S	More than 0°C (32°F)

CAUTION:

Always drive vehicle at a safe speed.

NOTÉ:

If "TESTING" does not change for a long time, retry from step 2.

Is "COMPLETED" displayed on CONSULT screen?

- YES >> GO TO 4.
- NO >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 2.

4.PERFORM DTC CONFIRMATION PROCEDURE-III

Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT screen?

- OK >> INSPECTION END
- NG >> Proceed to EC-319, "Diagnosis Procedure".

5.PERFORM COMPONENT FUNCTION CHECK

WITH GST

Perform component function check. Refer to EC-318, "Component Function Check".

NOTE:

Use component function check to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to EC-319, "Diagnosis Procedure".

Component Function Check

INFOID:000000007577168

1.PERFORM COMPONENT FUNCTION CHECK

- 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.

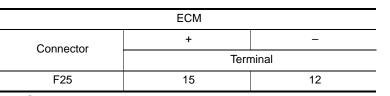
^{1.} Lift up drive wheels.

P0441 EVAP CONTROL SYSTEM

< 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.



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

Verify that EVAP control system pressure sensor value stays 0.1 V less than the value at idle speed (measured at step 6) for at least 1 second.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to EC-319, "Diagnosis Procedure".

Diagnosis Procedure	INFOID:000000007577169
1.CHECK EVAP CANISTER	
 Turn ignition switch OFF. 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 <u>FL-26, "2WD : Removal and Installation"(2WD), FL-29, "AWD</u>
 - Removal and Installation"(AWD).

2. CHECK PURGE FLOW

WITH CONSULT

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- 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 resul	t normal?
YES >> GO TO 7.	
NO >> GO TO 4.	
3.CHECK PURGE FI	LOW

WITHOUT CONSULT

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

2. Stop engine.

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P0441 EVAP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

- Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to <u>EC-55</u>, <u>"EVAPORATIVE EMISSION SYSTEM : System Description"</u>.
- 4. Start engine and let it idle. Never depress accelerator pedal even slightly.
- 5. Check vacuum gauge indication before 60 seconds pass after starting engine.

Vacuum should not exist.

6. Rev engine up to 2,000 rpm after 100 seconds pass after starting engine.

Vacuum should exist.

Is the inspection result normal?

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

4.CHECK EVAP PURGE LINE

1. Turn ignition switch OFF.

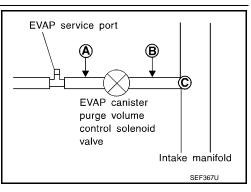
 Check EVAP purge line for improper connection or disconnection. Refer to <u>EC-530, "Inspection"</u>.

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair EVAP purge line.

5.CHECK EVAP PURGE HOSE AND PURGE PORT

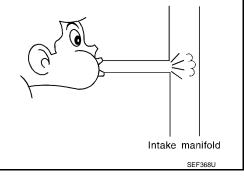
- 1. Disconnect purge hoses connected to EVAP service port (A) and EVAP canister purge volume control solenoid valve (B).
- 2. Blow air into each hose and EVAP purge port (C).



3. Check that air flows freely.

Is the inspection result normal?

- YES-1 >> With CONSULT: GO TO 6.
- YES-2 >> Without CONSULT: GO TO 7.
- NO >> Repair or clean hoses and/or purge port.



6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

WITH CONSULT

- 1. Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 8. NO >> GO TO 7.

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P0441 EVAP CONTROL SYSTEM < DTC/CIRCUIT DIAGNOSIS > 7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE Check the EVAP canister purge volume control solenoid valve. Refer to EC-325, "Component Inspection". Is the inspection result normal? YES >> GO TO 8. >> Replace EVAP canister purge volume control solenoid valve. Refer to FL-26, "2WD : Exploded NO 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. >> Replace EVAP control system pressure sensor. Refer to FL-26, "2WD : Exploded View" (2WD), NO FL-29, "AWD : Exploded View"(AWD). 9.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION Refer to EC-342, "DTC Logic" for DTC P0452, EC-345, "DTC Logic" for DTC P0453. Is the inspection result normal? YES >> GO TO 10. NO >> Replace EVAP control system pressure sensor. Refer to FL-26, "2WD : Exploded View"(2WD), FL-29, "AWD : Exploded View"(AWD). 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-332, "Component Inspection". Is the inspection result normal? YES >> GO TO 12. >> Replace EVAP canister vent control valve. Refer to FL-26, "2WD : Exploded View" (2WD), FL-29, NO "AWD : Exploded View"(AWD). 12.CHECK EVAP PURGE LINE Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks. Refer to EC-531, "Inspection". 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-43, "Intermittent Incident". >> INSPECTION END

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE < DTC/CIRCUIT DIAGNOSIS > [MR16DDT]

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Logic

INFOID:000000007577170

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition		Possible cause
P0443	PURG VOLUME CONT/ V (EVAP canister purge volume control solenoid valve)	A B	The canister purge flow is detected during the vehicle is stopped while the engine is running, even when EVAP canister purge volume control solenoid valve is completely closed. The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control sole- noid valve is completely closed.	 EVAP control system pressure sensor EVAP canister purge volume control solenoid valve (The valve is stuck open.) EVAP canister vent control valve EVAP canister Hoses (Hoses are connected incorrectly or clogged.)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

- Perform DTC CONFIRMATION PROCEDURE when the fuel is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Always perform test at a temperature of 5 to 60°C (41 to 140°F).
- Cool the vehicle so that engine coolant temperature becomes same level as ambient temperature.

Do you have CONSULT

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

2.PERFORM DTC CONFIRMATION PROCEDURE A

With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- Check that the following condition are met. FUEL T/TMP SE: 0 - 35°C (32 - 95°F)
- 4. Start engine and wait at least 60 seconds.
- 5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-323, "Diagnosis Procedure".

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE B

() With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode of "ENGINE" using CONSULT.
- 5. Touch "START".
- 6. Start engine and let it idle until "TESTING" on CONSULT changes to "COMPLETED". (It will take approximately 10 seconds.)

If "TESTING" is not displayed after 5 minutes, retry from step 2.

EC-322

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

	SELF-DIAG RE			
	blayed on CON			
	INSPECTION Proceed to EC	END 2-323, "Diagnosis F	Procedure"	
_		IRMATION PROC		
With GST				
	ition switch OI	N.		
. Check th	ne voltage betv	ween ECM harnes	s connector and	ground.
	+			
	+ ECM		Voltage	
Connector	Terminal		Voltage	
F25	15	Ground	3.1 - 4.0 V	
-	-	at least 60 seconds		
	st trip DTC.		-	
•	C detected?			
	Proceed to <u>EC</u> GO TO 5.	2-323, "Diagnosis F	Procedure".	
		IRMATION PROC		
With GST . Start end	nine and warm	n it up to normal op	erating tempera	
		FF and wait at leas		
 Start eng 	gine and let it i	idle for at least 20		
	st trip DTC.			
•	<u>C detected?</u> Proceed to EC	-323, "Diagnosis F	Procedure"	
	INSPECTION		<u>loccutic</u> .	
Diagnosis	Procedure	•		INFOID:000000007577171
.CHECK E	EVAP CANIST	ER PURGE VOLU	ME CONTROL	SOLENOID VALVE POWER SUPPLY
	ition switch Of			
	ect EVAP can ition switch Of		control solenoid	valve harness connector.
			ter purge volum	e control solenoid valve harness connector and
	-			
ground.				
	+			
ground.				
ground. EVAP caniste	+ er purge volume lenoid valve	_	Voltage	
ground. EVAP caniste	er purge volume	-	Voltage	
ground. EVAP caniste control so	er purge volume lenoid valve	_ Ground	Voltage Battery voltage	
ground. EVAP caniste control so Connector F106	er purge volume lenoid valve Terminal 2			
ground. EVAP caniste control so Connector F106 s the inspec	er purge volume lenoid valve Terminal			
ground. EVAP caniste control so Connector F106 s the inspector YES >> 0 NO >> 0	er purge volume lenoid valve Terminal 2 ction result nor GO TO 3. GO TO 2.	mal?	Battery voltage	
ground. EVAP caniste control so Connector F106 s the inspector YES >> 0 NO >> 0	er purge volume lenoid valve Terminal 2 ction result nor GO TO 3. GO TO 2.	mal?	Battery voltage	SOLENOID VALVE POWER SUPPLY CIRCUIT
ground. EVAP caniste control so Connector F106 s the inspec YES >> 0 NO >> 0 CHECK E	er purge volume lenoid valve Terminal 2 ction result nor GO TO 3. GO TO 2.	<u>mal?</u> ER PURGE VOLU	Battery voltage	OLENOID VALVE POWER SUPPLY CIRCUIT

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

	+	-		
	r purge volume lenoid valve	IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F106 2		E14	35	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.

 ${f 3.}$ CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

+		_		
EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F106	1	F26	95	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.

2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-26, "2WD : Exploded View"</u>(2WD), <u>FL-29, "AWD : Exploded View"</u>(AWD).

5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to EC-325. "Component Inspection".

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 6.

YES-2 >> Without CONSULT: GO TO 7.

NO >> Replace EVAP control system pressure sensor. Refrt to <u>FL-26</u>, "2WD : Exploded View"(2WD), <u>FL-29</u>, "AWD : Exploded View"(AWD).

6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

()With CONSULT

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Start engine.
- 4. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT. Check that engine speed varies according to the valve opening.

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

Revision: 2011 October

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
Check the EVAP canister purge volume control solenoid valve. Refer to EC-325. "Component Inspection".
Is the inspection result normal?
YES >> GO TO 8.
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to <u>EM-27</u> , "Exploded View".
8.CHECK RUBBER TUBE FOR CLOGGING
 Disconnect rubber tube connected to EVAP canister vent control valve. Check the nubber tube for closeding
 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-332, "Component Inspection".
Is the inspection result normal?
YES >> GO TO 10.
NO >> Replace EVAP canister vent control valve. Refer to <u>FL-26, "2WD : Exploded View"</u> (2WD), <u>FL-29</u> <u>"AWD : Exploded View"</u> (AWD).
10. CHECK IF EVAP CANISTER IS SATURATED WITH WATER
1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure senso
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-43. "Intermittent</u>
Incident".
Water
control valve PBIB1213E
11.CHECK EVAP CANISTER
Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure senso
attached.
The weight should be less than 1.9 kg (4.2 lb). Is the inspection result normal?
YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u> .
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 <u>FL-26, "2WD : Exploded View"(</u> 2WD), <u>FL-29</u> " <u>AWD : Exploded View"(</u> AWD).
Component Inspection
1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
1. Turn ignition switch OFF.

2. Reconnect all harness connectors disconnected.

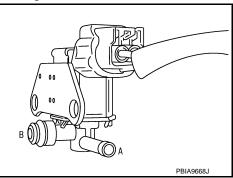
EC-325

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

- 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



[MR16DDT]

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
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Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-27, "Exploded View".

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Logic

INFOID:000000007577173

[MR16DDT]

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DTC DETECTION LOGIC

DTC No.	(Trouble diagno	osis name sis content)	DTC detecting condition	Possible cause
P0444	PURG VOLUME ((EVAP canister pu control solenoid va open)	rge volume	An excessively low voltage signal is ser ECM through the EVAP canister purge ume control solenoid valve.	
	FIRMATION F	ROCEDU	RE	
1.condi	TIONING			
before cor 1. Turn i 2. Turn i 3. Turn i TESTING	nducting the next gnition switch OI gnition switch OI gnition switch OI CONDITION:	test. FF and wait N. FF and wait	been previously conducted, all at least 10 seconds. at least 10 seconds. pcedure, confirm battery voltag	ways perform the following procedure ge is more than 11 V at idle.
>	> GO TO 2.			
2.PERFC	RM DTC CONF	IRMATION	PROCEDURE	
	engine and let it i 1st trip DTC.	dle for at lea	ast 13 seconds.	
	DTC detected?			
			nosis Procedure".	
	> INSPECTION	END		
-	is Procedure	•		INFOID:000000007577174
Diagnos			VOLUME CONTROL SOLENO	INFOID:00000000757717-
Diagnos 1.CHECH 1. Turn i 2. Disco 3. Turn i	K EVAP CANIST gnition switch OI nnect EVAP can gnition switch OI k the voltage bet	ER PURGE F. ister purge v N.	VOLUME CONTROL SOLENO volume control solenoid valve ha	ID VALVE POWER SUPPLY
Diagnos 1.CHECH 1. Turn i 2. Disco 3. Turn i 4. Chech	K EVAP CANIST gnition switch OI nnect EVAP can gnition switch OI the voltage bet d.	ER PURGE F. ister purge v N.	volume control solenoid valve ha	ID VALVE POWER SUPPLY
Diagnos 1.CHECH 1. Turn i 2. Disco 3. Turn i 4. Chech groun EVAP can	K EVAP CANIST gnition switch OI nnect EVAP can gnition switch OI k the voltage bet	ER PURGE F. ister purge v N.	volume control solenoid valve ha	ID VALVE POWER SUPPLY
Diagnos 1.CHECH 1. Turn i 2. Disco 3. Turn i 4. Chech groun EVAP can	K EVAP CANIST gnition switch OI nnect EVAP can gnition switch OI the voltage bet d. + ster purge volume solenoid valve	ER PURGE F. ister purge v N.	volume control solenoid valve ha	ID VALVE POWER SUPPLY
Diagnos 1.CHECH 1. Turn i 2. Disco 3. Turn i 4. Chech groun EVAP can control	K EVAP CANIST gnition switch OI nnect EVAP can gnition switch OI the voltage bet d. + ster purge volume solenoid valve	ER PURGE F. ister purge v N.	volume control solenoid valve ha P canister purge volume control	ID VALVE POWER SUPPLY
Diagnos 1.CHECH 1. Turn i 2. Discol 3. Turn i 4. Chech groun EVAP can control Connector F106 Is the insp YES >	K EVAP CANIST gnition switch OI nnect EVAP can gnition switch OI the voltage bet d. + ister purge volume solenoid valve or Terminal	ER PURGE FF. ister purge v N. ween EVAF	volume control solenoid valve ha P canister purge volume control	ID VALVE POWER SUPPLY

2. Disconnect IPDM E/R harness connector.

EC-327

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and IPDM E/R harness connector.

+		-	_	
EVAP canister purge volume control solenoid valve		IPDM E/R		Continuity
Connector	Terminal	Connector		
F106	2	E14 35		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.

 ${f 3.}$ CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

+			_	
	EVAP canister purge volume control solenoid valve		ECM	
Connector	Terminal	Connector Terminal		
F106	1	F26 95		Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 4.

YES-2 >> Without CONSULT: GO TO 5.

NO >> Repair or replace error-detected parts.

${f 4}$. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT

- 1. Reconnect all harness connectors disconnected.
- 2. Start engine.
- 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 4. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> GO TO 5.

5.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Check the EVAP canister purge volume control solenoid valve. Refer to <u>EC-325, "Component Inspection"</u>. <u>Is the inspection result normal?</u>

- YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.
- NO >> Replace EVAP canister purge volume control solenoid valve. Refer to <u>EM-27, "Exploded View"</u>.

Component Inspection

INFOID:000000007577175

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.

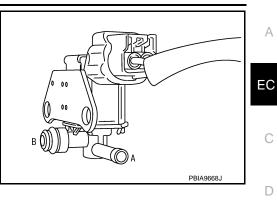
EC-328

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

6. Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve as per the following conditions.

Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



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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
s 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 >

P0447 EVAP CANISTER VENT CONTROL VALVE

DTC Logic

INFOID:000000007577176

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0447	VENT CONTROL VALVE	An improper voltage signal is sent to	 Harness or connectors
	(EVAP canister vent control valve cir-	ECM through EVAP canister vent	(EVAP canister vent control valve
	cuit open)	control valve.	circuit is open or shorted.) EVAP canister vent control valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and wait at least 8 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-330, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

(D) With CONSULT

- 1. Turn ignition switch OFF and then turn ON.
- 2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 3. Touch "ON/OFF" on CONSULT screen.
- 4. Check for operating sound of the valve.

Clicking sound should be heard.

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> GO TO 3.

3.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister vent control valve harness connector.
- 3. Turn ignition switch ON.

EC-330

INFOID:000000007577177

[MR16DDT]

< DTC/CIRCUIT DIAGNOSIS >

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4. Check the voltage between EVAP canister vent control valve harness connector and ground.

	+		
EVAP canister v	ent control valve	_	Voltage
Connector	Terminal		
B21	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.
- Check the continuity between EVAP canister vent control valve harness connector and IPDM E/R harness connector.

	+	-	-	
	er vent control Ive	IPDM	/I E/R	Continuity
Connector	Terminal	Connector	Terminal	
B21	1	E14	36	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		
B21	2	F26 69		Existed

4. Also check harness for short to power.

Is the inspection result normal?		
YES >> GO TO 6.	J	
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?	5	

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-332, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace EVAP canister vent control valve. Refer to <u>FL-26, "2WD : Exploded View"</u>

Component Inspection

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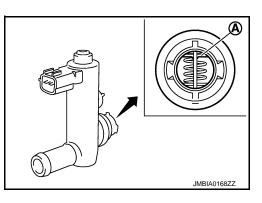
[MR16DDT]

1.CHECK EVAP CANISTER VENT CONTROL VALVE-I

- 1. Turn ignition switch OFF.
- 2. Remove EVAP canister vent control valve from EVAP canister.
- 3. Check portion (A) of EVAP canister vent control valve for being rusted.

Is it rusted?

- YES >> Replace EVAP canister vent control valve. Refer to <u>FL-26</u>, "2WD : Exploded View"(2WD), <u>FL-29</u>, "AWD : <u>Exploded View"</u>(AWD).
- NO >> GO TO 2.



2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT

- 1. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 4. Check air passage continuity and operation delay time.

Make sure new O-ring is installed properly.

Condition (VENT CONT/V)	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

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Operation takes less than 1 second.

Without CONSULT

Check air passage continuity and operation delay time under the following conditions.

Make sure new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace EVAP canister vent control valve. Refer to <u>FL-26, "2WD : Exploded View"(2WD)</u>, <u>FL-29,</u> "<u>AWD : Exploded View"(</u>AWD).

3.CHECK EVAP CANISTER VENT CONTROL VALVE-III

() With CONSULT

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.

< 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 sec	cond.
s the inspection result normal?	

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve. Refer to <u>FL-26</u>, "<u>2WD</u> : <u>Exploded View</u>"(2WD), <u>FL-29</u>, "<u>AWD</u> : <u>Exploded View</u>"(AWD).

[MR16DDT]

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< DTC/CIRCUIT DIAGNOSIS >

P0448 EVAP CANISTER VENT CONTROL VALVE

DTC Logic

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[MR16DDT]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0448	VENT CONTROL VALVE (EVAP canister vent control valve close)	EVAP canister vent control valve remains closed under specified driving conditions.	 EVAP canister vent control valve EVAP control system pressure sensor and the circuit Blocked rubber tube to EVAP canister vent control valve EVAP canister is saturated with water

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

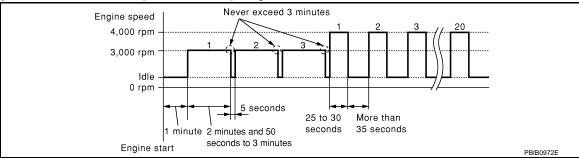
2. PERFORM DTC CONFIRMATION PROCEDURE

(I) With CONSULT

- Turn ignition switch ON and wait at least 5 seconds.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 4. Start engine and let it idle for at least 1 minute.
- 5. Repeat next procedures three times.
- Increase the engine speed up to 3,000 to 3,500 rpm and keep it for 2 minutes and 50 seconds to 3 minutes.

Never exceed 3 minutes.

- Fully released accelerator pedal and keep engine idle for about 5 seconds.
- 6. Repeat next procedure 20 times.
- Quickly increase the engine speed up to 4,000 to 4,500 rpm or more and keep it for 25 to 30 seconds.
- Fully released accelerator pedal and keep engine idle for at least 35 seconds.



7. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

- YES >> Proceed to EC-335. "Diagnosis Procedure".
- NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

Diagnosis Procedure	
1.CHECK RUBBER TUBE	A
 Turn ignition switch OFF. Disconnect rubber tube connected to EVAP canister vent control valve. Check the rubber tube for clogging. 	EC
Is the inspection result normal? YES >> GO TO 2. NO >> Clean rubber tube using an air blower.	С
2. CHECK EVAP CANISTER VENT CONTROL VALVE	D
Check the EVAP canister vent control valve. Refer to <u>EC-336</u> , <u>"Component Inspection"</u> . <u>Is the inspection result normal?</u> YES >> GO TO 3. NO >> Replace EVAP canister vent control valve. Refer to FL-26, "2WD : Exploded View"(2WD), FL-29	E
NO >> Replace EVAP canister vent control valve. Refer to <u>FL-26, "2WD : Exploded View"</u> (2WD), <u>FL-29</u> <u>"AWD : Exploded View"</u> (AWD). 3. CHECK IF EVAP CANISTER IS SATURATED WITH WATER	F
 Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure senso 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.	G H
Water EVAP canister vent	I
4.CHECK EVAP CANISTER	J
Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure senso attached. The weight should be less than 1.9 kg (4.2 lb).	r K
Is the inspection result normal? YES >> GO TO 6. NO >> GO TO 5.	L
5. DETECT MALFUNCTIONING PART	M
Check the following.EVAP canister for damageEVAP hose between EVAP canister and vehicle frame for clogging or poor connection	N
>> Repair hose or replace EVAP canister. Refer to <u>FL-26, "2WD : Exploded View"(2WD), FL-29</u> <u>"AWD : Exploded View"(</u> AWD).	0
6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	
 Disconnect EVAP control system pressure sensor harness connector. Check connectors for water. 	Ρ
Water should not exist.	

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-26, "2WD : Exploded View"</u>(2WD), <u>FL-29, "AWD : Exploded View"</u>(AWD).

EC-335

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

7.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to EC-341, "Component Inspection". Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".
- NO >> Replace EVAP control system pressure sensor. Refer to FL-26, "2WD : Exploded View" (2WD), FL-29, "AWD : Exploded View"(AWD).

Component Inspection

1.CHECK EVAP CANISTER VENT CONTROL VALVE-I

- 1. Turn ignition switch OFF.
- 2. Remove EVAP canister vent control valve from EVAP canister.
- Check portion (A) of EVAP canister vent control valve for being 3.

rusted.

Is it rusted?

- YES >> Replace EVAP canister vent control valve. Refer to FL-26. "2WD : Exploded View"(2WD), FL-29. "AWD : Exploded View"(AWD).
- NO >> GO TO 2.



(P)With CONSULT

- 1. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 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 (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> GO TO 3.

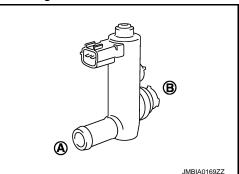
>> Replace EVAP canister vent control valve. Refer to FL-26, "2WD : Exploded View" (2WD), FL-29, NO "AWD : Exploded View" (AWD).

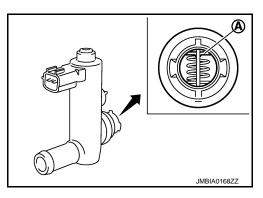
3.CHECK EVAP CANISTER VENT CONTROL VALVE-III

(P)With CONSULT

Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower. 1.







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< DTC/CIRCUIT DIAGNOSIS >

- 2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 3. Check air passage continuity and operation delay time.
- Make sure new O-ring is installed properly.

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.**

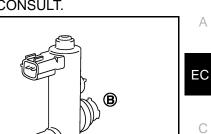
Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed
Operation takes loss than 1 se	aand

Operation takes less than 1 second.

Is the inspection result normal?

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- YES >> INSPECTION END
- NO >> Replace EVAP canister vent control valve. Refer to <u>FL-26, "2WD : Exploded View"(2WD), FL-29,</u> H <u>"AWD : Exploded View"(AWD).</u>



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P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0451 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-384, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)		Possible cause
P0451	EVAP SYS PRES SEN (EVAP control system pressure sensor perfor- mance)	ECM detects a sloshing signal from the EVAP control system pressure sensor	 Harness or connectors (EVAP control system pressure sensor circuit is shorted.) EVAP control system pressure sensor

DTC CONFIRMATION PROCEDURE

NOTE:

Never remove fuel filler cap during DTC confirmation procedure.

1.PRECONDITIONING

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

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

With CONSULT>>GO TO 2.

Without CONSULT>>GO TO 5.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

() With CONSULT

1. Start engine and let it idle for least 40 seconds. **NOTE:**

Do not depress accelerator pedal even slightly.

- 2. Check 1st trip DTC.
- Is 1st trip DTC detected?

YES >> Proceed to EC-339, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

- i. Select "EVAP DIAG READY" in "DATA MONITOR" mode of "ENGINE".
- Let it idle until "OFF" of "EVAP DIAG READY" changes to "ON". NOTE:

It will take at most 2 hours until "OFF" of "EVAP DIAG READY" changes to "ON".

 Turn ignition switch OFF and wait at least 90 minutes. NOTE:

Never turn ignition switch ON during 90 minutes.

- 4. Turn ignition switch ON.
- 5. Select "EVAP LEAK DIAG" in "DATA MONITOR" mode of "ENGINE".
- 6. Check that "EVAP LEAK DIAG" indication.

Which is displayed on CONSULT?

CMPLT>> GO TO 4.

- YET >> 1. Perform DTC CONFIRMATION PROCEDURE again.
 - 2. GO TO 1.

EC-338

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P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR	
< DTC/CIRCUIT DIAGNOSIS > [MR16DDT]
4.PERFORM DTC CONFIRMATION PROCEDURE-3	Δ
With CONSULT Check 1st trip DTC.	
Is 1st trip DTC detected?	EC
YES >> Proceed to <u>EC-339. "Diagnosis Procedure"</u> . NO >> INSPECTION END	
5. PERFORM DTC CONFIRMATION PROCEDURE-4	С
 With GST Start engine and let it idle for least 40 seconds. NOTE: Do not depress accelerator pedal even slightly. Check 1st trip DTC. 	D
Is 1st trip DTC detected?	E
YES >> Proceed to <u>EC-339, "Diagnosis Procedure"</u> . NO >> GO TO 6.	
6.PERFORM DTC CONFIRMATION PROCEDURE-5	F
 With GST Let it idle for at least 2 hours. Turn ignition switch OFF and wait at least 90 minutes. NOTE: Never turn ignition switch ON during 90 minutes. Turn ignition switch ON. 	G
4. Check 1st trip DTC.	
Is 1st trip DTC detected?	
YES >> Proceed to <u>EC-339, "Diagnosis Procedure"</u> . NO >> INSPECTION END	I
Diagnosis Procedure	⁷¹⁸³ ل
1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER	
 Turn ignition switch OFF. Disconnect EVAP control system pressure sensor harness connector. Check sensor harness connector for water. 	K
Water should not exist.	L
Is the inspection result normal?	
YES >> GO TO 2.	\mathbb{N}
NO >> Repair or replace harness connector.	
2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY	
 Turn ignition switch ON. Check the voltage between EVAP control system pressure sensor harness connector and ground. 	Ν
+ EVAP control system pressure sen- Voltage	C

	tem pressure sen- or	_	Voltage (Approx.)
Connector	Terminal		
B22 3		Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

 $\mathbf{3.}$ Check evap control system pressure sensor power supply circuit

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P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

- 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		
B22	3	F25 23		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		
B22	1	F25 12		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.

${f 5.}$ 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 pres- sure sensor		ECM	
Connector	Terminal	Connector Terminal		
B22	2	F25 15		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.

O.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to EC-341, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-26</u>, "<u>2WD</u> : <u>Exploded View</u>"(2WD), <u>FL-29</u>, "<u>AWD</u> : <u>Exploded View</u>"(AWD).

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection

[MR16DDT]

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1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

- 1. Turn ignition switch OFF.
- Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister.
 Always replace O-ring with a new one.
- 3. Install a vacuum pump to EVAP control system pressure sensor.
- 4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the c following conditions.

	ECM		Condition		
Connector	+	-	[Applied vacuum kPa (kg/cm ² , psi)]		
Connector	Terr	ninal			
F25	15 12		Not applied	0.5 - 4.6 V	E
125	15	12	-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 <u>FL-26, "2WD : Exploded View"(2WD)</u>, H <u>FL-29, "AWD : Exploded View"(AWD)</u>.

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P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0451 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-384, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0452	EVAP SYS PRES SEN (EVAP control system pressure sensor low in- put)	An excessively low voltage from the sensor is sent to ECM.	 Harness or connectors (EVAP control system pressure sensor circuit is shorted.) EVAP control system pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

() With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 5. Make sure that "FUEL T/TMP SE" indication is more than 0°C (32°F).
- 6. Start engine and wait at least 20 seconds.
- 7. Check 1st trip DTC.

With GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Set voltmeter probes to ECM harness connector terminals as per the following.

Connector	+	_	Voltage
Connector	Tern	ninal	
F25	15	12	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-343, "Diagnosis Procedure".
- NO >> INSPECTION END

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P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >	

[MR16DDT]

< DTC/CIRCU	IIT DIAGN	IOSIS >			[MR16DDT]	
Diagnosis F	Procedu	re			INF0ID:00000007577186	۸
1.CHECK EV	AP CONT	ROL SYSTE	M PRESSU	JRE SENSO	R CONNECTOR FOR WATER	A
1. Turn ignitio						EC
		ontrol system		ensor harnes	s connector.	LC
Water	should no	ot exist				C
Is the inspectio						0
YES >> GO	O TO 2.					D
•	•	place harnes				D
			M PRESSU	JRE SENSOR	R POWER SUPPLY	_
 Turn ignition Check the 			P control sy	stem pressur	e sensor harness connector and ground.	E
	+					_
EVAP control sys		re sen-		Voltage		F
	sor		-	(Approx.)		
Connector	Termi			5.)/		G
B22 Is the inspection	3		round	5 V		
•	<u>Эптезан п</u> Э ТО 4.					Н
-	O TO 3.					
			M PRESSU	JRE SENSO	R POWER SUPPLY CIRCUIT	
 Turn ignition Disconnect 		OFF. rness conne	ctor.			
Check the ness conn	-	/ between E	VAP contro	l system pre	ssure sensor harness connector and ECM har-	J
+		-	_			K
EVAP control sy sure sen	•	EC	CM	Continuity		
Connector	Terminal	Connector	Terminal	_		L
B22	3	F25	23	Existed		
		for short to g	ground and t	to power.		M
Is the inspection YES >> Pe			nacia far na	wer supply ci	rouit	1 1 1
		place error-d			icuit.	
4.CHECK EV	AP CONT	ROL SYSTE	M PRESSU	JRE SENSO	R GROUND CIRCUIT	Ν
1. Turn ignitio			-to #			
		rness conne / between E		l system pre	ssure sensor harness connector and ECM har-	0
ness conn	-					
						Ρ

	+ –				
	l system pres- sensor	ECM		Continuity	
Connector	Terminal	Connector Terminal			
B22	1	F25 12		Existed	

4. Also check harness for short to power.

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

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

 Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

	+		_	
	EVAP control system pres- sure sensor		ECM	
Connector	Terminal	Connector Terminal		
B22	2	F25	15	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-341. "Component Inspection".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.
- NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-26</u>, "2WD : Exploded View"(2WD), <u>FL-29</u>, "AWD : Exploded View"(AWD).

Component Inspection

INFOID:000000007577187

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. Always replace O-ring with a new one.
- 3. Install a vacuum pump to EVAP control system pressure sensor.
- 4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

ECM			Condition	
Connector	+	-	[Applied vacuum kPa (kg/cm ² , psi)]	Voltage
Connector	Terminal			
F25	E25 15		Not applied	0.5 - 4.6 V
125	15	15 12	-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 <u>FL-26, "2WD : Exploded View"(2WD)</u>, <u>FL-29, "AWD : Exploded View"(AWD)</u>.

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0451 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-384, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause	D	
P0453	EVAP SYS PRES SEN (EVAP control system pressure sensor high in- put)	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 	E	
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. 					
 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. pe	ERFORM DTC CONFIRMATION PROCEDURE
(P)Wi	th CONSULT
1. S	Start engine and warm it up to normal operating temperature.
2. T	urn ignition switch OFF and wait at least 10 seconds.
	urn ignition switch ON.
4. S	Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
	Ake sure that "FUEL T/TMP SE" indication is more than 0°C (32°F).
	Start engine and wait at least 20 seconds

- 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	Terr				
F25	15	12	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.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-346, "Diagnosis Procedure".
- NO >> INSPECTION END

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P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

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[MR16DDT]

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		
B22	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.

	+		_	
	system pres- sensor	ECM		Continuity
Connector	Terminal	Connector	Terminal	
B22	3	F25	23	Existed

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

Is the inspection result normal?

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

NO >> Repair or replace error-detected parts

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

	+		_	
	l system pres- sensor	ECM		Continuity
Connector	Terminal	Connector	Terminal	
B22	1	F25	12	Existed

4. Also check harness for short to power.

	P045	3 EVAP C	ONTROL	SYSTEM PR	ESSURE SENSOR	
< DTC/CIRC		NOSIS >			[MR16DDT]	
Is the inspec		ormal?				
	GO TO 5. Repair or re	place error-d	latacted part	e		А
_	•		•	is. IRE SENSOR SIGI		
. <u> </u>					sensor harness connector and ECM har-	EC
ness col	•		VAP CONITO	system pressure	sensor hamess connector and ECW har-	
						C
	+		-			0
	l system pres- sensor	E	CM	Continuity		_
Connector	Terminal	Connector	Terminal			D
B22	2	F25	15	Existed		
2. Also che	eck harness	for short to g	round and t	o power.		Е
Is the inspec		ormal?				
	GO TO 6. Bopoir or ro	place error-d	latacted part	·•		F
6.CHECK F	-	-	letected part			
				canister vent contro		
		be for cloggi				G
Is the inspec	ction result n	ormal?				
	GO TO 7.	ibbor tubo ur	ing on oir bl	ower, repair or repl	and rubbar tuba	Н
7.снеске			-			
Refer to EC-						I
Is the inspec		•				
•	GO TO 8.	onnan				
				valve. Refer to <u>FL-</u>	<u> 26, "2WD : Exploded View"(2WD), FL-29,</u>	J
-		oded View"(,	RE SENSOR		
				INE SENSOR		Κ
Refer to <u>EC-</u> Is the inspec						
	GO TO 9.	<u>orman</u>				L
					to FL-26, "2WD : Exploded View"(2WD),	
•		D : Exploded	•	WITH WATER		Μ
					and EVAP control system pressure sensor	1 V 1
attached			AF Carlister		and EVAP control system pressure sensor	
		rain from the		ster.		Ν
<u>Does water</u> YES >>	<u>drain from E</u> GO TO 10.	VAP caniste	<u>r?</u>		EVAP canister	
		nittent incide	ent. Refer to	GI-43, "Intermitten		0
	Incident".					
						Р
						-
					Water EVAP canister vent	
					control valve PBIB1213E	

10.CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection
 - >> Repair hose or replace EVAP canister. Refer to <u>FL-26, "2WD : Exploded View"(2WD)</u>, <u>FL-29,</u> <u>"AWD : Exploded View"(AWD)</u>.

Component Inspection

INFOID:000000007577190

[MR16DDT]

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. Always replace O-ring with a new one.
- 3. Install a vacuum pump to EVAP control system pressure sensor.
- 4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

ECM			Condition		
Connector	+	-	Condition [Applied vacuum kPa (kg/cm ² , psi)]	Voltage	
Connector	Terminal				
F25	15 12		Not applied	0.5 - 4.6 V	
125	15	12	-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 <u>FL-26, "2WD : Exploded View"(2WD),</u> <u>FL-29, "AWD : Exploded View"(</u>AWD).

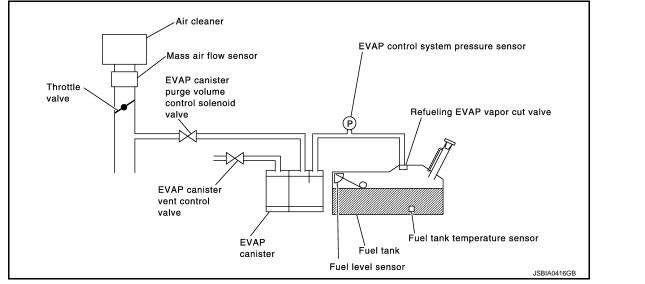
P0456 EVAP CONTROL SYSTEM

DTC Logic

DTC DETECTION LOGIC

This diagnosis detects leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the negative pressure caused by decrease of fuel temperature in the fuel tank after turning ignition switch OFF.

If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0456	EVAP VERY SML LEAK (Evaporative emission control system leak)	 EVAP system has a leak. EVAP system does not operate properly. 	 Incorrect fuel tank vacuum relief valve Incorrect fuel filler cap used Fuel filler cap remains open or does not close. Foreign matter caught in fuel filler cap. Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. Foreign matter caught in EVAP canister vent control valve. EVAP canister or fuel tank leaks EVAP purge line (pipe and rubber tube) leaks EVAP purge line rubber tube bent Loose or disconnected rubber tube EVAP canister purge volume control valve and the circuit EVAP canister purge volume control solenoid valve and the circuit EVAP canister purge volume control solenoid valve and the circuit EVAP canister is saturated with water EVAP control system pressure sensor Refueling EVAP vapor cut valve ORVR system leaks Fuel level sensor and the circuit Foreign matter caught in EVAP canister purge volume control solenoid valve

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.
- If the fuel filler cap is not tightened properly, the MIL may illuminate.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC CONFIRMATION PROCEDURE

[MR16DDT]

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< DTC/CIRCUIT DIAGNOSIS >

1.PRECONDITIONING

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

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

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 4.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

(I) WITH CONSULT

- 1. Turn ignition switch ON and select "EVAP DIAG READY" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
- Start engine and wait at idle until "OFF" of "EVAP DIAG READY" changes to "ON". NOTE:
- It will take at most 2 hours until "OFF" of "EVAP DIAG READY" changes to "ON".
- 3. Turn ignition switch OFF and wait at least 90 minutes. **NOTE:**
 - Never turn ignition switch ON during 90 minutes.
- 4. Turn ignition switch ON and select "EVAP LEAK DIAG" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 5. Check that "EVAP LEAK DIAG" indication.

Which is displayed on CONSULT?

CMPLT >> GO TO 3.

YET >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 1.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-350, "Diagnosis Procedure".
- NO >> INSPECTION END.

4.PERFORM DTC CONFIRMATION PROCEDURE

WITH GST

- 1. Start engine and wait engine idle for at least 2 hours.
- 2. Turn ignition switch OFF and wait at least 90 minutes. **NOTE:**

Never turn ignition switch ON during 90 minutes.

- 3. Turn ignition switch ON.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-350, "Diagnosis Procedure".
- NO >> INSPECTION END.

Diagnosis Procedure

INFOID:000000007577192

1.CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.

< DTC/CIRCUIT DIAGNOSIS >

2.

NO

NO

NO

NO

NO

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Check for genuine NISSAN fuel filler cap design. Is the inspection result normal? YES >> GO TO 2. >> Replace with genuine NISSAN fuel filler cap. NISSAN 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. >> 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. >> GO TO 4. **4.**CHECK FUEL TANK VACUUM RELIEF VALVE Refer to EC-354, "Component Inspection". Is the inspection result normal? YES >> GO TO 5. >> Replace fuel filler cap with a genuine one. **5.**CHECK FOR EVAP LEAK Refer to EC-531, "Inspection". Is there any leak in EVAP line? YES >> Repair or replace. >> GO TO 6. 6.CHECK EVAP CANISTER VENT CONTROL VALVE Check the following. EVAP canister vent control valve is installed properly. Refer to FL-26, "2WD : Exploded View". EVAP canister vent control valve. Refer to EC-332, "Component Inspection". Is the inspection result normal? YES >> GO TO 7. >> Repair or replace EVAP canister vent control valve and O-ring. Refer to FL-26, "2WD : Exploded View"(2WD), FL-29, "AWD : Exploded View"(AWD). 7.CHECK IF EVAP CANISTER SATURATED WITH WATER

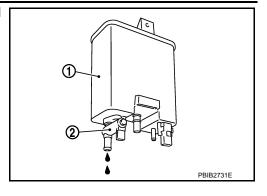
< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

- Remove EVAP canister (1) with EVAP canister vent control valve (2) and EVAP control system pressure sensor attached.
 Check if under will drain from the EVAP consister.
- 2. Check if water will drain from the EVAP canister.

Does water drain from EVAP canister?

- YES >> GO TO 8.
- NO-1 >> With CONSULT: GO TO 10.
- NO-2 >> Without CONSULT: GO TO 11.



8. CHECK EVAP CANISTER

Weigh the EVAP canister assembly with the EVAP canister vent control valve and EVAP control system pressure sensor attached. Refer to <u>FL-26, "2WD : Exploded View"</u>(2WD), <u>FL-29, "AWD : Exploded View"</u>(AWD). **The weight should be less than 2.1 kg (4.6 lb).**

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 10. YES-2 >> Without CONSULT: GO TO 11. NO >> GO TO 9.

9.DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to <u>FL-26, "2WD : Exploded View"(2WD)</u>, <u>FL-29,</u> <u>"AWD : Exploded View"(AWD)</u>.

10. Check evap canister purge volume control solenoid value operation

With CONSULT

- 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- 2. Start engine and let it idle.
- 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 4. Touch "Qu" on CONSULT screen to increase "PURG VOL CONT/V" opening to 100%.
- 5. Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

- YES >> GO TO 13.
- NO >> GO TO 12.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT

- T. Start engine and warm it up to normal operating temperature.
- 2. Stop engine.
- 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- 4. Start engine and let it idle for at least 80 seconds.
- 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 12. **12.**CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to FL-26, "2WD : Exploded View".

EC-352

< DTC/CIRCUIT DIAGNOSIS >	[MR16DDT]
Is the inspection result normal?	
YES >> GO TO 13.	А
NO >> Repair or reconnect the hose.	
13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	EC
Check the EVAP canister purge volume control solenoid valve. Refer to EC-328, "Component	Inspection".
Is the inspection result normal?	
YES >> GO TO 14. NO >> Replace EVAP canister purge volume control solenoid valve. Refer to <u>FL-26. "2</u> View".	2WD : Exploded
14. CHECK FUEL TANK TEMPERATURE SENSOR	D
Check the fuel tank temperature sensor. Refer to EC-269. "Component Inspection".	
Is the inspection result normal?	_
YES >> GO TO 15.	E
NO >> Replace fuel level sensor unit. Refer to <u>FL-5, "2WD : Exploded View"(</u> 2WD) <u>Exploded View"(</u> AWD).	
15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	F
Check the EVAP control system pressure sensor. Refer to FL-26, "2WD : Exploded View".	
Is the inspection result normal?	G
YES >> GO TO 16. NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-26, "2WD : Explod</u>	led View"(2\MD)
<u>FL-29, "AWD : Exploded View"</u> (AWD).	<u>ieu view (</u> 2000), H
16. CHECK EVAP PURGE LINE	Π
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper	er connection.
Refer to FL-25, "2WD : Hydraulic Layout"(2WD), FL-27, "AWD : Hydraulic Layout"(AWD).	I
Is the inspection result normal?	
YES >> GO TO 17. NO >> Repair or reconnect the hose.	
17.CLEAN EVAP PURGE LINE	0
Clean EVAP purge line (pipe and rubber tube) using air blower.	K
>> GO TO 18.	
18. CHECK EVAP/ORVR LINE	L
Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness ar	nd improper con-
nection. For location, refer to FL-25, "2WD : Hydraulic Layout" (2WD), FL-27, "AWD : Hydraulic	<u>c Layout"(</u> AWD).
Is the inspection result normal?	M
YES >> GO TO 19.	
NO >> Repair or replace hoses and tubes.	Ν
19. CHECK RECIRCULATION LINE	
Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, improper connection.	looseness and
Is the inspection result normal?	
YES >> GO TO 20.	
NO >> Repair or replace hose, tube or fuel filler tube. Refer to <u>FL-26, "2WD : Exploded V</u> <u>9, "AWD : Exploded View"(AWD).</u>	<u>/ıew"(</u> 2WD), <u>FL-</u> P
20.CHECK REFUELING EVAP VAPOR CUT VALVE	
Check the refueling EVAP vapor cut valve. Refer to <u>FL-27, "2WD : Inspection"</u> (2WD), <u>FL-30, tion"</u> (AWD).	"AWD : Inspec-
Is the inspection result normal?	

Is the inspection result normal?

YES >> GO TO 21.

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to <u>FL-26, "2WD : Exploded</u> <u>View"(2WD), FL-29, "AWD : Exploded View"(AWD).</u>

21.CHECK FUEL LEVEL SENSOR

Check the fuel level sensor. Refer to MWI-45. "Component Inspection".

Is the inspection result normal?

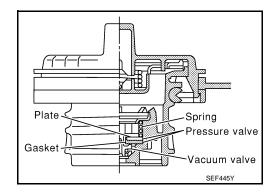
- YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.
- NO >> Replace fuel level sensor unit. Refer to <u>FL-5, "2WD : Exploded View"(2WD)</u>, <u>FL-9, "AWD :</u> <u>Exploded View"(AWD)</u>.

Component Inspection

INFOID:000000007577193

1.CHECK FUEL FILLER CAP

- 1. Turn ignition switch OFF.
- 2. Remove fuel filler cap.
- 3. Wipe clean valve housing.



- 4. Install fuel filler cap adapter (commercial service tool) to fuel filler cap.
- 5. Check valve opening pressure and vacuum.

Pressure:	15.3 - 20.0 kPa (0.156 - 0.204 kg/cm ² , 2.22 - 2.90 psi)
Vacuum:	-6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm ² ,

–0.87 to –0.48 psi)

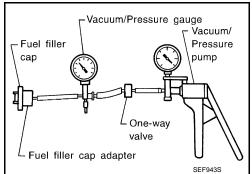
Is the inspection result normal?

YES >> INSPECTION END NO >> GO TO 2. 2.REPLACE FUEL FILLER CAP

Replace fuel filler cap.

CAUTION: Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.

>> INSPECTION END



P0460 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0460 FUEL LEVEL SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P0460 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0460 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-381, "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.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause	E
P0460	FUEL LEV SEN SLOSH (Fuel level sensor circuit noise)	Even though the vehicle is parked, a signal be- ing 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 	F

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-355</u>, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK COMBINATION METER FUNCTION

Refer to MWI-20, "CONSULT Function".

Is the inspection result normal?

YES >> CHECK INTERMITTENT INCIDENT. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Refer to <u>MWI-43</u>, "Component Function Check".

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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 <u>EC-381, "DTC Logic"</u>.

Driving long distances naturally affect fuel gauge level.

This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)		Possible cause
P0461	FUEL LEVEL SENSOR (Fuel level sensor circuit range/performance)	The output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long dis- tance.	 Harness or connectors (The CAN communication line is open or shorted) Harness or connectors (The sensor circuit is open or shorted) Combination meter Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to <u>EC-356, "Component Function Check"</u>.

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

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to EC-357, "Diagnosis Procedure".

Component Function Check

INFOID:000000007577197

1.PRECONDITIONING

WARNING:

When performing following procedure, be sure to observe the handling of the fuel. Refer to <u>EC-11</u>, <u>"General Precautions"</u>.

TESTING CONDITION:

Before starting component function check, preparation of draining fuel and refilling fuel is required.

Do you have CONSULT?

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

2. PERFORM COMPONENT FUNCTION CHECK

With CONSULT

NOTE:

Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/ 8 Imp gal) in advance.

- 1. Prepare a fuel container and a spare hose.
- 2. Release fuel pressure from fuel line, refer to EC-136, "Work Procedure".
- 3. Remove the fuel feed hose on the fuel level sensor unit.
- 4. Connect a spare fuel hose where the fuel feed hose was removed.
- 5. Turn ignition switch OFF and wait at least 10 seconds then turn ON.
- 6. Select "FUEL LEVEL SE" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 7. Check "FUEL LEVEL SE" output voltage and note it.

EC-356

INFOID:000000007577196

P0461 FUEL LEVEL SENSOR

FU401 FUEL LEVEL SENSOR		
< DTC/CIRCUIT DIAGNOSIS >	MR16DDT]	
 Select "FUEL PUMP RELAY" in "ACTIVE TEST" mode of "ENGINE" using CONSULT. Touch "ON" and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it. Check "FUEL LEVEL SE" output voltage and note it. 		A
11. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).		
 Check "FUEL LEVEL SE" output voltage and note it. Confirm whether the voltage changes more than 0.03 V during step 7 to 10 and 10 to 12. 		EC
Is the inspection result normal?	•	
YES >> INSPECTION END		С
NO >> Proceed to <u>EC-357, "Diagnosis Procedure"</u> .		0
3.PERFORM COMPONENT FUNCTION CHECK		
		D
 NOTE: Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 Imp gal) in advance. 1. Prepare a fuel container and a spare hose. 	US gal, 6-5/8	E
 Release fuel pressure from fuel line. Refer to <u>EC-136, "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. Turn ignition switch ON. 		F
 Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment. Confirm that the fuel gauge indication varies. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal). Confirm that the fuel gauge indication varies. 		G
Is the inspection result normal? YES >> INSPECTION END NO >> Proceed to EC-357, "Diagnosis Procedure".		Η
Diagnosis Procoduro	NFOID:000000007577198	I
	W 012.00000000000000000000000000000000000	
1.CHECK COMBINATION METER FUNCTION		J
Refer to <u>MWI-20. "CONSULT Function"</u> .		
<u>Is the inspection result normal?</u> YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u> . NO >> Refer to <u>MWI-43, "Component Function Check"</u>		Κ
		L
		M
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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-381, "DTC Logic"</u>.

This diagnosis indicates the former, to detect open or short circuit malfunction.

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0462	FUEL LEVEL SEN/ CIRC (Fuel level sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	 Harness or connectors (CAN communication line is open or shorted) Harness or connectors
P0463	FUEL LEVEL SEN/ CIRC (Fuel level sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	(Fuel level sensor circuit is open or shorted)Combination meterFuel 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.

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

- YES >> Proceed to EC-358, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007577200

1.CHECK COMBINATION METER FUNCTION

Refer to <u>MWI-20, "CONSULT Function"</u>.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Refer to <u>MWI-43</u>, "Component Function Check"

INFOID:000000007577199

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

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-381, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause	F
P0500	VEH SPEED SEN/CIRC (Vehicle speed sensor)	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 	G H

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 10 V or more at idle.

>> GO TO 2. 2. PERFORM DTC CONFIRMATION PROCEDURE M 1. Start engine. Shift the selector lever to D range and wait at least for 2 seconds. 2. Drive the vehicle at least 5 seconds at 20 km/h (13 MPH) or more. 3. **CAUTION:** Ν 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? Ρ YES >> Proceed to EC-359, "EXCEPT FOR M/T MODELS : Diagnosis Procedure" >> INSPECTION END NO EXCEPT FOR M/T MODELS : Diagnosis Procedure INFOID:000000007577203 1. CHECK DTC WITH TCM Check DTC with TCM. Refer to TM-116, "DTC Index".

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INFOID:000000007577202

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Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble shooting relevant to DTC indicated.

2.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Check DTC with ABS actuator and electric unit (control unit). Refer to <u>BRC-49</u>, "DTC Index".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform trouble shooting relevant to DTC indicated.

3.CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to <u>MWI-31, "DTC Index"</u>.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Perform trouble shooting relevant to DTC indicated.

4.CHECK OUTPUT SPEED SENSOR

Check output speed sensor. Refer to <u>TM-150, "Diagnosis Procedure"</u>.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace or replace error-detected parts.

 \mathbf{b} .CHECK WHEEL SENSOR

Check wheel sensor. Refer to <u>BRC-75, "Diagnosis Procedure"</u>.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace or replace error-detected parts.

M/T MODELS

M/T MODELS : Description

INFOID:000000007577204

INFOID:000000007577205

The vehicle speed signal is sent to the combination meter from the "ABS actuator and electric unit (control unit)" via the CAN communication line. The combination meter then sends a signal to the ECM via the CAN communication line.

M/T MODELS : DTC Logic

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-381, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0500	VEH SPEED SEN/CIRC (Vehicle speed sensor)	The vehicle speed signal sent to ECM is almost 0 km/h (0 MPH) even when vehicle is being driven.	 Harness or connectors (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)

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 Procedu before conducting the next tes 1. Turn ignition switch OFF a 2. Turn ignition switch ON.	ure has been previously conducted, always perform the following procedure st. and wait at least 10 seconds. and wait at least 10 seconds.
>> GO TO 3.	
3.CHECK VEHICLE SPEED	SIGNAL
NOTE:	
This procedure may be cond	ducted with the drive wheels lifted in the shop or by driving the vehicle. If a easier, it is unnecessary to lift the vehicle.
on CONSULT should exce	' in "DATA MONITOR" mode of "ENGINE" using CONSULT. The vehicle speed eed 10 km/h (6 mph) when rotating wheels with suitable gear position.
Is the inspection result normalYES>> GO TO 4.NO>> Proceed to EC-36	<u>)?</u> 32, "M/T MODELS : Diagnosis Procedure".
4.PERFORM DTC CONFIRM	IATION PROCEDURE
 Warm engine up to norma Maintain the following con CAUTION: Always drive vehicle at a 	nditions for at least 50 consecutive seconds.
ENG SPEED	1,800 - 6,000 rpm
COOLAN TEMP/S	More than 65°C (149°F)
B/FUEL SCHDL	6.25 - 31.8 msec
Selector lever	Except Neutral position
PW/ST SIGNAL	OFF
4. Check 1st trip DTC. Is 1st trip DTC detected?	
•	
Perform component function of Use component function check check, a 1st trip DTC might no Is the inspection result normal YES >> INSPECTION EN	check. Refer to <u>EC-361, "M/T MODELS : Component Function Check"</u> . ck to check the overall function of the vehicle speed signal circuit. During this of be confirmed.
M/T MODELS : Compo	nent Function Check INFOID:00000007577206
1.PERFORM COMPONENT	FUNCTION CHECK
With GST July the drive wheels	

- Lift up drive wheels.
 Start engine.
- 3. Read vehicle speed signal in Service \$01 with GST.

P0500 VSS

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

The vehicle speed signal on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-362, "M/T MODELS : Diagnosis Procedure".

M/T MODELS : Diagnosis Procedure

INFOID:000000007577207

1.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-49, "DTC Index".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble shooting relevant to DTC indicated.

2. CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to <u>MWI-31, "DTC Index"</u>.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Perform trouble shooting relevant to DTC indicated.

P0501, P2159 VEHICLE SPEED SENSOR

Description

ECM receives a rear wheel sensor signal from ABS actuator and electric unit (control unit) via CAN communication to switch combustion for the direct injection gasoline system. For the direct injection gasoline system, refer to <u>EC-40</u>, "DIRECT INJECTION GASOLINE SYSTEM : System Description".

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0501 or P2159 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to <u>EC-102, "DTC Index"</u>.

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0501	VEHICLE SPEED SEN A (Vehicle speed sensor A range/ performance)	ECM detects a rear LH wheel sensor mal- function signal transmitted from the ABS ac- tuator and electric unit (control unit) via CAN communication at least for 5 seconds in a row.	 Harness or connectors (The CAN communication line is open or shorted) Rear LH wheel sensor ABS actuator and electric unit (control unit)
P2159	Vehicle speed sensor B (Vehicle speed sensor B range/ performance)	ECM detects a rear RH wheel sensor mal- function signal transmitted from the ABS ac- tuator and electric unit (control unit) via CAN communication at least for 5 seconds in a row.	 Harness or connectors (The CAN communication line is open or shorted) Rear RH wheel sensor ABS actuator and electric unit (control unit)

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.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 9 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE M 1. Start engine and let it idle for at least 5 seconds. N 2. Check 1st trip DTC. N Is 1st trip DTC detected? N YES >> Proceed to EC-363, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure O 1.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) P

With CONSULT

Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-38, "CONSULT Function".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Perform Diagnosis Procedure corresponding to DTC indicated.

EC-363

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INFOID:000000007577209

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P0506 ISC SYSTEM

Description

INFOID:000000007577211

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:000000007577212

DTC DETECTION LOGIC

NOTE:

If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0506	ISC SYSTEM (Idle speed control system RPM lower than expected)	The idle speed is less than the target idle speed by 100 rpm or more.	Electric throttle control actuatorIntake air 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-132, "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 <u>EC-364, "Diagnosis Procedure"</u>.

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.

INFOID:000000007577213

[MR16DDT]

P0506 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace ECM. Refer to <u>EC-534</u>, "Removal and Installation".

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P0507 ISC SYSTEM

Description

INFOID:000000007577214

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:000000007577215

DTC DETECTION LOGIC

NOTE:

If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0507	ISC SYSTEM (Idle speed control system RPM higher than expected)	The idle speed is more than the target idle speed by 200 rpm or more.	Electric throttle control actuatorIntake air 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-132, "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-366, "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:000000007577216

P0507 ISC SYSTEM

[MR16DDT] < DTC/CIRCUIT DIAGNOSIS > 2. CHECK INTAKE AIR LEAK 1. Start engine and let it idle. 2. Listen for an intake air leak after the mass air flow sensor. Is intake air leak detected? EC YES >> Discover air leak location and repair. NO >> Replace ECM. Refer to EC-534, "Removal and Installation".

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P050A, 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

DTC DETECTION LOGIC

NOTE: If DTC P050A, P050B or P050E is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P050A	Cold start idle air control system performance	ECM does not control engine idle speed properly when engine is started with pre-warming up con- dition.	
P050E	Cold start engine exhaust temper- ature too low	The temperature of the catalyst inlet does not rise to the proper temperature when the engine is started with pre-warming up condition.	• 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 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 4. Check the indication of "COOLAN TEMP/S".

With GST

Follow the procedure "With CONSULT" above.

Is the value of "COOLAN TEMP/S" between 4°C (39°F) and 36°C (97°F)?

YES >> GO TO 3.

NO-1 [If it is below 4°C (39°F)]>>Warm up the engine until the value of "COOLAN TEMP/S" reaches 4°C (39°F) or more. Retry from step 1.

NO-2 [If it is above 36°C (97°F)]>>Cool engine down to less than 36°C (97°F). Retry from step 1.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT

- 1. Set the select lever in N range.
- Start the engine and warm up in idle with the value of "COOLAN TEMP/S" between 5°C (41°F) and 40°C (104°F) for more than 15 seconds.
- 3. Check 1st trip DTC.
- With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

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INFOID:000000007577218

P050A, P050E COLD START CONTROL

FUSUA, FUSUE COLD START CONTROL		
< DTC/CIRCUIT DIAGNOSIS >	[MR16DDT]	
YES >> Proceed to <u>EC-369, "Diagnosis Procedure"</u> . NO >> INSPECTION END		А
		A
Diagnosis Procedure	INFOID:000000007577219	
1.PERFORM IDLE AIR VOLUME LEARNING		EC
Perform <u>EC-132, "Work Procedure"</u> .		
Is Idle Air Volume Learning carried out successfully?		С
YES >> GO TO 2. NO >> Follow the instruction of Idle Air Volume Learning.		
2. CHECK INTAKE SYSTEM		D
Check for the cause of intake air volume lacking. Refer to the following.		D
Crushed intake air passage		
Intake air passage cloggingClogging of throttle body		Е
Is the inspection result normal?		
YES >> GO TO 3.		F
NO >> Repair or replace malfunctioning part		
3. CHECK FUEL INJECTION SYSTEM FUNCTION		
Perform DTC Confirmation Procedure for DTC P0171. Refer to EC-258, "DTC Logic".		G
Is the inspection result normal?		
YES >> GO TO 4. NO >> Proceed to <u>EC-259, "Diagnosis Procedure"</u> for DTC P0171.		Н
4.PERFORM DTC CONFIRMATION PROCEDURE		
1. Turn ignition switch ON.		I
2. Erase DTC.		
 Perform DTC Confirmation Procedure. See <u>EC-368, "DTC Logic"</u>. 		
Is the 1st trip DTC P050A or P050E displayed again?		J
YES >> Replace ECM. Refer to <u>EC-534, "Removal and Installation"</u> ,		
NO >> INSPECTION END		Κ
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< DTC/CIRCUIT DIAGNOSIS >

P0520 EOP SENSOR

DTC Logic

INFOID:000000007577220

[MR16DDT]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	Detecting condition	Possible cause
P0520	EOP SENSOR/SWITCH [Engine oil pressure (EOP) sensor circuit]	Signal voltage from the EOP sensor remains at more than 4.9 V / less than 0.26 V for 5 seconds or more.	 Harness or connectors (EOP sensor circuit is open or short- ed.) (Camshaft position sensor circuit is open or shorted) (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) Engine oil level abnormality EOP sensor Camshaft position sensor Fuel rail pressure sensor Battery current sensor Exhaust valve timing control position sensor Exhaust valve timing control position sensor Accelerator pedal position sensor 2 Turbocharger boost sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

- 1. Turn ignition switch OFF and wait at least 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 <u>EC-370, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1.CHECK ENGINE OIL

- 1. Turn ignition switch OFF.
- 2. Check engine oil level and pressure. Refer to LU-7, "Inspection".

Is inspection result normal?

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

INFOID:000000007577221

	ect EOP se tion switch e voltage b	ON.		r harness coni	nector termin	als.		
	EOP sens	or						
	+		_	Voltage (Approx.)				
Connector		terminal		(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				
F43	3		1	5 V				
ES >> @ D >> @ CHECK E		DR PO	WER SUPPL		or and the gr	aund		
eck the vo	liage beiw	een EO	P sensor har	ness connecto	or and the gro	ouna.		
	+							
EO	P sensor		_	Voltage (Approx.)				
Connector	Term	inal		(/ (pp/ox.)				
F43	3		Ground	5 V				
ES >> (C >> (result norn GO TO 5. GO TO 4. ENSOR PO		SUPPLY CIR	CUIT	_			
ES >> G D >> G CHECK S Turn ignit Disconne	GO TO 5. GO TO 4. ENSOR PO tion switch ect ECM ha	OWER OFF. arness o	connector.		t to ground, b	etween the	e following terminals.	
ES >> G D >> G CHECK S Turn ignit Disconne	GO TO 5. GO TO 4. ENSOR Po tion switch ect ECM ha arness con	OWER OFF. arness o	connector.		t to ground, b	etween the	e following terminals.	
ES >> 0 D >> 0 CHECK S Turn ignit Disconne Check ha	GO TO 5. GO TO 4. ENSOR Po tion switch ect ECM ha arness con	OWER OFF. arness o	connector.	ower and shor Sensor	t to ground, b	etween the	e following terminals.	
ES >> C D >> C CHECK S Turn ignit Disconne Check ha	GO TO 5. GO TO 4. ENSOR PO tion switch ect ECM ha arness con	OWER OFF. arness o	connector. for short to po Name	ower and shor Sensor			e following terminals.	
ES >> C D >> C CHECK S Turn ignit Disconne Check ha	GO TO 5. GO TO 4. ENSOR PO tion switch ect ECM ha arness con	OWER OFF. arness o nector f	connector. for short to po Name ensor	ower and shor Sensor	Connector	Terminal	e following terminals.	
ES >> C D >> C CHECK S Turn ignit Disconne Check ha EC	GO TO 5. GO TO 4. ENSOR PO tion switch ect ECM ha arness con M Terminal	OWER OFF. arness on nector f	connector. for short to po Name ensor	ower and shor Sensor	Connector F5	Terminal 1	e following terminals.	
ES >> C D >> C CHECK S Turn ignit Disconne Check ha EC	GO TO 5. GO TO 4. ENSOR PO tion switch ect ECM ha arness con M Terminal	OWER OFF. arness of nector f FRP s EOP s Turboo	connector. for short to po Name ensor ensor	ower and shor Sensor	Connector F5 F43	Terminal 1 3	e following terminals.	
ES >> G D >> G CHECK S Turn ignit Disconne Check ha EC onnector F25	GO TO 5. GO TO 4. ENSOR PO tion switch ect ECM ha arness con M Terminal	OWER OFF. arness of nector f FRP s EOP s Turboo	connector. for short to po Name ensor ensor charger boost se r current sensor	ower and shor Sensor	Connector F5 F43 F75	Terminal 1 3 1	e following terminals.	
ES >> C D >> C CHECK S Turn ignit Disconne Check ha EC	GO TO 5. GO TO 4. ENSOR PO tion switch ect ECM ha arness con M Terminal 39 68	OWER OFF. arness on nector f FRP s EOP s Turboo Batter	connector. For short to po Name ensor ensor charger boost se v current sensor	ower and shor Sensor	Connector F5 F43 F75 F52	Terminal 1 3 1 1	e following terminals.	
ES >> G D >> G CHECK S Turn ignit Disconne Check ha EC onnector F25	GO TO 5. GO TO 4. ENSOR PO tion switch ect ECM ha arness con M Terminal	OWER OFF. arness on nector f FRP s EOP s Turboo Battery G sens CMP s	connector. For short to po Name ensor ensor charger boost se v current sensor	ower and shor Sensor	Connector F5 F43 F75 F52 B32	Terminal 1 3 1 1 3 3	e following terminals.	
ES >> G D >> G CHECK S Turn ignit Disconne Check ha EC onnector F25 F26 E18	GO TO 5. GO TO 4. ENSOR PO tion switch ect ECM ha arness con M Terminal 39 68	OWER OFF. arness on nector 1 FRP si EOP si Turboo Battery G sens CMP si EVT co APP si	connector. For short to po Name ensor ensor charger boost se / current sensor sor	ower and shor Sensor	Connector F5 F43 F75 F52 B32 F109	Terminal 1 3 1 1 3 1 3 1	e following terminals.	

3. Check the continuity between EOP sensor harness connector and ECM harness connector.

< DTC/CIRCUIT DIAGNOSIS >

	+		_	
EOP	sensor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F43	1	F25	44	Existed

4. Also check harness for short to power.

Is inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

	+ CM	_	Continuity
Connector	Terminal	*	
F25	1		
F25	2		
	123	Ground	Existed
E18	124		
	127		

Is inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Repair or replace error-detected parts.

7. CHECK EOP SENSOR SIGNAL CIRCUIT

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

3. Check the continuity between EOP sensor harness connector and ECM harness connector.

	+		_	
EOP	sensor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F43	2	F25	43	Existed

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

Is inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.CHECK EOP SENSOR

Refer to EC-372, "Component Inspection".

Is inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Repair or replace error-detected parts.

Component Inspection

1.CHECK EOP SENSOR

1. Turn ignition switch OFF.

2. Disconnect EOP sensor harness connector.

3. Check resistance between EOP sensor connector terminals.

INFOID:000000007577222

< DTC/CIRCUIT DIAGNOSIS >

+	-	Condition	Resistance ($k\Omega$)	
Те	erminal			
	2		4 kΩ – 10 kΩ	
1	3		2 kΩ – 8 kΩ	
	1		4 kΩ – 10 kΩ	
2	3	None	1 kΩ – 3 kΩ	
•	1		2 kΩ – 8 kΩ	
3	2		1 kΩ – 3 kΩ	
ES >> I O >> I	NSPECTION END Replace EOP sens). sor. Refer to <u>EM-110, "Ex</u> t	bloded View".	

P0524 ENGINE OIL PRESSURE

DTC Logic

INFOID:000000007577223

[MR16DDT]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (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 or more.	 Decrease in engine oil pressure Decrease in engine oil level Engine oil condition EOP sensor Engine body

DTC CONFIRMATION PROCEDURE CAUTION:

If "<u>EC-375, "Diagnosis Procedure"</u>" is unfinished, be sure to perform Step 3 and 4.

1.PRECONDITIONING-1

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.

TEST CONDITION:

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

>> GO TO 2.

2.PRECONDITIONING-2

Is "Diagnosis Procedure" of DTC P0524 finished?

YES	>> GO TO 3.
NO	>> GO TO 4.
\mathbf{a}	

3.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and warm it up to normal operating temperature.
- 2. Maintain the following conditions for about 10 consecutive seconds.

Selector lever	P or N position
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 EC-375, "Diagnosis Procedure".

NO >> INSPECTION END

4.CHECK ENGINE OIL LEVEL

Check engine oil level. Refer to LU-7, "Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Proceed to EC-375, "Diagnosis Procedure".

5.CHECK ENGINE OIL PRESSURE

With CONSULT

P0524 ENGINE OIL PRESSURE

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

- 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.

					1
Monitor item	Condition		Value (Approx.)		EC
EOP SENSOR	 Engine oil temperature: 80°C (176°F) Selector lever: P or N position 	Engine speed: Idle	1,450 mV or more		С
	Air conditioner switch: OFFNo load	Engine speed: 2,000 rpm	2,850 mV or more		
Without CONS Check engine oil	SULT level. Refer to <u>LU-7, "Inspection"</u> .				D
Is the inspection YES >> GO T NO >> Proc		<u>lure"</u> .			E
Diagnosis Pro	ocedure			INFOID:000000007577224	F
1.CHECK ENG	NE OIL LEVEL				
 Turn ignition Check engined Is the inspection 	e oil level. Refer to <u>LU-7, "Inspect</u> i	ion".			G
YES >> GO 1 NO >> GO 1	ГО 2.				Н
					Ι
 Turn ignition Select "DATA" 					J
			Value		
Monitor item	Condition		(Approx.)		Κ
EOP SENSOR	 Engine oil temperature: 80°C (176°F) Selector lever: P or N position 	Engine speed: Idle	1,450 mV or more		
	Air conditioner switch: OFFNo load	Engine speed: 2,000 rpm	2,850 mV or more		L
Without CONS Check engine oil	ULT level. Refer to <u>LU-7, "Inspection"</u> .				M
Is the inspection	result normal?				
YES >> GO T NO >> Cheo	ΓΟ 3. ck oil pump. Refer to <u>LU-16, "Insp</u> e	ection".			Ν
3.CHECK EOP	• • •				
Check EOP sens	or. Refer to EC-376, "Component	Inspection".			0
Is the inspection					~
	ck intermittent incident. Refer to <u>G</u> air or replace error-detected parts.	I-43, "Intermitter	<u>nt Incident"</u> .		Ρ
4.CHECK ENG	NE OIL LEAKAGE				1
Check engine oil	leakage. Refer to LU-6, "Engine L	ubrication Syste	em".		
Is the inspection					
YES >> GO T	FO 5.				

NO >> Repair or replace error-detected parts.

А

$5. {\sf CHECK} \ {\sf CAUSE} \ {\sf OF} \ {\sf ENGINE} \ {\sf OIL} \ {\sf CONSUMPTION}$

Check the following item.

Step	Inspection item	Equipment	Standard	Reference
1	PCV valve	EC-533, "Inspection"		
2	Turbocharger	EM-38, "Inspection"		
3	Exhaust front tube	Visual	No blockingNo abnormal sounds	_
4	Oil pump	Visual	No blockingNo abnormal sounds	_
4	Oil pump	LU-16, "Inspection"		
5	PistonPiston pinPiston ring	Piston to piston pin oil clearancePiston ring side clearancePiston ring end gap		EM-129, "Description"
6	Cylinder block	Cylinder block top surface distortionPiston to cylinder bore clearance		EM-119, "Inspection"

>> Repair or replace error-detected parts.

Component Inspection

INFOID:000000007577225

1.CHECK EOP SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect EOP sensor harness connector.
- 3. Check resistance between EOP sensor connector terminals.

EOP	sensor		
+	_	Condition	Resistance (k Ω)
Terr	ninal		
1	2	None	4 kΩ – 10 kΩ
I	3		2 kΩ – 8 kΩ
2	1		4 kΩ – 10 kΩ
2	3		1 kΩ – 3 kΩ
3	1	1	2 kΩ – 8 kΩ
3	2		1 kΩ – 3 kΩ

Is the inspection result normal?

YES >> INSPECTION END.

NO >> Replace EOP sensor. Refer to <u>EM-110, "Exploded View"</u>.

P0603 ECM POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

P0603 ECM POWER SUPPLY

DTC Logic

А

EC

INFOID:000000007577226

[MR16DDT]

DTC DETECTION LOGIC

	Trouble diagnosis name		
DTC No.	(Trouble diagnosis content)	DTC detecting condition	Possible cause
P0603	ECM BACK UP/CIRCUIT (ECM power supply circuit)	ECM back up RAM system does not function properly.	 Harness or connectors [ECM power supply (back up) circuit is open or shorted.] ECM
DTC CON	FIRMATION PROCED	DURE	
1.PRECO	NDITIONING		
before cond 1. Turn ig 2. Turn ig 3. Turn ig	ducting the next test. nition switch OFF and w nition switch ON. nition switch OFF and w	ait at least 10 seconds.	, always perform the following procedure
•	> GO TO 2. RM DTC CONFIRMATIC		
	nition switch ON wait at		
 Turn ig Turn ig Repeat 	nition switch OFF and w nition switch ON, wait at t step 2 and 3 for five tim 1st trip DTC.	rait at least 5 minutes. t least 10 seconds.	
-	TC detected?		
	 Proceed to <u>EC-377, "D</u> INSPECTION END 	iagnosis Procedure".	
-	s Procedure		INFOID:00000007577227
	ECM POWER SUPPLY		
	nition switch OFF.		
	nect ECM harness conn the voltage between EC	ector. M harness connector terminals.	
	ECM		
Connector	+ –	Voltage	
Connector	Terminal		
E18	106 127	Battery voltage	
	ection result normal?		
	 GO TO 2. Perform the trouble dia 	gnosis for power supply circuit.	
-	INTERMITTENT INCID		
Perform GI	-43, "Intermittent Incider	<u>nt"</u> .	
Is the inspe	ection result normal?		
	GO TO 3.	-detected parts	
-	 Repair or replace error RM DTC CONFIRMATIC 	•	
J.FERFUI			

- Turn ignition switch ON.
 Erase DTC.
- 3. Perform DTC confirmation procedure. Refer to <u>EC-377. "DTC Logic"</u>.

Is the 1st trip DTC P0603 displayed again?

- YES >> Replace ECM. Refer to EC-534, "Removal and Installation".
- NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS > P0605 ECM

DTC Logic

INFOID:000000007577228

[MR16DDT]

EC

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)		DTC detecting condition	Possible cause
		A)	ECM calculation function is malfunctioning.	
DOCOF	ECM	B)	ECM EEP-ROM system is malfunctioning.	FOM
P0605	(Engine control module)	C)	ECM self shut-off function is malfunctioning.	ECM
		D)	ECM temperature sensor is malfunctioning.	
	IFIRMATION PROC	EDU	RE	
before con 1. Turn iç 2. Turn iç	onfirmation Procedure ducting the next test. gnition switch OFF and gnition switch ON. gnition switch OFF and	d wait		rform the following procedure
~	> GO TO 2.		PROCEDURE FOR MALFUNCTION A	
	gnition switch ON.	TION	PROCEDURE FOR MALFUNCTION A	
	1st trip DTC.			
<u>Is 1st trip D</u>	DTC detected?			
	Proceed to <u>EC-379.</u> GO TO 3.	"Diac	nosis Procedure".	
-		τιον	PROCEDURE FOR MALFUNCTION B	
1. Turn ig 2. Turn ig	nition switch ON and	wait a		
<u>Is 1st trip D</u>	DTC detected?			
	Proceed to <u>EC-379</u> , GO TO 4.	"Diag	nosis Procedure".	
		ΓΙΟΝ	PROCEDURE FOR MALFUNCTION C	
 Turn iç Repeat Check 	t step 2 for 32 times. 1st trip DTC.		at least 1 second. east 10 seconds and then turn ON.	
	DTC detected?			
	> Proceed to <u>EC-379.</u> > INSPECTION END	"Diag	nosis Procedure".	
Diagnos	is Procedure			INFOID:000000007577229
1.INSPEC	CTION START			
	nition switch ON.			
 Erase Performed 		roced	ure. Refer to EC-379, "DTC Logic".	
	rin DTC P0605 display			

Is the 1st trip DTC P0605 displayed again?

А

- YES >> Replace ECM. Refer to EC-534, "Removal and Installation".
- NO >> INSPECTION END

P0607 ECM

< DTC/CIRCUIT DIAGNOSIS > P0607 ECM

DTC Logic

INFOID:000000007577230

[MR16DDT]

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EC

DTC DETECTION LOGIC

 INSPECTION START Turn ignition switch ON. Erase DTC. Perform DTC confirmation procedure. Refer to <u>EC-381, "DTC Logic"</u>. Check DTC. 	DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
1. PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. 2. Check DTC. Is DTC detected? YES >> Proceed to <u>EC-381, "Diagnosis Procedure".</u> NO >> INSPECTION END Diagnosis Procedure 1. INSPECTION START 1. Turn ignition switch ON. 2. Erase DTC. 3. Perform DTC confirmation procedure. Refer to <u>EC-381, "DTC Logic".</u> 4. Check DTC. Is the DTC P0607 displayed again? YES >> Replace ECM. Refer to <u>EC-534, "Removal and Installation".</u>	P0607			ECM
 Turn ignition switch ON. Check DTC. <u>Is DTC detected?</u> YES >> Proceed to <u>EC-381, "Diagnosis Procedure"</u>. NO >> INSPECTION END Diagnosis Procedure INSPECTION START Turn ignition switch ON. Erase DTC. Perform DTC confirmation procedure. Refer to <u>EC-381, "DTC Logic"</u>. Check DTC. Is the DTC P0607 displayed again? YES >> Replace ECM. Refer to <u>EC-534, "Removal and Installation"</u>. 	DTC CON	FIRMATION PROCED	URE	
 2. Check DTC. <u>Is DTC detected?</u> YES >> Proceed to <u>EC-381, "Diagnosis Procedure"</u>. NO >> INSPECTION END Diagnosis Procedure 1.INSPECTION START 1. Turn ignition switch ON. 2. Erase DTC. 3. Perform DTC confirmation procedure. Refer to <u>EC-381, "DTC Logic"</u>. 4. Check DTC. <u>Is the DTC P0607 displayed again?</u> YES >> Replace ECM. Refer to <u>EC-534, "Removal and Installation"</u>. 	1. PERFO	RM DTC CONFIRMATIO	N PROCEDURE	
YES >> Proceed to <u>EC-381, "Diagnosis Procedure"</u> . NO >> INSPECTION END Diagnosis Procedure 1.INSPECTION START 1. Turn ignition switch ON. 2. Erase DTC. 3. Perform DTC confirmation procedure. Refer to <u>EC-381, "DTC Logic"</u> . 4. Check DTC. Is the DTC P0607 displayed again? YES >> Replace ECM. Refer to <u>EC-534, "Removal and Installation"</u> .	2. Check	DTC.		
 INSPECTION START Turn ignition switch ON. Erase DTC. Perform DTC confirmation procedure. Refer to <u>EC-381, "DTC Logic"</u>. Check DTC. Is the DTC P0607 displayed again? YES >> Replace ECM. Refer to <u>EC-534, "Removal and Installation"</u>. 	YES >>	Proceed to <u>EC-381, "Di</u>	agnosis Procedure".	
 Turn ignition switch ON. Erase DTC. Perform DTC confirmation procedure. Refer to <u>EC-381, "DTC Logic"</u>. Check DTC. Is the DTC P0607 displayed again? YES >> Replace ECM. Refer to <u>EC-534, "Removal and Installation"</u>. 	Diagnosi	s Procedure		INFOID:00000007577231
 Erase DTC. Perform DTC confirmation procedure. Refer to <u>EC-381, "DTC Logic"</u>. Check DTC. <u>Is the DTC P0607 displayed again?</u> YES >> Replace ECM. Refer to <u>EC-534, "Removal and Installation"</u>. 	1.INSPEC	TION START		
<u>Is the DTC P0607 displayed again?</u> YES >> Replace ECM. Refer to <u>EC-534, "Removal and Installation"</u> .	 Erase Perforr 	DTC. n DTC confirmation proc	edure. Refer to <u>EC-381, "DTC Logic"</u> .	
NO >> INSPECTION END	Is the DTC	P0607 displayed again?	EC-534, "Removal and Installation".	
	NO >>	INSPECTION END		

Ο

P0611 ECM PROTECTION

Description

This DTC is detected when the ECM protective function is activated due to an extreme temperature increase in ECM, resulting from severe conditions such as heavy load driving.

DTC Logic

INFOID:000000007577233

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0611	FIC MODULE (ECM protection)	ECM overheat protection control is activated.	ECM overheated

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

This DTC is displayed as protection function history. If no malfunction is detected after the diagnosis, the customer must be informed of the activation of the protection function.

>> Proceed to EC-382, "Diagnosis Procedure".

Diagnosis Procedure

1.INSPECTION START

- 1. Perform DTC confirmation procedure. Refer to EC-379, "DTC Logic".
- 2. Check 1st trip DTC.

Is DTC P0605 detected?

- YES >> Proceed to EC-379, "Diagnosis Procedure".
- NO >> Explain the customer about the activation of the protection function.

INFOID:000000007577232

INFOID:000000007577234

< DTC/CIRCUIT DIAGNOSIS > P062B ECM

Description

This DTC is detected when the ECM-integrated injector driver unit has a malfunction. For injector driver unit, refer to <u>EC-22, "ECM"</u>.

DTC Logic

INFOID:000000007577236

[MR16DDT]

INFOID:000000007577235

DTC DETECTION LOGIC

P062B ECM (Internal control module fuel injector control performance) Injector driver unit is malfunctioning. • Harness and connectors (Injector circuit is open or shorted) • Battery power supply • ECM (Injector driver unit) • Battery power supply • ECM (Injector driver unit) • Battery power supply • ECM (Injector driver unit) • Battery power supply • ECM (Injector driver unit) DTC CONFIRMATION PROCEDURE 1. Turn ignition switch OFF and wait at least 10 seconds. 2. 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. • Turn ignition switch OFF and wait at least 10 seconds. 2. PERFORM DTC CONFIRMATION PROCEDURE • Soft 0 2. 2. PERFORM DTC CONFIRMATION PROCEDURE • Soft 0 2. 2. PERFORM DTC CONFIRMATION PROCEDURE • Soft 0 2. 2. Check 1st trip DTC detected? • Soft 0 2. 2. FERFORM DTC CONFIRMATION END • Soft 0 2. 0 is inspection result normal? • Seconconcounter: • Soft 0 2. 1. CHECK FUEL INJECTOR • Check fuel injec	DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
 1. PRECONDITIONING 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch ON. 3. Turn ignition switch OFF and wait at least 10 seconds. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is 11 V or more at idle. >> GO TO 2. 2. PERFORM DTC CONFIRMATION PROCEDURE 1. Start the engine and keep the engine speed at idle for 30 seconds. 2. Check 1st trip DTC. Is 1st trip DTC detected? YES >> Proceed to EC-383, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure Mo >> INSPECTION END Diagnosis Procedure Check fuel injector. Refer to EC-485, "Component Function Check". Is inspection result normal? YES >> GO TO 2. PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. 2. Frase DTC. 3. Perform DTC confirmation procedure again. Refer to EC-383, "DTC Logic". 4. Check 1st trip DTC. 	P062B	(Internal control module fuel injector	Injector driver unit is malfunctioning.	(Injector circuit is open or shorted)Battery power supply
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is 11 V or more at idle. >> GO TO 2. 2.PERFORM DTC CONFIRMATION PROCEDURE Start the engine and keep the engine speed at idle for 30 seconds. Check 1st trip DTC. Is 1st trip DTC detected? YES >> Proceed to EC-383, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure Check fuel injector. Refer to EC-485, "Component Function Check". Is inspection result normal? YES >> GO TO 2. PERFORM DTC CONFIRMATION PROCEDURE Turn ignition switch ON. Erase DTC. PERFORM DTC CONFIRMATION PROCEDURE Turn ignition switch ON. Erase DTC. Perform DTC confirmation procedure again. Refer to EC-383, "DTC Logic". Check 1st trip DTC. 				
 Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is 11 V or more at idle. > GO TO 2. 2.PERFORM DTC CONFIRMATION PROCEDURE Start the engine and keep the engine speed at idle for 30 seconds. Check 1st trip DTC. Is 1st trip DTC detected? YES >> Proceed to EC-383. "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure Check fuel injector. Refer to EC-485. "Component Function Check". Is inspection result normal? YES >> GO TO 2. NO >> Repair or replace error-detected parts. 2.PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. Erase DTC. Perform DTC confirmation procedure again. Refer to EC-383. "DTC Logic". 				
 2.PERFORM DTC CONFIRMATION PROCEDURE Start the engine and keep the engine speed at idle for 30 seconds. Check 1st trip DTC. Is 1st trip DTC detected? YES >> Proceed to EC-383, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure Incheck FUEL INJECTOR Check fuel injector. Refer toEC-485, "Component Function Check". Is inspection result normal? YES >> GO TO 2. NO >> Repair or replace error-detected parts. 2.PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. 2. Erase DTC. 3. Perform DTC confirmation procedure again. Refer to EC-383, "DTC Logic". 4. Check 1st trip DTC.	 Turn ig Turn ig TESTING (nition switch ON. nition switch OFF and wait at le CONDITION:	east 10 seconds.	1 V or more at idle.
 Start the engine and keep the engine speed at idle for 30 seconds. Check 1st trip DTC. Is 1st trip DTC detected? YES >> Proceed to EC-383, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure I.CHECK FUEL INJECTOR Check fuel injector. Refer toEC-485, "Component Function Check". Is inspection result normal? YES >> GO TO 2. NO >> Repair or replace error-detected parts. PERFORM DTC CONFIRMATION PROCEDURE Turn ignition switch ON. Erase DTC. Perform DTC confirmation procedure again. Refer to EC-383, "DTC Logic". 	>>	GO TO 2.		
 2. Check 1st trip DTC. <u>Is 1st trip DTC detected?</u> YES >> Proceed to <u>EC-383, "Diagnosis Procedure"</u>. NO >> INSPECTION END Diagnosis Procedure <i>I.</i>CHECK FUEL INJECTOR Check fuel injector. Refer to <u>EC-485, "Component Function Check"</u>. <u>Is inspection result normal?</u> YES >> GO TO 2. NO >> Repair or replace error-detected parts. 2.PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. 2. Erase DTC. 3. Perform DTC confirmation procedure again. Refer to <u>EC-383, "DTC Logic"</u>. 	2.PERFOR	RM DTC CONFIRMATION PRO	OCEDURE	
Is 1st trip DTC detected? YES >> Proceed to EC-383, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure Infoloaccentre 1.CHECK FUEL INJECTOR Check fuel injector. Refer toEC-485, "Component Function Check". Is inspection result normal? YES >> GO TO 2. NO >> Repair or replace error-detected parts. 2.PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. 2. Erase DTC. 3. Perform DTC confirmation procedure again. Refer to EC-383, "DTC Logic". 4. Check 1st trip DTC.			speed at idle for 30 seconds.	
YES >> Proceed to EC-383, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure INFOLD.000000757237 1.CHECK FUEL INJECTOR Infold.00000757237 Check fuel injector. Refer to EC-485, "Component Function Check". Is inspection result normal? YES >> GO TO 2. NO >> Repair or replace error-detected parts. 2.PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. 2. Erase DTC. 3. Perform DTC confirmation procedure again. Refer to EC-383, "DTC Logic". 4. Check 1st trip DTC.		•		
 1.CHECK FUEL INJECTOR Check fuel injector. Refer to EC-485, "Component Function Check". Is inspection result normal? YES >> GO TO 2. NO >> Repair or replace error-detected parts. 2.PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. 2. Erase DTC. 3. Perform DTC confirmation procedure again. Refer to EC-383, "DTC Logic". 4. Check 1st trip DTC. 	YES >>	Proceed to EC-383, "Diagnos	is Procedure".	
Check fuel injector. Refer to <u>EC-485, "Component Function Check"</u> . <u>Is inspection result normal?</u> YES >> GO TO 2. NO >> Repair or replace error-detected parts. 2. PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. 2. Erase DTC. 3. Perform DTC confirmation procedure again. Refer to <u>EC-383, "DTC Logic"</u> . 4. Check 1st trip DTC.	Diagnosi	s Procedure		INFOID:000000007577237
Is inspection result normal? YES >> GO TO 2. NO >> Repair or replace error-detected parts. 2.PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. 2. Erase DTC. 3. Perform DTC confirmation procedure again. Refer to EC-383, "DTC Logic". 4. Check 1st trip DTC.	1.снеск	FUEL INJECTOR		
YES >> GO TO 2. NO >> Repair or replace error-detected parts. 2.PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. 2. Erase DTC. 3. Perform DTC confirmation procedure again. Refer to EC-383, "DTC Logic". 4. Check 1st trip DTC.		•	ponent Function Check".	
NO >> Repair or replace error-detected parts. 2.PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. 2. Erase DTC. 3. Perform DTC confirmation procedure again. Refer to EC-383, "DTC Logic". 4. Check 1st trip DTC.	-			
 Turn ignition switch ON. Erase DTC. Perform DTC confirmation procedure again. Refer to <u>EC-383, "DTC Logic"</u>. Check 1st trip DTC. 			ed parts.	
 Erase DTC. Perform DTC confirmation procedure again. Refer to <u>EC-383, "DTC Logic"</u>. Check 1st trip DTC. 	2.PERFOR	RM DTC CONFIRMATION PRO	OCEDURE	
	 Erase I Perform 	DTC. n DTC confirmation procedure	again. Refer to <u>EC-383, "DTC Logic"</u> .	
		•		
YES >> Replace ECM. Refer to <u>EC-534, "Removal and Installation"</u> . NO >> INSPECTION END			34, "Removal and Installation".	

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P0643 SENSOR POWER SUPPLY

DTC Logic

[MR16DDT]

INFOID:000000007577238

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0643	SENSOR POWER/ CIRC (Sensor power supply circuit short)	ECM detects a voltage of power source for sensor is excessively low or high.	 Harness or connectors (Refrigerant pressure sensor circuit is open or shorted.) (Crankshaft position sensor circuit is open or shorted) (Accelerator pedal position sensor 1 circuit is open or shorted.) (Throttle position sensor circuit is open or shorted.) (EVAP control pressure sensor circuit is open or shorted.) Refrigerant pressure sensor Crankshaft position sensor Accelerator pedal position sensor 1 Throttle position sensor EVAP control pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 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-384, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007577239

1.CHECK SENSOR POWER SUPPLY

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

P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

	+							ļ
	ECM		_	Voltage				
Connector	Termi	inal		(Approx.)				E
F25	23							
500	F26 58		Oracinad					
F26	62		Ground	5 V				(
E18	10'	1						
Is the inspec	tion result n	ormal?	2					
	Check interr GO TO 2.	mittent	incident. Refer	to <u>GI-43, "Ir</u>	ntermittent In	<u>cident"</u> .		[
2.снеск в	SENSOR PO	OWER	SUPPLY ROUT	TING CIRCL	JIT FOR SH	ORT		E
	ition switch arness for s		power and to g	ground, betw	veen the follo	wing termin	als.	F
EC	CM			Sensor			•	
Connector	Terminal		Name		Connector	Terminal	-	
F25	F25 23	Refrig	erant pressure sen	sor	E49	3	-	(
125	25	EVAP	VAP control system pressure sensor		B22	3	-	
F26	58	CKP s	sensor		F107	3		I
120	62	TP sei	nsor		F29	1		
E18	101	APP s	ensor		E101	4	_	
s the inspec		ormal?	<u>2</u>					
NO >> 3. CHECK (COMPONEN	•	error-detected p	oarts.				
Check the fo Refrigeran Refer to <u>E</u> • EVAP cont	t pressure s C-512, "Diag	nosis	Procedure".					I
Refer to E Crankshaft Refer to E	<u>C-341, "Con</u> t position se <u>C-307, "Con</u>	nponer nsor nponer	nt Inspection".					
Refer to E Accelerato	r pedal posi	nponer tion se	nt Inspection". Insor Inspection".					
s the inspec YES >>	<u>ction result n</u> Check interr	ormal? mittent			ntermittent In	<u>cident"</u> .		
	-							(

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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:000000007577241

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0850	P-N POS SW/CIRCUIT (Park/neutral position switch)	 For CVT models, the signal of transmission range switch is not changed in the process of engine starting and driving. For M/T models, the signal of the park/ neutral position (PNP) switch is not changed in the process of engine starting and driving. 	 Harness or connectors [The transmission range switch circuit is open or shorted.(CVT models)] [The park/neutral position (PNP) switch circuit is open or shorted.(M/T models)] Transmission range switch (CVT mod- els) Park/neutral position (PNP) switch (M/T models)

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 5.

2. PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

>> GO TO 3.

${\it 3.}$ Check pNP signal function

(B) 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	Known-good signal
N or P position (CVT) Neutral position (M/T)	ON
Except above position	OFF
	0.1

Is the inspection result normal?

YES >> GO TO 4.

NO >> Proceed to EC-387, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 2. Start engine and warm it up to normal operating temperature.

EC-386

INFOID:000000007577240

P0850 PNP SWITCH [MR16DDT] < DTC/CIRCUIT DIAGNOSIS > Maintain the following conditions for at least 60 consecutive seconds. 3. CAUTION: А Always drive vehicle at a safe speed. 1,400 - 6,375 rpm (CVT) EC ENG SPEED 1,675 - 6,375 rpm (M/T) COOLAN TEMP/S More than 65°C (149°F) **B/FUEL SCHDL** 1.6 - 31.8 msec VHCL SPEED SE More than 64 km/h (40 mph) Selector lever Suitable position Check 1st trip DTC. 4. Is 1st trip DTC detected? YES >> Proceed to EC-387, "Diagnosis Procedure". Е NO >> INSPECTION END 5. PERFORM COMPONENT FUNCTION CHECK Perform component function check. Refer to EC-387, "Component Function Check". NOTE: Use component function check the overall function of the transmission range switch circuit (CVT models) or the park/neutral position (PNP) switch circuit (M/T models). During this check, a 1st trip DTC might not be confirmed. Is the inspection result normal? >> INSPECTION END YES Н NO >> Proceed to EC-387, "Diagnosis Procedure". Component Function Check INFOID:000000007577242 1.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 Κ Voltage Condition + (Approx.) Connector Terminal P or N (CVT) 0 V Neutral (M/T) E18 103 127 Selector lever Except above Battery voltage Μ Is the inspection result normal? YES >> INSPECTION END NO >> Proceed to EC-387, "Diagnosis Procedure". Ν Diagnosis Procedure INFOID:000000007577243 **1**.INSPECTION START C Check which type of transmission the vehicle is equipped with. Which type of transmission? Ρ CVT >> GO TO 2. M/T >> 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.

EC-387

P0850 PNP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

	+		
Transmissior	range switch	_	Voltage
Connector	Terminal	*	
F27	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. CHECK TRANSMISSION RANGE SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector.
- Check the continuity between transmission range switch harness connector and IPDM E/R harness connector.

	+			
Transmission range switch		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F27	1	E15	58	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.

4.CHECK TRANSMISSION RANGE SWITCH SIGNAL CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between transmission range switch harness connector and ECM harness connector.

	+			
Transmission range switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F27	2	E18	103	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK TRANSMISSION RANGE SWITCH

Check the transmission range switch. Refer to <u>TM-143</u>. "Component Inspection (Transmission Range <u>Switch)</u>".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace transmission range switch. Refer to <u>TM-221, "Removal and Installation"</u>.

 $\mathbf{6.}$ CHECK PARK/NEUTRAL POSITION (PNP) SWITCH POWER SUPPLY

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

P0850 PNP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

DN	+ IP switch			Voltaga	
Connector	Termi	nal	-	Voltage	
F49	2		round	Battery voltage	
-		-	Touria	Ballery Vollage	
	<u>tion result n</u> 30 TO 7.	<u>onnal (</u>			
		trouble diag	nosis for i	power supply c	rcuit.
-		H INPUT SIG			
	tion switch				
		rness conne	ctor.		
Check th	e continuity	between PN	IP switch	harness conne	ctor and ECM harness connector.
				1	
+		-	-		
PNP s			CM	Continuity	
Connector	Terminal	Connector	Termina		
F49	3	E18	103	Existed	
		for short to g	round an	d to power.	
s the inspect		ormal?			
	GO TO 8. Repair or re	place error-d	etected p	arts	
8.CHECK P	•				
			15 "DAR		OSITION (PNP) SWITCH : Component Inspec-
ion".	INI SWITCH.		<u>15, 17, 17, 17, 17, 17, 17, 17, 17, 17, 17</u>		STHOR (THE) SWITCH : Component inspec-
s the inspect	tion result n	ormal?			
					<u>mittent Incident"</u> .
NO >> F	Replace PN	P switch. Re	fer to <u>TM</u>	<u>-19, "Removal :</u>	and Installation".

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< DTC/CIRCUIT DIAGNOSIS >

P1078 EVT CONTROL POSITION SENSOR

DTC Logic

INFOID:000000007577244

[MR16DDT]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1078	EXH TIM SEN/CIRC-B1 (Exhaust valve timing con- trol position sensor circuit)	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) (Camshaft position sensor circuit is open or shorted) (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or short- ed.) (Turbocharger boost sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) Accumulation of debris to the signal pick-up portion of the camshaft Exhaust valve timing control position sensor Crankshaft position sensor Camshaft position sensor Gasensor Battery current sensor G sensor Accelerator pedal position sensor 2 Turbocharger boost sensor Engine oil pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> 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-390, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007577245

1.CHECK EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR POWER SUPPLY

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

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

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EVT	+ sensor	_	Voltage (Approx.)
Connector	Connector Terminal		(Approx.)
F110	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check harness connector for short to power and short to ground, between the following terminals.

EC	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
		FRP sensor	F5	1
F25	F25 39	EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
	68	Battery current sensor	F52	1
EDE	00	G sensor	B32	3
F20	F2672	CMP sensor	F109	1
	12	EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is inspection result normal?

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

NO >> Repair or replace error-detected parts.

3.CHECK EVT CONTROL POSITION SENSOR GROUND CIRCUIT

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

	+			
EVT control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F110	2	F26	59	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.

2. Check the continuity between EVT control position sensor harness connector and ECM harness connector.

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

	+			
EVT control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F110	3	F26	67	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 EC-392, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace EVT control position sensor. Refer to EM-85, "Removal and Installation".

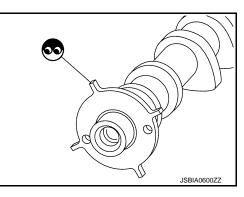
6.CHECK CAMSHAFT (EXT)

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-43, "Intermittent</u> <u>Incident"</u>.
- NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to <u>EM-85</u>, "<u>Removal</u> and Installation".



Component Inspection

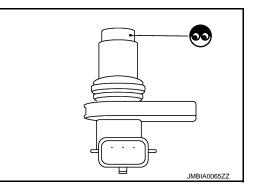
INFOID:000000007577246

1. EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR-I

- 1. Turn ignition switch OFF.
- 2. Disconnect EVT control position sensor harness connector.
- 3. Loosen the fixing bolt of the sensor.
- 4. Remove the sensor.
- 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-72.</u> <u>"Exploded View"</u>.



2.EVT CONTROL POSITION SENSOR-II

Check resistance EVT control position sensor terminals as shown below.

< DTC/CIRCUIT DIAGNOSIS >

EVT control p	position sensor		- -	A
+	_	Resistance		
Terr	minal		E	C
1	2			-
I	3	Except 0 or $\infty \Omega$ [at 25°C (77°F)]		
2	3			С
Is the inspection				
YES >> INS NO >> Rep	PECTION END place EVT control	I position sensor. Refer to <u>EM-72, "E</u>	xploded View".	D
			E	E
			F	F
			C	G
			ŀ	Н
				J
			ł	K
			L	L
			Ν	VI
			1	N
			C	С
			F	Ρ

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.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1148	CLOSED LOOP-B1 (Closed loop control func- tion)	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-102, "DTC Index"</u>.

INFOID:000000007577247

INFOID:000000007577248

[MR16DDT]

P1197 OUT OF GAS

Description

This diagnosis result is detected when the fuel level of the fuel tank is extremely low and the engine does not run normally.

DTC Logic

INFOID:000000007577250

[MR16DDT]

INFOID:000000007577249

DTC DETECTION LOGIC

Trouble diagnosis name

Revision [.] '	2011 October	EC-395	2012 JUKE		
1.REFU	EL THE VEHICLE				
Diagno	sis Procedure		INF0/D:00000007577251		
YES :	DTC detected? >> Proceed to <u>EC-395, "I</u> >> INSPECTION END	Diagnosis Procedure".	P		
If the	NOTE: If the fuel tank has sufficient fuel, this diagnosis result may not be detected.				
 Keep the engine speed at 3,500 rpm for 5 seconds and let it idle at least 60 seconds. Check the 1st trip DTC. 					
NOTE: For best results, warm up the engine until "COOLAN TEMP/S" on "DATA MONITOR" mode of "ENGINE" using CONSULT reaches at least 70°C (158°F).					
		rmal operating temperature.			
3.PERF	ORM DTC CONFIRMATI	ON PROCEDURE-II	N		
	>> GO TO 3. >> Proceed to <u>EC-395, "I</u>	<u>Diagnosis Procedure"</u> .			
	engine start?		L		
Start the	engine.				
<u> </u>	ORM DTC CONFIRMATI	ON PROCEDURE-I	k		
Before p		procedure, confirm that battery vo	oltage is 11 V or more at idle.		
3. Turn	ignition switch ON. ignition switch OFF and v CONDITION:	wait at least 10 seconds.	J		
1. Turn	ignition switch OFF and	wait at least 10 seconds.			
	ONDITIONING				
	NFIRMATION PROCE	DURE			
P1197	FUEL RUN OUT (Out of gas)	 bar, 11.2 kg/cm², 195.5 ps/) of less for 5 seconds or more with the fuel level too low. Fuel rail pressure remains 2.7 MPa (27 bar, 27.5 kg/cm², 392 psi) lower than a target fuel pressure for 5 seconds or more with the fuel level too low. 	 Fuel pressure regulator Low pressure fuel system Harness or connectors (High pressure fuel pump circuit is shorted.) High pressure fuel pump High pressure fuel system Fuel rail pressure sensor Disconnection of the fuel hose 		
		 Fuel rail pressure remains at 1.1 MPa (11 bar, 11.2 kg/cm², 159.5 psi) or less for 5 	 Out of gas Harness or connectors (Low pressure fuel pump circuit is open or shorted.) Low pressure fuel pump 		
DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause		

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P1197 OUT OF GAS

< DTC/CIRCUIT DIAGNOSIS >

1. Refuel 10 liter (10 US qt, 8 imp qt). CAUTION:

Never refuel more than 10 liter.

2. Start the engine and keep the engine speed at 3,000 rpm for 30 seconds.

NOTE: For best results, warm up the engine until "COOLAN TEMP/S" on "DATA MONITOR" mode of "ENGINE" using CONSULT reaches at least 70°C (158°F).

- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Turn ignition switch ON.
- 7. Erase the DTC.
- 8. Start the engine and let it idle at least 60 seconds.
- 9. Perform DTČ confirmation procedure again. Refer to EC-395, "DTC Logic".

Is 1st trip DTC detected?

- YES >> GO TO 2.
- NO >> INSPECTION END
- 2.CHECK LOW PRESSURE FUEL PUMP

Refer to EC-490, "Component Function Check" .

Is inspection result normal?

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

 ${
m 3.}$ CHECK HIGH PRESSURE FUEL PUMP

Refer to EC-493, "Component Function Check".

Is inspection result normal?

- YES >> Check the fuel hose for disconnection and looseness.
- NO >> Repair or replace error-detected parts.

signals are exchanged between ECM and "ABS actuator and electric unit (control unit)".

DTC DETECTION LOGIC

< DTC/CIRCUIT DIAGNOSIS >

P1212 TCS COMMUNICATION LINE

(control unit)" but also for ECM after TCS related repair.

NOTE:

Description

DTC Logic

- If DTC P1212 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to <u>EC-163, "DTC Logic"</u>.
- If DTC P1212 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-381, "DTC Logic"</u>.

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause	(
P1212	TCS/CIRC (TCS communication line)	ECM can not receive the information from "ABS actuator and electric unit (control unit)" continuously.	 Harness or connectors (CAN communication line is open or shorted.) ABS actuator and electric unit (control unit) Dead (Weak) battery 	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

Start engine and let it idle for at least 10 seconds. 1. M Check 1st trip DTC. 2. Is 1st trip DTC detected? YES >> Proceed to EC-397, "Diagnosis Procedure". Ν NO >> INSPECTION END Diagnosis Procedure INFOID:000000007577254 Perform the trouble diagnosis for TCS. Refer to BRC-52, "Work Flow". NOTE: If DTC P1212 is displayed with DTC UXXXX and/or P0607, perform the following trouble diagnosis. Ρ Trouble diagnosis for DTC UXXXX Refer to EC-102, "DTC Index".

Trouble diagnosis for DTC P0607 Refer to <u>EC-381</u>, "<u>DTC Logic</u>".

Revision: 2011 October

P1212 TCS COMMUNICATION LINE

This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse

Be sure to erase the malfunction information such as DTC not only for "ABS actuator and electric unit

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INFOID:000000007577253

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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-381, "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.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P1217	ENG OVER TEMP [Engine over tempera- ture (Overheat)]	 Cooling fan does not operate properly (Overheat). Cooling fan system does not operate properly (Overheat). Engine coolant was not added to the system using the proper filling method. Engine coolant is not within the specified range. 	 Harness or connectors (Cooling fan circuit is open or shorted.) IPDM E/R Cooling fan control module Cooling fan motor Radiator hose Radiator Radiator cap Reservoir tank Water pump Thermostat Water control valve

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to <u>CO-8, "Draining"</u>. Also, replace the engine oil. Refer to <u>CO-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-11</u>, "<u>Anti-Freeze Coolant Mixture Ratio</u>".

2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to <u>EC-398</u>, "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-399</u>, "Diagnosis Procedure".

Component Function Check

INFOID:000000007577256

1.PERFORM COMPONENT FUNCTION CHECK-I

WARNING:

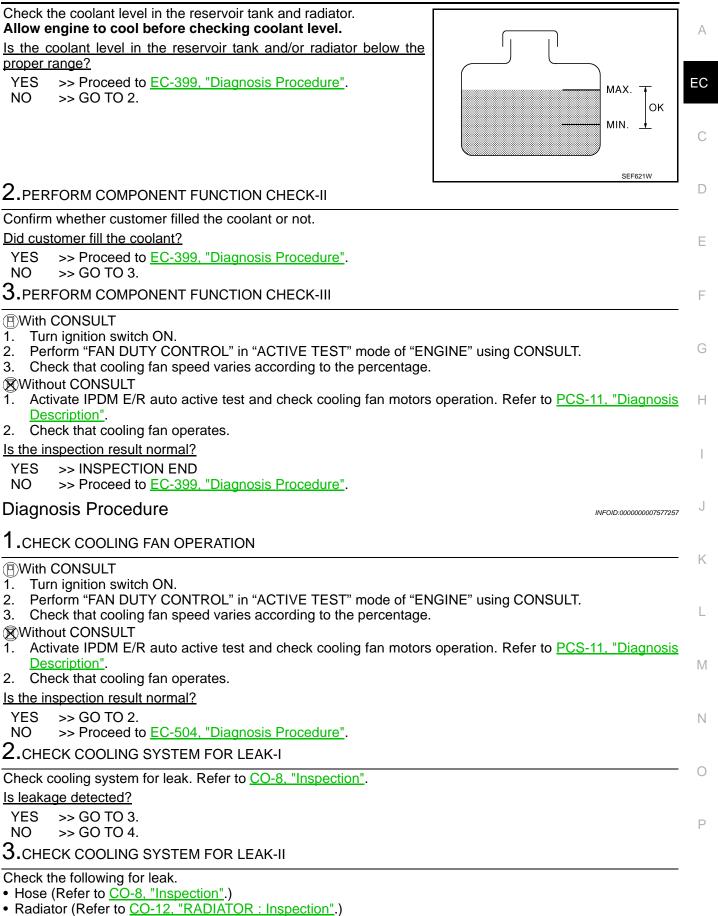
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

INFOID:000000007577255

P1217 ENGINE OVER TEMPERATURE

[MR16DDT]



• Water pump (Refer to CO-19, "Inspection".)

< DTC/CIRCUIT DIAGNOSIS >

P1217 ENGINE OVER TEMPERATURE

P1217 ENGINE OVER TEMPERATURE	
< DTC/CIRCUIT DIAGNOSIS >	[MR16DDT]
>> Repair or replace malfunctioning part.	
4. CHECK RADIATOR CAP	
Check radiator cap. Refer to CO-12, "RADIATOR CAP : Inspection".	
Is the inspection result normal?	
YES >> GO TO 5. NO >> Replace radiator cap. Refer to <u>CO-14, "Exploded View"</u> .	
5.CHECK THERMOSTAT	
Check thermostat. Refer to CO-22, "Inspection".	
Is the inspection result normal?	
YES >> GO TO 6.	
NO >> Replace thermostat. Refer to <u>CO-21, "Removal and Installation"</u> .	
6.CHECK WATER CONTROL VALVE	
Check water control valve. Refer to CO-24, "Inspection".	
Is the inspection result normal?	
YES >> GO TO 7.	
NO >> Replace water control valve. Refer to <u>CO-23</u> , "Exploded View".	
7. CHECK ENGINE COOLANT TEMPERATURE SENSOR	
Refer to EC-209, "Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 8.	
NO >> Replace engine coolant temperature sensor. Refer to <u>CO-23, "Exploded View"</u> .	
8. OVERHEATING CAUSE ANALYSIS	

If the cause cannot be isolated, check the <u>CO-6, "Troubleshooting Chart"</u>.

>> INSPECTION END

P1225 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1225 TP SENSOR

DTC Logic

А

EC

INFOID:000000007577258

[MR16DDT]

DTC DETECTION LOGIC

DTC No. Trouble diagnosis name (Trouble diagnosis con- tent) DTC detecting condition Possible cause P1225 CTP.LEARNING-B1 (Closed throttle position learning value is excessively learning performance) Electric throttle control actuator (TP sensor 1 and 2) DTC CONFIRMATION PROCEDURE 1. PRECONDITIONING Electric throttle control actuator (TP sensor 1 and 2) 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. Seconds. 2. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch OFF and wait at least 10 seconds. 2. PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch ON. 2. PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. 2. Turn ignition switch ON. 3. Turn ignition switch ON. 3. Turn ignition switch ON. 4. Check 1st trip DTC. Is lating DTC detected? YES >> Proceed to EC-401. "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure 2. Remove th					
P1225 [Closed throttle position low. Closed throttle position 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 OFF and wait at least 10 seconds. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch OFF and wait at least 10 seconds. Effore 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. 2. Turn ignition switch ON. 2. Turn ignition switch ON. 2. Turn ignition switch ON. 3. Turn ignition switch ON. 3. Turn ignition switch ON. 4. Check 1st trip DTC detected? YES >> Proceed to EC-401. "Diagnosis Procedure". NO >> INSPECTION END 2. Diagnosis Procedure 2. 1. Turn ignition switch OFF. 3. Check if foreign matter is caught between the throttle valve and the housing. <	DTC No.	(Trouble diagnosis con-	DTC detecting condition	Possible cause	
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. 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 10 V at idle. > GO TO 2. 2.PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. 1. Turn ignition switch ON. 2. Turn ignition switch ON. 1. Turn ignition switch ON. 3. Turn ignition switch ON. 1. Stattip DTC detected? YES >> Proceed to EC-401, "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 e	P1225	[Closed throttle position			
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 10 V at idle. >> GO TO 2. 2.PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. 2. Turn ignition switch ON. 2. Turn ignition switch ON. 2. Turn ignition switch ON. 3. Turn ignition switch ON. 4. Check 1st trip DTC. Is 1st trip DTC detected? YES >> Proceed to EC-401, "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 EM-27, "Exploded View". NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform	DTC CO	NFIRMATION 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 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. 2. Turn ignition switch ON. 2. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch ON. 2. 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-401, "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 EM-27, "Exploded View". NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform	1.PRECO	ONDITIONING			
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-401, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure 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 EM-27, "Exploded View". NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform	before cor 1. Turn i 2. Turn i	nducting the next test. gnition switch OFF an gnition switch ON.	d wait at least 10 seconds.	perform the following procedure	
 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-401, "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 EM-27, "Exploded View". NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform 	TESTING	CONDITION:		e is more than 10 V at idle.	(
 Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Check 1st trip DTC. Is 1st trip DTC detected? YES >> Proceed to EC-401, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure I.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY Turn ignition switch OFF. Remove the intake air duct. Refer to EM-25, "Exploded View". 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 EM-27, "Exploded View". NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform 	>	-> GO TO 2.			
 2. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch ON. 4. Check 1st trip DTC. <u>Is 1st trip DTC detected?</u> YES >> Proceed to <u>EC-401, "Diagnosis Procedure"</u>. NO >> INSPECTION END Diagnosis Procedure I. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY 1. Turn ignition switch OFF. 2. Remove the intake air duct. Refer to <u>EM-25, "Exploded View"</u>. 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-27, "Exploded View"</u>. NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform 	2.PERFC	ORM DTC CONFIRMA	TION PROCEDURE		
Is 1st trip DTC detected? YES >> Proceed to EC-401, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure INFOLD.0000007577259 1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY Infold.000000000000000000000000000000000000	 Turn i Turn i 	gnition switch OFF an gnition switch OFF.	d wait at least 10 seconds.		
NO >> INSPECTION END Diagnosis Procedure INFOLD:00000007577259 1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY Infold:000000000000000000000000000000000000		•			
Diagnosis Procedure INFORMATION VISUALLY 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 EM-27, "Exploded View". NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform			"Diagnosis Procedure".		
 Turn ignition switch OFF. Remove the intake air duct. Refer to <u>EM-25, "Exploded View"</u>. Check if foreign matter is caught between the throttle valve and the housing. <u>Is the inspection result normal?</u> YES >> Replace electric throttle control actuator. Refer to <u>EM-27, "Exploded View"</u>. NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform 	-			INFOID:00000007577259	
 Turn ignition switch OFF. Remove the intake air duct. Refer to <u>EM-25, "Exploded View"</u>. Check if foreign matter is caught between the throttle valve and the housing. <u>Is the inspection result normal?</u> YES >> Replace electric throttle control actuator. Refer to <u>EM-27, "Exploded View"</u>. NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform 	1. CHECK	K ELECTRIC THROT	ILE CONTROL ACTUATOR VISUALLY		
 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 EM-27. "Exploded View". NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform 	1. Turn i	gnition switch OFF.			
YES >> Replace electric throttle control actuator. Refer to <u>EM-27, "Exploded View"</u> . NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform				sing.	
NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform	Is the insp	ection result normal?	-	-	
		Remove the foreign	n matter and clean the electric throttle con	trol actuator inside, then perform	
					(

< DTC/CIRCUIT DIAGNOSIS >

P1226 TP SENSOR

DTC Logic

[MR16DDT]

INFOID:000000007577260

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)		Possible cause
P1226	CTP LEARNING-B1 (Closed throttle position learning performance)	Closed throttle position learning is not performed successfully, repeatedly.	Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Turn ignition switch OFF, wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Repeat steps 2 and 3 for 32 times.
- 5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-402, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007577261

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-27, "Exploded View"</u>.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to <u>EC-131</u>, "Work Procedure".

P1423, P1424 COLD START CONTROL

< DTC/CIRCUIT DIAGNOSIS >

P1423, P1424 COLD START CONTROL

Description

ECM controls fuel injection timing and fuel injection quantity when engine is started with the engine cold. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

DTC Logic

DTC DETECTION LOGIC

NOTE:

• If DTC P1423 or P1424 is displayed with other DTC, first perform the trouble diagnosis for other DTC. D

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause	
P1423	COLD START CONTROL (Cold start emission reduction strategy monitoring)	ECM does not control fuel injection timing properly when engine is started with the engine cold.	ECM	_
P1424	COLD START CONTROL (Cold start emission reduction strategy monitoring)	ECM does not control fuel injection quantity properly when engine is started with the engine cold.	ECIM	

DTC CONFIRMATION PROCEDURE

1

1.PRECONDITIONING	Н
 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. 	Ι
>> GO TO 2.	J
2. PERFORM DTC CONFIRMATION PROCEDURE	
	Κ
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. 	
 Select "DATA MONITOR" mode of "ENGINE" using CONSULT. Check that "COOLAN TEMP/S". 	L
- If it is between 5°C (41°F) and 40°C (104°F) go to the following steps.	
 If it is below 5°C (41°F) warm engine up to more than 5°C (41°F) and retry from step 1. If it is above 40°C (104°F) cool engine down to less than 40°C (104°F) and retry from step 1. 	M
 Start engine and let it idle for 5 minutes. Check 1st trip DTC. 	
@WITH GST	Ν
Follow the procedure "With CONSULT" above.	
<u>Is 1st trip DTC detected?</u> YES >> Proceed to <u>EC-403, "Diagnosis Procedure"</u> .	\bigcirc
NO >> INSPECTION END	0

Diagnosis Procedure

1.INSPECTION START

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC confirmation procedure. Refer to EC-403, "DTC Logic".
- 4. Check 1st trip DTC.

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P1423, P1424 COLD START CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

Is the 1st trip DTC P1423 or P1424 displayed again?

- YES >> Replace ECM. Refer to EC-534, "Removal and Installation".
- NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

P1451 PRESSURE SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P1451 is displayed with DTC P0452 or P0453, first perform the trouble diagnosis for DTC P0452 or P0453. Refer to <u>EC-342, "DTC Logic"</u> or <u>EC-345, "DTC Logic"</u>.

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1451	TC/SC PRES-EVAP PRES (EVAP control system pressure sensor/turbocharger boost sen- sor correlation)	ECM detects a state that the pressure differ- ence remains –13.0 kPa (–98 mmHg, –3.83 inHg) or less/13.5 kPa (102 mmHg, 3.99 in- Hg) or more for continuously for 5 seconds or more under the condition that the pressure of the EVAP control system pressure sensor and that of the turbocharger boost sensor are equal.	 EVAP control system pressure sensor Turbocharger boost sensor Clogging, crushing, or damage in hose or piping
NOTE:	NFIRMATION PROCEDU		
	ONDITIONING	iowing procedule.	
		been previously conducted, always	perform the following procedure
	nducting the next test. ignition switch OFF and wai	t at least 10 seconds	
2. Turn i	ignition switch ON.		
3. Turni	ignition switch OFF and wai	t at least 10 seconds.	
;	>> GO TO 2.		
2.PERF	ORM DTC CONFIRMATION	I PROCEDURE	
2. Turn i 3. Start	ignition switch OFF and wai	rmal operating temperature t at least 10 seconds. 15 seconds after the start of idle runni	ng.
	DTC detected?		
	> Proceed to <u>EC-405, "Dia</u> >> INSPECTION END	<u>gnosis Procedure"</u> .	
	sis Procedure		INFOID:00000007577266
	K HOSE AND PIPING		
	ignition switch OFF. k the following.		
- Block	age, crush, or damage in th	ne hose and the piping of EVAP purge	line between fuel tank and intake
		ne hose and the piping of intake air pa	assage between inlet air duct and
	pection result normal?		
	>> GO TO 2. >> Repair or replace error-d	etected parts	
•	K EVAP CONTROL SYSTE	•	
		e sensor. Refer to <u>EC-406, "Compone</u>	ent Inspection (EVAP Control Sys-

tem Pressure Sensor)".

Is the inspection result normal?

EC-405

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EC

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INFOID:000000007577265

P1451 PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 3.
- NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-26, "2WD : Exploded View"</u>.

3.CHECK TURBOCHARGER BOOST SENSOR

Check turbocharger boost sensor. Refer to <u>EC-406. "Component Inspection (Turbocharger Boost Sensor)"</u>. Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace turbocharger boost sensor (with intake temperature sensor 2). Refer to <u>EM-30.</u> <u>"Exploded View"</u>.

Component Inspection (EVAP Control System Pressure Sensor)

INFOID:000000007577267

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. Always replace O-ring with a new one.
- 3. Install a vacuum pump to EVAP control system pressure sensor.
- 4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

ECM			Condition		
Connector	+	-	Condition [Applied vacuum kPa (kg/cm ² , psi)]	Voltage	
Connector	Terminal				
F25	15	15 12	12	Not applied	0.5 - 4.6 V
125	15	15 12	-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 <u>FL-26, "2WD : Exploded View"</u>.

Component Inspection (Turbocharger Boost Sensor)

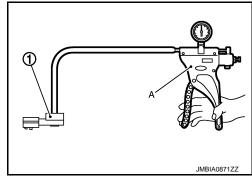
INFOID:000000007577268

1.CHECK TURBOCHARGER BOOST SENSOR

- 1. Turn ignition switch OFF.
- 2. Remove turbocharger boost sensor with its harness connector.
- 3. Install pressure pump (A) to turbocharger boost sensor (1). CAUTION:

When insert a pressure pump hose to the sensor, be careful to the damage of the sensor housing.

- 4. Turn ignition switch ON.
- 5. Check the voltage between ECM harness connector terminals as per the following conditions.



NOTE:

- Always calibrate the pressure pump gauge when using it.
- Inspection should be done at room temperature [10 30°C (50 86°F)].

P1451 PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

	ECM			
Connector	+	-	Condition [Pressure (Relative to at- mospheric pressure)]	Voltage (Approx.)
Connector	Terr	minal		× + + /
			0 kPa (0 mbar, 0 mmHg, 0 inHg)	2.03 V
F25	41	41 44	40 kPa	2.67 V
			(400 mbar, 300 mmHg, 11.81 inHg)	2.67 V
Is the insp				
YES > NO >	> INSPEC ⁻ > Replace	TION END) ger boost sensor. Refer to <u>EM-37,</u>	"Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

P1550 BATTERY CURRENT SENSOR

DTC Logic

Revision: 2011 October

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1550	BAT CURRENT SENSOR (Battery current sensor circuit range/performance)	The output voltage of the battery current sensor remains within the specified range while engine is running.	 Harness or connectors (Battery current sensor circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted) (Fuel rail pressure sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) Battery current sensor Camshaft position sensor Camshaft (Intake) Starter motor Starting system circuit Dead (Weak) battery Fuel rail pressure sensor G sensor Exhaust valve timing control position sensor Accelerator pedal position sensor 2 Turbocharger boost sensor Exhaust valve timing control position sensor Accelerator pedal position sensor 2 Turbocharger boost sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 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-408, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK BATTERY CURRENT SENSOR POWER SUPPLY

[MR16DDT]

INFOID:000000007577269

< DTC/CIRCUIT DIAGNOSIS >

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			
F52	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check harness connector for short to power and short to ground, between the following terminals.

EC	M	Sen	isor	
Connector	Terminal	Name	Connector	Terminal
		FRP sensor	F5	1
F25	39	EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
	68	Battery current sensor	F52	1
F26	00	G sensor	B32	3
F20	72	CMP sensor	F109	1
	12	EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5
the inspec	tion result r	normal?		
S >> I	Perform the	trouble diagnosis for power s	upply circuit.	

NO >> Repair or replace error-detected parts.

${ m 3.}$ 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	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	
F52	3	F26	87	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.

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[MR16DDT]

< DTC/CIRCUIT DIAGNOSIS >

	+		_	
Battery cur	rent sensor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F52	4	F26	80	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 <u>EC-410, "Component Inspection"</u>.

Is the inspection result normal?

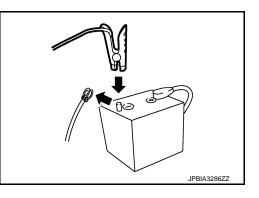
YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace battery negative cable assembly. Refer to <u>PG-96, "Exploded View"</u>.

Component Inspection

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 and ground.



	ECM		
Connector	+	-	Voltage (Approx.)
Connector	Ter	minal	
F26	80	87	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-88. "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly. Refer to <u>PG-96, "Exploded View"</u>.

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P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1551, P1552 BATTERY CURRENT SENSOR

DTC Logic

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INFOID:000000007577272

[MR16DDT]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1551	BAT CURRENT SENSOR (Battery current sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (Battery current sensor circuit is open or shorted.)
P1552	BAT CURRENT SENSOR (Battery current sensor circuit high input)	An excessively high voltage from the sen- sor is sent to ECM.	 (Camshaft position sensor circuit is open or shorted) (Fuel rail pressure sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) Battery current sensor Camshaft position sensor Camshaft (Intake) Starter motor Starting system circuit Dead (Weak) battery Fuel rail pressure sensor G sensor Exhaust valve timing control position sensor Accelerator pedal position sensor 2 Turbocharger boost sensor
TC CONF	FIRMATION PROCEDUR	E	1
	NDITIONING	-	
f DTC Conf		en previously conducted, always pe	rform the following before conduct

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 with ignition switch ON $$\mathbb{N}$$

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

YES >> Proceed to EC-412, "Diagnosis Procedure".

NO >> INSPECTION END

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P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

INFOID:000000007577273

[MR16DDT]

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
Connector	Terminal	-	(Approx.)
F52	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check harness connector for short to power and short to ground, between the following terminals.

EC	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
		FRP sensor	F5	1
F25	39	EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
	68	Battery current sensor	F52	1
F26	00	G sensor	B32	3
F20	72	CMP sensor	F109	1
	12	EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

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	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F52	3	F26	87	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.

EC-412

P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

Battery cu	rrent sensor	E	CM	Continuity						
Connector	Terminal	Connector	Terminal							
F52	4	F26	80	Existed	-					
the inspe YES >> NO >> CHECK heck the b the inspe YES >> NO >>	ction result n GO TO 5. Repair or re BATTERY C attery currer ction result n Check intern Replace bat	ormal? place error-o URRENT SE at sensor. Re ormal? mittent incide tery negative tion	efer to <u>EC-41</u> ent. Refer to e cable asse	s <u>0, "Compon</u> <u>GI-43, "Inter</u>	rmittent Ir	ncident".	led View".	INF	OID:000000007577	274
. Turn igi . Reconr . Disconr . Install ji ground. . Turn igi	nect battery r umper cable nition switch the voltage	OFF. connectors on egative cab between bat	disconnected	e terminal ar	-			E	JPBIA3286ZZ	
 Turn igi Reconr Disconr Install ji ground Turn igi Check 	nition switch lect harness nect battery r umper cable nition switch the voltage	OFF. connectors on egative cab between bat	disconnected le. ttery negative ECM harne	e terminal ar	-				JPBIA3286ZZ	
 Turn igr Reconr Disconr Install juground Turn igr Check ground 	nition switch lect harness nect battery r umper cable nition switch the voltage	OFF. connectors on egative cab between bat	disconnected le. ttery negative ECM harne	e terminal ar	-				JPBIA3286ZZ	
 Turn igi Reconr Disconr Install ji ground Turn igi Check 	nition switch lect harness nect battery r umper cable nition switch the voltage ECM +	OFF. connectors of negative cab between bat ON. between	disconnected le. ttery negative ECM harne	e terminal ar ss connect	-	,			JPBIA3286ZZ	
 Turn igr Reconr Disconr Install juground Turn igr Check ground 	hition switch lect harness nect battery r umper cable nition switch the voltage ECM + Term 80	OFF. connectors of negative cab between bat ON. between between	disconnected le. ttery negative ECM harne	e terminal ar ss connect tage prox.)	or and					

< DTC/CIRCUIT DIAGNOSIS >

P1553 BATTERY CURRENT SENSOR

DTC Logic

Revision: 2011 October

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1553	BAT CURRENT SENSOR (Battery current sensor perfor- mance)	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.) (Camshaft position sensor circuit is open or shorted) (Fuel rail pressure sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) Battery current sensor Camshaft position sensor Camshaft (Intake) Starter motor Starting system circuit Dead (Weak) battery Fuel rail pressure sensor G sensor Exhaust valve timing control position sensor Accelerator pedal position sensor 2 Turbocharger boost sensor Exhaust valve timing control position sensor Accelerator pedal position sensor 2 Turbocharger boost sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 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-414, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK BATTERY CURRENT SENSOR POWER SUPPLY

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EC-414

< DTC/CIRCUIT DIAGNOSIS >

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		
F52	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check harness connector for short to power and short to ground, between the following terminals.

EC	M	Sen	isor	
Connector	Terminal	Name	Connector	Terminal
		FRP sensor	F5	1
F25	39	EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
	<u></u>	Battery current sensor	F52	1
F26	68	G sensor	B32	3
F20 -	72	CMP sensor	F109	1
	12	EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5
the inspect	tion result r	normal?		
		e trouble diagnosis for power si	upply circuit.	

NO >> Repair or replace error-detected parts.

${f 3.}$ 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	
F52	3	F26	87	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.

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< DTC/CIRCUIT DIAGNOSIS >

+				
Battery cur	rent sensor	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F52	4	F26	80	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 <u>EC-410, "Component Inspection"</u>.

Is the inspection result normal?

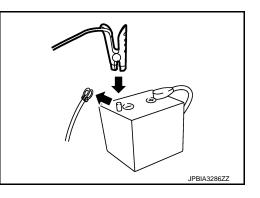
YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace battery negative cable assembly. Refer to <u>PG-96, "Exploded View"</u>.

Component Inspection

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 and ground.



	ECM		
Connector	+	-	Voltage (Approx.)
Connector	Tei	minal	
F26	80	87	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-88, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly. Refer to <u>PG-96, "Exploded View"</u>.

INFOID:000000007577277

< DTC/CIRCUIT DIAGNOSIS >

P1554 BATTERY CURRENT SENSOR

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1554	BAT CURRENT SENSOR (Battery current sensor perfor- mance)	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.) (Camshaft position sensor circuit is open or shorted) (Fuel rail pressure sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) Battery current sensor Camshaft position sensor Camshaft (Intake) Starter motor Starting system circuit Dead (Weak) battery Fuel rail pressure sensor G sensor Exhaust valve timing control position sensor Accelerator pedal position sensor 2 Turbocharger boost sensor Engine oil pressure sensor Engine oil pressure sensor
DTC CONF	FIRMATION PROCEDUR	E	
1.PERFOR	RM COMPONENT FUNCTIO	ON CHECK	
		fer to EC-417, "Component Functio	n Check".
NOTE: Use compor		k the overall function of the battery	y current sensor circuit. During this
YES >>	<u>ction result normal?</u> INSPECTION END Proceed to <u>EC-418, "Diagn</u>	osis Procedure".	
	ent Function Check		INFOID:00000007577279

- 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

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< DTC/CIRCUIT DIAGNOSIS >

- 1. Start engine and let it idle.
- 2. Select "BAT CUR SEN" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 3. Check "BAT CUR SEN" indication for 10 seconds. "BAT CUR SEN" should be above 2,300 mV at least once.

Without CONSULT

- 1. Start engine and let it idle.
- 2. Check the voltage between ECM harness connector and ground.

	ECM		
Connector	+	-	Voltage
Connector	Tern	ninal	
F26	80	87	Above 2.3 V at least once

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to <u>EC-418</u>, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000007577280

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 current sensor		-	Voltage (Approx.)	
Connector	Terminal			
F52 1		Ground	5 V	
the increation requit normal?				

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check harness connector for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
		FRP sensor	F5	1
F25	F25 39	EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
	68	Battery current sensor	F52	1
F26	00	G sensor	B32	3
F20	72	CMP sensor	F109	1
12	EVT control position sensor	F110	1	
E18	118	APP sensor 2	E101	5

Is the inspection result normal?

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

NO >> Repair or replace error-detected parts.

 $\mathbf{3}$.check battery current sensor ground circuit

< DTC/CIRCUIT DIAGNOSIS >

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- 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	
F52	3	F26	87	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 cur	rent sensor	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F52	4	F26	80	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-410, "Component Inspection".

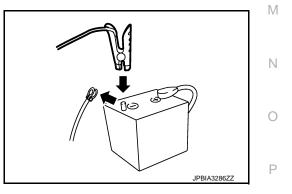
Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".
- NO >> Replace battery negative cable assembly. Refer to PG-96. "Exploded View".

Component Inspection

1.CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable.
- Install jumper cable between battery negative terminal and body ground.
- 5. Turn ignition switch ON.
- Check the voltage between ECM harness connector and ground.



< DTC/CIRCUIT DIAGNOSIS >

	ECM			
Connector	+	-	Voltage (Approx.)	
Connector	Ter	minal		
F26	80	87	2.5 V	

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-88. "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly. Refer to PG-96, "Exploded View".

P1556, P1557 BATTERY TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1556, P1557 BATTERY TEMPERATURE SENSOR

DTC Logic

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[MR16DDT]

P1556 (Batt cuit I P1557 (Batt cuit I P1557 (Batt cuit I PTC CONFIRM PRECONDITIO PRECONDITIO Turn ignition Turn ignition ESTING CONDI Sefore performin	switch OFF and wait at switch ON. switch OFF and wait at TION: ng the following proc	t least 10 seconds.	 Harness or connectors [Battery current sensor (Battery temperature sensor) circuit is shorted.] Battery current sensor (Battery temperature sensor)
P1557 (Batt cuit h DTC CONFIRM, 1 .PRECONDITIO 1. Turn ignition 2. Turn ignition 3. Turn ignition TESTING CONDI Before performin	ery temperature sensor cir- nigh input) ATION PROCEDURI DNING switch OFF and wait at switch ON. switch OFF and wait at TION: ng the following proc	sensor remains 4.84V or more for 5 sec- onds or more. E t least 10 seconds. t least 10 seconds.	Battery current sensor (Battery temperature sensor)
1. PRECONDITION 1. Turn ignition 2. Turn ignition 3. Turn ignition TESTING CONDI Before performin >> GO T	ONING switch OFF and wait at switch ON. switch OFF and wait at TION: ng the following proc	t least 10 seconds. t least 10 seconds.	ge is 10 V or more at idle.
 Turn ignition Turn ignition TESTING CONDI Before performin >> GO T 	switch ON. switch OFF and wait at TION: ng the following proc O 2.	t least 10 seconds.	ge is 10 V or more at idle.
>> GO T 2.PERFORM DT			
2. Check 1st trip <u>Is 1st trip DTC de</u> YES >> Proce			
Diagnosis Pro	cedure		INFOID:000000007577
1.CHECK BATT	ERY TEMPERATURE	SENSOR POWER SUPPLY	
3. Turn ignition	attery current sensor h switch ON.	arness connector. current sensor harness connector a	and ground.
+		Voltage	
Battery curren	t sensor –	Voltage (Approx.)	
Connector	Terminal		
F52	2 Ground	5 V	
Is the inspection r YES >> GO T NO >> GO T	0 3. 0 2.	SENSOR POWER SUPPLY CIRC	

3. Check the continuity between battery current sensor harness connector and ECM harness connector.

P1556, P1557 BATTERY TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

+	+		_	
Battery curr	ent sensor	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F52	2	F26	79	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 BATTERY TEMPERATURE 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 current sensor		ECM		Continuity	
Connector	Terminal	Connector	Terminal		
F52	3	F26	87	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 TEMPERATURE SENSOR

Check the battery temperature sensor. Refer to EC-422, "Component Inspection".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".
- NO >> Replace battery negative cable assembly. Refer to <u>PG-96, "Exploded View"</u>.

Component Inspection

INFOID:000000007577284

1.CHECK BATTERY TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect battery current sensor.
- 3. Check the resistance between battery current sensor connector terminals.

-	Battery current sensor + – Terminal		
-	+	-	Resistance
-	Terminal		
_	2 3		Continuity with the resistance value 100 $\boldsymbol{\Omega}$ or more
			-

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace battery negative cable assembly. Refer to PG-96. "Exploded View".

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-379, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1564	ASCD SW (ASCD steering switch)	 An excessively high voltage signal from the ASCD steering switch is sent to ECM. ECM detects that input signal from the ASCD steering switch is out of the specified range. ECM detects that the ASCD steering switch is stuck ON. 	 Harness or connectors (ASCD steering switch circuit is open or shorted.) ASCD steering switch ECM
	NFIRMATION PROCED	URE	
before cor 1. Turn i 2. Turn i	onfirmation Procedure handucting the next test. gnition switch OFF and war gnition switch ON. gnition switch ON.		perform the following procedure
•	-> GO TO 2. DRM DTC CONFIRMATIC	N PROCEDURE	
2. Wait a 3. Press 4. Press 5. Press	CANCEL switch for at lea ACCEL/RES switch for a	10 seconds, then release it and wait at l ast 10 seconds, then release it and wait t least 10 seconds, then release it and v t least 10 seconds, then release it and v	at least 10 seconds. wait at least 10 seconds.
<u>Is DTC de</u> YES >	< DTC. <u>tected?</u> → Proceed to <u>EC-423, "Di</u> → INSPECTION END	agnosis Procedure".	
Diagnos	sis Procedure		INFOID:00000007577286
1. CHECK	KASCD STEERING SWIT	TCH CIRCUIT	
1. Turn i	ONSULT gnition switch ON. t "CANCEL_SW". "RESU	ME/ACC SW" and "SET SW" in "DAT	A MONITOR" mode of "ENGINE"

- 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
MAIN SW		Released	OFF
CANCEL SW CANCEL switch	Pressed	ON	
		Released	OFF

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P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

Monitor item	Condition		Indication
RESUME/ACC	ACCEL/RES switch	Pressed	ON
SW	ACCEL/RES Switch	Released	OFF
SET SW	COAST/SET switch	Pressed	ON
SETSW		Released	OFF

Without CONSULT

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals.

ECM				
Connector + Termina	+ -		Condition	Voltage (Approx.)
	ninal		()	
E18	110		MAIN switch: Pressed	0 V
		110 111	CANCEL switch: Pressed	1 V
			COAST/SET switch: Pressed	2 V
			ACCEL/RES switch: Pressed	3 V
			All ASCD steering switches: Released	4 V

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

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		
Connector	Terminal	Connector	Connector Terminal		
M33	32	E18	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.

3. CHECK ascd steering switch input signal circuit

1. Check the continuity between ECM harness connector and combination switch.

+			_		
	tion switch l cable)	ECM Connector Terminal		Continuity	
Connector	Terminal				
M33			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.

P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

4. CHECK ASCD STEERING SWITCH

Refer to EC-425, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43. "Intermittent Incident".

NO >> Replace ASCD steering switch. Refer to <u>ST-8, "Exploded View"</u>.

Component Inspection

1.CHECK ASCD STEERING SWITCH

- 1. Disconnect combination switch (spiral cable) harness connector.
- Check the resistance between combination switch harness connector terminals as per the following conditions.

Combination switch (Spiral cable)				Resistance	
Connector	+ –	Condition	(Approx.)		
Termi	ninals				
M302	13		MAIN switch: Pressed	0 Ω	
			CANCEL switch: Pressed	250 Ω	
		16	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>ST-8. "Exploded View"</u>.

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< DTC/CIRCUIT DIAGNOSIS >

P1572 ASCD BRAKE SWITCH

DTC Logic

INFOID:000000007577288

[MR16DDT]

DTC DETECTION LOGIC

NOTE

- If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-379, "DTC Logic".
- This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)		DTC detecting condition	Possible cause	
	ASCD BRAKE SW	A) ASCD BRAKE SW		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
	(ASCD brake switch)	ASCD brake	Brake pedal position switch signal is not sent to ECM for extremely long time while the vehicle is driving.	 Brake pedal position switch Incorrect stop lamp switch installation Incorrect brake pedal position switch installation 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.

NOTE:

Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Start engine.
- 2. Press MAIN switch and make sure that CRUISE indicator is displayed in combination meter.
- 3. Drive the vehicle for at least 5 consecutive seconds as per the following conditions.

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position

4. Check DTC.

Is DTC detected?

YES >> Proceed to EC-431, "Diagnosis Procedure".

NO >> GO TO 3.

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CUIT DIA	GNOSIS	>				[MR16DDT]	
RM DTC C	CONFIRM	ATION PRO	CEDUR	E FOR MA	LFUNCTION B		/
<mark>ON:</mark> s drive ve rocedure	hicle at a may be co	safe speed	ith the d	Irive whee	Is lifted in the sh	op or by driving the vehicle.	E
d		More than 30 l	(m/h (19 r	nph)			(
er							
ion		Depress the bit than five second off from the ab	rake peda nds so as r	not to come			E
DTC.		•					
			Proced	ure".			F
s Proce	dure					INFOID:000000007577289	(
OVERALI	FUNCTION						
							ŀ
nition swit "BRAKE S	SW1" in "D					SULT.	
r item		Condition		Indication			
S\N/1	Brake pode	Slightly de	pressed	OFF			,
		Fully relea	sed	ON			
nition swit	ch ON.	ECM harne	ss conn	ector termi	nals as per the fo	llowing.	I
ECM							l
+	_		Condition		Voltage		
Terr	ninal				(Approx.)		N
116	107	Brako podol	Slightly	depressed	0 V	-	1
011	141	DIAKE DEUA					
	RM DTC (ne vehicle ON: s drive ve rocedure id test is of d d r ion DTC. ected? Proceed INSPEC s Proceed INSPEC s Proceed OVERALI NSULT nition switt 'BRAKE S 'BRAKE S	RM DTC CONFIRM/ ne vehicle for at leas ON: a drive vehicle at a rocedure may be conditest is expected d d d d ar d on DTC. ected? Proceed to EC-431 INSPECTION END s Procedure OVERALL FUNCTION NSULT nition switch ON. 'BRAKE SW1'' indic ritem SW1 Brake peda CONSULT nition switch ON. the voltage between ECM	CUIT DIAGNOSIS > RM DTC CONFIRMATION PROMeter And DECONSTRUCTION Proceed for at least 5 consecutions To vehicle for at least 5 consecutions Suitable positions Suitable positions To ceedure may be conducted with the second of the test is expected to be easient More than 30 I To ceedure DTC. Ceted? Proceed to EC-431. "Diagnosis INSPECTION END S Procedure OVERALL FUNCTION-I NSULT nition switch ON. Brake pedal Slightly de Fully relea CONSULT nition switch ON. tecM ECM ECM Functional	CUIT DIAGNOSIS > RM DTC CONFIRMATION PROCEDUR The vehicle for at least 5 consecutive sectors on: to vehicle at a safe speed. Tocedure may be conducted with the cold test is expected to be easier, it is under than 30 km/h (19 means) d More than 30 km/h (19 means) d Depress the brake pedat than five seconds so as a second from the above-ment cle speed. DTC. Depress the brake pedat than five seconds so as a second from the above-ment cle speed. DTC. Depress the brake pedat than five seconds so as a second from the above-ment cle speed. DTC. Depress the brake pedat than five seconds so as a second so asecond so asecond so as a second so as a second so asec	CUIT DIAGNOSIS > RM DTC CONFIRMATION PROCEDURE FOR MAIl te vehicle for at least 5 consecutive seconds as per ON: a drive vehicle at a safe speed. rocedure may be conducted with the drive wheel of test is expected to be easier, it is unnecessary d More than 30 km/h (19 mph) gr Suitable position d Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed. DTC. acted? Proceed to EC-431, "Diagnosis Procedure". INSPECTION END S Procedure OVERALL FUNCTION-I NSULT nition switch ON. 'Brake pedal Slightly depressed OFF Support on the above-mentioned vehicle speed. OVERALL FUNCTION-I NSULT Indication as per the following condi Interminal Slightly depressed OFF Fully released ON CONSUL	CUIT DIAGNOSIS > RM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B revenice for at least 5 consecutive seconds as per the following cor ON: or colspan="2">conducted with the drive wheels lifted in the shid test is expected to be easier, it is unnecessary to lift the vehicle d More than 30 km/h (19 mph) or Suitable position d Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehic. cle speed. DTC. ceted? Proceed to EC-431. "Diagnosis Procedure". INSPECTION END S Procedure OVERALL FUNCTION-I NSULT Indication as per the following conditions. ritem Condition Indication SW1 Brake SW1" in dication as per the following conditions. CONSULT NULT Indication Indication SW1 Brake pedal Slightly depressed OFF Fully released OFF Consult Notes connector ter	RM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B is eventicle for at least 5 consecutive seconds as per the following conditions. ON: is drive vehicle at a safe speed. ocedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. id More than 30 km/h (19 mph) ir Suitable position ion Depress the brake pedal for more than five seconds as an ot ocome off from the above-mentioned vehicle sepeed. DTC. Depress the brake pedal for more than five seconds as an ot ocome off from the above-mentioned vehicle sepeed. DTC. Strend the second set on

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT

Select "BRAKE SW2" and check indication as per the following conditions.

Monitor item	Condition		Indication
	Brake nedal	Slightly depressed	ON
BRARE OWZ	BRAKE SW2 Brake pedal	Fully released	OFF

Without CONSULT

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

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< DTC/CIRCUIT DIAGNOSIS >

	ECM		Condition			
Connector	+	—			Voltage (Approx.)	
Connector	Tern	ninal				
E18	115	127	Brake pedal	Slightly depressed	Battery voltage	
210	115	Diake pedal	Fully released	0 V		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43. "Intermittent Incident".

NO >> GO TO 6.

3.CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY

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	osition switch	-	Voltage	
Connector	Terminal			
E112	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 4.

NO >> Perform the trouble diagnosis for power supply circuit.

4.CHECK BRAKE PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- Check the continuity between brake pedal position switch harness connector and ECM harness connector.

+		-		
Brake pedal p	osition switch	ECM		Continuity
Connector	Terminal	Connector	Terminal	
E112	2	E18	116	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK BRAKE PEDAL POSITION SWITCH

Check the brake pedal position switch. Refer to <u>EC-515</u>, "Component Inspection (Brake Pedal Position Switch)"

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".
- NO >> Replace brake pedal position switch. Refer to <u>BR-18, "Exploded View"</u>.

6.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect stop lamp switch harness connector.
- 3. Check the voltage between stop lamp switch harness connector and ground.

< DTC/CIRCUIT DIAGNOSIS >

	+					
Stop la	amp switch			Voltage		
Connector	Termir	nal		i onago		
E102 ^{*1} E118 ^{*2}	1	Grou	Ind	Battery voltage		
*1: CVT mo	dels					
*2: M/T mod	dels					
s the inspecti	ion result ne	ormal?				
	O TO 7.					
		-		power supply ci	rcuit.	
				NAL CIRCUIT		
		mess conne		witch hornood a	anneator and T	
2. Check the	e continuity	between sto	p lamp s	witch namess c	connector and E	ECM harness connector.
+			-			
Stop lamp	switch	EC	M	Continuity		
Connector	Terminal	Connector	Termina			
E102 ^{*1}	2	= 10				
E118 ^{*2}	2	E18	115	Existed		
*1: CVT mo	dels					
*2: M/T mod		e 1		1.4		
		for short to g	round ar	id to power.		
<u>s the inspecti</u> YES >> G	O TO 8.	<u>umar:</u>				
		place error-d	etected p	oarts.		
B. CHECK S ⁻	TOP LAMP	SWITCH				
Check the sto	p lamp swit	tch. Refer to	EC-430,	"Component In	spection (Stop	Lamp Switch)".
s the inspecti						
				to GI-43, "Inter		<u>t"</u> .
NO >> R	eplace stop	o lamp switcl	h. Refer t	o <u>BR-18, "Explo</u>	oded View".	
Componen	t Inspect	tion (Brak	e Peda	I Position Sv	vitch)	INFOID:00000007577
1.снеск в				<u>-н-</u> і		
			N OWIT			
	ion switch (ct brake pe	dal position	harness	connector.		
					terminals as p	er the following conditions.
						-
Brake peda	I position swit	ch				
+	-		Con	dition	Continuity	
Те	rminals					_
4	2	Broke	nodol	Fully released	Existed	-
1	2	Brake	peual	Slightly de- pressed	Not existed	
	ion result of	ormal?		F100000		-
e the increati	on result no					
<u>s the inspecti</u> YES >> IN						
YES >> IN	NSPECTIO					

< DTC/CIRCUIT DIAGNOSIS >

- 1. Adjust brake pedal position switch installation. Refer to <u>BR-7, "Inspection and Adjustment"</u>.
- 2. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal p	Brake pedal position switch			
+	_	Condition		Continuity
Term	ninals			
			Fully released	Existed
1	2	Brake pedal	Slightly de- pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace brake pedal position switch. Refer to <u>BR-18, "Exploded View"</u>.

Component Inspection (Stop Lamp Switch)

INFOID:000000007577291

[MR16DDT]

1.CHECK STOP LAMP SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- 3. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch				
+	-	Condition		Continuity
Tern	ninals			
			Fully released	Not existed
1	2	Brake pedal	Slightly de- pressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-7, "Inspection and Adjustment".

2. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch				
+	-	Condition		Continuity
Term	ninals			
			Fully released	Not existed
1	2	Brake pedal	Slightly de- pressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to <u>BR-18, "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-57</u>, "<u>AUTOMATIC SPEED CONTROL DEVICE (ASCD)</u> : <u>System Description</u>" for ASCD functions.

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1574 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to <u>EC-163, "DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to <u>EC-359, "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-379, "DTC Logic"</u>
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-381, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause	G
P1574	ASCD VHL SPD SEN (ASCD vehicle speed sensor)	ECM detects a difference between two vehicle speed signals is out of the specified range.	 Harness or connectors (CAN communication line is open or shorted.) ABS actuator and electric unit (control unit) TCM ECM 	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

 Start engine.
 Drive the vehicle at more than 40 km/h (25 MPH).
 CAUTION: Always drive vehicle at a safe speed.

NOTE: This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

3. Check DTC.

Is DTC detected?

- YES >> Proceed to EC-431, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-103. "CONSULT Function (TRANSMISSION)".

EC-431

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P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Is DTC detected?

NO >> GO TO 2.

YES >> Perform trouble shooting relevant to DTC indicated.

2.check dtc with "abs actuator and electric unit (control unit)"

Check DTC with ABS actuator and electric unit (control unit). Refer to <u>BRC-38, "CONSULT Function"</u>. <u>Is DTC detected?</u>

- NO >> INSPECTION END
- YES >> Perform trouble shooting relevant to DTC indicated.

P158A ECM

< DTC/CIRCUIT DIAGNOSIS > P158A ECM

DTC Logic

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				EC
DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause*	
P158A	G SENSOR (G sensor calibration is incom- plete)	ECM detects a state that calibration of the G sensor is incomplete.	G sensor calibration is incomplete	С
	DTC is detected when G sensor	calibration is incomplete, there is not replaceme	nt parts.	D
before co 1. Turn	confirmation Procedure has nducting the next test. ignition switch OFF and wa ignition switch ON.	s been previously conducted, always it at least 10 seconds.	perform the following procedure	E
3. Turn	ignition switch OFF and wa	it at least 10 seconds.		F
•	ORM DTC CONFIRMATION	N PROCEDURE		G
2. Chec <u>Is DTC de</u>	ignition switch ON. k DTC. <u>etected?</u> >> Proceed to <u>EC-433, "Dia</u>	anosis Procedure"		Н
	>> INSPECTION END	<u>gnosis Fiocedure</u> .		I
Diagnos	sis Procedure		INFOID:00000007577296	I
	ORM CALIBRATION OF G			J
Perform c	alibration of G sensor. Refe	er to <u>EC-134, "Work Procedure"</u> .		
:	>> INSPECTION END			K

< DTC/CIRCUIT DIAGNOSIS >

P159A, P159C, P159D G SENSOR

DTC Logic

INFOID:000000007577297

[MR16DDT]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P159A	G SENSOR (G sensor circuit)	When ECM detects the following status: A voltage signal transmitted from the G sen- sor is less than 0.5 V or more than 5.02 V continuously for 5 seconds or more.	Harness or connectors (G sensor circuit is open or shorted.) (Intake air temperature sensor 2 cir- cuit is open or shorted.)
P159C	G SENSOR (G sensor circuit low input)	When ECM detects the following status: A voltage signal transmitted from the G sen- sor is less than 0.5 V continuously for 5 sec- onds or more.	(Turbocharger boost sensor circuit is open or shorted.) (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open
P159D	G SENSOR (G sensor circuit high input)	When ECM detects the following status: A voltage signal transmitted from the G sen- sor is more than 4.5 V continuously for 5 sec- onds or more.	or shorted.) (Crankshaft position sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) G sensor Intake air temperature sensor 2 Turbocharger boost sensor Fuel rail pressure sensor Battery current sensor Crankshaft position sensor Exhaust valve timing control position sensor Accelerator pedal position sensor 2 Engine oil pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

TEST 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 at least 5 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-434, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK G SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.

INFOID:000000007577298

P159A, P159C, P159D G SENSOR

< DTC/CIRCUIT DIAGNOSIS >

- 2. Disconnect G sensor harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between G sensor harness connector terminals.

	G sen	sor		N / . H	
Connector	+		-	Voltage (Approx.)	
Connector		Terminal		(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
B32	3		2	5 V	-
s the inspectio	n result norr	nal?			-
	D TO 2. D TO 4.				
2. снеск д s	SENSOR SIG	GNAL CIRCUI	Г		
	on switch OF				
		ess connector.			
. Check the	continuity de	etween G sens	or narness	connector and	ECM harness connector.
+			_		-
G ser	sor		CM	Continuity	
Connector	Terminal	Connector	Terminal		
B32	1	F26	83	Existed	-
-		short to grour			-
		0	iu anu shun	t to power.	
s the inspectio		<u>nal?</u>			
	D TO 3.	aa arrar dataa	tod porto		
-	• •	ce error-detec	ted parts.		
3. CHECK G S	SENSOR				
Check G sense	or. Refer to E	C-436, "Comp	onent Inspe	ection".	
<u>s the inspectio</u>	on result norr	<u>nal?</u>			
			Refer to GI-4	3. "Intermittent	Incident".
	Replace G		_ /		
					<u>Nork Procedure"</u> .
LCHECK G S	SENSOR PO	WER SUPPL	CIRCUIT-	II	
Check the volta	age between	G sensor har	ness conne	ctor terminal ar	d ground.
	+				-
G	sensor		-	Voltage (Approx.)	
Connector	Termi	nal		(Applox.)	
B32	3	G	iround	5 V	-
s the inspectio	n result norr				-
	D TO 5.				
	D TO 5. D TO 7.				
D.CHECK G S			пт		
			11		
•	on switch OF				
		ess connector.	or harness	connector and	ECM harness connector

3. Check the continuity between G sensor harness connector and ECM harness connector.

[MR16DDT]

P159A, P159C, P159D G SENSOR

< DTC/CIRCUIT DIAGNOSIS >

+				
G sensor		E	Continuity	
Connector	Terminal	Connector	Terminal	
B32	3	F26	87	Existed

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

E	CM	Ground	Continuity	
Connector	Connector Terminal		Continuity	
F25	1			
F23	2		Existed	
	123	Ground		
E18	124			
	127			

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".

NO >> Repair or replace error-detected parts.

7.CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connectors and each sensor harness connectors

3. Check harness connector for short to power and short to ground, between the following terminals.

ECM		Sensor				
Connector	Terminal	Name	Connector	Terminal		
		FRP sensor	F5	1		
F25	39	EOP sensor	F43	3		
		Turbocharger boost sensor	F75	1		
68	Battery current sensor	F52	1			
	F26	G sensor	B32	3		
F20	72	CMP sensor	F109	1		
		EVT control position sensor	F110	1		
E18	118	APP sensor 2	E101	5		

Is the inspection result normal?

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

NO >> Repair or replace error-detected parts.

Component Inspection

1.CHECK G SENSOR

(B) With CONSULT

- 1. Remove G sensor.
- 2. Reconnect all harness connectors disconnected.
- 3. Place the G sensor on a flat table.
- 4. Turn ignition switch ON.

INFOID:000000007577299

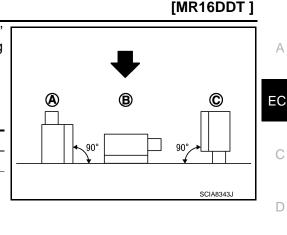


< DTC/CIRCUIT DIAGNOSIS >

5. Select "G SENSOR" in "DATA MONITOR" mode of "ENGINE" using CONSULT to check indications according to the following conditions:

Direction of gravitational force

Monitor item	Condition	Value (V)
	Parallel with the table (0G) (B)	2.18 – 2.82
G SENSOR	Vertical to the table (-1G) (A) \downarrow	0.85 – 1.49* ↓
	Parallel with the table (0G) (B) \downarrow	2.18 – 2.82* ↓
	Vertical to the table (1G) (C)	3.51 – 4.15*



*: Check that voltage rises as the G sensor measurement condition changes in the order of (A), (B), and (C).

- Without CONSULT
- 1. Remove G sensor.
- 2. Reconnect all harness connectors disconnected.
- 3. Place the G sensor on a flat table.
- 4. Turn ignition switch ON.
- 5. Check the voltage between ECM harness connector terminal and ground.

: Direction of gravitational force

•		0			A	B	©	F
EC		_	Condition	Voltage (V)		90°	90°	I
			Parallel with the table (0G) (B)	2.18 – 2.82			SCIA8343J	J
F26	83	Ground	Vertical to the table $(-1G)$ (A) \downarrow Parallel with the table (0G) (B) \downarrow Vertical to the table (1G) (C)	0.85 – 1.49* ↓ 2.18 – 2.82* ↓ 3.51 – 4.15*				K

*: Check that voltage rises as the G sensor measurement condition changes in the order of (A), (B), and (C).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace G sensor.

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< DTC/CIRCUIT DIAGNOSIS >

P159B G SENSOR

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P159B	G SENSOR (G sensor circuit range/perfor- mance)	Every time when the vehicle is stopped, ECM detects the following status 13 times in a row: A voltage signal transmitted from the G sen- sor is less than 2.275V or more than 2.725 V continuously for 5 seconds or more.	 Harness or connectors (G sensor circuit is open or shorted.) (Intake air temperature sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (Crankshaft position sensor circuit is open or shorted.) (Crankshaft position sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) G sensor Intake air temperature sensor 2 Turbocharger boost sensor Fuel rail pressure sensor Battery current sensor Crankshaft position sensor 2 Turbocharger boost sensor Exhaust valve timing control position sensor G sensor Battery current sensor Crankshaft position sensor 2 Turbocharger boost sensor Exhaust valve timing control position sensor Crankshaft position sensor 2 Exhaust valve timing control position sensor Exhaust valve timing control position sensor Exhaust valve timing control position sensor G sensor fitting condition 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.

TEST 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.
- 2. Drive the vehicle for at least 5 seconds at 35 km/h (22 MPH) or more.
- 3. Stop the vehicle and let it idle for at least 5 seconds.
 - NOTE:
 - Depress the brake pedal to bring the vehicle to a full stop.
 - Never depress the accelerator pedal while the vehicle is stopped.
- 4. Repeat Step 2 and Step 3 thirteen times.
- 5. Check 1st trip DTC.
- Is 1st trip DTC detected?
- YES >> Proceed to EC-439, "Diagnosis Procedure".

EC-438

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< DTC/CIRCUI	T DIAGNO	SIS >	11550	SENCOR		[MR16DDT]	
NO >> INS	PECTION I	END					A
Diagnosis Pr	ocedure					INFOID:000000007577301	A
1 .perform (ALIBRATIO	ON OF G SEN	ISOR				С
Perform calibrat	ion of G se	nsor. Refer to	<u>EC-134, "W</u>	/ork Procedure".			C
>> GO	TO 2						С
2.PERFORM D	-	RMATION PR	OCEDURE				
Perform DTC Co	onfirmation	Procedure. Re	efer to <u>EC-4</u>	38, "DTC Logic	"_•		D
Is 1st trip DTC c						L	
YES >> GO NO >> INS	TO 3. PECTION I	END					Е
3.CHECK G SI	ENSOR FIT	TING CONDI	TION			I	
Check G sensor	•						_
Is the inspection YES >> GO		nal?				1	F
NO >> 1.	Adjust part	s fitting condit	ion.				
2. 4. CHECK G SI					Vork Procedure".	(G
1. Turn ignition				I			
2. Disconnect	G sensor h	arness conned	ctor.			ł	Η
 Turn ignition Check the v 			r harness co	onnector termina	als.		
	0						I
	G sen	sor		Voltage			
Connector	+	Terminal	_	(Approx.)			J
B32	3		2	5 V	-		
Is the inspection		nal?				ł	K
YES >> GO NO >> GO							
5.CHECK G SI	ENSOR SIG	GNAL CIRCUI	т			I	L
1. Turn ignition							
		ess connector. Etween G sens	sor harness	connector and	ECM harness connector.	Γ	M
G sens	or Terminal	E(Connector	CM Terminal	Continuity		1	Ν
B32	1	F26	83	Existed	-		
4. Also check	harness for	short to grour	nd and shor	t to power.	•	(0
Is the inspection		nal?					
YES >> GO NO >> Rep		ce error-detec	ted parts.			F	Ρ
6.CHECK G SI	•						
Check G sensor			ponent Insp	ection".			
Is the inspection YES >> Che			Pefer to CL	43, "Intermittent	Incident"		
	Replace G						

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< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

2. Perform calibration of G sensor. Refer to EC-134, "Work Procedure".

7.CHECK G SENSOR POWER SUPPLY CIRCUIT-II

Check the voltage between G sensor harness connector terminal and ground.

	+		Voltage (Approx.)	
G se	ensor	_		
Connector	Terminal			
B32	3	Ground	5 V	
1 41 1 41	14 10			

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 10.

8.CHECK G SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between G sensor harness connector and ECM harness connector.

G se	ensor	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
B32	2	F26	87	Existed

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

E	CM	Ground	Continuity
Connector	Terminal	Giouna	Continuity
F25	1		
125	2		
	123	Ground	Existed
E18	124		
	127		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Repair or replace error-detected parts.

10. CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connectors and each sensor harness connectors
- 3. Check harness connector for short to power and short to ground, between the following terminals.

EC	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
		FRP sensor	F5	1
F25	39	EOP sensor	F43	3
		Turbocharger boost sensor	F75	1

< DTC/CIRCUIT DIAGNOSIS >

E	СМ	Sensor		
Connector	Terminal	Name	Connector	Terminal
	68	Battery current sensor	F52	1
F26	00	G sensor	B32	3
120	72	CMP sensor	F109	1
	12	EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is the inspection result normal?

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

NO >> Repair or replace error-detected parts.

Component Inspection

1.CHECK G SENSOR

(P)With CONSULT

- 1. Remove G sensor.
- 2. Reconnect all harness connectors disconnected.
- 3. Place the G sensor on a flat table.
- 4. Turn ignition switch ON.
- Select "G SENSOR" in "DATA MONITOR" mode of "ENGINE" using CONSULT to check indications according to the following conditions:

: Direction of gravitational force

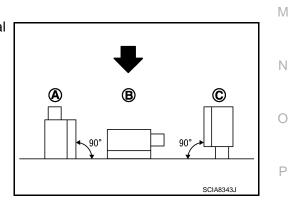
Monitor item	Condition	Value (V)
	Parallel with the table (0G) (B)	2.18 – 2.82
G SENSOR	Vertical to the table (–1G) (A) \downarrow	0.85 – 1.49* ↓
COLINGOIN	Parallel with the table (0G) (B) \downarrow	2.18 – 2.82* ↓
	Vertical to the table (1G) (C)	3.51 – 4.15*

*: Check that voltage rises as the G sensor measurement condition changes in the order of (A), (B), and (C).

Without CONSULT

- 1. Remove G sensor.
- 2. Reconnect all harness connectors disconnected.
- 3. Place the G sensor on a flat table.
- 4. Turn ignition switch ON.
- 5. Check the voltage between ECM harness connector terminal and ground.

Direction of gravitational force



(A)

B



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< DTC/CIRCUIT DIAGNOSIS >

EC		_	Condition	Voltage (V)
Connector	Terminal			
			Parallel with the table (0G) (B)	2.18 – 2.82
F26	83	Ground	Vertical to the table $(-1G)$ (A) \downarrow Parallel with the table (0G) (B) \downarrow Vertical to the table (1G) (C)	$0.85 - 1.49^*$ \downarrow $2.18 - 2.82^*$ \downarrow $3.51 - 4.15^*$

*: Check that voltage rises as the G sensor measurement condition changes in the order of (A), (B), and (C).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace G sensor.

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. Models with no Intelligent Key System transmit a control signal directly to IPDM E/R. On the other hand, models with the Intelligent Key System transmit a control signal to IPDM E/R by way of BCM via CAN communication. Under normal conditions, ECM controls and maintains the starter relay in OFF state during engine running or

"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

DTC DETECTION LOGIC

NOTE:

- If DTC P1650 is displayed with DTC U1001, perform the trouble diagnosis for DTC U1001. Refer to <u>EC-163</u>, <u>"DTC Logic"</u>.
- If DTC P1650 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to <u>EC-381</u>, <u>"DTC Logic"</u>.
- If DTC P1650 is displayed with B209F or B20A0 of IPDM E/R, perform the trouble diagnosis for B209F or B20A0. Refer to <u>SEC-90, "DTC Logic"</u> or <u>SEC-92, "DTC Logic"</u>.
- If DTC P1650 is displayed with B26F9 or B26FA of BCM, perform the trouble diagnosis for B209F or B20A0. Refer to <u>SEC-84, "DTC Logic"</u> or <u>SEC-86, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)		DTC detecting condition	Possible cause
		A	Starter relay is stuck ON.	 Harness and connectors (Between IPDM E/R harness connector and ECM harness connector is shorted to ground.) (Between IPDM E/R harness connector and BCM harness connector is shorted to ground.) IPDM E/R
P1650	STR MTR RELAY 2 (Starter relay circuit)	в	Starter relay power supply circuit is excessively high voltage.	 Harness and connectors (Between IPDM E/R harness connector and ECM harness is open or shorted to power.) (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.

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P1650 STARTER MOTOR RELAY 2

< DTC/CIRCUIT DIAGNOSIS >

- 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-444, "Diagnosis Procedure".

NO >> GO TO 3.

 ${f 3.}$ 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. Shift the selector lever to D position while depressing fully the brake pedal.
- 9. Remove vacuum hoses from intake manifold.
- 10. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-444, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007577305

1.CHECK STARTER RELAY POWER SUPPLY CIRCUIT

Check the starter motor relay power supply circuit. Refer to <u>PCS-30, "Diagnosis Procedure"</u> (With Intelligent Key system) or <u>PCS-58, "Diagnosis Procedure"</u> (Without Intelligent Key system).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK STARTER RELAY CONTROL SIGNAL CIRCUIT

With Intelligent Key system

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector.
- 3. Disconnect BCM harness connector.
- 4. Check the continuity between IPDM E/R harness connector and BCM harness connector.

P1650 STARTER MOTOR RELAY 2

< DTC/CIRCUIT DIAGNOSIS >

	+ // E/R	BC		Continuity			
Connector	Terminal	Connector	Terminal	Continuity			
E13	30	M70	97	Existed			
		for short to g			1		
hout Intellig Turn ign	ent Key syste	m OFF.		wer.			
Disconn	ect ECM ha	R harness co rness connec between IPI	ctor.	ness connec	tor and ECM harness	s connector.	
	+	_					
IPDN	/IE/R	EC	M	Continuity			
Connector	Terminal	Connector	Terminal				
E13	30	F26	66	Existed			
erform <u>GI-4</u> the inspec 'ES >>	<u>13, "Intermit</u> t <u>tion result n</u> Replace IPD		r to <u>PCS-31</u>	I <u>, "Removal a</u> ts.	and Installation".		

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P1651 STARTER MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

P1651 STARTER MOTOR RELAY

Description

INFOID:000000007577306

[MR16DDT]

ECM controls ON/OFF state of the starter relay, according to the engine and vehicle condition. Models with no Intelligent Key System transmit a control signal directly to IPDM E/R. On the other hand, models with the Intelligent Key System transmit a control signal to IPDM E/R by way of BCM via CAN communication.

Under normal conditions, ECM controls and maintains the starter relay in OFF state during engine running or "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:000000007577307

DTC DETECTION LOGIC

NOTE:

- If DTC P1650 is displayed with DTC U1001, perform the trouble diagnosis for DTC U1001. Refer to <u>EC-163</u>, <u>"DTC Logic"</u>.
- If DTC P1650 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to <u>EC-381</u>, <u>"DTC Logic"</u>.
- If DTC P1650 is displayed with B209F or B20A0 of IPDM E/R, perform the trouble diagnosis for B209F or B20A0. Refer to <u>SEC-90, "DTC Logic"</u> or <u>SEC-92, "DTC Logic"</u>.
- If DTC P1650 is displayed with B26F9 or B26FA of BCM, perform the trouble diagnosis for B209F or B20A0. Refer to <u>SEC-84, "DTC Logic"</u> or <u>SEC-86, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecti	ng condition
P1651	STR MTR RELAY (Starter control relay circuit)	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.) (Between ECM harness connector and BCM harness connector is shorted to power.) IPDM E/R BCM

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 EC-447, "Diagnosis Procedure".
- NO >> INSPECTION END

P1651 STARTER MOTOR RELAY

< DTC/CIRCUIT DIAG	NOSIS >			[MR16DI	DT]
Diagnosis Procedu	re			INF01D:00000000	7577308
1.INSPECTION STAR	т				
Check the starter moto	operation.				
s the starter motor ope	rated?				
YES >> GO TO 3. NO >> GO TO 2.					
2. CHECK DTC WITH	IPDM E/R				
Check DTC with IPDM		<u>CS-13, "C(</u>	ONSULT Fui	nction (IPDM E/R)".	
s the inspection result	normal?				
YES-1 >> With Intellig					
YES-2 >> Without Int NO >> Perform tro	ouble diagnosis				
3. снеск отс with	-				
Check DTC with BCM.	Refer to BCS-2	9, "BCM : (CONSULT F	unction (BCM - BCM)".	
s the inspection result	normal?				
YES >> GO TO 4. NO >> Perform tro	ouble diagnosis	for DTC in	dicated		
1. CHECK CRANKING	-				
	OFF				
I. Turn ignition switch		or.			
 Turn ignition switch Disconnect ECM h Disconnect IPDM E 	arness connecto E/R harness con	nnector.			
. Turn ignition switch 2. Disconnect ECM h 3. Disconnect IPDM E	arness connecto E/R harness con	nnector.	connector ar	d IPDM E/R harness connector.	
 Turn ignition switch Disconnect ECM h Disconnect IPDM E 	arness connecto E/R harness con	nnector.	connector ar	d IPDM E/R harness connector.	
 Turn ignition switch Disconnect ECM h Disconnect IPDM E Check the continuit 	arness connecto E/R harness con	nnector. A harness (connector ar	d IPDM E/R harness connector.	
 Turn ignition switch Disconnect ECM h Disconnect IPDM E Check the continuit + 	arness connecto E/R harness con ty between ECM	nnector. A harness (d IPDM E/R harness connector.	
Turn ignition switch Disconnect ECM h Disconnect IPDM E Check the continui + ECM	arness connecto E/R harness con ty between ECM 	nnector. // harness (E/R		d IPDM E/R harness connector.	
Turn ignition switch Disconnect ECM h Disconnect IPDM E Check the continuit ECM Connector Terminal F26 92	arness connecto E/R harness con ty between ECM IPDM E Connector E13	Annector. A harness of E/R Terminal 23	Continuity Existed	d IPDM E/R harness connector.	
Turn ignition switch Disconnect ECM h Disconnect IPDM E Check the continuit F26 S Also check harness s the inspection result	arness connecto E/R harness con ty between ECM IPDM E Connector E13 s for short to gro	Annector. A harness of E/R Terminal 23	Continuity Existed	d IPDM E/R harness connector.	
1. Turn ignition switch 2. Disconnect ECM h 3. Disconnect IPDM E 4. Check the continuit + ECM Connector Terminal F26 92 5. Also check harness s the inspection result YES >> GO TO 5.	arness connecto E/R harness con ty between ECM IPDM E Connector E13 s for short to gro normal?	E/R Terminal 23 Dund to pov	Continuity Existed wer.	d IPDM E/R harness connector.	
I. Turn ignition switch 2. Disconnect ECM h 3. Disconnect IPDM E 4. Check the continuit + ECM Connector F26 92 5. Also check harness s the inspection result YES >> GO TO 5. NO >> Repair or result	arness connecto E/R harness con ty between ECM IPDM E Connector E13 s for short to gro normal?	A harness of A harness of E/R Terminal 23 Dund to pow tected parts	Continuity Existed wer. S.	d IPDM E/R harness connector.	
Turn ignition switch Disconnect ECM h Disconnect IPDM E Check the continuit F26 S2 Also check harness sthe inspection result YES >> GO TO 5. NO >> Repair or re D.CHECK CRANKING	arness connecto Arness connector PDM E Connector E13 s for short to gro normal? AREQUEST SIG	Annector. A harness of E/R Terminal 23 Dund to pow tected parts GNAL CIRC	Continuity Existed wer. S.	d IPDM E/R harness connector.	
Turn ignition switch Disconnect ECM h Disconnect IPDM E Check the continuit F26 92 Also check harness the inspection result YES >> GO TO 5. NO >> Repair or re D.CHECK CRANKING Disconnect BCM h	arness connector Arness connector PDM E Connector E13 s for short to gro normal? eplace error-det REQUEST SIG arness connector	E/R Terminal 23 Dund to pow tected parts GNAL CIRC or.	Continuity Existed wer. s. CUIT-II	d IPDM E/R harness connector.	
Turn ignition switch Disconnect ECM h Disconnect IPDM E Check the continuit F26 92 Also check harness the inspection result YES >> GO TO 5. NO >> Repair or re D.CHECK CRANKING Disconnect BCM h	arness connector Arness connector PDM E Connector E13 s for short to gro normal? eplace error-det REQUEST SIG arness connector	E/R Terminal 23 Dund to pow tected parts GNAL CIRC or.	Continuity Existed wer. s. CUIT-II		
I. Turn ignition switch 2. Disconnect ECM h 3. Disconnect IPDM E 4. Check the continuit + ECM Connector Terminal F26 92 5. Also check harness s the inspection result YES >> GO TO 5. NO >> Repair or resolution D.CHECK CRANKING 1. Disconnect BCM h 2. Check the continuit	arness connector Arness connector PDM E Connector E13 s for short to gro normal? eplace error-det REQUEST SIG arness connector y between ECM	Annector. A harness of E/R Terminal 23 Dund to power tected parts GNAL CIRC or. A harness of A harness o	Continuity Existed wer. S. CUIT-II connector ar		
I. Turn ignition switch 2. Disconnect ECM h 3. Disconnect IPDM E 4. Check the continuit + ECM Connector Terminal F26 92 5. Also check harness s the inspection result YES P.CHECK CRANKING I. Disconnect BCM h 2. Check the continuit	arness connector Arness connector y between ECM PDM E Connector E13 s for short to gro normal? eplace error-det REQUEST SIG arness connector ty between ECM — BCM	Annector. A harness of E/R Terminal 23 Dund to pow tected parts GNAL CIRC or. A harness of A	Continuity Existed wer. s. CUIT-II		
 Turn ignition switch Disconnect ECM h Disconnect IPDM E Check the continuit ECM Connector Terminal F26 92 Also check harness s the inspection result YES >> GO TO 5. NO >> Repair or no CHECK CRANKING Disconnect BCM h Check the continuit 	arness connector Arness connector PDM E Connector E13 s for short to gro normal? eplace error-det arness connector ty between ECM Connector BCM Connector	Annector. A harness of E/R Terminal 23 Dund to power tected parts GNAL CIRC or. A harness of A Terminal	Continuity Existed wer. s. CUIT-II connector ar Continuity		
1. Turn ignition switch 2. Disconnect ECM h 3. Disconnect IPDM E 4. Check the continuit + ECM Connector Terminal F26 92 5. Also check harness s the inspection result YES SO TO 5. NO D.CHECK CRANKING 1. Disconnect BCM h 2. Check the continuit + ECM Connector Terminal F26 92	arness connector Arness connector PDM E Connector E13 s for short to gro normal? eplace error-det REQUEST SIG arness connector y between ECM Connector BCM Connector	Annector. A harness of E/R Terminal 23 Dound to power tected parts GNAL CIRC or. A harness of A Terminal 64	Continuity Existed wer. s. CUIT-II connector ar Continuity Existed		
1. Turn ignition switch 2. Disconnect ECM h 3. Disconnect IPDM E 4. Check the continuit + ECM Connector Terminal F26 92 5. Also check harness s the inspection result YES >> GO TO 5. NO >> Repair or result Disconnect BCM h 2. Check the continuit + ECM Connector Terminal F26 S the inspection result YES S CHECK CRANKING 1. Disconnect BCM h 2. Check the continuit + ECM Connector Terminal F26 92 3. Also check harness	arness connector Arness connector y between ECM Connector E13 s for short to gro normal? eplace error-det REQUEST SIG arness connector y between ECM Connector BCM Connector S for short to gro	Annector. A harness of E/R Terminal 23 Dound to power tected parts GNAL CIRC or. A harness of A Terminal 64	Continuity Existed wer. s. CUIT-II connector ar Continuity Existed		
1. Turn ignition switch2. Disconnect ECM h3. Disconnect IPDM E4. Check the continuit $+$ ECMConnectorTerminalF26925. Also check harnesss the inspection resultYESYESS. CHECK CRANKING1. Disconnect BCM h2. Check the continuit $+$ ECMConnectorTerminalF26923. Also check harnesss the inspection result	arness connector Arness connector y between ECM Connector E13 s for short to gro normal? eplace error-det REQUEST SIG arness connector y between ECM Connector BCM Connector S for short to gro	Annector. A harness of E/R Terminal 23 Dound to power tected parts GNAL CIRC or. A harness of A Terminal 64	Continuity Existed wer. s. CUIT-II connector ar Continuity Existed		
1. Turn ignition switch 2. Disconnect ECM h 3. Disconnect IPDM E 4. Check the continuit + ECM Connector Terminal F26 92 5. Also check harness is the inspection result YES Socheck cranking 1. Disconnect BCM h 2. Check the continuit + ECM Connector Terminal F26 92 5. Also check harness Sthe inspection result YES Socheck the continuit + ECM Connector Terminal + ECM Connector Terminal F26 92 3. Also check harness is the inspection result YES >> GO TO 7.	arness connector Arness connector y between ECM Connector E13 s for short to gro normal? eplace error-det REQUEST SIG arness connector y between ECM Connector BCM Connector S for short to gro	Annector. A harness of E/R Terminal 23 Dound to power tected parts GNAL CIRC or. A harness of A Terminal 64 Dound to power 64	Continuity Existed wer. s. CUIT-II connector ar Continuity Existed wer.		

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.

EC-447

P1651 STARTER MOTOR RELAY

	+		_	
E	CM	IPDN	M E/R	Continuity
Connector	Terminal	Connector	Terminal	
F26	92	E13	23	Existed

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

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK INTERMITTENT INCIDENT

Perform GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-31, "Removal and Installation".

NO >> Repair or replace error-detected parts.

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. Models with no Intelligent Key System transmit a control signal directly to IPDM E/R. On the other hand, models with the Intelligent Key System transmit a control signal to IPDM E/R by way of BCM via CAN communication. Under normal conditions, ECM controls and maintains the starter relay in OFF state during engine running or

"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

DTC DETECTION LOGIC

NOTE:

- If DTC P1650 is displayed with DTC U1001, perform the trouble diagnosis for DTC U1001. Refer to <u>EC-163</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-381</u>, <u>"DTC Logic"</u>.
- If DTC P1650 is displayed with B209F or B20A0 of IPDM E/R, perform the trouble diagnosis for B209F or B20A0. Refer to <u>SEC-90, "DTC Logic"</u> or <u>SEC-92, "DTC Logic"</u>.
- If DTC P1650 is displayed with B26F9 or B26FA of BCM, perform the trouble diagnosis for B209F or B20A0.
 Refer to <u>SEC-84, "DTC Logic"</u> or <u>SEC-86, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause	
P1652	STR MTR SYS COMM (Starter motor communica- tion line)	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-449, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.INSPECTION START

- 1. Erase DTC.
- Perform DTC confirmation procedure. Refer to <u>EC-449, "DTC Logic"</u>.
- 3. Check DTC.

EC-449

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P1652 STARTER MOTOR SYSTEM COMM

< DTC/CIRCUIT DIAGNOSIS >

Is the P1652 displayed again?

YES >> GO TO 2.

NO >> INSPECTION END

2. CHECK INTERMITTENT INCIDENT

Perform GI-43, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace IPDM E/R. Refer to <u>PCS-31. "Removal and Installation"</u>.
- NG >> Repair or replace error-detected parts.

P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

P1805 BRAKE SWITCH

DTC Logic

[MR16DDT]

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DTC DETECTION LOGIC

DTC No.	Trouble diagnosis ((Trouble diagnosis tent)		DTC detecting condition	Possible cause
P1805	BRAKE SW/CIRCU (Brake switch)		mp switch signal is not sent to extremely long time while the ve- riving.	 Harness or connectors (Stop lamp switch circuit is open or shorted.) Stop lamp switch
DTC CON	FIRMATION PF	OCEDURE		
1.PERFOF	RM DTC CONFI	RMATION PR	OCEDURE	
2. Fully de 3. Erase t 4. Check <u>s 1st trip D</u> YES >>	nition switch ON. epress the brake he DTC. 1st trip DTC. <u>TC detected?</u> Proceed to <u>EC-</u>	151, "Diagnos		
	INSPECTION E	ND		
Jiagnosis	s Procedure			INFOID:00000007577313
I .CHECK	STOP LAMP SV	ITCH POWE	R SUPPLY CIRCUIT	
1. Turn igi	nition switch OFF			
1. Turn igi 2. Disconr	nition switch OFF nect stop lamp s	: witch harness		and ground.
1. Turn igi 2. Disconr	nition switch OFF nect stop lamp so the voltage betwo	: witch harness	connector.	and ground.
1. Turn igr 2. Disconr 3. Check t	nition switch OFF nect stop lamp so the voltage betwo +	: witch harness	s connector. S switch harness connector	and ground.
 Turn igr Disconr Check t Stop 	nition switch OFF nect stop lamp sy the voltage betw + p lamp switch	: witch harness	connector.	and ground.
Turn igi Disconi Check t Stop Connecto	nition switch OFF nect stop lamp sy the voltage betwo + o lamp switch or Terminal	vitch harness een stop lamp	s connector. 5 switch harness connector Voltage	and ground.
 Turn igr Disconr Check t Stop 	nition switch OFF nect stop lamp sy the voltage betw + p lamp switch	: witch harness	s connector. S switch harness connector	and ground.
1. Turn igr 2. Disconr 3. Check t Stop Connecto E102 ^{*1} E118 ^{*2} *1: CVT r	nition switch OFF nect stop lamp sv the voltage between + o lamp switch or Terminal 1 models	vitch harness een stop lamp	s connector. 5 switch harness connector Voltage	and ground.
1. Turn igr 2. Disconr 3. Check t Stop Connecto E102 ^{*1} E118 ^{*2} *1: CVT r *2: M/T n	nition switch OFF nect stop lamp sy the voltage betwo + o lamp switch or Terminal 1 models	vitch harness een stop lamp 	s connector. 5 switch harness connector Voltage	and ground.
1. Turn ign 2. Disconr 3. Check t Stop Connecto E102 ^{*1} E118 ^{*2} *1: CVT r *2: M/T rr s the inspe	nition switch OFF nect stop lamp sy the voltage betwy + o lamp switch or Terminal 1 models nodels ction result norm	vitch harness een stop lamp 	s connector. 5 switch harness connector Voltage	and ground.
1. Turn igr 2. Disconr 3. Check t Stop Connecto E102 ^{*1} E118 ^{*2} *1: CVT r *2: M/T rr <u>s the inspe</u> YES >> NO >>	nition switch OFF nect stop lamp sy the voltage betwo 	en stop lamp Ground	s for power supply circuit.	and ground.
1. Turn igr 2. Disconr 3. Check t Stop Connecto E102 ^{*1} E118 ^{*2} *1: CVT r *2: M/T rr <u>s the inspe</u> YES >> NO >>	nition switch OFF nect stop lamp sy the voltage betwo 	en stop lamp Ground	Connector. So switch harness connector Voltage Battery voltage	and ground.
1. Turn igr 2. Disconr 3. Check t 3. Check t Connecto E102 ^{*1} E118 ^{*2} *1: CVT r *2: M/T rr s the inspe YES >> NO >> 2.CHECK 1. Disconr	nition switch OFF nect stop lamp sy the voltage betwo + o lamp switch or Terminal 1 models nodels ction result norm GO TO 2. Perform the trou STOP LAMP SW	itch harness een stop lamp Ground al? ble diagnosis /ITCH INPUT	s for power supply circuit.	and ground.
1. Turn igr 2. Disconr 3. Check t 3. Check t Connecto E102 ^{*1} E118 ^{*2} *1: CVT r *2: M/T rr s the inspe YES >> NO >> 2.CHECK 1. Disconr	nition switch OFF nect stop lamp sy the voltage betwo + o lamp switch or Terminal 1 models nodels ction result norm GO TO 2. Perform the trou STOP LAMP SW	itch harness een stop lamp Ground al? ble diagnosis /ITCH INPUT	s for power supply circuit.	

	+		_		
	Stop lamp switch		ECM		Continuity
-	Connector	Terminal	Connector	Terminal	
	E102 ^{*1} E118 ^{*2}	2	E18	115	Existed
	*** 01/7				

*1: CVT models

*2: M/T models

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

P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK STOP LAMP SWITCH

Check the stop lamp switch. Refer to EC-452, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace stop lamp switch. Refer to <u>BR-18. "Exploded View"</u>.

Component Inspection (Stop Lamp Switch)

INFOID:000000007577314

[MR16DDT]

- 1.CHECK STOP LAMP SWITCH-I
- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- 3. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch				
+	_	Condition		Continuity
Term	ninals			
			Fully released	Not existed
1	2	Brake pedal	Slightly de- pressed	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-7, "Inspection and Adjustment"</u>.

2. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch				
+	_	Condition		Continuity
Term	ninals			
			Fully released	Not existed
1	2	Brake pedal	Slightly de- pressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to <u>BR-18, "Exploded View"</u>.

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

DTC Logic

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INFOID:000000007577315

[MR16DDT]

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DTC DETECTION LOGIC
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DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause	С					
P2100	ETC MOT PWR-B1 (Throttle control motor relay circuit open)	ECM detects a voltage of power source for throttle control motor is excessively low.	 Harness or connectors (Throttle control motor relay circuit is open) Throttle control motor relay 	D					
P2103	P2103ETC MOT PWR (Throttle control motor relay circuit short)ECM detect the throttle control motor relay is stuck ON.• Harness or connectors (Throttle control motor relay circuit is shorted) • Throttle control motor relay• Harness or connectors (Throttle control motor relay circuit is shorted) • Throttle control motor relay								
DTC CON	DTC CONFIRMATION PROCEDURE								
1.PRECO	NDITIONING								
		has been previously conducted, alwa	ays perform the following procedure	G					
	ducting the next test. nition switch OFF and	l wait at least 10 seconds.							
2. Turn ig	nition switch ON.			Н					
	nition switch OFF and CONDITION:	l wait at least 10 seconds.							
-	-	g procedure, confirm that battery vol	tage is more than 8 V.	I					
	is detected? • GO TO 2.								
	GO TO 3.			J					
2.PERFO	RM DTC CONFIRMA	TION PROCEDURE FOR DTC P2100		J					
		wait at least 2 seconds.							
 Start er Check 	ngine and let it idle for DTC.	5 seconds.		K					
Is DTC dete	ected?								
	 Proceed to <u>EC-453</u>. INSPECTION END 	<u>"Diagnosis Procedure"</u> .		L					
•		TION PROCEDURE FOR DTC P2103							
		wait at least 1 second.		M					
2. Check	DTC.								
Is DTC dete YES >>		"Diagnosis Procedure".		Ν					
	INSPECTION END	Diagnosis i locedure.							
Diagnosi	s Procedure		INFOID:00000007577316	0					
1.снеск	THROTTLE CONTRO	OL MOTOR RELAY POWER SUPPLY							
	nition switch OFF.		_	Ρ					
2. Check	the voltage between I	ECM harness connector and ground.							
	. .								

+ –			_	
	ECM			
Connector	Terminal	Terminal		
F26	77	E18	127	Battery voltage



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P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

 $2. {\sf check throttle control motor relay power supply circuit}$

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.

+		-		
E	ECM		IPDM E/R	
Connector	Terminal	Connector	Connector Terminal	
F26	F26 77		60	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 THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL

Check the voltage between ECM harness connector and ground as per the following conditions.

	ECM				
Connector	+	_	Condition	Voltage (Approx.)	
Connector	Teri	minal		(, , , , , , , , , , , , , , , , , , ,	
E18	122	127	Ignition switch: OFF	0 V	
L 10	122	121	Ignition switch: ON	Battery voltage	

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> GO TO 4.

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.

+			_	
ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E18	122	E15	55	Existed

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

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43. "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 <u>EC-453, "DTC Logic"</u>.
- If DTC P2101 is displayed with DTC P2119, first perform the trouble diagnosis for DTC P2119. Refer to <u>EC-460, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause				
P2101	ETC FNCTN/CIRC-B1 (Electric throttle control performance)	Electric throttle control function does not operate properly.	 Harness or connectors (Throttle control motor circuit is open or shorted) Electric throttle control actuator 				
DTC COI	NFIRMATION PROC	CEDURE					
1.PREC	ONDITIONING						
 before conducting the next test. 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch ON. 3. Turn ignition switch OFF and wait at least 10 seconds. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 11 V when engine is running. 							
engine is	running.						
- >	-running. -> GO TO 2. DRM DTC CONFIRMA	ATION PROCEDURE					
2.PERFO 1. Turn 2. Start 3. Chec	> GO TO 2. DRM DTC CONFIRMA ignition switch ON and engine and let it idle for k DTC.	d wait at least 2 seconds.					
2.PERF(1. Turn i 2. Start 3. Chec Is DTC de YES >	> GO TO 2. DRM DTC CONFIRMA ignition switch ON and engine and let it idle for k DTC. etected?	d wait at least 2 seconds. or 5 seconds. , "Diagnosis Procedure".					
2.PERF0 1. Turn i 2. Start i 3. Chec <u>Is DTC de</u> YES > NO >	> GO TO 2. DRM DTC CONFIRMA ignition switch ON and engine and let it idle for k DTC. etected? > Proceed to EC-455	d wait at least 2 seconds. or 5 seconds. , "Diagnosis Procedure".	 INFOID:000000007577318				
2.PERFO 1. Turn i 2. Start i 3. Chec Is DTC de YES NO Diagnos	 > GO TO 2. DRM DTC CONFIRMA ignition switch ON and engine and let it idle for k DTC. <u>etected?</u> > Proceed to <u>EC-455</u> > INSPECTION END sis Procedure 	d wait at least 2 seconds. or 5 seconds. , "Diagnosis Procedure".					

	ECM				
Connector	+	_	Condition	Voltage (Approx.)	
Connector	Teri	minal		(TT - 7	
E18	122	127	Ignition switch: OFF	0 V	
LIO	122 127		Ignition switch: ON	Battery voltage	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.

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P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

- 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	nal Connector Terminal		
E18	122	E15	55	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.

 ${f 3.}$ 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	
F26	77	E15	60	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.
- 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		
F29	5	5 F26	51	Not existed
	0		52	Existed
	0		51	Existed
	0		52	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.

5.check electric throttle control actuator visually

1. Remove the intake air duct. Refer to EM-25, "Exploded View".

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-131, "Work Procedure"</u>.

EC-456

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

[MR16DDT]

CHECK THR	OTTLE CONTR	OL MOTOR	
heck the thrott	le control motor	. Refer to EC-457, "Component Insp	pection".
	result normal?		
		ncident. Refer to GI-43, "Intermitter	nt Incident".
		ottle control actuator. Refer to EM-2	
Component l	Inspection		INFOID:000000007577319
	nopoolion		INFOID.00000007577519
.CHECK THR	OTTLE CONTR	OL MOTOR	
. Turn ignitior	n switch OFF.		
		control actuator harness connector.	
3. Check the re	esistance betwe	en electric throttle control actuator	terminals as per the following.
Electric throttle of	control actuator		
+	-	Resistance (Approx.)	
Termi	nals	(, ++, -, -,)	
5	6	1 - 15 Ω [at 25°C (77°F)]	
s the inspection	result normal?		
	PECTION END		
		ottle control actuator. Refer to EM-2	7 "Evploded View"

< DTC/CIRCUIT DIAGNOSIS >

P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

P2118 THROTTLE CONTROL MOTOR

DTC Logic

INFOID:000000007577320

[MR16DDT]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)		Possible cause
P2118	ETC MOT-B1 (Throttle control motor circuit short)	ECM detects short in both circuits between ECM and throttle control motor.	 Harness or connectors (Throttle control motor circuit is shorted.) Electric throttle control actuator (Throttle control motor)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always 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-458, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007577321

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		
F29	5	F26	51	Not existed
			52	Existed
			51	Existed
	0		52	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.

EC-458

P2118 THROTTLE CONTROL MOTOR

P	2118 IHROITLE CON		
< DTC/CIRCUIT DIAGNOSIS	i >	[MR16DDT]	
2. CHECK THROTTLE CONT	ROL MOTOR		А
Check the throttle control moto	r. Refer to <u>EC-459, "Componer</u>		~
Is the inspection result normal			
	incident. Refer to <u>GI-43, "Interr</u> prottle control actuator. Refer to		C
Component Inspection		INFOID:00000007577322	С
1. CHECK THROTTLE CONT	ROL MOTOR		C
 Turn ignition switch OFF. Disconnect electric throttle 	control actuator harness conne		D
		lator terminals as per the following.	
Electric throttle control actuator		F	Е
+ –	Resistance		
Terminals	(Approx.)	ſ	F
5 6	1 - 15 Ω [at 25°C (77°F)]		
Is the inspection result normal			G
YES >> INSPECTION ENI NO >> Replace electric th	orottle control actuator. Refer to		G
			Н
		Г	
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P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Logic

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DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)		DTC detecting condition	Possible cause
	ETC ACTR-B1		TC ACTR-B1 A Electric throttle control actuator does not function properly due to the return spring malfunction.	
P2119	(Electric throttle control actuator)	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-460, "Diagnosis Procedure".

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Set selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
- 3. Set selector lever to P (CVT) or Neutral (M/T) position.
- 4. Start engine and let it idle for 3 seconds.
- 5. Check DTC.

Is DTC detected?

- YES >> Proceed to EC-460, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- 1. Remove the intake air duct. Refer to EM-25, "Exploded View".
- 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 EM-27, "Exploded View".

EC-460

INFOID:000000007577324

[MR16DDT]

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to <u>EC-131</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-384, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P2122	APP SEN 1/CIRC (Accelerator pedal position sensor 1 circuit low input)	An excessively low voltage from the APP sensor 1 is sent to ECM.	Harness or connectors (APP sensor 1 circuit is open or shorted.)
P2123	APP SEN 1/CIRC (Accelerator pedal position sensor 1 circuit high input)	An excessively high voltage from the APP sensor 1 is sent to ECM.	 Accelerator pedal position sensor (APP 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 DTC.

Is DTC detected?

- YES >> Proceed to EC-462, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

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.

	+		
APP sensor		-	Voltage (Approx.)
Connector	Connector Terminal		
E101	E101 4		5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

EC-462

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P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

- 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		
E101	4	E18	101	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.

${f 3.}$ CHECK APP SENSOR 1 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	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	
E101	2	E18	105	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.

 ${f 4.}$ CHECK APP SENSOR INPUT SIGNAL CIRCUIT

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

+				
APP sensor		ECM		Continuity
Connector	Terminal	Connector Terminal		
E101	3	E18	102	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 the APP sensor. Refer to <u>EC-463. "Component Inspection"</u>. Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace accelerator pedal assembly. Refer to <u>EM-27, "Exploded View"</u>.

Component Inspection

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.

EC-463

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P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

ECM							
Connector	+	-	Condition		Condition Voltage		Voltage
Connector	Terr	ninal					
	102	105		Fully released	0.6 - 0.9 V		
E18	102	105		Fully depressed	3.9 - 4.7 V		
LIO	119 120	 Accelerator pedal 	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 EM-27, "Exploded View".

P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P2127, P2128 APP SENSOR

DTC Logic

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DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P2127	APP SEN 2/CIRC (Accelerator pedal position sensor 2 circuit low input)	An excessively low voltage from the APP sensor 2 is sent to ECM.	Harness or connectors (APP sensor 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit
P2128	APP SEN 2/CIRC (Accelerator pedal position sensor 2 circuit high input)	An excessively high voltage from the APP sensor 2 is sent to ECM.	 is shorted.] (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Battery current sensor circuit is shorted.) Accelerator pedal position sensor (APP sensor 2) Crankshaft position sensor (POS) Refrigerant pressure sensor EVAP control system pressure sensor Battery current 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 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-465</u>, "Diagnosis Procedure". NO >> INSPECTION END

Diagnosis Procedure

1.CHECK APP SENSOR 2 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.

	+		Voltage (Approx.)	
APP	sensor	_		
Connector	Terminal			
E101 5		Ground	5 V	

Is the inspection result normal?

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< DTC/CIRCUIT DIAGNOSIS >

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

2. CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check harness connector for short to power and short to ground, between the following terminals.

ECM		Sensor			
Connector Terminal		Name	Connector	Terminal	
		FRP sensor	F5	1	
F25	39	EOP sensor	F43	3	
		Turbocharger boost sensor	F75	1	
	68	Battery current sensor	F52	1	
F26		G sensor	B32	3	
F20	72	CMP sensor	F109	1	
		EVT control position sensor	F110	1	
E18	118	APP sensor 2	E101	5	

Is 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	E	Continuity	
Connector	Terminal	Connector	Terminal	
E101	1	E18	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	E	Continuity	
Connector	Terminal	Connector	Terminal	
E101	6	E18	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 the APP sensor. Refer to EC-467, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS > NO >> Replace accelerator pedal assembly. Refer to <u>EM-27, "Exploded View"</u>.

Component Inspection

$1. CHECK \ ACCELERATOR \ PEDAL \ POSITION \ SENSOR$

- 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				
	102 105		Fully released	0.6 - 0.9 V	
E18	102	105		Fully depressed	3.9 - 4.7 V
ETO		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 EM-27, "Exploded View".

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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-384, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)		Possible cause
P2135	TP SENSOR-B1 (Throttle position sensor circuit range/perfor- mance)	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-468, "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.

	+			
Electric throttle	control actuator	-	Voltage (Approx.)	
Connector	Terminal	*	(11 -)	
F29	1	Ground	5 V	

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.check throttle position sensor power supply circuit

1. Turn ignition switch OFF.

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

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P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

-	+	-	_		
	e control actu-	EC	СМ	Continuity	
Connector	Terminal	Connector	Terminal	_	
F29	1	F26	62	Existed	
4. Also che		-	-	Existed	
Is the inspec			jiouna.		
			nosis for po	wer supply ci	
		place error-d			
3. снеск т	THROTTLE	POSITION S	ENSOR GF	ROUND CIRC	
1. Turn ign	ition switch	OFF.			
		rness conne		a control act	r bornoon connector and ECM bornoon con
 Check the nector. 	ne continuity	/ between ei	ectric throtti	e control acti	r harness connector and ECM harness con-
-	+	-	_		
Electric throttle		F	CM	Continuity	
	tor		-	Continuity	
Connector	Terminal	Connector	Terminal		
F29	4	F26	74	Existed	
				PUT SIGNAL	r harness connector and ECM harness con-
	+		_		
Electric throttl					
	or	EC	CM	Continuity	
Connector	Terminal	Connector	Terminal		
E20	2	EDE	75	Existed	
F29	3	F26	76	EXISIEU	
2. Also che	eck harness	for short to g	round and t	to power.	
Is the inspec		ormal?			
	GO TO 5. Banair anan		ort to arrow	dorchoute	er in hernese er connectore
_			-	u or short to	er in harness or connectors.
		POSITION S			
	-		efer to <u>EC-4</u>	69, "Compon	Inspection".
Is the inspec			nt Defend	01.40	
				<u>GI-43, "Inter</u> ator Refer to	ent Incident". -27, "Exploded View".
_					
Compone	nt inspec	uon			INFOID:0000000757733.
1. СНЕСК Т	HROTTLE	POSITION S	ENSOR		
1 Turn ion	ition switch	OFF.			

1. Turn ignition switch OFF.

2. Reconnect all harness connectors disconnected.

P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

- 3. Perform "Throttle Valve Closed Position Learning". Refer to EC-131, "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						
Connector	+	_	С	Condition Voltage		
Connector	Terr	ninal				
	75	74	Accelerator pedal	Fully released	More than 0.36V	
F26	75			Fully depressed	Less than 4.75V	
F20	76	74		Fully released	Less than 4.75V	
	10			Fully depressed	More than 0.36V	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to <u>EM-27. "Exploded View"</u>.

< DTC/CIRCUIT DIAGNOSIS >

P2138 APP SENSOR

DTC Logic

DTC DETECTION LOGIC **NOTE:**

If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-384, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P2138	APP SENSOR (Accelerator pedal posi- tion sensor circuit range/ performance)	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	 Harness or connector (APP sensor 1 or 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) Accelerator pedal position sensor (APP sensor 1 or 2) Turbocharger boost sensor Fuel rail pressure sensor Battery current sensor G sensor Camshaft position sensor Exhaust valve timing control position sen- sor Engine oil pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 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-472, "Diagnosis Procedure".

NO >> INSPECTION END

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< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

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[MR16DDT]

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.

APP	+ sensor		Voltage (Approx.)
Connector	Terminal		(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
E101	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK APP SENSOR 1 POWER SUPPLY 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	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
E101	4	E18	101	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 s	sensor	_	Voltage (Approx.)	
Connector	Terminal			
E101			5 V	

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check harness connector for short to power and short to ground, between the following terminals.

EC	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
		FRP sensor	F5	1
F25	39	EOP sensor	F43	3
		Turbocharger boost sensor	F75	1

< DTC/CIRCUIT DIAGNOSIS >

EC	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
	68 F26	Battery current sensor	F52	1
Fac		G sensor	B32	3
120	72	CMP sensor	F109	1
	12	EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

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	
E101	1	E18	120	Existed
L101	2		105	LAISICU

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.

+		_		
APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E101	3	E18	102	Existed
E101	6	EIO	119	EXISIED

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

1.CHECK APP SENSOR

Check the APP sensor. Refer to <u>EC-467, "Component Inspection"</u>.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace accelerator pedal assembly. Refer to <u>EM-27, "Exploded View"</u>.

Component Inspection

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.

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< DTC/CIRCUIT DIAGNOSIS >

	ECM					
Connector	+	_	Condition		Voltage	
Connector	Terr	ninal				
	102 105	105	Accelerator pedal	Fully released	0.6 - 0.9 V	
E18				Fully depressed	3.9 - 4.7 V	
EIS		Accelerator pedar	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 EM-27, "Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

P2162 VEHICLE SPEED SENSOR

Description

ECM receives a rear wheel sensor signal from ABS actuator and electric unit (control unit) via CAN communication to switch combustion for the direct injection gasoline system. For the direct injection gasoline system, refer to EC-40, "DIRECT INJECTION GASOLINE SYSTEM : System Description".

DTC Logic

DTC DETECTION LOGIC NOTE:

- If DTC P2162 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to EC-102, "DTC Index".
- If DTC P2162 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-381, "DTC Logic".

DTC No	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause	F
P2162	VEHICLE SPEED SEN A/B (Vehicle speed sensor A/B cor- relation)	ECM detects a rear LH wheel sensor signal or a rear RH wheel sensor signal transmitted from the ABS actuator and electric unit (con- trol unit) via CAN communication at least for 15 seconds in a row when the vehicle is in stopped condition.	 Harness or connectors (The CAN communication line is open or shorted) Rear LH wheel sensor Rear RH wheel sensor ABS actuator and electric unit (control unit) 	G

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.

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

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 9 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1 Start engine and let it idle for at least 30 seconds. NOTE: M Never depress the accelerator pedal during idle running. 2. Check 1st trip DTC. Is 1st trip DTC detected? Ν YES >> Proceed to EC-475, "Diagnosis Procedure". >> INSPECTION END NO Diagnosis Procedure C INFOID:000000007577339 **1.**CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) P With CONSULT

Check DTC with ABS actuator and electric unit (control unit). Refer to <u>BRC-38, "CONSULT Function"</u>.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform diagnosis procedure corresponding to DTC indicated.

2.CHECK REAR WHEEL SENSOR-I

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P2162 VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

With CONSULT

- 1. Stop the vehicle.
- 2. Set the parking brake.
- Use CONSULT to select "RR RH SENSOR" and "RR RH SENSOR" in "DATA MONITOR" mode of "ABS"
 Check indications of "RR RH SENSOR" and "RR RH SENSOR".
- NOTE:

Never cause the vehicle to vibrate.

Is 0 km/h (0 MPH) indicated for both "RR RH SENSOR" and "RR RH SENSOR"?

YES >> GO TO 3.

NO >> Perform trouble diagnosis of the rear wheel sensor if 0 km/h (0 MPH) is not displayed. Refer to BRC-75, "Diagnosis Procedure".

3.CHECK REAR WHEEL SENSOR-II

()With CONSULT

Drive the vehicle at 20 km/h (13 MPH).
 CAUTION:

Always drive vehicle at a safe speed.

2. Check indications of "RR RH SENSOR" and "RR RH SENSOR".

Is the difference between the indicated values of "RR RH SENSOR" and "RR RH SENSOR" within \pm 1 km/h (1 MPH)?

- YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.
- NO >> Perform trouble diagnosis of the rear wheel sensor. Refer to <u>BRC-75, "Diagnosis Procedure"</u>

< DTC/CIRCUIT DIAGNOSIS >

P2263 TC SYSTEM

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P2263 is displayed with DTC P0237 or P0238, first perform the trouble diagnosis for DTC P0237 or P0238. Refer to <u>EC-294. "DTC Logic"</u>.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2263	TC SYSTEM-B1 (Turbocharger boost system performance)	In spite of the boosting area, the boost does not increase.	 Intake air leaks Exhaust gas leaks Turbocharger boost sensor Turbocharger boost control solenoid valve Recirculation valve Exhaust manifold and turbocharger assembly Boost control actuator
DTC CO	NFIRMATION PROCEDL	IRE	
1.PERF	ORM COMPONENT FUNC	TION CHECK	
NOTE: Use comp		Refer to <u>EC-477, "Component Function</u> neck the overall function of the turboo	
Is the insp YES >	 > INSPECTION END > Proceed to <u>EC-478</u>, "Dia 		
Compoi	nent Function Check		INF0ID:00000007577341
1.PERF	ORM COMPONENT FUNC	TION CHECK-I	
DisconrExhaust	e following: nection of air duct or hose but gas leaks of exhaust mani- suck of recirculation valve	etween electric throttle control actuator fold	r and compressor wheel.
 Stuck of 	turbocharger		
	<u>pection result normal?</u> >> GO TO 2. >> Proceed to <u>EC-478, "Dia</u>	anosis Procedure"	
•		-	
2.PERF	SPROCEED to <u>EC-478. Dra</u> DRM COMPONENT FUNC ignition switch OFF.	-	

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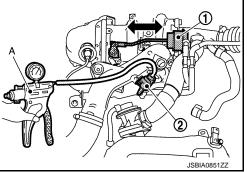
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< DTC/CIRCUIT DIAGNOSIS >

- 5. Check that the rod of the boost control actuator (1) activates when supplying pressure and battery voltage to the turbocharger boost control solenoid valve (2) as per the following conditions.
 - A. Pressure pump



Turbocharger boost control solenoid valve	Operation
Condition	Operation
Supply pressure [73 kPa (548 mmHg, 21.56 inHg)] with battery voltage to terminals 1 and 2	Boost control actuator rod operates
Supply pressure [73 kPa (548 mmHg, 21.56 inHg)] with battery voltage to terminals 1 and 2	Boost control actuator rod not operates

CAUTION:

Do not supply pressure over 83 kPa (623 mmHg, 24.51 inHg).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to EC-478, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK FOR EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- 2. Listen for an exhaust gas leak of exhaust manifold.

Is exhaust gas leak detected?

YES >> GO TO 2.

NO >> Repair or replace malfunction parts.

2.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak between electric throttle control actuator and compressor wheel.

Is intake air leak detected?

YES >> GO TO 3.

NO >> Repair or replace malfunction parts.

3.CHECK RECIRCULATION VALVE

1. Turn ignition switch OFF.

Check recirculation valve. Refer to <u>EM-38, "Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace recirculation valve. Refer to EM-30, "Exploded View".

4.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY

1. Disconnect turbocharger boost control solenoid valve harness connector.

2. Turn ignition switch ON.

3. Check the voltage between turbocharger boost control solenoid valve harness connector and ground.

	+		
-	st control solenoid lve	_	Voltage
Connector	Terminal		
F54	2	Ground	Battery voltage

Is the inspection result normal?

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

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EC-478

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[MR16DDT]

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

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5. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector.
- 3. Check the continuity between turbocharger boost control solenoid valve harness connector and IPDM E/R harness connector.

	+		_	
	boost control so- d valve	IPDN	M E/R	Continuity
Connector	Terminal	Connector	Terminal	
F54	2	E14	36	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

6.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT

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

	+		-	
0	ooost control so- d valve	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F54	1	F26	73	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Check the turbocharger boost control solenoid valve. Refer to <u>EC-480, "Component Inspection (Turbocharger</u> <u>L</u> <u>Boost Control Solenoid Valve)</u>".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace turbocharger boost control solenoid valve. Refer to <u>EM-37, "Exploded View"</u>.

8.CHECK BOOST CONTROL ACTUATOR

Check the boost control actuator. Refer to EM-38, "Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace exhaust manifold and turbocharger assembly. Refer to EM-37, "Exploded View".

9.CHECK TURBOCHARGER BOOST SENSOR

Check the turbocharger boost sensor. Refer to EC-480, "Component Inspection (Turbocharger Boost Sensor)".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace turbocharger boost sensor. Refer to <u>EM-30</u>, "Exploded View".

10. CHECK EXHAUST MANIFOLD AND TURBOCHARGER ASSEMBLY

Check the exhaust manifold and turbocharger assembly. Refer to EM-42, "Inspection".

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Is the inspection result normal?

YES >> CHECK INTERMITTENT INCIDENT. Refer to GI-43, "Intermittent Incident".

NO >> Replace exhaust manifold and turbocharger assembly. Refer to EM-37, "Exploded View".

Component Inspection (Turbocharger Boost Control Solenoid Valve)

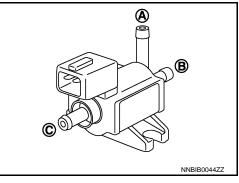
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1.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

- 1. Turn ignition switch OFF
- 2. Disconnect turbocharger boost control solenoid valve harness connector.
- 3. Disconnect hoses connected to turbocharger boost control solenoid valve.
- Check air passage continuity of turbocharger boost control solenoid valve as per the following conditions.

Condition	Air passage con- tinuity between (A) and (B)	Air passage con- tinuity between (A) and (C)
12 V direct current supply between terminals 1 and 2	Existed	Not existed
No supply	Not existed	Existed



is the inspection result normal?

YES >> INSPECTION END

NO >> Replace turbocharger boost control solenoid valve. Refer to EM-37, "Exploded View".

Component Inspection (Turbocharger Boost Sensor)

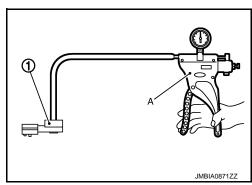
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1.CHECK TURBOCHARGER BOOST SENSOR

- 1. Turn ignition switch OFF.
- 2. Remove turbocharger boost sensor with its harness connector.
- 3. Install pressure pump (A) to turbocharger boost sensor (1). CAUTION:

When insert a pressure pump hose to the sensor, be careful to the damage of the sensor housing.

- 4. Turn ignition switch ON.
- 5. Check the voltage between ECM harness connector terminals as per the following conditions.



NOTE:

- Always calibrate the pressure pump gauge when using it.
- Inspection should be done at room temperature [10 30°C (50 86°F)].

	ECM		Ora dition (Decours (Deletive to at	
Connector	+	-	Condition [Pressure (Relative to at- mospheric pressure)]	Voltage (Approx.)
Connector	Tern	ninal		
F25	41	44	0 kPa (0 mbar, 0 mmHg, 0 inHg)	2.03 V
125	41	44	40 kPa (400 mbar, 300 mmHg, 11.81 inHg)	2.67 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace turbocharger boost sensor. Refer to EM-37, "Exploded View".

EC-480

< DTC/CIRCUIT DIAGNOSIS >

P2A00 A/F SENSOR 1

DTC Logic

DTC DETECTION LOGIC

To judge the malfunction, the A/F signal computed by ECM from the A/F sensor 1 signal is monitored not to be shifted to LEAN side or RICH side.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P2A00	A/F SENSOR1 (B1) (Air fuel ratio (A/F) sensor 1 circuit range/performance)	 Output voltage computed by ECM from the A/F sensor 1 signal is shifted to the lean side for a specified period. A/F signal computed by ECM from the A/F sensor 1 signal is shifted to the rich side for a specified period. 	 A/F sensor 1 A/F sensor 1 heater Heated oxygen sensor 2 Fuel pressure Fuel injector Intake air leaks Exhaust gas leaks
	FIRMATION PROCED	JRE	
	NDITIONING	s been previously conducted, always pe	arform the following procedure
before cond	ducting the next test.		anorm the following procedure
2. Turn ig	nition switch OFF and wa nition switch ON.		
TESTING (nition switch OFF and wa CONDITION:		
Before per	forming the following p	rocedure, confirm that battery voltage i	s more than 11 V at idle.
•	GO TO 2.		
	RM DTC CONFIRMATIO		
		ing value. Refer to <u>EC-135, "Work Proced</u>	ure"
 Start er Let eng Keep er 	ngine and keep the engin jine idle for 1 minute. ngine speed between 2,5	it at least 10 seconds. e speed between 3,500 and 4,000 rpm for 500 and 3,000 rpm for 20 minutes.	
 Start er Let eng Keep er Check Ist trip D 	ngine and keep the engin jine idle for 1 minute. ngine speed between 2,5 1st trip DTC. <u>TC detected?</u>	e speed between 3,500 and 4,000 rpm for	
 Start er Let eng Keep er Check Is 1st trip D YES >> 	ngine and keep the engin jine idle for 1 minute. ngine speed between 2,5 1st trip DTC.	e speed between 3,500 and 4,000 rpm for	
 Start er Let eng Keep er Check Is 1st trip D YES >> NO >> 	ngine and keep the engin gine idle for 1 minute. ngine speed between 2,5 1st trip DTC. <u>TC detected?</u> • Proceed to <u>EC-481, "Dia</u>	e speed between 3,500 and 4,000 rpm for	
 Start er Let eng Keep e Check Is 1st trip D YES >> NO >> Diagnosi 	ngine and keep the engin gine idle for 1 minute. ngine speed between 2,5 1st trip DTC. <u>TC detected?</u> • Proceed to <u>EC-481, "Dia</u> • INSPECTION END	e speed between 3,500 and 4,000 rpm for 500 and 3,000 rpm for 20 minutes. Agnosis Procedure".	1 minute under no load.
 3. Start er 4. Let eng 5. Keep e 6. Check <u>Is 1st trip D</u> YES >> NO >> Diagnosi 1.CHECK 1. Turn ig 2. Discon 	ngine and keep the engin gine idle for 1 minute. ngine speed between 2,5 1st trip DTC. <u>TC detected?</u> Proceed to <u>EC-481, "Dia</u> INSPECTION END s Procedure HARNESS CONNECTO nition switch OFF. nect A/F sensor 1 harnes	e speed between 3,500 and 4,000 rpm for 500 and 3,000 rpm for 20 minutes. Agnosis Procedure". R	1 minute under no load.
 3. Start er 4. Let eng 5. Keep e 6. Check <u>Is 1st trip D</u> YES >> NO >> Diagnosi 1.CHECK 1. Turn ig 2. Discon 	ngine and keep the engin gine idle for 1 minute. ngine speed between 2,5 1st trip DTC. <u>TC detected?</u> Proceed to <u>EC-481, "Dia</u> INSPECTION END S Procedure HARNESS CONNECTOR nition switch OFF.	e speed between 3,500 and 4,000 rpm for 500 and 3,000 rpm for 20 minutes. Agnosis Procedure". R	1 minute under no load.
 3. Start er 4. Let eng 5. Keep e 6. Check 1st trip D YES >> NO >> Diagnosi 1.CHECK 1. Turn ig 2. Discon 3. Check 	ngine and keep the engin gine idle for 1 minute. ngine speed between 2,5 1st trip DTC. <u>TC detected?</u> Proceed to <u>EC-481, "Dia</u> INSPECTION END s Procedure HARNESS CONNECTO nition switch OFF. nect A/F sensor 1 harnes	e speed between 3,500 and 4,000 rpm for 500 and 3,000 rpm for 20 minutes. Agnosis Procedure". R	1 minute under no load.
 3. Start er 4. Let eng 5. Keep er 6. Check 1st trip D YES >> NO >> Diagnosi 1.CHECK 1. Turn ig 2. Discon 3. Check Watter Is the inspective 	ngine and keep the engin gine idle for 1 minute. ngine speed between 2,5 1st trip DTC. <u>TC detected?</u> Proceed to <u>EC-481, "Dia</u> NSPECTION END S Procedure HARNESS CONNECTO nition switch OFF. nect A/F sensor 1 harnes harness connector for war er should not exit. ection result normal?	e speed between 3,500 and 4,000 rpm for 500 and 3,000 rpm for 20 minutes. Agnosis Procedure". R	1 minute under no load.
3. Start er 4. Let eng 5. Keep e 6. Check Is 1st trip D YES >> NO >> Diagnosi 1.CHECK 1. Turn ig 2. Discon 3. Check Wat Is the inspen- YES >>	ngine and keep the engin ngine idle for 1 minute. ngine speed between 2,5 1st trip DTC. <u>TC detected?</u> Proceed to <u>EC-481, "Dia</u> INSPECTION END S Procedure HARNESS CONNECTO nition switch OFF. nect A/F sensor 1 harnes harness connector for wa	e speed between 3,500 and 4,000 rpm for 500 and 3,000 rpm for 20 minutes. agnosis Procedure". R R s connector. ater.	1 minute under no load.

Loosen and retighten the A/F sensor 1 and heated oxygen sensor 2. Refer to <u>EM-41, "Exploded View"</u>, <u>EX-5,</u> "<u>Exploded View</u>".

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>> GO TO 3.

3.CHECK FOR EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- 2. Listen for an exhaust gas leak before the three way catalyst 2.

Is exhaust gas 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-135, "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-258, "DTC Logic"</u> or <u>EC-262,</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 se	ensor 1	-	Voltage
Connector	Terminal		
F70	4	Ground	Battery voltage

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	
F70	4	E14	36	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.

8.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.

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2. Disconnect ECM harness connector.

3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

+		-		
A/F ser	nsor 1	EC	М	Continuity
Connector	Terminal	Connector	Terminal	
F70	1	F25	21	Existed
170	2	125	25	LAISIEU

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

	+		
A/F s	ensor 1	-	Continuity
Connector	Terminal		
F70	1	Ground	Not existed
	2	Glound	Not existed
	+	-	
	СМ	-	Continuity
Connector	Terminal		
F25	21	Ground	Not existed
	25		
		short to power.	
	tion result norr	<u>nal?</u>	
	GO TO 9. Repair or repla	ce error-detected	d parts
^	/F SENSOR 1		
			172 "Componer
	tion result norr		-172, "Componer
	GO TO 10.	<u>nar:</u>	
	GO TO 12.		
10.снеск	HEATED OX	YGEN SENSOR	2
			C-242, "Compone
	tion result norr		
· · · · · · · · · · · · · · · · · · ·	GO TO 11.		
		d oxygen sensor	2. Refer to EX-5,
11.снеск	INTERMITTE	NT INCIDENT	
Perform GI-4	3, "Intermitten	t Incident".	
	tion result norr		
YES >> (GO TO 12.		
	• •	ce error-detected	•
12.repla	CE AIR FUEL	RATIO (A/F) SEI	NSOR 1
Replace air f			

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.

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• 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

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-135, "Work Procedure".

Do you have CONSULT?

YES >> GO TO 15.

NO >> INSPECTION END

15. CONFIRM A/F ADJUSTMENT DATA

(I) 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.

>> INSPECTION END

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.

NO >> Proceed to EC-485, "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

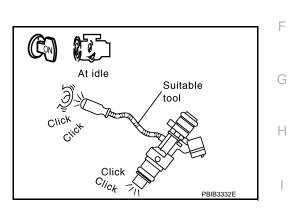
- 1. Let engine idle.
- 2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-485, "Diagnosis Procedure".



Diagnosis Procedure

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1.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect fuel injector harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between fuel injector harness connector and ground.

+				
	Fuel injector		-	Voltage
Cylinder	Connector	Terminal		
1	F65	1	Ground	Ground Battery voltage
2	F66	1		
3	F67	1		
4	F68	1		
s the inspec	ction result no	ormal?	1	

YES >> GO TO 9.

NO >> GO TO 2.

2.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between fuel injector harness connector and ECM harness connector.

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	+		-		
	Fuel injector		ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F65	1		3	
2	F66	1	F25	4	Existed
3	F67	1	F23	4	EXISIEU
4	F68	1		3	

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3. CHECK FUEL INJECTOR DRIVER POWER SUPPLY

1. Reconnect ECM harness connector.

2. Turn ignition switch ON.

3. Check the voltage between ECM harness connector and ground.

	+			
E	CM	-	Voltage	
Connector	Terminal			
F26	49	Ground	Battony voltago	
120	53	Ground	Battery voltage	

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>

NO >> GO TO 4.

4.CHECK FUEL INJECTOR DRIVER POWER SUPPLY CIRCUIT

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

3. Disconnect fuel injector relay harness connector.

4. Check the continuity between ECM harness connector and fuel injector relay harness connector.

	+				
E	СМ	Fuel injector relay		Continuity	
Connector Terminal		Connector	Terminal		
F26	49	E57	5	Existed	
1 20	53	L07	7	LAISIEU	

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts

5.CHECK FUEL INJECTOR RELAY POWER SUPPLY (CONTACT SIDE)

Check the voltage between fuel injector relay harness connector and ground.

		+			
	Fuel inje	ctor relay	_	Voltage	
_	Connector	Terminal			
	E57	3	Ground	Battery voltage	
	237	6	Ground	Dattery Voltage	

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Is the inspection result ne	ormal?			
YES >> GO TO 6.				А
NO >> Perform the	trouble diagnosis for	power supply circ	uit.	
6.CHECK FUEL INJEC	TOR RELAY POWER	R SUPPLY (EXCIT	ATION COIL SIDE)	
				EC
 Reconnect all harnes Turn ignition switch (ss connectors discon วงเ	neclea.]
	etween fuel injector re	elav harness conr	ector and ground.	
	j	,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,	<u> </u>	С
+			•	
Fuel injector relay		Voltage		_
		Vollage		D
			-	
E57 1	Ground	Battery voltage	-	Е
Is the inspection result ne	ormal?			
YES >> GO TO 8.				
NO >> GO TO 7				F
1 .CHECK FUEL INJEC	TOR RELAY POWER	R SUPPLY CIRCU	IIT (EXCITATION COIL SIDE)	Г
1. Turn ignition switch (OFF.			
2. Disconnect fuel inject	ctor relay harness cor			G
	R harness connector			0
4. Check the continuity	between IPDM E/R I	harness connecto	r and fuel injector harness connector.	
				Н
+	_			
IPDM E/R	Fuel injector relay	Continuity		
Connector Terminal	Connector Termin	nal		
E14 35	E57 1	Existed		
5. Also check harness	for short to ground.			
Is the inspection result ne	ormal?			J
YES >> Perform the	trouble diagnosis for	power supply circ	uit.	
	place error-detected p			LZ.
8. CHECK FUEL INJEC	TOR RELAY GROUN	ID CIRCUIT		K
1. Turn ignition switch (
	ctor relay harness cor	nnector.		1
	between fuel injector		nnector and ground.	-
+			-	Μ
Fuel injector relay		Continuity		
Connector Termin	al			
E57 2	Ground	Existed	-	Ν
_		LAISIGU	-	
4. Also check harness	•			
Is the inspection result ne	<u>ormal?</u>			0
YES >> GO TO 10. NO >> Repair or rep	alace error detected	oarte		
· · ·	place error-detected			
9.CHECK FUEL INJEC				Ρ
1. Turn ignition switch (OFF.			

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Turn ignition switch OFF.
 Disconnect ECM harness connector.
 Check the continuity between fuel injector harness connector and ECM harness connector.

Existed

+				
Fuel injector		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F65	2		5	
F66	2		6	

F25

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

2

2

Is the inspection result normal?

F67

F68

YES >> GO TO 11.

Cylinder 1 2

3

4

NO >> Repair or replace error-detected parts.

10.CHECK FUEL INJECTOR RELAY

Check the fuel injector relay. Refer to EC-488, "Component Inspection (Fuel Injector Relay)".

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Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident"

NO >> Replace fuel injector relay. Refer to <u>PG-8. "Standardized Relay"</u>.

11.CHECK FUEL INJECTOR

Check the fuel injector. Refer to EC-488, "Component Inspection (Fuel Injector)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43. "Intermittent Incident"</u>

NO >> Replace malfunctioning fuel injector. Refer to <u>EM-51, "Exploded View"</u>.

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.

r	Fuel injector			
- Resistance	+ –			
	Terminals			
2 1.44 - 1.73 Ω [at 10 - 60°C (50 - 140°F)]	1 2			

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning fuel injector.<u>EM-51, "Exploded View"</u>

Component Inspection (Fuel Injector Relay)

1.CHECK FUEL INJECTOR RELAY

1. Turn ignition switch OFF.

2. Remove fuel injector relay.

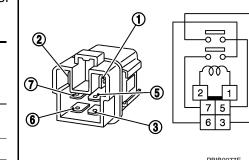
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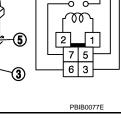
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3. Check the continuity between fuel heater relay terminals as per the following conditions.



Fuel inje	ector relay		
+ –		Conditions	Continuity
Teri	minal		
3	5	12 V direct current supply between ter- minals 1 and 2	Existed
		No current supply	Not existed
6	7	12 V direct current supply between ter- minals 1 and 2	Existed
		No current supply	Not existed



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel injector relay.



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LOW PRESSURE FUEL PUMP

Component Function Check

1.CHECK FUEL PUMP FUNCTION

1. Turn ignition switch ON.

2. Pinch fuel feed hose with two fingers. **NOTE:**

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

<u>Is the inspection result normal?</u> YES >> INSPECTION END

YES >> INSPECTION END NO >> Proceed to <u>EC-490, "Diagnosis Procedure"</u>.

Diagnosis Procedure

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1.CHECK FUEL PUMP RELAY POWER SUPPLY

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

Connector	+	_	Voltage	
Connector	Terr	minal		
E18	117	127	Battery voltage	

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT

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

+				
E	CM	IPDN	/I E/R	Continuity
Connector	Terminal	Connector	Terminal	
E18	117	E13	31	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 LOW FUEL PUMP POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Reconnect ECM harness connector.
- 3. Disconnect fuel level sensor unit and fuel pump harness connector.
- 4. Turn ignition switch ON.
- 5. Check the voltage between fuel level sensor unit and fuel pump harness connector and ground.

LOW PRESSURE FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

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	sensor unit el pump	-		Voltag	e		
Connector	Terminal						E
B46	1	Ground		ry voltage sho nd after ignitior	uld for exist 1 n switch is turn		(
s the inspe	ection resul	t normal?					
	> GO TO 5. > GO TO 4.						
4.CHECK	LOW FUE	L PUMP F	POWE	R SUPPLY	CIRCUIT		
2. Discon 3. Check	nition switc nect IPDM the continu onnector.	E/R harn			or unit and f	uel pump harness connector and IPDM E/R har-	
	+		_	-			
	sensor unit an I pump	d	IPDN		Continuity		(
Connector	Terminal			Terminal		_	
B46	1	E1	-	54	Existed		
	neck harnes		rt to g	round.			
YES >> NO >>	Repair or	ne trouble replace e	rror-d	etected part		ircuit.	
D. CHECK	LOW FUE	L PUMP (GROL	IND CIRCU	IT		
	nition swite the continu		en fue	el level sens	or unit and f	uel pump harness connector and ground.	
	+						
	sensor unit ar el pump	nd	_		Continuity		
Connector	Termina	al					
B46	3		Ground	t t	Existed		
. Also ch	neck harnes	ss for sho	rt to p	ower.			
YES >>	ection resul > GO TO 6. > Repair or		rror-de	etected part	'S.		
`	LOW FUE						
			to FC	C-491, "Com	nponent Insp	ection".	
	ection resul	•					
YES >>	> Check inte	ermittent i				<u>mittent Incident"</u> . fer to <u>FL-5, "2WD : Exploded View"</u> .	
Compon	ent Inspe	ection				INFOID:00000007577353	
	FUEL PRE		REGU	LATOR			
2. Check	nition switc low fuel pro	essure. R	efer to) <u>EC-136, "\</u>	Nork Proced	ure".	

Is inspection result normal?

Revision: 2011 October

LOW PRESSURE FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

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

2.CHECK LOW PRESSURE FUEL PUMP

- 1. Turn ignition switch OFF.
- 2. Disconnect fuel level sensor unit.

3. Check resistance between fuel level sensor unit terminals as follows.

Fuel level sensor unit			
+	-	Condition	Resistance
Terminals		*	
2	4	Temperature: 25°C (77°F)	0.2 - 5.0 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel level sensor unit. Refer to <u>FL-5, "2WD : Exploded View"</u>.

Revision: 2011 October

< DTC/CIRCUIT DIAGNOSIS > HIGH PRESSURE FUEL PUMP

Component Function Check

1. CHECK HIGH PRESSURE FUEL PUMP FUNCTION

With CONSULT

1. Start engine.

2. Check "FUEL PRES SEN V" in "DATA MONITOR" mode of "ENGINE" using CONSULT.

Monitor Item	Condition	Values/Status
	Engine speed: Idle	1,140 – 1,460 mV
FUEL PRES SEN V	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,300 – 2,900 mV

Without CONSULT

1. Start engine.

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

	ECM			
Connector	+	_	Condition	Voltage
Connector	Terr	ninal		
F26	55	50	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	BATTERY VOLTAGE (11 - 14 V) ★ 20mSec/div 5V/div
F20	55	50	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V) ★ 20mSec/div 5V/div JPBIA4723ZZ
YES >>	<u>tion result r</u> INSPECTIC Proceed to	ON END	Diagnosis Procedure".	
	Procedu		-	INFOID:00000007577355
•				

EC-493

1.CHECK HIGH PRESSURE FUEL PUMP POWER SUPPLY

1. Turn ignition switch ON.

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

E	+ CM	_	Voltage
Connector	Terminal		
F26 54		Ground	Battery voltage
In the second sections are	14 10		

Is inspection result normal?



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< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

YES >> GO TO 8. NO >> GO TO 2.

2.CHECK HIGH PRESSURE FUEL PUMP POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Disconnect fuel injector relay harness connector.
- 4. Check the continuity between ECM harness connector and high pressure fuel pump relay harness connector.

+			_	
E	СМ	High pressure fuel pump re- lay		Continuity
Connector	Terminal	Connector Terminal		
F26	54	E58 3		Existed

5. 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 HIGH PRESSURE FUEL PUMP RELAY POWER SUPPLY (CONTACT SIDE)

Check the voltage between high pressure fuel pump relay harness connector and ground.

	+		
High pressure	fuel pump relay	_	Voltage
Connector	Terminal		
E58 5		Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> Perform the trouble diagnosis for power supply circuit.

4.CHECK HIGH PRESSURE FUEL PUMP RELAY POWER SUPPLY (EXCITATION COIL SIDE)

- 1. Reconnect all harness connectors disconnected.
- 2. Turn ignition switch ON.

3. Check the voltage between high pressure fuel pump relay harness connector and ground.

	+		
High pressure	fuel pump relay	_	Voltage
Connector	Terminal		
E58	E58 2		Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5

 $\mathbf{5.}$ CHECK HIGH PRESSURE FUEL PUMP RELAY POWER SUPPLY CIRCUIT (EXCITATION COIL SIDE)

1. Turn ignition switch OFF.

- 2. Disconnect high pressure fuel pump relay harness connector.
- 3. Disconnect IPDM E/R harness connector.
- check the continuity between ipdm e/r harness connector and high pressure fuel pump harness connector.

< DTC/CIRCUIT DIAGNOSIS >

-	F		_		
IPDN	1 E/R		e fuel pump re- ay	Continuity	
Connector	Terminal	Connector	Terminal	-	
E14	35	E58	2	Existed	
5. Also che	ck harness	for short to g	ground.		
Is the inspec	tion result n	ormal?			
		trouble diag			cuit.
•	•	place error-d	•		
6.CHECK +				AT GROUN	CIRCUIT
	ition switch ect hiah pre	OFF. ssure fuel pu	ump relav ha	rness conne	tor.
					ay harness connector and ground.
				Continuity	
Connector	re fuel pump re Termin	-	. (Continuity	
E58	1	Gro	und	Existed	
	•	for short to p			
Is the inspec			ower.		
	GO TO 7.				
—	•	place error-d	•		
I.CHECK H	IIGH PRES	SURE FUEL	PUMP REL	AY	
	gh pressure	fuel pump re	alay. Refer to	0 <u>EC-497, "C</u>	omponent Inspection (High Pressure Fuel Pump
Relay)". Is inspection	result norm	202			
-	GO TO 8.				
		h pressure fu	iel pump rela	ay. Refer to	G-8, "Standardized Relay".
8.CHECK F	IIGH PRES	SURE FUEL	PUMP CIRC	CUIT	
	ition switch				
					el pump harness connector. d high pressure fuel pump harness connector.
	io continuity			oonneolor al	
	÷	-	_		
EC	CM	High pressu	re fuel pump	Continuity	
Connector	Terminal	Connector	Terminal		
F26	55	F53	1	Existed	
F20	56	F00	2		
4. Also che	eck harness	for short to g	round and to	o power.	
Is inspection		al?			
	GO TO 9. Repair or re	place error-d	etected nart	s	
9.CHECK F	-	-		0.	
				400	nent increation (Link Dressure First Dress)
	•		terer to <u>EC-4</u>	490, "Comp	nent Inspection (High Pressure Fuel Pump)".
Is inspection		<u>iai (</u>			

YES >> GO TO 10.

NO >> Replace high pressure fuel pump. Refer to <u>EM-46</u>, "Exploded View".

EC-495

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

10. CHECK HIGH PRESSURE FUEL PUMP INSTALLATION CONDITION

1. Turn ignition switch OFF.

2. Check that the high pressure fuel pump is installed with no backlash and looseness.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair or replace error-detected parts.

11.CHECK CAMSHAFT

1. Remove camshaft. Refer to EM-84, "Exploded View".

2. Check camshaft. Refer to EM-88, "Inspection".

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".

NO >> Replace camshaft. Refer to EM-84, "Exploded View".

Component Inspection (High Pressure Fuel Pump)

INFOID:000000007577356

1.CHECK HIGH PRESSURE FUEL PUMP-I

1. Turn ignition switch OFF.

2. Disconnect high pressure fuel pump harness connector.

3. Check the resistance between high pressure fuel pump terminals as follows.

High pressu	ire fuel pump			
+	_	Condi	Resistance	
Terr	minal			
1	2	Temperature °C (°F) 20 – 30 (68 - 86)		0.46 - 0.51 Ω

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace high pressure fuel pump. Refer to <u>EM-46, "Exploded View"</u>.

2. CHECK HIGH PRESSURE FUEL PUMP-II

() With CONSULT

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

Data monitor item	Condition	Voltage (Approx.)
FUEL PRES SEN V	Engine speed: idle	1,140 – 1,460 mV
I OLL I NEO OLINIV	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,300 – 2,900 mV

Without CONSULT

1. Start the engine.

2. Check fuel rail pressure sensor signal voltage.

	+				
Fuel rail pressure sensor		-	Condition	Value (Approx.)	
Connector	Terminal				
			Engine speed: idle	1.14 – 1.46 V	
F5	2	Ground	Engine speed: Revving engine from idle to 4,000 rpm quickly	1.3 – 2.9 V	

Is the inspection result normal?

YES >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

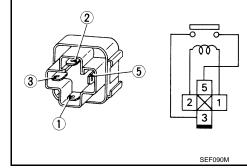
NO >> Replace high pressure fuel pump. Refer to <u>EM-46, "Exploded View"</u>.

Component Inspection (High Pressure Fuel Pump Relay)

1.CHECK HIGH PRESSURE FUEL PUMP RELAY

- 1. Turn ignition switch OFF.
- 2. Remove high pressure fuel pump relay.
- Check the continuity between high pressure fuel pump relay terminals as per the following conditions.

0 1	ssure fuel o relay		0	
+	_	Conditions	Continuity	
Terr	minal			
3	5	12 V direct current supply between ter- minals 1 and 2	Existed	
		No current supply	Not existed	



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace high pressure fuel pump relay.

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< DTC/CIRCUIT DIAGNOSIS >

IGNITION SIGNAL

Component Function Check

INFOID:000000007577358

[MR16DDT]

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES >> GO TO 2.

NO >> Proceed to EC-498, "Diagnosis Procedure".

2. IGNITION SIGNAL FUNCTION

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.

	E			
	+	_		Voltage signal
Connector	Terminal	Connector	Terminal	1
	82			
	86	E18	107	100mSec/div
500	90			
F26			127	
	94			
				2V/div JPBIA4733ZZ

NOTE:

The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-498. "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000007577359

1.CHECK CONDENSER POWER SUPPLY

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

3. Turn ignition switch ON.

4. Check the voltage between condenser harness connector and ground.

	+		
Conc	lenser	-	Voltage
Connector	Connector Terminal		
F13	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK CONDENSER POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector.
- 3. Check the continuity between IPDM E/R harness connector and condenser harness connector.

EC-498

IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

	+				
חחו	+ M E/R	C	ndenser	Continuity	
	Terminal			Continuity	
Connector E15	61	Connecto F13	r Termina 1	Existed	
-				Existed	
	ction result	s for short to	giouna.		
			annosis for	power supply c	rcuit
		eplace erro			
3.CHECK	CONDENS	ER GROUN		Г	
	nition switch				
			Condenser	harness conne	ctor and ground.
	+				
(Condenser		-	Continuity	
Connecto	r Terr	ninal			
F13		2	Ground	Existed	
3. Also ch	eck harnes	s for short to	power.		
s the inspe	ction result	normal?			
	GO TO 4.				
4	•	eplace erro	-detected p	oarts.	
4.CHECK	CONDENS	ER			
Check the c	ondenser. r	efer to <u>EC-</u>	501, "Comp	onent Inspectio	n (Condenser)".
s the inspe		normal?			
	GO TO 5.	ndoncor			
_	Replace co			,	
		COIL POWE			
		ess connec			
	nition switch	i coil harnes i ON.		1 .	
	he voltage	between igr	nition coil h	arness connecte	r and ground.
	+				
	Ignition coil		-	Voltage	
Cylinder	Connector	Terminal			
1	F33	3			
2	F34	3	Ground	Battery voltage	
3	F35	3	Cround	Dattory voltage	
4	F36	3			
s the inspe	ction result	normal?			
	GO TO 6.				
•			•	power supply c	rcuit.
J. CHECK	IGNITION (COIL GROU	ND CIRCL	ЛТ	
Turn iar	nition switch	OFF			

1. Turn ignition switch OFF.

2. Check the continuity between ignition coil harness connector and ground.

IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

	+			
	Ignition coil	-	Continuity	
Cylinder	Connector	Terminal		
1	F33	2		
2	F34	2	Ground	Existed
3	F35	2	Ground	
4	F36	2		

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 IGNITION COIL OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.

2. Check the continuity between ECM harness connector and ignition coil harness connector.

	+		-	-	
Ignition coil			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F33	1		82	
2	F34	1	F26	86	Existed
3	F35	1	120	90	LAISIGU
4	F36	1	•	94	

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

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

 $\mathbf{8}$. CHECK IGNITION COIL WITH POWER TRANSISTOR

Check the ignition coil with power transistor. Refer to <u>EC-500</u>, "Component Inspection (Ignition Coil with <u>Power Transistor)</u>".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-57, "Exploded View".

Component Inspection (Ignition Coil with Power Transistor)

INFOID:000000007577360

1. CHECK IGNITION COIL WITH POWER TRANSISTOR-I

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

3. Check resistance between ignition coil terminals as per the following.

Ignition coil with	power transistor		
+ – Terminal		Resistance [Ω at 25°C (77°F)	
1 <u>3</u> 2 3		Event 0	
		Except 0	

Is the inspection result normal?

YES >> GO TO 2.



IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-57, "Exploded View".

2.CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

- Turn ignition switch OFF. 1.
- Reconnect all harness connectors disconnected. 2.
- Remove fuel pump fuse in IPDM E/R to release fuel pressure. 3. NOTE:
 - Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.
- Start engine. 4.
- After engine stalls, crank it two or three times to release all fuel pressure. 5
- 6. Turn ignition switch OFF.
- 7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils. Refer to EM-57, "Exploded View".
- Remove ignition coil and spark plug of the cylinder to be checked. Refer to .0EM-57, "Exploded View"
- 9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 10. Connect spark plug and harness connector to ignition coil.
- 11. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 -0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

• 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 electrical discharge voltage becomes 20 kV or more.

It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken. NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-57. "Exploded View".

Component Inspection (Condenser)

1.CHECK CONDENSER

- 1. Turn ignition switch OFF.
- 2. Disconnect condenser harness connector.
- 3. Check resistance between condenser terminals as per the following.

Conc	denser	
+	-	Resistance
Terr	minal	
1	2	Above 1 MΩ [at 25°C (77°F)]
s the inspectio	n result norma	2

<u>on result normal?</u>

>> INSPECTION END YES

NO >> Replace Condenser.

Н 13 - 17 mm ากกกกก้ากกกก้ำ (0.52-0.66 in) Grounded metal portion (Cylinder head, cylinder block, etc.) IMBIA0066GB

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INFOID:000000007577361

ELECTRICAL LOAD SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

ELECTRICAL LOAD SIGNAL

Description

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred via the CAN communication line.

Component Function Check

1.CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

With CONSULT

- 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.

Monitor item	Condition		Indication
LOAD SIGNAL	Rear window defogger switch	ON	ON
LOAD SIGNAL	Treat window delogger switch	OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to EC-502, "Diagnosis Procedure".

2.CHECK LIGHTING SWITCH FUNCTION

(B) With CONSULT-III

Check "LOAD SIGNAL" indication as per the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Lighting switch	ON at 2nd posi- tion	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.

NO >> Proceed to EC-502, "Diagnosis Procedure".

$\mathbf{3.}$ CHECK HEATER FAN CONTROL SWITCH FUNCTION

With CONSULT

Select "HEATER FAN SW" and check indication as per the following conditions.

Monitor item	Condition	Indication	
HEATER FAN	Heater fan control switch	ON	ON
SW	Heater fair control switch	OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to <u>EC-502</u>, "Diagnosis Procedure".

Diagnosis Procedure

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to <u>EC-502, "Component 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.

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ELECTRICAL LOAD SIGNAL	
< DTC/CIRCUIT DIAGNOSIS >	[MR16DDT]
2.CHECK REAR WINDOW DEFOGGER SYSTEM	А
Check the rear window defogger system. Refer to DEF-22, "Work Flow".	^
>> INSPECTION END 3.CHECK HEADLAMP SYSTEM	EC
Check the headlamp system. Refer to <u>EXL-38, "Work Flow"</u> .	
	С
>> INSPECTION END	
4.CHECK HEATER FAN CONTROL SYSTEM	D
Check the heater fan control system. Refer to HAC-37, "Work Flow".	
>> INSPECTION END	E
	F
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COOLING FAN

Component Function Check

1.CHECK COOLING FAN FUNCTION

With CONSULT

- 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

- 1. Activate IPDM E/R auto active test and check cooling fan motors operation. Refer to <u>PCS-11, "Diagnosis</u> <u>Description"</u>.
- 2. Check that cooling fan operates.
- Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to <u>EC-504</u>, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000007577366

1. CHECK COOLING FAN CONTROL MODULE POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect cooling fan control nodule harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between cooling fan control nodule harness connector and ground.

+			
Cooling fan control module			Voltage
Connector	Terminal	*	
E203	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 2.

2.CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect cooling fan relay harness connector.
- 3. Check the continuity between cooling fan control nodule harness connector and cooling fan relay harness connector.

	+		_	
Cooling fan o	ontrol module	Cooling fan relay		Continuity
Connector	Terminal	Connector	Terminal	
E203	3	E204	3	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

${\it 3.}$ CHECK COOLING FAN RELAY POWER SUPPLY CIRCUIT

1. Disconnect IPDM E/R harness connector.

2. Check the continuity between cooling fan relay harness connector and IPDM E/R harness connector.

INFOID:000000007577365

COOLING FAN

	+		_			A
	fan relay	IPDI	M E/R	Continuity		
Connector	Terminal	Connector	Terminal	_		_
E204	1	E17	67	Existed		E
<u>Is the inspec</u> YES >>	<u>ction result n</u> GO TO 4.	for short to o ormal? place error-o	-	rto		C
4.CHECK	•	•	lelecleu pa	115.		[
Check coolir	ng fan relay.	Refer to EC	-506, "Com	ponent Inspe	ction (Cooling Fan Relay)".	
Is the inspec						E
				ower supply ci	rcuit. Irdized Relay".	
_	-	-	-			_
				E GROUND (F
	iition switch he continuity		oling fan c	ontrol nodule	narness connector and ground.	
						Ċ
Cooling f	+ an control mod	ulo		Continuity		
Connector			_	Continuity		ŀ
E203	1		Ground	Existed		
	eck harness	for short to p				I
Is the inspec		•				
	GO TO 6.					
NO >>	Repair or re	place error-o	letected pa	rts.		,
6.CHECK	COOLING F	AN CONTRO	OL SIGNAL	CIRCUIT		
		/R harness c / between co		ontrol nodule	harness connector and IPDM E/R harness con-	ŀ
						L
	+ control module	IPDI	– M E/R	Continuity		
Connector	Terminal	Connector	Terminal			N
E203	2	E17	72	Existed		
3. Also che	eck harness	for short to	ground and	to power.		_
Is the inspec	ction result n	ormal?				ľ
	GO TO 7.					
	-	place error-o				(
					GNAL CIRCUIT	
		ss connecto				
	ition switch			ess connecto		
			ing fan con	trol module te	rminals and ground.	

COOLING FAN

< DTC/CIRCUIT DIAGNOSIS >

	+			
Cooling fan c	ontrol module	_	Voltage	
Connector	Terminal	•		
E301	4	Ground	Battery voltage	
E302	6	Giodila	Ballery Vollage	

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.CHECK COOLING FAN MOTORS -1 AND -2

Check the cooling fan motor. Refer to EC-506. "Component Inspection (Cooling Fan Motor)".

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace cooling motor. Refer to <u>CO-17, "Exploded View"</u>.

Component Inspection (Cooling Fan Motor)

1. CHECK COOLING FAN MOTOR

- 1. Turn ignition switch OFF.
- 2. Disconnect cooling fan control module harness connector.
- 3. Supply cooling fan control module harness connector terminals with battery voltage as per the following, and check operation.

Cod	oling fan contro			
Motor	Connector	Tern	ninal	Operation
MOLOI	Connector	(+)	(-)	
1	E301	4	5	Cooling fan operates.
2	E302	6	7	Cooling fan operates.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning cooling fan motor. Refer to <u>CO-17, "Exploded View"</u>.

Component Inspection (Cooling Fan Relay)

1. CHECK COOLING FAN RELAY

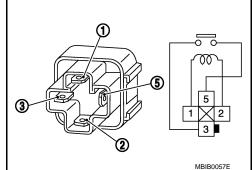
- 1. Turn ignition switch OFF.
- 2. Remove cooling fan relay.
- 3. Check the continuity between cooling fan relay terminals under the following conditions.

Cooling	fan relay		Continuity	
+	-	Conditions		
Ter	minal			
3	5	12 V direct current supply between terminals 1 and 2	Existed	
		No current supply	Not existed	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace cooling fan relay.



INFOID:000000007577367

ON BOARD REFUELING VAPOR RECOVERY (ORVR) < DTC/CIRCUIT DIAGNOSIS > [MR16DDT] ON BOARD REFUELING VAPOR RECOVERY (ORVR)

А **Component Function Check** INFOID:000000007577369 1. CHECK ORVR FUNCTION EC Check whether the following symptoms are present. • Fuel odor from EVAP canister is strong. Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling. Is any symptom present? YES >> Proceed to EC-507, "Diagnosis Procedure". >> INSPECTION END NO D Diagnosis Procedure INFOID:000000007577370 Ε **1**.INSPECTION START Check whether the following symptoms are present. A: Fuel odor from EVAP canister is strong. F B: Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling. Which symptom is present? А >> GO TO 2. В >> GO TO 8. 2. CHECK EVAP CANISTER Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor Н 1. attached. 2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. The weight should be less than 1.9 kg (4.2 lb). Is the inspection result normal? YES >> GO TO 3. NO >> GO TO 4. 3.CHECK IF EVAP CANISTER IS SATURATED WITH WATER Κ Check if water will drain from EVAP canister. Does water drain from the EVAP canister? EVAP canister YES >> GO TO 4. L >> GO TO 7. NO M ÈVAP canister vent Water control valve Ν PBIB1213E **4**.REPLACE EVAP CANISTER Replace EVAP canister with a new one. >> GO TO 5. 5. CHECK DRAIN FILTER Refer to EC-511, "Component Inspection (Drain filter)". Is the inspection result normal? OK >> GO TO 6. NO >> Replace drain filter.

O.DETECT MALFUNCTIONING PART

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

7.CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-509, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace refueling EVAP vapor cut valve with fuel tank.

8. CHECK EVAP CANISTER

- 1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- Weigh the EVAP canister with 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?

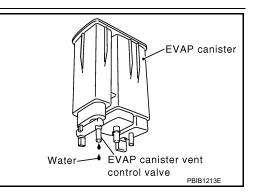
YES >> GO TO 9. NO >> GO TO 10.

9. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

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



10.REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 11.

11.CHECK DRAIN FILTER

Refer to EC-511, "Component Inspection (Drain filter)".

Is the inspection result normal?

OK >> GO TO 12.

NO >> Replace drain filter.

12. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

13. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 14.

NO >> Repair or replace hoses and tubes.

14.CHECK RECIRCULATION LINE

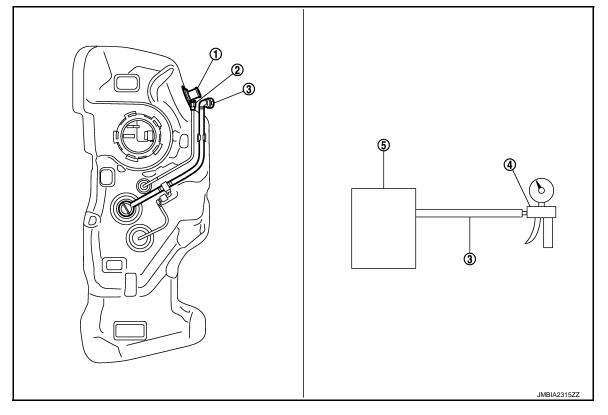
<pre></pre>	IR16DDT]
Check recirculation line for clogging, dents and cracks.	
Is the inspection result normal?	А
YES >> GO TO 15.	
NO >> Replace fuel filler tube.	
15. CHECK REFUELING EVAP VAPOR CUT VALVE	EC
Refer to EC-509, "Component Inspection (Refueling EVAP vapor cut valve)".	
Is the inspection result normal?	С
YES >> GO TO 16. NO >> Replace refueling EVAP vapor cut valve with fuel tank.	
16. CHECK FUEL FILLER TUBE	D
Check fuel filler tube and hose connected to the fuel tank for clogging, dents and cracks.	
Is the inspection result normal?	-
YES >> GO TO 17.	E
NO >> Replace fuel filler tube.	
17.CHECK ONE-WAY FUEL VALVE-I	F
Check one-way valve for clogging.	
Is the inspection result normal?	0
YES >> GO TO 18. NO >> Repair or replace one-way fuel valve with fuel tank.	G
18. CHECK ONE-WAY FUEL VALVE-II	
1. Make sure that fuel is drained from the tank.	H
 Remove fuel filler tube and hose. 	
3. 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 stick it should close.	I
Do not drop any material into the tank. One-way fuel valve	
Is the inspection result normal?	J
YES >> INSPECTION END	
NO >> Replace fuel filler tube or replace one-way fuel valve with fuel tank.	
Fuel tank	SEF665U
Component Inspection (Refueling E)/AR vapor out valve)	
	=OID:000000007577371
1.INSPECTION START	Μ
Do you have CONSULT?	
Do you have CONSULT?	Ν
YES >> GO TO 2. NO >> GO TO 3.	IN
2. CHECK REFUELING EVAP VAPOR CUT VALVE	
OWith CONSULT	0
1. Remove fuel tank. Refer to <u>FL-17, "2WD : Removal and Installation"</u> .	
2. Drain fuel from the tank as per the following:	Р
 Remove fuel feed hose located on the fuel gauge retainer. Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed at 	nd the other
side to a fuel container.	
 Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode of "ENGINE" using CONSUL Check refugling EVAP years out value for being stuck to close as par the following 	.Т.
 Check refueling EVAP vapor cut valve for being stuck to close as per the following. Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and 	d check that
the air flows freely into the tank.	
4. Check refueling EVAP vapor cut valve for being stuck to open as per the following.	

EC-509

< DTC/CIRCUIT DIAGNOSIS >

Connect vacuum pump to hose end.

- Remove fuel gauge retainer with fuel gauge unit.
- Always replace O-ring with new one.
- Put fuel tank upside down.
- Apply vacuum pressure to hose end [-13.3 kPa (-0.136 kg/cm³, -1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.



Filler tube 1.

Recirculation line 2. Fuel tank

5.

3. EVAP/ORVR line

- 4. Vacuum/pressure handy pump
- Is the inspection result normal?
- YFS >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-26, "2WD : Exploded View".

3.CHECK REFUELING EVAP VAPOR CUT VALVE

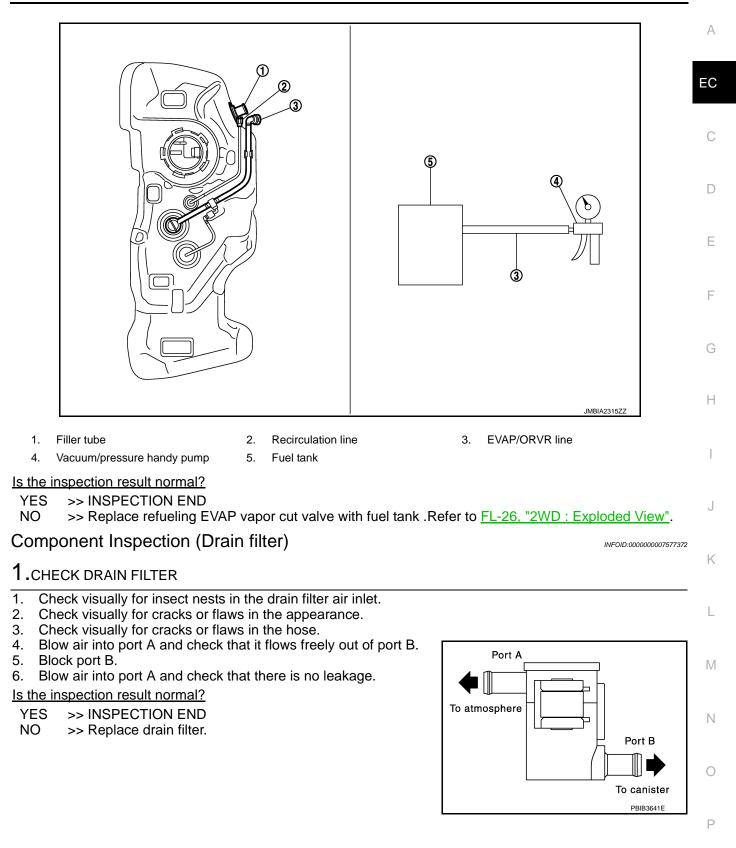
Without CONSULT

- 1. Remove fuel tank. Refer to FL-17, "2WD : Exploded View".
- Drain fuel from the tank as per the following: 2.
- Remove fuel gauge retainer.
- Drain fuel from the tank using a handy pump into a fuel container.
- Check refueling EVAP vapor cut valve for being stuck to close as per the following. 3. Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
- 4. Check refueling EVAP vapor cut valve for being stuck to open as per the following.
- Connect vacuum pump to hose end.
- Remove fuel gauge retainer with fuel gauge unit.
- Always replace O-ring with new one.
- Put fuel tank upside down.
- Apply vacuum pressure to hose end [-13.3 kPa (-0.136 kg/cm³, -1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.

EC-510

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]



REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

REFRIGERANT PRESSURE SENSOR

Component Function Check

1.CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

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

2. Turn A/Č switch and blower fan switch ON.

3. Check the voltage between ECM harness connector and ground.

Connector	+	_	Voltage
Connector	Ter		
F25	19	12	1.0 - 4.0V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to <u>EC-512</u>, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000007577374

1.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY

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

	+				
Refrigerant pr	essure sensor	-	Voltage (Approx.)		
Connector	Terminal		(
E49	3	Ground	5 V		

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

	+			
Refrigerant pr	essure sensor	E	Continuity	
Connector	Terminal	Connector	Terminal	
E49	3	F25	23	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 REFRIGERANT PRESSURE SENSOR GROUND

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

[MR16DDT]

REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

					_								
	+	-	-										
efrigerant pr	essure sensor	EC	M	Continuity									
Connector	Terminal	Connector	Terminal										
E49	1	F25	12	Existed									
		for short to p	ower.										
· · · ·	tion result n	ormal?											
	GO TO 4. Repair or re	place error-d	atacted par	te									
	•	NT PRESSU	•			1.4.1			F				
. Check th tor.	ne continuity	/ between E	JM harness	connector a	and r	retr	rigei	rant p	oressur	e sen	sor ha	arness o	connec-
ton													
-	+	-	_		—								
Refrigerant pr	essure sensor	EC	M	Continuity									
Connector	Terminal	Connector	Terminal										
E49	2	F25	19	Existed	_								
. Also che	eck harness	for short to g	round and t	o power.									
s the inspec	tion result n	ormal?											
	GO TO 5.												
_		place error-d		ts.									
		ENT INCIDE											
		ent Incident											
	tion result n												
		igerant press place error-d			<u>AC-90</u>	<u> 90, "</u>	<u>"Ex</u>	plode	d View	<u>.</u>			

Ν

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< DTC/CIRCUIT DIAGNOSIS >

BRAKE PEDAL POSITION SWITCH

Component Function Check

1.CHECK BRAKE PEDAL POSITION SWITCH FUNCTION

(B) 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
DRAKE SWI	Blake pedal	Fully released	ON

Without CONSULT

Turn ignition switch ON.

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

ECM						
Connector + -		C	Voltage (Approx.)			
Connector	Tern	ninal		× 11 - 7		
E18	116	127	Brake pedal	Slightly depressed	0 V	
LIU	110 127		Drake pedal	Fully released	Battery voltage	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to <u>EC-514</u>, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000007577376

1. CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY

- 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	osition switch	-	Voltage
Connector	Terminal		
E112	E112 1		Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK BRAKE PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between brake pedal position switch harness connector and ECM harness connector.

+		-	_								
Brake pedal pe	osition switch	EC	Continuity								
Connector	Terminal	Connector	Terminal								
E112	2	E18	116	Existed							

EC-514

[MR16DDT]

BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUI	T DIAGNOSIS				[MR16DDT]	
		ort to ground ar	nd to power.			
Is the inspection		0				А
YES >> GC						
-		error-detected				EC
3.CHECK BRA	AKE PEDAL PO	DSITION SWIT	CH			EC
Check the brain Switch)"	ke pedal positi	ion switch. Re	fer to <u>EC-515,</u>	"Component Ins	spection (Brake Pedal Position	С
Is the inspection	n result normal	<u>?</u>				C
				mittent Incident"		
				-18, "Exploded \	<u>/iew"</u> .	D
Component	Inspection (Brake Peda	I Position Sv	vitch)	INFOID:000000007577377	
1.CHECK BRA	AKE PEDAL PO	SITION SWIT	CH-I			E
	n switch OFF.					
		osition harness een brake peda		terminals as pe	er the following conditions.	F
	position switch		-1141	Orationity		G
+	- ninals	. Cor	dition	Continuity		
	linais		Eully released	Existed		
1	2	Brake pedal	Fully released Slightly de-			Н
			pressed	Not existed		
Is the inspection						
		C				
-) TO 2.		211.11			1
2.CHECK BRA						0
					and Adjustment". r the following conditions.	
2. Oneok the	continuity betwe				The following contaitions.	Κ
Brake pedal p	osition switch					
+	_	Con	dition	Continuity		1
Term	ninals	-				
			Fully released	Existed		
1	2	Brake pedal	Slightly de- pressed	Not existed		Μ
Is the inspection	n result normal	?				
	SPECTION ENI					Ν
NO >> Re	place brake peo	dal position swi	tch. Refer to <u>BR</u>	-18, "Exploded \	<u>/iew"</u> .	
						0
						Р

CLUTCH PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

CLUTCH PEDAL POSITION SWITCH

Component Function Check

1.CHECK FOR CLUTCH PEDAL POSITION SWITCH FUNCTION

1. Turn ignition switch ON.

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

	ECM				
Connector + –	C	Condition	Voltage (Approx.)		
Connector	Teri	minal			, II <i>,</i>
E18	108	127	Clutch pedal	Slightly depressed	Battery voltage
LIO	100 127		Ciutch pedal	Fully released	0V

Is the inspection result normal?

YES >> INSPECTION END. NO >> Proceed to EC-516, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000007577379

1. CHECK CLUTCH PEDAL POSITION INPUT SIGNAL

- 1. Turn ignition switch OFF.
- 2. Disconnect clutch pedal position switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between clutch pedal position switch harness connector and ground.

	+		
Clutch pedal	position switch	_	Voltage
Connector	Terminal		
E113	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK CLUTCH PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connectors.
- Check the continuity between clutch pedal position switch harness connector and ECM harness connector.

	+	_	_								
Clutch pedal	position switch	EC	Continuity								
Connector	Terminal	Connector	Terminal								
E113	1	E18	108	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.

$\mathbf{3}$.check clutch pedal position switch ground circuit

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connectors.
- 3. Check the continuity between clutch pedal position switch harness connector and ground

EC-516

[MR16DDT]

CLUTCH PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR16DDT]

	+ position switch	_		
Connector		-	Continuity	
E113	Terminal	_		
	2	Ground	Existed	
Also check	harness for sh	ort to power.		
	n result normal	•		
YES >> GC NO >> Rej	-	error-detected p	oarts.	
CHECK CLL	JTCH PEDAL F	POSITION SWI	ГСН	
heck the clutc	h pedal positio	n switch. Refer	to <u>EC-517, "Comp</u> o	onent Inspection".
the inspection	n result normal	?		
			to GI-43, "Intermit	
NO >> Rej	place clutch pe	edal position swi	tch. Refer to <u>CL-11</u>	<u>, "Exploded View"</u> .
component	Inspection			INFOID:000000007577380
CHECK CU		POSITION SWI	ICH-I	
		Comon Swi		
	n switch OFF. clutch pedal p	osition switch h	arness connector.	
				rminals as per the following conditions.
Clutch pedal p	osition switch			
+	_	Co	ondition	Continuity
Tern	ninal			
1	2	Clutch podel	Fully released	Existed
I	2	Clutch pedal	Slightly depressed	Not existed
the inspection	n result normal	?		
	PECTION EN	D		
NO >> GO				
CHECK CLL	JTCH PEDAL F	POSITION SWI	FCH-II	
				2. "Inspection and Adjustment".
Check the	continuity betw	een clutch peda	I position switch te	rminals as per the following conditions.
Clutch pedal p	osition switch	_		
+ -	-	Cc	ondition	Continuity
Tern	ninal			
1	2	Clutch pedal	Fully released	Existed
			Slightly depressed	Not existed
	اممينية بالانممينية	?		
the inspection				
YES >> INS	PECTION EN	D		
YES >> INS	PECTION EN	D	tch. Refer to <u>CL-11</u>	. "Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

INFORMATION DISPLAY (ASCD)

Component Function Check

1. CHECK INFORMATION DISPLAY

- 1. Start engine.
- 2. Press ASCD MAIN switch on ASCD steering switch.
- 3. Drive the vehicle at more than 40 km/h (25 MPH). CAUTION:

Always drive vehicle at a safe speed.

- 4. Press SET/- switch.
- 5. Check that the reading of the speedometer shows the same value as the set speed indicated in the information display while driving the vehicle on a flat road.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to <u>EC-518, "Diagnosis Procedure"</u>.

Diagnosis Procedure

INFOID:000000007577382

1. СНЕСК ДТС

Check that DTC UXXXX, P0500 or P1574 is not displayed.

- Is the inspection result normal?
- YES >> GO TO 2.
- NO-1 >> Perform trouble diagnosis for DTC UXXXX.
- NO-2 >> Perform trouble diagnosis for DTC P0500. Refer to <u>EC-359, "EXCEPT FOR M/T MODELS : DTC</u> Logic".
- NO-3 >> Perform trouble diagnosis for DTC P1574. Refer to <u>EC-431, "DTC Logic"</u>.

2. CHECK DTC WITH COMBINATION METER

Refer to <u>MWI-20, "CONSULT Function"</u>.

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Perform trouble diagnosis for DTC indicated.

3.CHECK INTERMITTENT INCIDENT

Perform GI-43, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace combination meter. Refer to <u>MWI-53, "Removal and Installation"</u>.
- NO >> Repair or replace error-detected parts.

MALFUNCTION INDICATOR LAMP

< DTC/CIRCUIT DIAGNOSIS >	[MR16DDT]	
MALFUNCTION INDICATOR LAMP		0
Component Function Check	INFOID:000000007577383	A
1. CHECK MIL FUNCTION		EC
 Turn ignition switch ON. Check that MIL lights up. Is the inspection result normal? YES >> INSPECTION END NO >> Proceed to <u>EC-519, "Diagnosis Procedure"</u>. 		С
Diagnosis Procedure	INFOID:000000007577384	D
1.снеск отс		Е
Check that DTC UXXXX is not displayed.		
<u>Is the inspection result normal?</u> YES >> GO TO 2. NO >> Perform trouble diagnosis for DTC UXXXX.		F
2. CHECK DTC WITH METER		
Refer to MWI-20, "CONSULT Function".		G
Is the inspection result normal?YES>> GO TO 3.NO>> Perform trouble diagnosis for DTC indicated.		Н
3. CHECK INTERMITTENT INCIDENT		
Refer to <u>GI-43, "Intermittent Incident"</u> . Is the inspection result normal?		
 YES >> Replace combination meter. Refer to <u>MWI-53, "Removal and Installation"</u>. NO >> Repair or replace error-detected parts. 		J
		K

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< SYMPTOM DIAGNOSIS >

[MR16DDT]

SYMPTOM DIAGNOSIS ENGINE CONTROL SYSTEM

Symptom Table

SYSTEM — BASIC ENGINE CONTROL SYSTEM

							S	MPT	ОМ						
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
	y symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Low pressure fuel pump circuit	1	1	2	3	2		2	2			3		2	<u>EC-490,</u>
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			<u>EC-136</u>
	Fuel injector circuit	1	1	2	3	2		2	2			2			<u>EC-485</u>
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			<u>EC-530</u>
	FRP sensor circuit	1	1	2	2	2		2	2			2			<u>EC-273</u>
	High pressure fuel pump circuit			4		3									<u>EC-493</u>
Air	Positive crankcase ventilation sys- tem	3	3	4	4	4	4	4	4	4		4	1		<u>EC-533</u>
	Incorrect idle speed adjustment						1	1	1	1		1			<u>EC-132</u>
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	<u>EC-455,</u> <u>EC-460</u>
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			<u>EC-529</u>
	Ignition circuit	1	1	2	2	2		2	2			2			<u>EC-498</u>
Main po	wer supply and ground circuit	2	2	3	3	3		3	3		2	3			<u>EC-157</u>
Mass ai	r flow sensor circuit	1			2										<u>EC-199</u>
Engine	coolant temperature sensor circuit						3			3					<u>EC-210</u>
Air fuel	ratio (A/F) sensor 1 circuit		1	2	3	2		2	2			2			<u>EC-224,</u> <u>EC-228,</u> <u>EC-231,</u> <u>EC-234</u>
Throttle	position sensor circuit					L.	2			2					<u>EC-214</u> , <u>EC-288</u> , <u>EC-401</u> , <u>EC-402</u>
Accelera	ator pedal position sensor circuit			3	2	1									<u>EC-462,</u> <u>EC-465,</u> <u>EC-471</u>

< SYMPTOM DIAGNOSIS >

[MR16DDT]

	SYMPTOM													А
(EXCP. HA)		от		ERATION					URE HIGH	N		3E)		EC
(EXC		L SP(z	CELI					ERAT	PTIC	lion	CHARGE)		
RESTART		GING/FLA	TONATIO	POOR AC	DLE	ITING	7	n to Idle	ER TEMPERATURE	FUEL CONSUMPTION	OIL CONSUMPTION	JNDER CH	Reference page	С
HARD/NO START/RESTART	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		SIVE OIL C	ry dead (under		D
HARD/N	ENGINE STALI	HESITA	SPARK	LACK O	HIGH ID	ROUGH	IDLING	SLOW/N	OVERH	EXCESSIVE	EXCESSIVE	BATTERY		Е
Warranty symptom code AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		F
Heated oxygen sensor 2 circuit		6		6		6	6			5			<u>EC-239,</u> <u>EC-245,</u> <u>EC-252</u>	Г
Knock sensor circuit		2								3			<u>EC-303</u>	G
Engine oil temperature sensor circuit		4		2						3			<u>EC-285</u>	
Engine oil pressure sensor circuit		4		4	3	3	3			3			<u>EC-370</u>	Н
Crankshaft position sensor (POS) circuit 2	2												<u>EC-305</u>	
Camshaft position sensor (PHASE) circuit 3	2												<u>EC-308</u>	
Turbocharger boost sensor circuit		3		3									<u>EC-294</u>	
Vehicle speed signal circuit	2	3		3						3			<u>EC-359,</u> <u>EC-363,</u> <u>EC-475</u>	J
ECM 2	2	3	3	3	3	3	3	3	3	3			<u>EC-377,</u> <u>EC-379,</u> <u>EC-381,</u> <u>EC-382,</u> <u>EC-383</u>	K
Intake valve timing control solenoid valve cir- cuit	3	2		1	3	2	2	3		3			<u>EC-164,</u> <u>EC-179</u>	L
Exhaust valve timing control solenoid valve circuit	3	2		1	3	2	2	3		3			<u>EC-167,</u> <u>EC-182</u>	
Exhaust valve timing control position sensor 5	5	5	5	5		5	5			5			<u>EC-390</u>	Μ
Turbocharger boost control solenoid valve cir- cuit		3		3									<u>EC-177</u>	Ν
PNP signal circuit		3		3		3	3			3			<u>EC-386</u>	
Refrigerant pressure sensor circuit	2				3			3		4			EC-512	0
Cooling fan control module circuit 5	5	5	5	5		5	5	5	4	5			<u>EC-504</u>	0
Battery current sensor circuit					4	5	5					3	<u>EC-408,</u> <u>EC-411,</u> <u>EC-414,</u> <u>EC-417</u>	Ρ
Starter relay circuit 3													<u>EC-443</u>	
Starter control relay circuit 3													<u>EC-446</u>	
Electrical load signal circuit						3							<u>EC-502</u>	

< SYMPTOM DIAGNOSIS >

[MR16DDT]

						S١	(MPT	OM						
Warranty symptom code	B HARD/NO START/RESTART (EXCP. HA)	B ENGINE STALL	HESITATION/SURGING/FLAT SPOT	B SPARK KNOCK/DETONATION	H LACK OF POWER/POOR ACCELERATION			E IDLING VIBRATION	SLOW/NO RETURN TO IDLE	X OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
				-								73191		
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	<u>HAC-37</u>
ABS actuator and electric unit (control unit)			4											<u>BRC-52</u>

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

							S`	YMPT	OM						
		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
Warranty s	symptom code	A A	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5													<u>FL-21,</u> <u>FL-23</u>
	Fuel piping			5	5	5		5	5			5			<u>EM-51</u>
	Vapor lock		5												_
	Valve deposit														_
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5			5			_

< SYMPTOM DIAGNOSIS >

[MR16DDT]

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		(1				NOI					HIGH					A
		P. H		F		ERAT					URE	z		Э.		EC
		(EXC		- SPC	z	CELE					ERAT	PTIO	lion	IARG		
		RESTART		BING/FLAT	TONATIO	POOR AC	LE	TING	_	N TO IDLE	ER TEMPERATURE	FUEL CONSUMPTION	OIL CONSUMPTION	INDER CH	Reference page	С
		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	SIVE FUEL	SIVE OIL C	BATTERY DEAD (UNDER CHARGE)	P~30	D
		HARD/	ENGIN	HESIT/	SPARK	LACK (HIGH II	ROUGI	IDLING	SLOW	OVERH	EXCESSIVE	EXCESSIVE	BATTE		Е
Warranty s	symptom code	A A	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		F
Air	Air duct														<u>EM-25</u>	
	Air cleaner	1													<u>EM-25</u>	-
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)		5	5		5		5	5			5				G
	Electric throttle control actuator	5			5		5			5					<u>EM-27</u>	Н
	Air leakage from intake manifold/ Collector/Gasket	-														
Cranking	Battery	1	1	1		1		1	1					1	<u>PG-95</u>	
	Generator circuit	1	1	1		I		-	1					1	<u>CHG-7</u>	
	Starter circuit	3										1			<u>STR-8,</u> <u>STR-9</u>	J
	Signal plate	6													<u>EM-111</u>	
	PNP signal	4													<u>TM-19</u> , <u>TM-221</u>	Κ
Engine	Cylinder head	5	5	5	5	5		5	5			5			<u>EM-97</u>	
	Cylinder head gasket	Ŭ			Ū	•				-	4		3			L
	Cylinder block	_														
	Piston	-											4			M
	Piston ring	6	6	6	6	6		6	6			6		-	<u>EM-111</u>	
	Connecting rod	-														
	Bearing	-														Ν
<u>) (- 1</u>	Crankshaft														FM 70	
Valve mecha-	Timing chain	-													<u>EM-73</u>	0
nism	Camshaft	-													<u>EM-85</u>	-
	Intake valve timing control	5	5	5	5	5		5	5			5			<u>EM-73</u>	
	Exhaust valve timing control	-												-	<u>EM-73</u>	Ρ
	Intake valve												3		<u>EM-85</u>	
	Exhaust valve															

< SYMPTOM DIAGNOSIS >

[MR16DDT]

		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 s	symptom code	A A	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			<u>EM-41,</u> <u>EX-6</u>
	Three way catalyst														<u>EM-32,</u> <u>EM-34,</u> <u>EX-6</u>
Lubrica- tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			<u>EM-45,</u> <u>EM-109,</u> <u>LU-12, LU-</u> <u>16</u>
	Oil level (Low)/Filthy oil														<u>LU-7</u>
Cooling	Radiator/Hose/Radiator filler cap					5 5			5						<u>CO-14</u>
	Thermostat	5	5							5	-				<u>CO-21</u>
	Water pump														<u>CO-19</u>
	Water gallery			5	5			5			4	5			<u>CO-23</u>
	Cooling fan														<u>CO-17</u>
	Coolant level (Low)/Contaminat- ed coolant									5					<u>CO-8</u>
NVIS (Niss NATS)	san Vehicle Immobilizer System -	1	1												<u>SEC-15</u> , <u>SEC-122</u>

1 - 6: The numbers refer to the order of inspection.

ASCD TEMPORARY RELEASE CANNOT BE PERFORMED BY THE CLUTCH PEDAL

FLDAL			
< SYMPTOM DIAGNOSIS >	[MR16	6DDT]	
ASCD TEMPORARY RELEASE CANNOT BE PERFORMED CLUTCH PEDAL	BY	THE	A
Diagnosis Procedure	INFOID:0000	0000007577386	EC
1.снеск отс with есм			
Check that DTC is not displayed. <u>Is the inspection result normal?</u> YES >> GO TO 2.			С
NO >> Perform trouble diagnosis relevant to DTC indicated. 2.CHECK CLUTCH PEDAL POSITION SWITCH			D
Refer to EC-516, "Component Function Check". Is the inspection result normal? YES >> GO TO 3.			E
NO >> Repair or replace malfunctioning part. 3.CHECK INTERMITTENT INCIDENT			F
Refer to <u>GI-43. "Intermittent Incident"</u> . >> INSPECTION END			G

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INFORMATION DISPLAY IS MALFUNCTIONING

< SYMPTOM DIAGNOSIS >

INFORMATION DISPLAY IS MALFUNCTIONING

Diagnosis Procedure

1.CHECK DTC WITH ECM

Check that DTC is not displayed.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble diagnosis relevant to DTC indicated.

2. CHECK INFORMATION DISPLAY (ASCD)

Refer to EC-518, "Component Function Check".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

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[MR16DDT]

NORMAL OPERATING CONDITION

< SYMPTOM DIAGNOSIS >

NORMAL OPERATING CONDITION

Description

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 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 direct injection gasoline system, <u>EC-40.</u> <u>"DIRECT INJECTION GASOLINE SYSTEM : System Description"</u>.

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[MR16DDT]

PERIODIC MAINTENANCE IDLE SPEED

Inspection

1.CHECK IDLE SPEED

With CONSULT
 Check idle speed in "DATA MONITOR" mode of "ENGINE" using CONSULT.
 With GST
 Check idle speed with Service \$01 of GST.

>> INSPECTION END

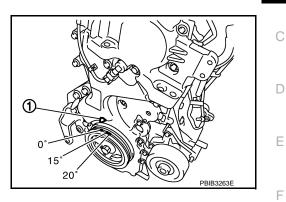
[MR16DDT]

IGNITION TIMING

Inspection

1. CHECK IGNITION TIMING

- 1. Attach timing light to the ignition coil No.1 harness.
- 2. Check ignition timing.
 - 1 : Timing indicator
 - >> INSPECTION END



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EVAPORATIVE EMISSION SYSTEM

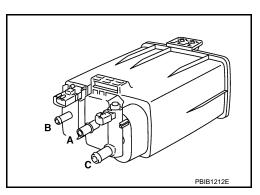
Inspection

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



[MR16DDT]

EVAP LEAK CHECK

< PERIODIC MAINTENANCE >

EVAP LEAK CHECK

Inspection

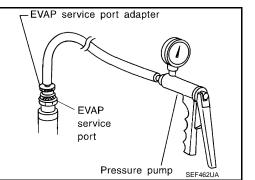
CAUTION:

- 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.

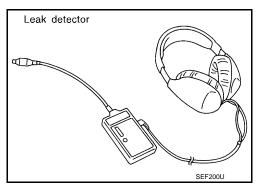
1.EVAP LEAK CHECK

(P)With CONSULT

Install EVAP service port adapter [commercial service tool: (J-1. 41413-OBD)] and pressure pump to EVAP service port.

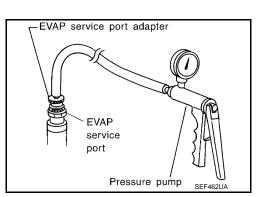


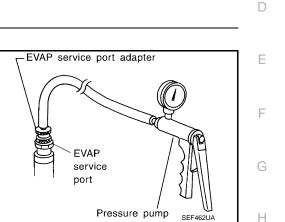
- 2. Turn ignition switch ON.
- Select the "EVAP SYSTEM CLOSE" in "WORK SUPPORT" mode of "ENGINE" using CONSULT. 3.
- Touch "START". A bar graph (Pressure indicating display) will appear on the screen. 4.
- 5. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
- 6. Remove EVAP service port adapter [commercial service tool: (J-41413-OBD)] and hose with pressure pump.
- 7. Locate the leak using a leak detector [commercial service tool: (J-41416)]. Refer to EC-55, "EVAPORATIVE EMISSION SYS-TEM : System Description".



Without CONSULT

Ĩ. Install EVAP service port adapter [commercial service tool: (J-41413-OBD)] and pressure pump to EVAP service port.





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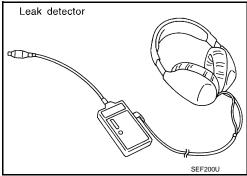
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EVAP LEAK CHECK

< 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-55. "EVAPORATIVE EMISSION SYS-</u> <u>TEM : System Description"</u>.

>> INSPECTION END



POSITIVE CRANKCASE VENTILATION

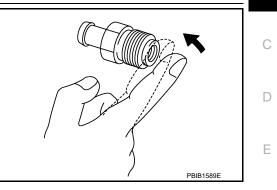
Inspection

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 EM-57, "Exploded View".



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REMOVAL AND INSTALLATION ECM

Removal and Installation

REMOVAL

- 1. Remove fusible link bracket. Keep a service area.
- 2. Disconnect ECM harness connectors. Refer to PG-5. "Harness Connector".
- 3. Remove ECM mounting nuts, and then remove ECM.

INSTALLATION

Install in the reverse order of removal. **CAUTION:**

Must be perform additional service when replacing ECM. Refer to EC-129, "Work Procedure".

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS) SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

Transmission	Condition	Specification	0
CVT	No load* (in P or N position)	650 ± 50 rpm	C
M/T	No load* (in Neutral position)	600 ± 50 rpm	
*: Under the following conditions			D

A/C switch: OFF

• Electric load: OFF (Lights, heater fan & rear window defogger)

Steering wheel: Kept in straight-ahead position

Ignition Timing

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Transmission	Condition	Specification
CVT	No load* (in P or N position)	6 ± 2° BTDC
M/T	No load* (in Neutral position)	8 ± 2° BTDC

*: Under the following conditions

A/C switch: OFF

· Electric load: OFF (Lights, heater fan & rear window defogger)

• Steering wheel: Kept in straight-ahead position

Calculated Load Value

Condition	Specification (Using CONSULT or GST)	
At idle	5 – 35 %	
At 2,500 rpm	5 – 35 %	
		_

Mass Air Flow Sensor

Supply voltage	Battery voltage (11 – 14 V)	
Output voltage at idle	0.9 – 1.2V*	-
Mass air flow (Using CONSULT or GST)	1.0 – 4.0 g/s at idle* 2.0 – 10.0 g/s at 2,500 rpm*	N

*: Engine is warmed up to normal operating temperature and running under no load.

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